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Identifying Challenges and Barriers to Participating in the Source Separation of Waste Program in Tabriz, Northwest of Iran: A Qualitative Study from the Citizens' Perspective

Towhid Babazadeh [1], Haidar Nadrian [2], Mohammad Mosaferi [3] and Hamid Allahverdipour [4,*]

1 Health Education and Promotion, Department of Health Education & Promotion, Tabriz University of Medical Sciences, Tabriz 14711, Iran; towhid.babazadeh@gmail.com
2 Health Education & Promotion, Social Determinants of Health Research Center, Tabriz University of Medical Sciences, Tabriz 14711, Iran; haidarnadrian@gmail.com
3 Environmental Health, Department of Environmental Health, Tabriz University of Medical Sciences, Tabriz 14711, Iran; mmosaferi@yahoo.com
4 Health Education & Promotion, Department of Health Education & Promotion Clinical Psychiatry Research Center, Tabriz University of Medical Sciences, Tabriz 14711, Iran
* Correspondence: allahverdipourh@tbzmed.ac.ir; Tel./Fax: +98-411-3344731

Received: 2 August 2018; Accepted: 27 August 2018; Published: 29 August 2018

Abstract: There are many problems with the waste management systems (WMSs) in developing countries. In order to provide applicable strategies for improving the WMSs in these countries, there is a need to identify the barriers and challenges at the community level. Our aim in the present study was to explain the challenges and barriers in front of the citizen's participation in the Source Separation of Waste (SSW) program in Tabriz, Iran. In this qualitative research, 13 citizens were invited to participate and were then interviewed. Data were analyzed with the content analysis approach. MAXQDA$_{10}$ was applied to facilitate the organization of data. Four core categories of the barriers to sourcing the separation of household waste were identified: (a) problems in the collecting system of waste; (b) a lack of responsibility among citizens; (c) insufficient awareness among citizens, and (d) the expectation of receiving incentives. The findings of the study indicated the potential infrastructure barriers that may hinder in-process household solid waste separation attempts. Recycling investors, environmental health policymakers, and stakeholders should take into account these barriers while designing, implementing, and/or reorienting the Source Separation of Waste (SSW) programs.

Keywords: source separation of waste; waste management; household waste

1. Introduction

The progressive enlargement of towns and cities in developing countries, without proper planning and organization to solve the problems of crowded populations, leads to numerous environmental issues such as air pollution and waste production [1]. The disposal and management of waste is rapidly becoming a social and environmental concern in the most of developing countries [2,3]. Along with urbanization, many factors may have contributed to the phenomenon of waste production. For instance, small rises in income and changes in lifestyle and living standards in the urban areas have nowadays become major challenges for municipalities, especially in developing countries [4]. In many developing countries, a lack of cooperation between organizations, a limited level of resources, population growth and urbanization, poor management, a lack of financial resources, and a lack of technical skills in

municipal authorities have led to difficulties and complexities in the management of municipal solid waste (MSW) [5–8]. However, in developed countries, the process of waste management is shown to be optimized when the citizens and the local governments jointly adopt the appropriate behaviors [9]. The poor management of MSW may lead to consequences such as air pollution, a loss of aesthetic values, and economic losses [10], as well as hygienic problems including unpleasant smells and the transmission of diseases [11].

Obviously, the proper management of MSW is necessary to reduce the direct and indirect health risks for people and environment as well [12]. There are several procedures for waste management, including incineration, biogas production, composting, landfilling, and recycling. However, nowadays, sustainable recycling methods and reusing the waste are suggested as significantly important methods to managing MSW [13–17]. These methods not only reduce the amount of produced waste and prevent further contamination of the environment; they also help the waste managers save financial, natural and energy resources [18].

According to a previous study in Nepal (as a developing country), only about 5% of MSW are recycled [4], whereas in Austria and Germany (as developed countries), this amount is reported to be about 56% and 66% [19], respectively. A reason for successful MSW in developed countries is the application of different technical systems for the Source Separation of Waste (SSW), which is associated with the active participation of the citizens [20,21]. Several factors may be associated with the level of participation in the SSW among the inhabitants. Based on a meta-analysis conducted on the determinants of recycling behaviors, convenience with the behaviors, moral norms, information, and environmental concern were the strongest predictors of recycling behaviors among householders [22]. In a review on recycling behaviors and waste-sorting systems, convenience (adequate access to sorting facilities, good service, etc.) as well as knowledge and information were reported as the most relevant factors that encourage waste sorting in households [23]. Intrinsic factors, such as attitude toward recycling and environmental concern, may also affect sorting behavior [24]. Zhang et al., in another study in China, concluded that people's attitude toward waste separation at the source was the main predictor forming waste separation behavior [25]. Furthermore, sorting skills [26] and a person's knowledge on how to recycle [27] were reported as factors that may influence recycling participation. Social characteristics such as reading newspapers and books, watching TV, and using the Internet [28] are also noted as affecting factors on the knowledge of people regarding MSW and separation at source programs.

In two previous Iranian studies, Damghani et al. [11] and Jamshidi et al. [29] reported that only about 5% and 8% of MSW are recycled, respectively. Such a lack in recycling solid waste in Iran may be due to the inefficiency of SSW [11]. In Iranian studies, the main reasons for the lack of success in implementing SSW were reported to be the lack of participation among the citizens, a lack of proper and systematic implementation of SSW by the contractors, and institutional problems at the level of waste management, such as the high cost of contractors [30,31].

Despite all of the above-mentioned barriers, the most important barriers to implementing SSW are reported to be the lack of participation among citizens and improper planning for SSW management [30–32]. Discovering the reasons for the lack of cooperation and participation in SSW among citizens seems to be helpful in providing effective and feasible solutions to improve waste management system in the cities, especially for the source separation of recyclable waste.

According to the study conducted by Zazouli et al. in Tabriz, 1200 tonnes per capita of waste is generated, among which organic materials (58.5%) and recyclable materials (such as paper, plastic, metals, and glass) (26.2%) are the most prevalent compositions (Table 1). They concluded that about 85% of waste can be recycled in Tabriz, which may play a significant role in reducing environmental pollution [33]. Despite the importance of recycling plans, the history of waste recycling programs in Iran is not more than three decades.

In Iran, in 1997, the Tehran Municipal Recycling and Converting Agency, with the assistance of the World Bank, developed "The Waste Law". The law comprised 20 provisions and nine notes, which

was approved by the Islamic Consultative Assembly on 20 February 2004. In the approved "Waste Management Law", there was an emphasis on the importance of the source separation of wastes. The "Waste Management Law" contained an executive code that was approved by the Cabinet of Ministers on 5 May 2006 in order to increase the enforcement of the law [34]. Based on the legislation, a SSW plan was initiated in 2006 throughout Tabriz metropolitan city, which was aimed to separate household recyclable waste, including plastic, bottles, paper, glass, and all types of metals. [35]. After 12 years of implementing the SSW management system in the city and conducting various simultaneous efforts such public education through mass media, education in schools, and designing and putting up separate boxes for dry and wet waste, there are still huge and noticeable gaps in the successful implementation of the SSW. Consequently, despite the high cost spent to run the program, more than 250 million kilograms of the recyclable materials per day are inevitably landfilled in Tabriz [36]. Such an insufficiency in the SSW not only causes the loss of the national capital, it also results in the destruction and pollution in the environment. Therefore, we conducted this study to identify the challenges and obstacles of participation in the SSW program from the viewpoints of citizens in Tabriz.

Table 1. Available waste composition data in Tabriz [33].

Waste Component	%
Biodegradable/organic	58.5
Paper	7.2
Plastic	8.3
Tires	2.5
Metals	3.9
Glass	6.8
Textiles	4.5
Cardboard	6.8
Others	1.5

2. Materials and Methods

2.1. Study Area

Tabriz is the largest city and the capital of East Azerbaijan Province in Iran. Tabriz is located in the northwest of Iran (38°4′35.76″ N, 46°16′48″ E) (Figure 1). The average maximum and minimum temperatures are about 15.7 °C and 6.8 °C, respectively. The average annual precipitation of this area is estimated as approximately 250–300 mm. According to the latest national census, the population of Tabriz in 2016 was 1,773,033 with the population growth rate of 0.97% from 2012 to 2016 [37].

2.2. Solid Waste Management System in Tabriz

According to the waste management law in Iran, each municipality is responsible for all of the wastes of the city, excluding industrial and special wastes. The main responsibility of the Municipal Waste Management Organization (MWMO) is to collect and landfill the MSW of the city (Khatoon Abad). Besides this task, source separation of the waste for recycling and the establishment of a composting facility are the two other main activities of the organization. As mentioned above, the MWMO started the source separation program in 2006. To implement the program, the MWMO has signed a contract with the private sector. Based on the contract, the private sector was responsible for collecting separated wastes from all around the city. The responsibility of MWMO was to provide the private sector with financial resources and necessary facilities, and train the citizens on how to separate the wastes. According to the program, a number of trained educators had face-to-face visits to the citizens' houses, and provided the households with educational leaflets. Moreover, particular yellow-colored bags were distributed among the households of each region for free in order to separate wet waste from the dry (such as plastic, bottles, paper, glass and all types of metals) and deliver

them to predefined garbage trailers and/or bins. The garbage trailers designed to collect dry waste have melodies, and come twice a week (on Mondays and Fridays) to collect dry waste. After being collected, the dry waste is transferred to the recycling stations to separate the different types of waste. Then, the separated materials in the recycling stations are transferred to particular recycling plants. The materials such as the bottles of polyethylene terephthalate are exported to overseas, and some other plastic materials, after melting, are reused to produce plastic material appliances. Also, the non-recyclable materials and some of the recyclable materials such as glass are landfilled due to the absence of glass recycling factories in the country.

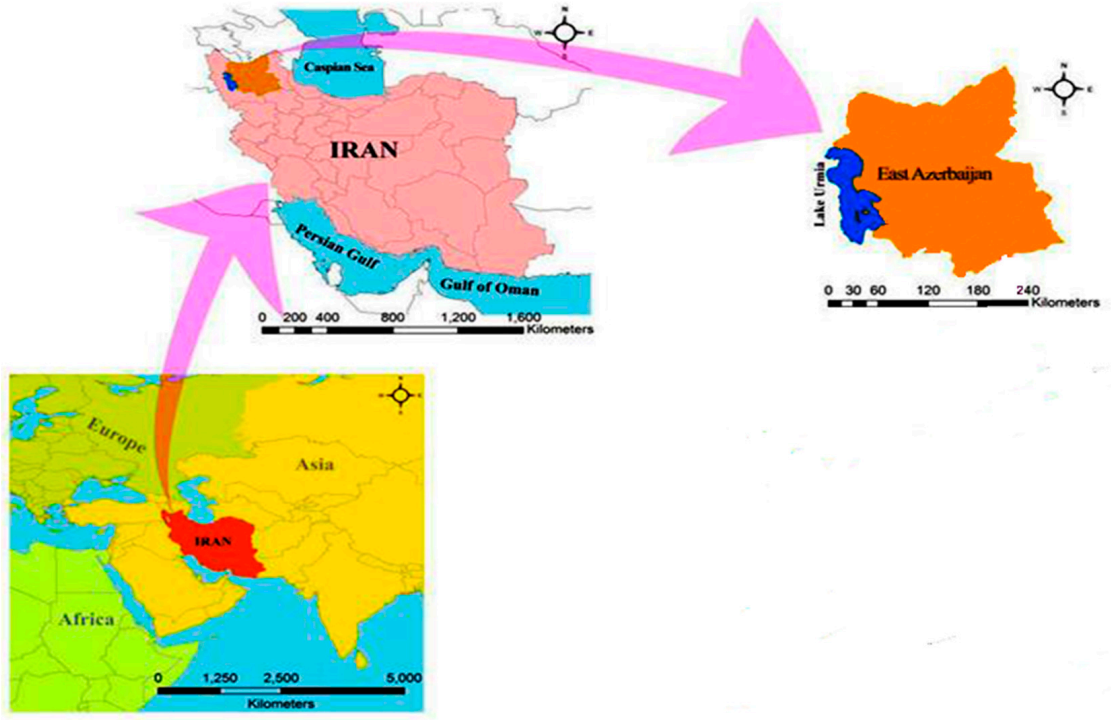

Figure 1. The study area in East Azerbaijan, Tabriz.

2.3. Participants and Sampling Procedures

This was a qualitative study with a conventional content analysis approach conducted to explore the obstacles and challenges of the citizens' participation in the SSW program in Tabriz, Iran. The participants were selected from those living in the city through a purposeful sampling method with maximum variation in age, gender, job, level of education, and residency. This means that we tried to invite the individuals from different age groups, types of jobs, levels of education, places of residence, and both genders to participate in the study. In order to assess the economic status of the participants, they were asked to classify their own place of residence into the regions with weak, medium, and good economic status. Thus, the authors were sure of maximum variation in the socio-demographic and economic characteristics of the citizens who participated in the study. Thirteen individuals participated in the in-depth interviews. In order to invite citizens to participate in the study, the first researcher had a phone call with the citizens who were elected from the list of residents with health records in the health centers of the city. Based on the Iranian health system, all of the households in the cities throughout the country have health records in the health centers. On the phone, the citizens were invited to participate in the study, and if they agreed, they were suggested to have an appointment with the first researcher in the closest health center to their house. After coordination, interviews were conducted at a time and place (dominantly a private room in the health centers) preferred by the participants. As the method of data analysis in the present study

was conventional content analysis, which is a descriptive approach, our premise was descriptive saturation [38]. In the last two interviews, no new descriptive code, category, or theme emerged from the analyzing of data, and the authors, based on their experiences [39], concluded that descriptive data saturation was happened. If we think of our data in terms of rich and thick [40], our emphasis in the present study was on the richness of data. In other words, we tried to have a detailed, intricate, many-layered, and nuanced data rather than a thick data, with high quantity. As we had in-depth interviews with the participants, we assured about the depth of the data [41]. More details on the participants are displayed in Table 2. Inclusion criteria for the study included living in Tabriz and a willingness to participate in the study.

Table 2. The characteristics of the study participant.

Participant no.	Gender	Age	Workplace	Marital Status	Level of Education	Residency #
P1	Female	25	Housewife	Married	Bachelor	Mirdamad ***
P2	Male	36	Self-employed	Married	Diploma	Akhmaghayeh *
P3	Male	47	Employed	Married	Bachelor	Abureyhan **
P4	Female	33	Employed	Married	Bachelor	Zaferanieh ***
P5	Female	38	Housewife	Married	MSc	Golpark ***
P6	Male	30	Self-employed	Single	Bachelor	Barenj *
P7	Female	27	Student	Single	MSc	Taleghani **
P8	Male	35	Self-employed	Married	High school	Kuy-e-ostadan **
P9	Male	29	Self-employed	Married	Elementary	Pishghadam **
P10	Female	27	Housewife (Unemployed)	Single	Technician	Yakhchian **
P11	Female	36	Employed	Married	Bachelor	Baghmisheh **
P12	Male	53	Retired	Married	Bachelor	Manzarieh ***
P13	Female	49	Housewife	Married	High school	Ghonghabashi **

Classification of regions based on socio-economic status; Classification based on the participants information: * Weak, ** Medium, *** Good.

2.4. Data Collection

The main research question in the present study was: 'What are the obstacles and challenges of implementing the household solid wastes separation plan at [the] source in Tabriz?'. Individually semi-structured in-depth interviews were conducted to collect the data. Each interview was initiated with an open-ended question ('How would you explain the implementation of the Household Solid Wastes Separation Plan at the Source in Tabriz?'), and then, the probing questions were asked according to the participants' answers. As suggested by Guest et al., the interview questions were structured to facilitate asking multiple participants the same questions [42]. The following are some of the probing questions:

1. Based on your viewpoint, how would citizens participate in the process of waste separation?
2. How would you explain the performance of your municipality in implementing the waste separation plan at the source?
3. How would you explain the performance of the contractor in your municipality in implementing the waste separation plan at the source?

The time and place of the interviews was determined based on the participants' preferences. As a result, the interviews were mostly conducted in the participants' work places or homes or healthcare centers. Each participant was interviewed once, for about 15–25 min. A voice recorder was used to record all of the conversations during the interviews.

2.5. Data Analysis

Data analysis was conducted after each interview. It is important for the researchers in qualitative studies to be involved in the process of data analysis throughout the study. As a consequence, they will

increasingly focus on the ongoing data gathering, the development of the topics, and the elaboration of the developed themes [43]. Qualitative content analysis was applied to analyze the data, based on which, all of the interviews were transcribed verbatim and were read several times. The analysis was initiated through identifying the units of meaning, which were extracted from the statements. The codes were inductively generated, and the extracted codes were identified as the categories based on the differences and similarities.

Data analysis was continued until data saturation, when no new theme or idea emerged from the data. The qualitative data analysis software MAXQDA$_{10}$ was applied to facilitate the organization of data and structuralize the process of coding and the development of relationships between the concepts. MAXQDA$_{10}$ is a high-performance program for professional social science-oriented text analysis that is ideal for researchers from social sciences, education, economics, and many other fields that work with and analyze text in professional capacities. While MAXQDA is used by researchers in many different disciplines, the program has a sociological application in qualitative social research and mixed-methods approach [44].

2.6. Data Trustworthiness

In order to be confident that the findings are based on participants' responses and not any potential bias or personal motivations of the researcher (confirmability), we had prolonged engagement with the participants to verify the preliminary findings from the earlier interviews (member check). To establish dependability, the research team members conducted peer checking as expert revisions, and examined the research process and the data analysis. To ensure the transferability of the study, thick descriptions were provided in the findings to show that the study's findings can be applicable to other contexts. In addition, sampling with the maximum variation approach enhanced the credibility of the data.

2.7. Ethical Considerations:

Ethical approval to conduct the study was obtained from the Ethics Committee in Tabriz University of Medical Sciences (IR.TBZMED.REC. 1395.864). Before conducting the interviews, the purpose of study was described to the participants and all signed informed consent forms.

3. Results

Following data analysis, four themes appeared as the main barriers and challenges for implementing the source separation of MSW in urban areas of Tabriz, including "problems in the collecting system of waste", "a lack of responsibility among citizens", "insufficient awareness among citizens", and "expectation to receive incentives" (Table 3). The details of each theme are presented comprehensively in the following states.

Table 3. Identified barriers for complying with the Waste Separation at Source program (n = 13).

Themes	Subcategories
Problems in the waste collection system	Inefficiency of contractors Lack of authority in the municipality to implement the recycling plan Gathering the wastes by unauthorized individuals Mixing the separated wastes in the transportation stage by the workers The inappropriate bins used in the waste separation program
Lack of responsibility among the citizens	Lack of belief in the need to waste separation Inaction of the citizens in the waste separation Space limitations
Insufficient awareness among the citizens	Poor announcement and insufficient amount educational materials Low public knowledge
Expectation of receiving incentives	Not receiving incentive in exchange for separating wastes

3.1. Problems in the Collecting System of Waste

The theme of "problems in the collecting system of waste" included the problems at the stage of collecting wastes at the source. This theme is explained in the following five subcategories.

3.1.1. Inefficiency of Contractors

According to the participants' explanations, a problem in the collecting system of the separated waste was employing inefficient contractors. This issue may have caused changes in the mind of citizens, and as a result, they were unsatisfied with the observance of waste separation at the source. Based on the participants' opinions, a lack of timely collecting of the separated wastes by the collectors was a major problem in the system. A participant (P3) stated that "*they (the* collectors*) collect separated wastes too late. They have put a garbage collection bin which becomes full very soon, considering that our apartment complex is large and populated. They do not take out the separated wastes. When people see this scene, they say that we have separated them, why don't they take them out*".

Another problem of the program was failure in using or installing dry waste collecting stations in the required places of the city. A citizen (P3) stated that "*they have placed only one shelter building, in which I haven't seen anyone (a person in charge of receiving the garbage)*".

3.1.2. Lack of the Municipality Authorities in Implementing the Plan

Based on the citizens' explanations, the municipality authorities have weakly supervised the contractors' activities in tracking the separated waste, which have resulted in unsuccessful implementation of the source separation plan. In this regard, one of the participants (P6) stated that "*maybe they haven't stressed the persistence of these tasks to their contractors [collection of at-source separated wastes]*".

In addition, the participants believed that the municipality stakeholders did not pay sufficient attention to the SSW and have not taken effective actions. One of the participants (P6) said "*virtually, the municipality itself does not care about the source separation of wastes. I have seen somewhere that the bin is filled with garbage at a level more than its capacity, such that the people had put some garbage outside the bin. The municipality has not done anything to keep tracking the plan*".

3.1.3. Collection of the Separated Waste by Unauthorized Individuals

A majority of the participants believed that unauthorized individuals collecting the separated wastes was a main problem in the SSW. Participants believed that recycled wastes, such as paper, were collected by non-municipal workers. This action may disrupt the collecting process of separated waste, as it may diminish the motivation of citizens toward the source separation of waste. Therefore, the citizens preferred not to separate the waste with the hope of it being separated by the informal sector. A participant (P8) stated that: "*we place our dry wastes in front of our shop on the garbage box so that the individuals who are not municipal workers come and separate cardboard waste; these people take the garbage and sell for themselves; unauthorized collectors cause us to not have a motivation to garbage separation, because they themselves separate recyclable waste from the mixed bins".*

3.1.4. Mix Up the Separated Waste at the Transportation Stage by the Municipality Workers

An important problem stated by a majority of the participants was mixing the separated waste up by the municipality workers during the transferring phase. One of the participants (P5) explained that: "*my mother had seen the mixing of the separated wastes by the workers and asked me why to separate the wastes? Tomorrow, the workers of municipality will come and mix them all together again, and thereby wasting all your efforts, she said*".

The participants believed that mixing the separated wastes up by the workers resulted in the loss of motivation among citizens and had a negative impact on the people's perception about the effectiveness of their efforts in separating the wastes. A participant (P12) stated that: "*when we place the*

garbage outside our home, we lose our motivation as we see that they do so [re-mixing the separated wastes]. I see that they mix all the wastes together. This causes a negative impact on people".

3.1.5. Inappropriate Bins for the Purpose of Waste Separation

The participants explained the use of inappropriate waste separation bins as one of the obstacles against the separation of wet/dry wastes, such that the devised boxes were small, and were filled too soon. In this regard, a citizen (P9) stated that "*the neighborhood is so populated that in the case [where] all [the] neighbors throw their wastes away into the bins, the garbage bin become full and overloaded very fast*".

In addition, the participants believed that the waste separation bins are not suitably designed in terms of aesthetics. Confirming this point, one of the participants (P2) stated that: "*they have placed ugly bins there, and expect people to separate their garbage. With these poorly designed bins, people would not separate their garbage*".

Many of the participants believed that the waste separation bins are not available enough everywhere. In this regard, one of the participants stated that "*the person who has separated his/her garbage should walk a long way to throw the separated waste away into the separation boxes*". Similarly, another participant (P11) said: "*occasionally, when I wanted to find garbage separation boxes, I looked for the box in the street or avenue for a long time, and eventually I found a garbage separation box in the main street*".

The citizen's explanations displayed that the household solid wastes separation equipment is not equally distributed in the different regions of the city. For instance, one of the participants (P7) explained: "*currently, I don't see any garbage separation box in our region, but I have seen them in other parts of the city. I think that the program is not executed throughout the city, or it is not implemented routinely in all [of the] regions*".

3.2. Lack of Responsibility among the Citizens

This theme indicates the lack of responsibility among citizens. To evade their responsibility as a citizen, the participants noted different reasons for not complying with the implementation of SSW. Their reasons are extracted in three subcategories.

3.2.1. Lack of Feeling in the Need to Separating the Waste

According to the participants, the citizens have not still felt the necessity of separating their wastes. In this regard, a participant (P2) stated that "*consider a taxi station, we need it; however, we do not need garbage separation, and no one can compel us to separate our garbage, unless we want to do this according to sense of citizenship responsibility*".

3.2.2. Inaction of the Citizens in Separating the Waste

Negligence of citizens in some occasions such as having guests or being in a hurry causes them not to care about separating the dry and wet wastes. Confirming this statement, one of the participants (P5) noted that: "*sometimes when we are in a hurry or have guests, we put our dry wastes into the wet waste bin*".

3.2.3. Space Limitations

Living in apartments and small houses was another reason for citizens to neglect such citizenship responsibility. Most of the participants believed that they cannot use separate bins for dry and wet wastes due to limited space in their house. In this regard, a participant (P8) noted that "*nowadays, houses are small and are not like those old large houses. To place four garbage bins on our house, we need space*".

Another participant (P2) stated that: "*in the majority of houses, there are such conditions [limited space]. There are few people who claim that I have 4–5 garbage bins in my house*".

3.3. Insufficient Awareness among Citizens

Another theme extracted from the citizens' explanations on the barriers to implement SSW was a lack of awareness of the implementation of plans among citizens and thus, their low level of involvement in the program. The participants believed that the municipality had not performed the necessary educational activities to inform people regarding the SSW. This theme is explained in the following subcategories.

3.3.1. Poor Announcement and Insufficient Amount of Educational Materials

A majority of the participants believed that the municipality had not carried out sufficient health educational activities and notifications for the SSW. In this regard, a participant (P6) said "*I saw no special advertisement or notification throughout the city announcing that the municipality is running a plan for [the] separation of wastes. In the city, I saw somewhere that they have put some bins on which there was written glass and paper. I also saw boxes with 'wet' and 'dry' labels, but I saw no promotion, encouragement, or anything like that. I look around myself, I carefully see the city, I also use buses, but I have seen no special information or advertisement in this regard*".

According to the participants' explanations, the lack of such educational and persuasive programs have caused less engagement of the citizens in the plan as well as less institutionalization of the source separation behavior at home among the residents, which may have consequently increased the problems of SSW implementation. In this regard, a participant (P1) noted that: "*the citizens in our city have not been instructed [in this regard], they absolutely don't know if they should separate their wastes*".

3.3.2. Low Public Knowledge

Based on the participants' opinion, a lack of knowledge about the SSW was a main barrier to participating in the plan. In this regard, one of the participants (P6) stated that: "*Personally, I don't know the reason for waste separation. What would happen if we separate or not separate our waste?*"

3.4. Expectation of Receiving Incentives

According to this theme, some of the citizens expected to receive an incentive when they participated in separating the household solid wastes. This theme is explained in the following subcategory.

Not Receiving an Incentive to Separate Wastes

The participants announced that they do not participate in the SSW due to the absence of incentive mechanisms. They believed that the municipality should provide them with something as incentive for their participation in separating the waste. In this regard, one of the participants (P6) explained that: "*We don't do it [*separating the waste*] until something goes into our pocket! Otherwise, we don't have the motivation. Economically, it may benefit the city, and regardless of its hygiene, people don't find any required motivation. There should be some incentives. I think that there should be some motives [in order for] the waste separation [to work]*".

4. Discussion

The findings of current study indicated that several factors may constrain the participation of citizens in the SSW plan in Tabriz. In this study, based on the viewpoints of participants, the most important barriers for participating in the SSW were problems in the collecting system of the solid wastes, a lack of responsibility among citizens toward the plan, insufficient awareness among citizens regarding the plan, and the expectation of receiving incentives.

4.1. Problems in the Solid Waste Collecting System

Various factors were identified in the solid waste collecting system that may play important roles in the management of SSW. The problems identified in the present research included the poor performance

of the private sector, a lack of facilities and equipment, collecting the separated wastes by unauthorized recyclers, and negligence of the municipality workers in collecting the source separated solid wastes. Several previous studies have shown the problems in the waste collecting systems, especially in developing countries, as important barriers to implementing SSW [45,46]. According to a report from Ghana, a lack of coordination during collecting the separated solid wastes was one of the most important challenges in the solid waste collecting system of the country [45]. In addition, in an Indian study, the most important problems of the collecting system were reported as inadequate management and insufficient technical skills for collecting and transporting solid wastes by municipalities [47]. In Sweden, Rousta et al. claimed that a successful SSW plan may be expected a suitable collecting system is provided, such as easy access to recycling stations [48]. These evidences indicate that the successful implementation of SSW depends on the good development of necessary infrastructures and facilities. However, as reported in the previous research studies [45,48], developing countries have currently essential problems in providing the necessary and required infrastructures to develop a successful SSW plan. Therefore, in such countries, a priority should be given to the provision of facilities and equipment required for implementing SSW and also to the reforms and/or policy creation that would better facilitate the management of SSW processes.

4.2. Lack of Citizens' Responsibility toward the Plan

In the present study, a lack of felt needs to separate solid wastes at the source, a lack of interest in the source separation of solid wastes, and not having enough space at home for the source separation of wastes were three factors that may lead the citizens to neglect their participation in the SSW. In a similar study in the United Kingdom (UK), a lack of responsibility and giving low priority to source separation were declared as barriers to minimizing household food waste [49]. A previous study in Japan [50] also indicated insufficient space at home as a reason for the lack of participation in waste separation among residents. In order to promote the responsibility among citizens, there is a need for providing residents with small home-suited equipment. Also, introducing the plan and presenting the environmental health of the region as a public health concern through mass media, especially local media, may be helpful in promoting the people's belief toward recycling behaviors. However, Metcalfe et al. suggested the provision of required infrastructures for the separation of solid waste as a more effective strategy than changing the beliefs and influencing the awareness of people. This strategy may provide a situation for changing the citizen's mind regarding the issue, and may consequently result in greater involvement in SSW programs. In other words, these infrastructures may not only provide the equipment required for the separation of solid wastes, it could also involve the presentation of solutions to place equipment in the houses [51].

4.3. Insufficient Awareness among Citizens about SSW

According to the apparent findings in this study, a majority of citizens were not adequately informed about the consequences of blending solid wastes and the benefits of wastes separation. Similar to the findings of the current study, Chu et al. [52] also reported lack of awareness as an influential barrier for the realization of citizens' participation in the recycling scheme. To comply with a recommended behavior, awareness about the implications of the behavior is necessary [53]. Therefore, the municipality should have stage-specific programs to promote the knowledge, attitudes, and practices of residents in complying with SSW plan-related behaviors. However, our findings may represent the poor performance of the administrative organizations in propaganda, notification, and educating the residents about the SSW plan. Previous research studies have indicated that propaganda and notification may play important roles in the realization of the determined objectives [48,54]. For instance, a campaign conducted in Malaysia to decrease the consumption of plastic bags indicated the effectiveness of increased public awareness on promoting the recycling behaviors of individuals [55]. Rousta et al. reported that when people have sufficient information, there may be a 70% reduction in the source decay of recyclable materials [48]. Similarly, the lack of public knowledge on the environmental

effects of wastes has been reported as an important barrier to complying with the recommended health behaviors [54]. Also, having proper knowledge is reported as one of the most powerful predictors for recycling behavior among individuals [56]. In conclusion, it seems that in order to improve the recycling behaviors among residents, knowledge of households about the benefits of SSW should be promoted. In this regard, the application of promotional and educational programs such as educational campaigns aiming at SSW promotion may be effective in enhancing the level of SSW awareness and behavior within the communities.

4.4. Expectation of Receiving Incentives

Similar to those findings reported by Babaei et al. [56], the citizens in the current study expected to receive incentives in exchange for delivering separated wastes. This finding may be explained based on the main assumption of the expectancy-value theory [57]. Based on the theory, before performing a given behavior, individuals take the value and the consequence of a recommended behavior into account, and then adopt the behavior [57]. This assumption has been confirmed in previous studies [45,56]. Oduro-Appiah and Aggrey reported that in the exchange for separating solid waste, people expect to receive motivational products such as free garbage bins to separate recyclable wastes [45]. In another study, about 50% of the participants reported financial incentives as an important factor for participating in the "No Plastic Bag" campaign [58]. In a study conducted in Thailand, the existence of financial incentive mechanisms increased the rate of waste separation by up to 51% among the households [59]. Halvorsen claimed that for the residents in the industrialized countries, recycling behaviors have priority owing to their importance in the preservation of environmental health [60]. The findings regarding the expectations for incentives in favor of complying with SSW programs among people in developing countries may be a rationale for financial problems among the residents living in developing countries, as well as the lack of acculturation for preserving environmental health without any expectation in such communities. These findings suggest that motivational expectations for complying with SSW programs may create a major challenge for the administrative authorities of the municipalities in developing countries, which needs reorientations regarding implementing the SSW programs with the hope of achieving the targets of the programs.

5. Limitations of the Research and Future Directions

As a limitation for the present study, we only used one method for data collection. This means that no other complementary method was used to confirm the findings. Having a mixed approach to triangulate the qualitative findings with quantitative ones may have provided us with a high level of internal validity. Using different methods in data collection could help the team of research in checking the reliability and validity of the data. Also, this study provided the participants' experiences and their perceptions about the problems in implementing the SSW program in Tabriz, Iran. In such studies, evaluating the impartiality and objectivity of the participants' responses is difficult, and the presented explanations may be insufficient. Therefore, further studies are suggested regarding the citizens' attitudes toward SSW by administrative authorities while designing, implementing, and/or reorienting the SSW programs.

6. Conclusions

According to the findings in the present research, several barriers have led to introducing the citizens' participation in the source separation of household waste as a challenging public health issue. The findings indicated that the stakeholders responsible for the plan have not been successful in providing the citizens with infrastructural and cultural conditions for the source separation of wastes. In order to succeed in implementing such programs, it is pivotal to provide the infrastructures and introduce the benefits of the program in advance. Considering the expectation of citizens to receive incentives for source separation of waste in this study and the studies conducted in other developing countries, it seems that the citizens in developing countries have still not yet completely

understood the benefits of implementing such programs in promoting their environment and health. Therefore, prior to implementing such programs in developing countries, there is a need to increase citizens' awareness and responsibility toward the source separation of wastes through applying various educational programs such as environmental health campaigns and public education in local mass media. Some barriers of the SSW program, such as a belief in the disposability of the source separation of waste, may be relatively easy to overcome through disseminating information associated with the behavior through the mass media. However, addressing some barriers, such as the inefficiency of the contractors, may be very challenging and require adopting innovative approaches. Therefore, the recycling investors, environmental health policymakers, and municipality decisionmakers should take into account these identified barriers while designing, implementing, and/or reorienting the SSW programs.

Author Contributions: All the authors equally contributed to the conceptualization, methodology and writing of the manuscript.

Funding: This work was supported by the Tabriz University of Medical Sciences (Grant no: 69686).

Conflicts of Interest: The authors declare no conflict of interest.

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