

Assessment of Community's Perception Toward Single-Use Plastic Shopping Bags and Use of Alternative Bags in Jimma Town, Ethiopia

Environmental Health Insights
Volume 16: 1–8
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DOI: 10.1177/11786302221085047



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ABSTRACT

BACKGROUND: The use of plastic shopping bags increases and poses tremendous pressure on the local environment. However, little is known about its utilization among different population categories and their perception of its utilization and willingness to use other sustainable alternatives. This study aimed to assess the community's perception toward the use of plastic shopping bags and its options in Jimma town, Ethiopia

METHODS: A community-based descriptive cross-sectional study design was conducted on 351 customers and retailers selected from the town's main marketing areas. The data was collected using a structured questionnaire in a face-to-face interview and analyzed using SPSS v.21.

RESULTS: The results show that all the respondents use plastic shopping bags for different shopping services. The majority (147 (41.9%)) of the respondents said that they use 5 to 10 shopping bags, and 66 (18.8%) use more than 10 shopping bags per week. Participants responded with different reasons for the frequent use of plastic bags for shopping. Accordingly, 116 (33.0%) responded that plastic bags are cheap, 92 (26.2%) use them due to lack of alternatives, and 89 (25.4%) responded that plastic bags are light and convenient to use. However, 326 (93%) of the respondents support efforts to reduce single-use plastic bags, 284 (80.9%) support a ban on single-use plastic bags, and 319 (90%) were willing to pay for alternative shopping bags.

CONCLUSION: Communities are aware of the environmental problems associated with the intensive use of plastic shopping bags, their wastes, and the need for alternative options. However, it will continue to pose significant environmental challenges unless low-cost and environment-friendly alternative options are available.

KEYWORDS: Plastic shopping bags, community perception, utilization, Jimma, Ethiopia

RECEIVED: October 22, 2021. **ACCEPTED:** February 14, 2022.

TYPE: Original Research

FUNDING: The author(s) received no financial support for the research, authorship, and/or publication of this article.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Introduction

Wastes generated from industrial, residential, and commercial areas due to human activities are handled in various ways.^{1,2} Solid waste management involves collection, transportation, recycling, resource recovery, and disposal activities. The problem associated with the management of solid wastes in today's society of developing countries is challenging due to the quantity and diverse nature of the wastes, sprawling urban areas, and limited funding for public services. Many of the problems are related to the increasing use of disposable items such as plastic bags.

Plastics are synthetic or semi-synthetic polymerized products formed from organic condensation or the addition of polymers. Plastics can be used as packaging for various objects such as products, storage areas, additional materials for automotive.³ Plastics are inexpensive, lightweight, strong, durable, corrosion-resistant materials with high thermal and electrical insulation properties. The widespread utilization of plastic bags is attributed to their cheapness and convenience to use. Plastics play an essential beneficial role in food transportation, preservation, hygiene, and safety, increasing the lifespan of foods, the length of value chains, and contributing to food and nutrition security.⁴

Globally, over 1 million plastic drinking bottles are purchased every minute, while up to 5 trillion single-use plastic bags are used every year and thrown away.⁵ The study made in Jordan reported that, on average, 500 bags per person per year is used for different purposes.⁶ Most of these plastics end up in the environment without any treatment usually after a single-use. It is believed that plastic bags can persist up to 1000 years in the environment and pose significant challenges without being decomposed by sunlight and/or microorganisms.^{7,8} They consequently result in massive environmental degradation and ecosystem disruptions. Plastic wastes pose serious environmental pollutions and humans and animals health problems due to release of toxic chemicals and clogging of the environmental systems.^{9,10} The seriousness of these problems are understood when the level of plastic shopping bags use and its determining factors are identified at the community level, which this study focus on to analyze.

Plastic waste management is based on the physical properties of plastics.¹¹ Plastic wastes can be recycled, reused, incinerated, or disposed of depending on the property of the plastics.^{12,13} Plastic waste management requires sufficient awareness creation



and enabling policies. Achieving these requires understanding the communities toward its environmental and health impacts, plastic use behavior, and existing local situations.¹⁴ Many countries, including developing countries, are taking serious management measures involving banning single-use plastic shopping bags and limiting their free access during shopping.^{5,15-17} Nevertheless, many of the specific policy tools were not practical due to the country's situation, for instance, Indonesia.¹⁸ Uganda, Rwanda, and Kenya have imposed a plastic banning policy to become a front runner in green development, but not equally effective because of varying national development agendas and socio-economic situations.¹⁹

In Ethiopia, plastic shopping bags are commonly known as “festal” and widely used for shopping. Moreover, the majorities of the residents collect their household wastes in plastic bags and dispose them open field due to a lack of waste management facilities. Some individuals informally collect used plastic bottles and earn money by selling them to recycling companies.^{20,21} The informal plastic collectors significantly contribute to the country's plastic waste management, but they did not get sufficient consideration.²¹

Moreover, the primary plastic products attached to people's day-to-day life (ie, plastic shopping bags) are neglected and continue to become significant environmental challenges. However, any policy measures related to plastic waste management rely on the general understanding of the problems and perception of the consumers and retailers. A study has shown that 72.1% of the residents in Addis Ababa were aware of the adverse effects of plastic wastes; however, 38.5% and 24.2% of them responded to burning and open field dumping, respectively, as main disposal methods in the area.²² Another study conducted in the country shows the high generation of plastic bags by 46% and plastic bottles by 34% of the respondents.²³ Most of these plastic bags end up in the environment. They would entail enormous environmental consequences accompanied by high generation rates, a low level of awareness, and a lack of enabling policy measures. A lot of studies have focused on solid waste management and rarely addressed the issues of plastic wastes in Ethiopia, thus there is no sufficient information about local community's perception toward single use plastic shopping bags and its management options.

Therefore, this study aims to assess the local community's perception of single-use plastic shopping bags and their willingness to shift to a sustainable alternative. Jimma town is selected for this study based on its typical waste management characteristics. Most of the wastes are dumped in open areas, roadsides, river courses, and gullies; thus, the finding can be inferable to other towns in the country. This is associated with a lack of appropriate solid waste management as elsewhere in other country cities, including plastic waste management. The finding is vital for policymakers and municipal authorities to find a sustainable solution for the increasing environmental problems associated with single-use plastic shopping bags.

Methods and Materials

Study setting

The study was conducted in Jimma town, Hermata Mentina kebele, the main commercial center, from January 11 to 16, 2021. Jimma town is located in Oromia National Regional State, in Jimma Zone, at a distance of 352 km from Addis Ababa city of Ethiopia. Based on the 2007 Census, Jimma town has a total population of 120 960, of whom 60 824 were male, and 60 136 were female. The current total population of the town is expected to be over 200 000 when the national average annual growth rate is considered. Temperatures at Jimma are in a comfortable range, with the daily mean staying between 20°C and 25°C year-round with an average annual rainfall of 1766 mm and 180 average rainy days, an annual average humidity of 70%, and Mean daily sunshine of 6.4 hours. The town is located at an average elevation of 1780 m above sea level, and its geographical location is 7°4'North Latitude and 36°5'East Longitude. The town was developed on the Awetu River, which passes the town dividing into two. One of the significant challenges of the town is the increasing population with unplanned sprawling urban settlements and the lack of a proper waste management system. Most of the wastes generated from the town are dumped into this river and the outskirts of the town.

Study design and sampling procedure

A community-based descriptive cross-sectional study design was used to assess the communities' perception of single-use plastic shopping bags and acceptance of alternative management options. This study considered customers and retailers in the commercial area of Jimma town for the interview. Accordingly, all customers and retailers available at the time of data collection, above 18 years old and willing to respond, were included in the study. The sample size for selecting the study participants was made by using a single population formula considering a population proportion of 50%, margin of error of 5%, and 95% level of significance considering 5% compensation for non-respondents. Accordingly, 351 respondents were determined to approach for the interview. The selection of the population for the interview was made by using a combination of convenient and systematic sampling techniques. The convenient sampling technique was used to ask available customers during data collection. The systematic sampling techniques were used to select retailers. The study allocated an equal sample size for both retailers and customers. Accordingly, the sample of retailers was selected by using a systematic random sampling technique at an interval of 15 shops. The purpose of separate consideration for the sampling of retailers and customers is not for comparisons but to take representative samples. Therefore, the analysis will consider both a community and not a comparative group.

Data collection methods

The data was collected by graduating Environmental health science students with sufficient knowledge about the study topic. Prior to data collection, data collectors have been given training on the questionnaires and ethical standards they need to follow during consent taking and the interview and confidentiality of the respondents. The data was collected using a structured questionnaire and observational checklists prepared in English and translated into local languages Afan Oromo or Amharic versions to avoid ambiguous communication between the interviewer and interviewee. The questionnaires contain questions related to the respondents' socio-economic and demographic background, knowledge, attitude, and practice toward plastic shopping bags, its wastes environmental problems, and their willingness to shift to other alternative bags. The questionnaires were pre-tested on 5% of the town's population in other villages (kebele).

Ethical approval and quality assurance

Prior to data collection, an ethical approval letter was received from Jimma University Institute of Health Institutional Review Board (IRB) and a written letter from the Department of Environmental health sciences and Technology to the local administration. Accordingly, oral consent was obtained from the study participants. The chance of leaving the study at any time was also given to the participants with subsequent removal of their personal information. The quality of the data was assured by assigning trained supervisors to check the completeness of the data daily and other issues related to data collection.

Data management and analysis

The data were analyzed using a statistical software package (SPSS V.21). Prior to analysis, the data was checked for its completeness and consistency. The results were presented using a descriptive frequency distribution of the data after checking its normal distribution and removing an outlier. The frequency distribution of the data was shown based on the socio-economic status, educational and occupational categories of the study participants. Further analysis was made by using contingency tests (cross-tabulation tests) to compare the results with different respondents according to their socio-economic and educational categories. The contingency analysis is strong to examine the relationships within the data that might not be readily understandable from the descriptive analysis of the survey responses.

The variation in the use of plastic shopping bags were further tested with logistic and linear regression models. Accordingly, the strength of the association between number of plastic shopping bags and level of education and income were tested with linear regression models due to their continuous

Table 1. Socio-demographic characteristics of the study participants.

CATEGORY	DESCRIPTION	FREQUENCY	%
Age in years	Less than 20	67	19.09
	21-25	61	17.38
	26-30	78	22.22
	31-35	57	16.24
	36-40	45	12.82
	Above 45	43	12.25
Sex	Male	158	45.01
	Female	193	54.99
Monthly income in Birr	Less than 500	89	25.36
	500-2500	113	32.19
	2501-4500	92	26.21
	Above 4500	57	16.24
Occupation	Student	43	12.25
	Government employee	76	21.65
	Private business	187	53.28
	Others	45	12.82
Educational status	Do not write and read	32	9.12
	Primary school complete	153	43.59
	High school education complete	109	31.05
	Diploma and above	57	16.24
Marital status	Single	124	35.33
	Married	208	59.26
	Divorced	11	3.13
	Widowed	8	2.28

nature. We also tested whether plastic shopping bags were affected by profession. The likelihood of variation of use of plastic shopping bags by profession were tested with logistic regression model by adjusting the level of significances at 95%.

Results

Socio-demographic characteristics of the study participants

A total of 351 respondents participated in this study. Results on socio-demographic characteristics of the study participants are presented in Table 1. 187 (53.2%) were male, and 164 (46.8%) were female. Most of the respondents, 153 (43.6%), attended primary school, followed by 109 (31.0%) who completed high school education. The largest participants, 78 (22.22%), were

Table 2. Participant's plastic utilization status and willingness to shift to other alternatives.

CATEGORY	DESCRIPTION	FREQUENCY	%
Market visit	Daily	91	25.9
	Every other day	68	19.4
	3-5 times per week	33	9.4
	Two times per week	106	30.2
	Weekly	41	11.7
	One per month	12	3.4
Reasons for using plastic bags	Cheap	116	33.0
	Easily available	54	15.4
	Lack of alternatives	92	26.2
	Light and convenient	89	25.4
Number of plastic bags used per person per week	Less than 5 bags	138	39.3
	5-10 bags	147	41.9
	More than 10 bags	66	18.8
Intention on use of plastic bags	Continue to use	138	39.3
	Stops if alternatives are available	213	60.7

from the age group (26–30 years) followed by 67 (19.09%) and 61 (17.38%) of the age less than 20 and 21 to 25 years respectively. Married participants were 208 (59.26%), followed by 124 (35.33%) unmarried participants. The majority of the participants, 187(53.28%), were business owners, 76 (21.65%) were government employees, and 43 (12.25%) were students. Many of the study participants, 113 (32.19%), have a monthly income of 500 to 2500 birr and followed by those (92 (26.21%)) earning 2501 to 4500 birr per month.

Utilization condition of the single-use plastic shopping bag

The results on the utilization status of the households are presented in Table 2. The study results indicated that respondents visit supermarkets/markets at different times. Many 106 (30.2%) of them visit the supermarkets 2 times per week, 91 (25.9%) visits every day, and 68 (19.4%) visits every other day. Consequently, most 147 (41.9%) use 5 to 10 shopping bags per week, and 66 (18.8%) use more than ten shopping bags per week. Plastic bags are widely used in daily life activities to carry shopping goods and commodities from supermarkets, markets, grocery stores, and kiosks. Participants responded with different reasons for widely using plastic bags for shopping. Most 116 (33.0%) responded that plastic bags are cheap, 92 (26.2%) used plastic bags due to lack of alternatives, and 89 (25.4%)

responded that plastic bags are light and convenient to use. The investigators asked the respondents if they would stop using plastic bags. Accordingly, 213 (60.7%) responded that they wanted to stop using it if alternative shopping bags were available, while the rest 138 (39.7%) insisted on continuing to use it.

Results presented in Table 3 showed that 287 (81.78%) of the respondents had heard about the environmental impacts of plastic bags when they were asked. Their source of information was TV/Radio 162 (56.4%), school 63 (21.9%), municipalities 41 (14.3%), flyers and pamphlets 17 (5.9%), and the rest 4 (1.4%) obtained from different sources. Accordingly, 110 (38.3%) responded that it blocks sewage systems, 73 (25.4%) said that it kills animals if accidentally eaten, 36 (12.5%) reported that it affects human health, and 63 (23.9%) responded that it deteriorates the natural beauty of the environment (Table 3). We also asked the respondents to respond to the disposal methods for the used plastic bags (Figure 1). Accordingly, 41% responded open dumping methods, 26% said recycling, followed by 23% who answered that it is burning.

Moreover, 285 (81.3%) of the respondents said that they throw away plastic bags after single-use, 34(9.7%) reuses for different purposes, and 32 (9%) use for waste wrapping and disposal (Table 3). Nevertheless, 326 (93%) support efforts to reduce the use of plastic bags, of which 284 (80.9%) of them would support a ban on single-use plastic bags. Moreover, 319 (90.9%) respondents were willing to pay for alternative plastic shopping bags. Respondents suggested different alternative shopping bags based on their knowledge. Accordingly, 152 (47.6%) recommended paper bags, 65 (20.4%) fiber bags, 97 (30.4%) cloth bags, and others 5 (1.6%) suggested any alternatives other than plastic bags.

The pattern of plastic shopping bags used according to socio-economic characteristics of the participants

Results of the cross-tabulations are presented in Tables 4 to 6. Table 4 shows participants' plastic bag use frequency according to their professional category. Accordingly, over 85% of the participants frequently use plastic bags for shopping. Students are the frequent users with 95.3%, followed by private business owners accounting for 88.7%. This indicates the heavy reliance of the communities on plastic bags irrespective of their professional categories.

A similar evaluation was made to understand if the income of the participants can affect the plastic shopping bags frequency of use. However, we did not see much difference between the participants at different income levels. Over 85% of them frequently use plastics bags for shopping irrespective of their income level (Table 5). We also investigated the frequency of use of plastic shopping bags according to marital status. However, we did not identify significant differences between the categories (Table 6).

Table 3. Perception of respondents toward impacts of plastic bags, disposal practice, and alternative use.

CATEGORY	DESCRIPTION	FREQUENCY (YES)	PERCENT (%)
Do you know the environmental impacts of plastic bags?		287	81.78
What environmental impacts do you know?	Blocks sewage systems	110	38.3
	Kill animals if accidentally eaten	73	25.4
	Human health problems	41	14.2
	Deteriorates the natural beauty of the environment	63	23.9
What disposal methods do you use for used plastic bags?	Use and throw away	285	81.3
	Reuse for different purposes	34	9.7
	Waste collection and dumping	32	9
Do you support efforts to reduce single-use plastic bags?		326	93
Do you support a ban on single-use plastic bags?		284	80.9
Are you willing to pay for alternative shopping bags?		319	90
Alternatives suggested	Paper bags	152	47.6
	Fiber bags	65	20.4
	Cloth bags	97	30.4
	Other durables	5	1.6

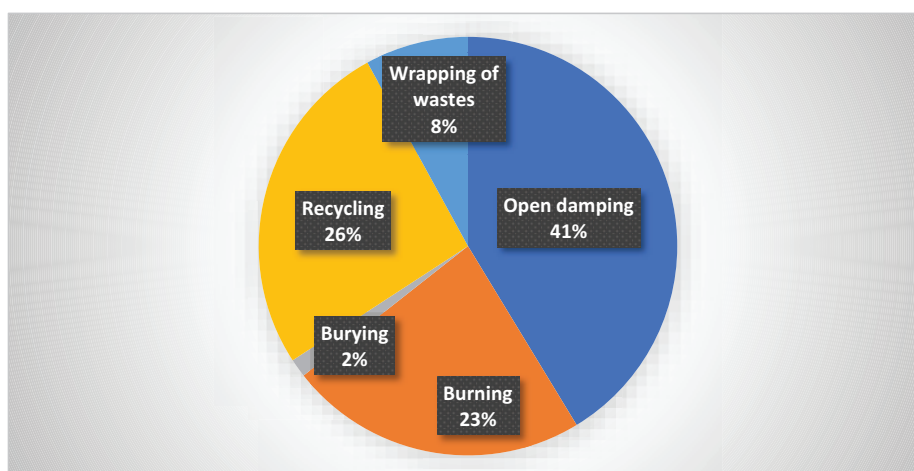


Figure 1. Community's perception toward disposal methods of plastic bags.

Table 4. The pattern of plastic bags used according to professional categories.

OCCUPATION	FREQUENCY OF PLASTIC BAG USE		TOTAL (%)
	ALWAYS (%)	SOMETIMES (%)	
Student	41 (95.3)	2 (4.7)	43 (12.2)
Government employee	62 (81.5)	14 (15.5)	76 (21.6)
Retailers	166 (88.7)	21 (11.2)	187 (53.4)
Others	34 (75.5)	11 (24.5)	45 (12.8)
Total	303 (86.3)	48 (13.7)	351 (100)

Table 5. Use of plastic shopping bags frequency according to income level.

MONTHLY INCOME LEVEL IN ETB	PLASTIC BAG USAGE FREQUENCY		TOTAL (%)
	ALWAYS (%)	SOMETIMES (%)	
Less than 500	76 (85.3)	13 (14.7)	89 (25.4)
500-2500	96 (85.0)	17 (15.0)	113 (32.2)
2501-4500	79 (85.8)	13 (14.2)	92 (26.2)
Above 4500	52 (91.2)	5 (8.8)	57 (16.2)
Total	303 (86.3)	48 (13.7)	351 (100)

Table 6. Use of plastic shopping bags frequency according to marital status.

MARITAL STATUS	PLASTIC SHOPPING BAGS USING FREQUENCY		TOTAL (%)
	ALWAYS (%)	SOMETIMES (%)	
Single	109 (88.0)	15 (12.0)	124 (35.3)
Married	177 (85.0)	31 (15.0)	208 (59.2)
Divorced	10 (91.0)	1 (9.0)	11 (3.1)
Widowed	7 (87.5)	1 (12.5)	8 (2.4)
Total	303 (86.3)	48 (13.7)	351 (100)

Table 7. Association of use of plastic shopping bags with professional categories.

USE OF PLASTIC SHOPPING BAGS	EXP(B)	95% CI FOR EXP(B)		SIG.
		LOWER	UPPER	
Students	1.569	1.049	2.472	.064
Government employee	1.082	0.861	1.675	.092
Retailers	1.126	0.930	2.147	.071
Other professionals	0.951	0.836	1.852	.126

Our cross-tabulation analysis shows no variation on the use of plastic shopping bags according to their professional categories. Further testes with logistic regression model also revealed similar results where none of the profession had shown impacts (Table 7). We also tested whether the number of plastic shopping bags are affected by level of education and income. However, not of these predictors have shown statistically significant associations with the number of plastic shopping bags used with the participants at different level of education and income (Table 8).

Discussions

This study assessed the perception of different community categories toward the utilization of plastic shopping bags. The

Table 8. Association of use of plastic shopping bags with some explanatory variables.

USE OF PLASTIC SHOPPING BAGS	PREDICTORS	UNSTANDARDIZED B	SIG.
Number of plastic shopping bags used	Level of education	1.002	.258
	Support plastic ban	1.004	.198
	Monthly income	1.058	.124

results revealed that most of the respondents used plastic shopping bags for various purposes. Since their invention, plastic bags have gained increasing popularity amongst consumers and retailers.^{24,25} It has been estimated that over 500 billion different plastic bags are used every year worldwide.²⁶ Over 8.3 billion tons of plastics have been produced since the 1950s of which, about 60% of them ended up in either a landfill or in the natural environment.⁵ Most of these plastic bags find their way in the open environment, particularly in developing countries where poor waste management systems exist. Most plastic bags end up in water bodies, including scarcely freshwater sources.²⁶⁻²⁸ Most people responded that they use about 10 plastic bags per week in this study. With this assumption, a single person uses over 500 plastic bags per year on average. Due to the lack of appropriate waste management in the town, these wastes end up in the environment. Moreover, more than 99% of plastics are produced from chemicals derived from oil, natural gas, and coal, all of which are non-renewable resources. If current trends continue, by 2050, the plastic industry could account for 20% of the world's total oil consumption.⁵

The environmental problems related to plastic bags are worsening in developing countries because of different reasons. The widespread use of polyethylene single-use shopping plastic bags could be attributed to retailers' or supermarket owners' free distribution of these bags.^{29,30} This is evidenced in this study that all respondents reported that plastic bags are cheap, convenient, and readily available to use (Table 2). Accordingly, over 60% of the study participants responded that they use more than 5 and up to 10 plastic bags weekly for shopping. Another study report from Ethiopia similarly shows that 76.5% of the respondents reported using plastic bags more frequently for shopping.³¹ This is comparable with the utilization in other developing countries. For instance, on average, an adult person in Jordan uses over 500 plastic bags per year.⁶ The growing utilization of plastic bags is driven by the proliferation of plastic producing industries as main business strategies and lack of sustainable alternatives and policy focusing on the issues. Estimates show that world plastic production grew from 1.5 million tons in 1950 rose to 381 million tons by 2015, of which about 5 to 13 million tons were discarded into the oceans annually by countries with ocean coastlines.^{24,25,32}

Moreover, over 99% of plastics are produced from chemicals derived from fossilized non-renewable resources. If current trends continue, by 2050, the plastic industry could account for 20% of the world's total oil consumption,⁵ thus posing a significant burden on dwindling fossil fuel resources. Nevertheless, most people are aware of its environmental impacts. In this study, over 60% of the respondents were willing to stop using plastic shopping bags if alternative shopping bags were available (Table 2). In another study conducted in the eastern part of Ethiopia, 88.7% of the study participants were aware of the environmental impacts of plastic shopping bags.³³ This study further investigated possible suggestions by the study participants that only 39% responded to continue using. The results are comparable with the study reports where 54% of the residents suggested banning plastic bags utilizations and 84.7% suggested substituting paper bags after banning.³³

Many developing countries also had developed a plastic banning or pricing policy to alleviate their environmental problems and to foster their economy. For instance, the Kenya government has declared a banning on plastic bags and became an exemplar to other developing countries.³⁴ Rwanda and Uganda are also other east African countries with a plastic bags banning policy to become environmentally front-runners in the region.¹⁹ However, the success of the banning policy is determined by the country's overall developments agenda and sectoral strategy than tackling environmental problems. This implies that having a good policy or increased awareness alone may not achieve the intended goal. Still, commitments of all concerned bodies are needed for its implementations.

Moreover, the study findings did not show utilization differences among different population groups. On average more than 85% of the population always uses plastic bags for shopping irrespective of their economic status, education, marital status, and occupation (Tables 4-6). However, the use of plastic bags by the students is relatively high, which is probably attributed to bulk purchase of materials for the family. The overall utilization indicates the lack of alternative and affordable shopping bags for the broader communities. Moreover, 81.3% of the respondents said they use and throw plastic wastes to open fields after a single use. The result is comparable with the survey findings from another town in Ethiopia.²² The absence of variation between different population groups on the use of plastic shopping bags and open field disposal could be associated with the lack of enforcing policy and translation of prevailing positive perception into practice.^{20,23} Nevertheless, it was presented in the results that 326 (93%) of the respondents support efforts to reduce single-use plastic bags, 284 (80.9%) support a ban on single-use plastic bags, and 319 (90%) were willing to pay for alternative shopping bags (Table 3). Such a high level of awareness and positive development in the general community would be vital for implementing policy measures on the reduction of single-use plastic bags and their wastes.

Moreover, the main problems associated with plastic bag use are its diverse chemical characteristics complicating its management and non-biodegradability if dumped in an open disposal facility. Substitution of non-biodegradable plastics is another option in areas where banning is ineffective.³⁵ It is also good to look back to before 20 years when the environment is free of plastic bags and innovatively used the experiences. This could be an area of income generation, particularly for the growing jobless youths graduating from universities. Nevertheless, it requires an enabling policy with strategically planned financial support for the start-up.

Conclusion

The utilization of plastic products is dramatically growing, mainly with plastic shopping bags among different community groups. The main driving factors are the lack of sustainable alternative shopping bags, the convenience of plastic shopping bags, and their availability for free or at low costs. These plastic shopping bags end up in open environments, including water bodies. However, most of the study participants were willing to discontinue plastic bags if alternative bags were available. This positive development encourages the substitution of plastic shopping bags with other sustainable and environment-friendly alternative bags.

Moreover, continuous awareness is needed to reach the wider community to focus on the environmental impacts of plastic shopping bags and the importance of replacing them with other alternatives. Hence, an enabling policy is needed for innovative technologies that can help substitute plastic shopping bags. This approach may also help integrate income generation activities while solving plastic-related environmental problems.

Author Contributions

BM participated in conceptualization, study design, data collection, and analysis writing of original draft; GTT participated in conceptualization, study design, supervised the study, review, and editing of the final draft.

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