

مجلة البحوث البيئية والطاقة
جامعة المنوفية قطاع خدمة المجتمع وتنمية البيئة

Measuring the Level of Environmental Awareness
Among Students of Faculty of Agriculture, Sana'a
University, and the Possibility of Introducing
Courses on Environmental Foundations

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المجلد ١٠ العدد (١٦) يناير ٢٠٢١م

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ABSTRACT

This study aims to identify environmental awareness and its components. It also aims to identify the role of educational institutions represented by the university in developing and spreading environmental awareness and solving environmental problems in society. It also aims to identify how the university contributes to developing environmental awareness. To achieve these goals, the study adopted a descriptive and analytical approach. The questionnaire tool is used for data collection. The study population/sample is 400 male and female students from Sana'a University, Faculty of Agriculture was displayed on a random sample of the students of the Faculty of Agriculture, Sana'a University in the academic year 2019-2020. 200 forms were distributed. 170 forms were retrieved. Only 160 completed forms were accepted, and 10 were excluded due to incomplete information. The study results showed that the participants' environmental awareness is low, having a negative perception of the environment's impact. Furthermore, it revealed the weaknesses of the university's academic role of the university in developing environmental awareness. Therefore, Yemeni universities should activate their role in promoting environmental awareness by adopting a set of environmental programs designed and taught by the best Yemeni expertise working in the field of environment. The study

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recommends that universities should work on developing their cultural role related to environmental awareness. It also recommends that universities work to motivate students for effective environmental participation.

Key Words: Environment, Awareness, Education, University Students, Sustainable Development

ملخص

تهدف هذه الدراسة إلى التعرف على الوعي البيئي ومكوناته. كما يهدف إلى التعرف على دور المؤسسات التعليمية التي تمثلها الجامعة في تنمية ونشر الوعي البيئي وحل المشكلات البيئية في المجتمع. كما يهدف إلى التعرف على كيفية مساهمة الجامعة في تنمية الوعي البيئي. لتحقيق هذه الأهداف ، اعتمدت الدراسة المنهج الوصفي والتحليلي. تستخدم أداة الاستبيان لجمع البيانات. بلغ مجتمع الدراسة / عينة الدراسة ٤٠٠ طالب وطالبة من جامعة صنعاء بكلية الزراعة تم عرضهم على عينة عشوائية من طلاب كلية الزراعة جامعة صنعاء في العام الدراسي ٢٠١٩-٢٠٢٠. تم توزيع ٢٠٠ استمارة. تم استرجاع ١٧٠ استمارة. تم قبول ١٦٠ نموذجًا مكتملاً فقط ، وتم استبعاد ١٠ بسبب عدم اكتمال المعلومات. أظهرت نتائج الدراسة أن الوعي البيئي لدى المشاركين متدنٍ ، مع وجود تصور سلبي لتأثير البيئة. كما كشفت عن ضعف الدور الأكاديمي للجامعة في تنمية الوعي البيئي. لذلك ، على الجامعات اليمنية تفعيل دورها في نشر الوعي البيئي من خلال تبني مجموعة من البرامج البيئية التي صممها وتدرسها أفضل الخبرات اليمنية العاملة في مجال البيئة. أوصت الدراسة بضرورة أن تعمل الجامعات على تطوير دورها الثقافي المرتبط بالوعي البيئي. كما توصي بأن تعمل الجامعات على تحفيز الطلاب على المشاركة البيئية الفعالة.

الكلمات المفتاحية: البيئة ، الوعي ، التعليم ، طلاب الجامعات ، التنمية المستدامة

INTRODUCTION

Environmental pollution and water drain in random methods are among the serious problems experienced by various developing countries. The environment is no longer able to regenerate its natural resources. As a result, the balance between the environment various elements are imbalanced and unstable. Thus, environmental issues are among the fateful and contemporary societal issues that higher education institutions must deal with. University education seeks to connect university students with their local community issues, increase their awareness, and engage them to solve them.

Yemen has its share of these issues. Today, Sana'a Governorate suffers from several environmental problems. The first is the severe deterioration of

water stock for many reasons, the most important of which is the random drilling of artesian wells, reaching about 5,000.

Raising awareness among young people who are the target and the important segment of society is one of the most significant priorities because achieving sustainable development for society requires these youth's participation as they are the largest and most effective groups operating in society. In return, this would help them build a balanced perspective of the relationship between a decent life and preserving the environment. As a result, this would affect the thinking patterns and behavior related to the environment to produce positive environmental behavior (Arabiyat & Muzhara 2009).

Universities are one of the important institutions in society in terms of developing human resources. It is known that universities do have three important trends: the first one is spreading knowledge and teaching, the second trend is developing knowledge and applying it, and the third one is serving the community for the functions universities performs through which seeking to achieve their mission in leading the cognitive and scientific movement of society and developing it in all areas. The university teaching function is one of the most important universities and the most effective to prepare students for life and community service. Thus, university teaching is supposed to sharpen students' cognitive skills to be more efficient and effective in society (Yasser & Kazem, 1998).

Therefore, educational activities must be directed towards the environment, the environmental resources, and preservation to invest them properly, which will certainly achieve a change and awareness of future environmental challenges. Doing so means that we have created a practical link between the learner and his/her environment to contribute to preparing a generation capable of preserving its environment and preserving its resources to get its benefits (Al-Faraji & Abusel 2006).

The educational institution is one of the most appropriate means to achieve environmental education for students and raise their environmental awareness, for environmental education in the educational institution aims to help students understand the position of man in his environmental framework, to be aware of the mutual relations that affect the human connection to the environment and to emphasize the significance of the cooperation between individuals, groups, and institutions to advance the levels of environmental protection, and to get the student to realize that he/she is an influential organism in the environmental entity and is affected

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by it. Furthermore, the student is an integral part of this entity. Formatting environmental awareness among students and providing them with expertise and skills is essential in this stage.

Currently, Yemen is encountering tough challenges related to these issues due to two reasons: The first is indifference to water reserves and preserving a clean environment, and the other reason is environmental pollution as a result of the war and the conflict between the two parties to the conflict since 2015, which has caused serious environmental pollution and the leakage of large quantities of fatal chemicals and radioactive materials into the environment, as well as disruption of energy sources and power stations, causing the environment to be subjected to the worst destruction ever.

STUDY PROBLEM

The absence of education courses and the building of environmental foundations in Yemeni universities may negatively impact the level of awareness among community members.

Most studies indicate that studying a course related to universities' environment reflects positively on students' perspectives towards the environment. As a result, they possess environmental knowledge and trends towards improving the environment and giving university students positive attitudes and behaviors towards some issues related to environmental safety compared to students whom an environment course is not part of their education curriculum. Studies have indicated the prevalence of behavioral patterns harmful to the environment, which requires directing the educational institution as it is one of the most appropriate means to achieve environmental education for students and upgrade their environmental awareness, for environmental education in the educational institution aims to help students understand the position of man in his environmental framework, to be aware of the mutual relations that affect the human connection to the environment and to emphasize the significance of cooperation between individuals, groups, and institutions to advance the levels of environmental protection, and to get students to realize that they are influential organisms in the environmental entity and are affected by it. Furthermore, they are an integral part of this entity. Creating environmental awareness among students and providing them with the necessary experiences, skills, and attitudes would positively influence their interactions and behavior with the environment.

STUDY SIGNIFICANCE

1. The lack of studies and research in this field, especially regarding water awareness, to the researcher's knowledge.
2. This study, along with other studies in this field, may strengthen the role of environmental education in the educational system, aiming to establish a functional environmental culture that leads to positive behaviors and trends towards the environment.
3. The weakness of adherence to positive environmental values and behaviors and the vision of students in particular and members of society regarding preserving the water environment and the water drain's seriousness.
4. Enabling the student to understand the systems of the natural environment, including the water environment, to be familiar with its problems, and to acquire trends and behaviors to reduce these problems, especially regarding the issue of water resources, issues related to the water environment, and the development of the environmental sense towards the environment and how to preserve it.

STUDY OBJECTIVES

The study aims to measure the level of water environmental awareness in students' attitudes of the Faculty of Agriculture, Sana'a University, and towards issues related to environmental safety.

Study Questions:

The study attempts to answer the following two questions:

1. What are the average trends towards water drain in Sana'a Governorate and some issues of environmental safety among the study population at Sana'a University?
2. Are there statistically significant differences ($\alpha = 0.05$) between the averages of the study population trends in the Faculty of Agriculture, Sana'a University, towards some issues related to environmental safety due to the variables (Gender, Academic Level, And Program Type) and the interactions between them?

Study Hypotheses:

The study attempts to test the following null hypothesis:

There are statistically significant differences ($\alpha = 0.05$) between the averages of trends towards some issues related to the environmental

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problem among students of the Faculty of Agriculture, Sana'a University, due to variables such as Gender, Academic Level and Program Type.

STUDY LIMITATIONS

It is possible to set the limits of the current study in two basic frameworks:

- Time limits: the second term at the beginning of March 2019.
- Spatial limits: Students of Sana'a University (Faculty of Agriculture).

STUDY METHODOLOGY

To achieve the intended objectives of the current study measuring the water environmental awareness among students of the Faculty of Agriculture, Sana'a University, the researcher designed a scale whose points were collected through a questionnaire tool to collect the data that students possess regarding the water environment and environmental issues through their responses to answer the sentences (40 paragraphs) each paragraph represents specific information about the water environment and the main problems regarding water drain as well as the water environment, according to the students' perspectives.

Study Validity and Reliability:

The questionnaire was presented for arbitration to four professors at Sana'a University: a specialist in environmental sciences and a specialist in agricultural sciences at the Faculty of Agriculture, a specialist in biological sciences at the Faculty of Science, and a specialist in educational psychology at the Faculty of Education. Based on the opinions of the arbitrators, the wording of the questionnaire was amended for some paragraphs. After the deletion and addition, the scale settled in its final form at forty (40) paragraphs, according to the Likert Scale's five-point hierarchy.

In front of each paragraph, a pentagonal scale was placed, representing the student's awareness of the environmental problems such as deterioration in water reserves and the aquatic environment that Sana'a Governorate suffers from called the Environmental Awareness Scale.

This scale is designed to identify the information (facts, concepts, and trends) that the Faculty of Agriculture Students, Sana'a University have about environmental pollution, consisting of forty paragraphs distributed

on three axes. Only one option is selected for each paragraph as follows: (Highly Agree, Medium Degree, Agree, Neutral, Disagree, Highly Disagree.) These alternatives have been assigned graded weights, starting with grade five (5) and ending with grade one (1). A high score indicates a high level of environmental awareness. On contrast, a low grade indicates a low level of awareness.

The scale was applied to an exploratory sample consisting of thirty (30) male and female students from the study population, not from the samples specified for the data collection. The reliability coefficient was calculated using the internal consistency method using SPSS-Scale-Reliability analysis (Alpha Cronbach's). It was found to be equal to (0,81), which is an acceptable value for the study.

The questionnaire was presented to a random sample of students of the Faculty of Agriculture - Sana'a University. Two hundred (200) participants for the academic year 2019 - 2020. One hundred and Seventy (170) questionnaire forms were retrieved. Only One hundred (160) completed forms were accepted, while ten (10) were discarded due to incomplete information.

THEORETICAL FRAMEWORK

Water Awareness:

Water environmental awareness is defined by Al-Wahesh, as "The wise and rational consumption of water resources, to preserve them from being depleted as long as possible. Water resources must be preserved in a way that allows their continuity and the continuation of their benefit for the largest number of generations, based on awareness, understanding, and knowledge related to water and its issues" (Al-Wahesh 2000). Also, Khalifa described it as "The learner's perception and sense of the current and future state of water resources, the related problems and their role in rationalizing and preserving their consumption in a manner that allows their utility to continue to the maximum extent possible" (Khalifa 2008).

The researcher agrees on the definition of water environmental awareness, which is the appropriate amount of facts, perceptions, and concepts related to the water environment that the students do have, which help them to adhere to the appropriate consumption considering the challenges that the water environment face and to carry out positive behavior patterns that stem from a sense of responsibility towards the

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preservation of the water environment and its resources. This is measured by the rate the participate obtained while answering the questionnaire designed for this study.

Previous Studies:

- The water situation in valleys and mountain bottoms is worse. In Sana'a Basin, where about 10% of the population lives, in 1994, (224) million were extracted, while nutrition exceeded (42) million cubic meters (drain at a rate of 400%). Sana'a Basin reservoirs are expected to dry up within ten years (World Bank Report 2010).
- The water shortage crisis is pushing the country to a huge humanitarian disaster. If urgent measures are not undertaken, the country will fall into more humanitarian crises.

The annual share of Yemeni people of water is the lowest worldwide, as Yemen's available water resources are estimated at 115 cubic meters per person annually. That is equivalent to approximately 2% of the global average.

“In the current conflict, the per capita share is expected to drop to 55 cubic meters for each person annually,” says Karaja.

Therefore, the deterioration of natural resources in Yemen has become a national issue that is the responsibility of society. We must bring attention to it and explain the danger of draining water reserves to the community. Understanding the environment and working to properly invest and protect it and form positive attitudes towards the perspective that it is the responsibility of all individuals. Hence, educational institutions need to play their positive role in preparing the environmental human being who can understand the natural ecosystems of which they are a part and use it responsibly and with enhancement (Al-Sabbari & Al-Hamad 1994).

Yemen's available water resources are estimated at 115 cubic meters per capita annually, which is equivalent to approximately 2% of the global average.

Upon reviewing the available previous studies related to this field, it is noticed that there is a lack of local studies related to this issue, which are the attitudes towards issues related to the environment safety. Also, despite their importance, the local studies were conducted a long time

ago, such as Al-Sabarini's (1987) study and Al-Khateebah & Al-Qaoud (2000) study.

There is also a noticeable difference in the results of some studies related to the impact of different curricula on the attitudes towards the environment or environmental awareness due to the nature of the course itself. The study of Shalaby (1990) agreed with the results of the study of Sabarini (1987) regarding the positive impact of the environmental education course on the attitudes of the students towards the environment.

The study of Al-Khateebah & Al-Qaoud (2000) indicated a weak positive relationship between students' possession of environmental knowledge and their attitudes towards the environment.

Valaardingerbroek & Taylor (2007) cultivated the same result: the Lebanese students had a narrow and limited environmental awareness despite their high scores on the environmental attitudes scale.

Al-Shahrani & Al-Ghannam (1994) also pointed out the curricula' ineffectiveness for students of health institutes in developing environmental concepts and attitudes.

Vlaardingerbroek & Taylor (2007) questioned the ability of programs concerned with environmental education in schools to inculcate the attitudes and develop environmental awareness among individuals. The study of AL-Adely (2010) indicated no evidence for studying a course related to the environment (Ecology), which is given in the Faculty of Science and not in the Faculty of Educational Sciences. In light of all this, the two researchers believe that there is a need to conduct a study to reveal the Environmental Education course's role in providing university students with positive attitudes towards some issues related to environmental safety.

ANALYSIS AND DISCUSSION

The analysis of the results of the questionnaire. Table No. (3) illustrates the study participants' various responses to the questionnaire axes, mainly related to the first section measuring information and general knowledge about environmental issues and safety. The second section was concerned with the extent of the participant interaction with the current environmental problems. In contrast, the third section was devoted to measuring the level of water awareness and pollution in

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Yemen. After calculating the arithmetic means and standard deviations, the researcher found the following:

The first section is concerned with measuring the level of information on environmental awareness that the participants do have. The various responses about the statements were in medium or weak degree with an average of about 1.7, except for the first two statements about the significance of the tree and the necessity of afforestation to preserve the environment. The participants' responses were high and medium of an estimated value of 4.2, which indicates that the nature of agricultural courses, most of which contribute to preserving the tree, was reflected in the students positively.

The second section related to plastic bags' effect on soil deterioration got a high degree with an estimated value of 4.2 and a standard deviation of 0.83575. For the rest of the statements, it is clear that the participants' responses are medium and weak. The average of the total responses for the paragraphs of this section was estimated at 1.67 with a weak degree, which means that the measure of the level of knowledge and information was weak, and this confirms the need to add courses related to these issues to the curriculum of the university or the college.

The second section that its statements relate to interaction and participation found that all the statements got a weak rate, between an average of 1.3 and 1.7. For the whole section, the average was about 1.49, with a weak estimate too. This can be attributed to the deficiency of awareness and the knowledge about the importance of the environment, about which little is known and perhaps the name only. This is one of the basic defects recorded on the university's requirements, which is supposed to have the student with different attitudes and behavior towards the environment surrounding in which he/she lives.

The third section, which its statements are related to defining the responsibility for preserving the environment in the community, such as the excessive use of water, especially in the cultivation of Qat, a tree that most of the Yemeni people chew, and the extent of concern about the environmental deterioration in the vicinity of Sana'a Governorate. It was found that all the statements got weak percentages, between an average of 1.2 and 1.9. For to entire section, the average and standard deviation were, respectively, 1.5 and 680. This is a weak estimate, which can be attributed to the deficiency in environmental awareness and the absence

of resources that contribute to students' environmental awareness to make them realize that the environment is the responsibility of every individual, not just the state. Besides, preserving natural resources is the responsibility of society and every living individual. This is one of the basic defects recorded in university education curricula. The environmental basics course is supposed to be one of the compulsory courses and university requirements.

Normal Distribution

Kolmogorov-Smirnov test, which tests the null hypothesis, through Table (2), states that the participants' responses do not follow the normal distribution, and the alternative hypothesis that says that the participants' responses follow the normal distribution. Accordingly, based on the table, it becomes clear that the degree of significance (Sig) for the various sections of the questionnaire is less than 05.0. Therefore, the responses of the participants follow the normal distribution. The first hypothesis concerns the existence of a correlation between the accounting teaching curricula and the market.

The First Hypothesis

- The first hypothesis is related to the existence of statistically significant differences in the participants' responses according to the difference in the type of program at the university. The second hypothesis states that there are statistically significant differences in the two samples' responses according to the study program type. Using the ANOVA test, it was found that the analysis of variance of the respondents' individual responses according to the type of the program. The test results showed that the F rate was 018.0, and the value of its statistical significance level was 894.0, which is a value greater than 05.0. Therefore, the null hypothesis that says there are no statistically significant differences in the participants' responses due to the type of study program is accepted.

The Second Hypothesis

- The second hypothesis is related to statistically significant differences in the participants' responses according to the gender variance. The second hypothesis states that there are statistically significant differences in the participants' responses according to

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gender, using ANOVA test that shows the variance of the participants' responses according to their gender. The test results showed that the F rate reached 018.0 and that the value of its statistical significance level was 894.0, which is a value greater than 05.0. Therefore, the null hypothesis that says there are no statistically significant differences in the respondents' responses about the degree of awareness due to the difference of their gender is accepted.

The Third Hypothesis

- The third hypothesis is related to the existence of statistically significant differences in the participants' responses according to the studying stage. The null hypothesis states that there are no statistically significant differences in the participants' responses according to the studying stage. The mono variance analysis test showed that Alpha's value reached 0.223 and that the value of its level of statistical significance 0638, which is a value greater than 0.05. Therefore, the null hypothesis that says there are no statistically significant differences in the participants' responses according to the studying stage is accepted.

CONCLUSION

The study showed that students of Sana'a University do not obtain adequate environmental awareness, which indicates that the university did not pay enough attention to environmental and water awareness that students need in their surrounding world. Due to the lack of courses, many barriers were created between the students' educational achievements and their behavioral and cognitive potential. Furthermore, the study concluded that it is necessary to introduce courses in environmental foundations within the university requirements. Thus, it is recommended to conduct studies on other topics such as awareness of cultural trends and material levels.

Annexes

1. Table (1): Sample Distribution by Different Characteristics

	Description	No.	Percentage %
Gender	Male	44	27%
	Female	116	73%
Programs	Economy and Guidance	62	38%
	Animal production	22	14%
	Horticulture	44	27.0%
	Food industry	32	20.0%
Phase	3 th	77	48%
	4 th	83	52%
Total		160	

2. Table (2): Normal Distribution Test:

Kolmogorov-Smirnova			
Statistic	Ddl	Sign	
.826	160	.000	
.904	160	.000	
.911	160	.000	

3. Table (3): It illustrates the arithmetic mean and standard deviation of the study outcomes

No.	Scale Paragraphs	Arithmetic Mean	Standard Deviation	Response
First Section: Background Information about the Yemeni Environment				
1	Tree cover is critical to environmental health.	4.2	423	High
2	There is a relationship between the widespread diseases affecting Yemeni people and the pollution of the environment.	1.31	564	Low

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3	Plastic bags scattered in the provinces are a major cause of soil degradation.	4.2	443	High
4	The state must give special attention to afforestation and green spaces.	1.1	549	Low
5	The environment is the concern of governments, not individuals.	1.2	732	Low
6	I do pay more attention to watching TV Shows about the environment.	1.2	532	Low
7	The problem of population growth is not as worrisome as it is globally.	1.5	551	Low
8	Excessive water consumption is a manifestation of hygiene.	1.3	601	Low
9	Health education is one of the best ways to protect people from environmental pollution.	1.2	601	Low
10	Media has given undivided attention to the environment and its problems.	1.17	472	Low
11	Water pollution increases the incidence of diseases among citizens.	1.3	814	Low
12	Chemical pollution of the environment leads to human cancer.	1.4	812	Low
13	The environment requires the efforts of each individual to conserve its resources.	1.4	636	Low
14	It is difficult to convince others to protect the environment since it is not their responsibility.	1.3	532	Low
15	Marine pollution due to oil spills do not affect us as long as	1.7	601	Low

	we do not use it in drinking water.			
16	Anyone who causes environmental pollution must be severely punished.	1.4	505	Low
17	Legal legislation alone can eliminate environmental pollution problems.	1.5	734	Low
	The Average of the First Section:	1.67	835	Low
Second Section: The Extent of The Environmental Concern in Yemen				
18	I am well acquainted with environmental issues and water drain in Yemen.	1.8	404	Low
19	Serious environmental consequences are caused when the government does not control and enforce the well-digging limitation.	1.9	608	Low
20	Yemen has many natural resources if we know how to develop and make its best use.	2.0	621	Medium
21	Laws and regulations in force in the country are sufficient to protect the environment.	1.3	712	Low
22	Educational programs in universities are characterized by a wide range of covering environmental knowledge and conservation of students' resources.	1.4	816	Low
23	Various media outlets show a high interest in raising community awareness about water conservation issues.	1.7	823	Low

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24	I am perplexed about environmental issues, especially the impact of plastic bags on the soil.	1.5	602	Low
25	The use of groundwater in the irrigation of Qat Trees is very concerning.	1.7	609	Low
26	Environmental education is as important as any other curriculum.	1.8	704	Low
27	Concerted efforts should be made to protect natural resources such as water.	2.1	426	LOW
28	Population growth is negatively affecting environmental resources.	1.1	404	Low
29	There is a lack of awareness among society and institutions about the preservation of resources.	1.2	603	Low
30	Individual behavior in rationalizing water consumption and recycling materials contributes to environmental protection.	1.0	721	Low
31	If I notice any harmful behavior to the environment, I must inform the competent authorities	1.2	506	Low
32	Community participation in environmental events and activities has a significant impact on raising environmental awareness in Yemen.	1.2	801	Low
33	Community understanding of environmental issues such as	1.2	506	Low

	resource drain and pollution in various forms helps raise environmental awareness.			
34	The Average of The Second Section:	1.49	0.61	Low
Third Section: Examining the Level of Public Awareness:				
	The Ozone Hole is far away over the southern continent, so we do not have to be worried.	1.2	543	Low
35	We must tolerate the gases and waste of factories as long as we enjoy the benefits of manufacturing.	1.1	543	Low
36	The spread of serious diseases such as Swine Flu in some countries does not affect us.	1.4	861	Low
37	I would not participate in an environmental pollution prevention program unless it is a requirement of my studies.	1.3	543	Low
38	Any violations of the atmosphere shall be treated as offenses against public property.	1.7	663	Low
39	I believe that only governmental agencies are responsible for detecting expired foods in the markets.	1.5	624	Low
40	Environmental issues are not a priority in society's current issues.	1.3	604	Low
41	The environment is not anyone's property to be misused.	1.4	806	Low
42	Dumping solid waste outside residential areas is sufficient to	2.1	423	Low

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	reduce the spread of diseases.			
43	I do not care what is being raised about smoking and its relation to cancer; it is just an overblown matter.	2.1	746	Low
44	There is no objection to smoke rising from different factories as long as they are far from residential areas.	1.1	842	Low
45	Using loudspeakers at parties and weddings is a form of joy and does not harm the environment.	1.6	0.68	Low
46	Gross Average Suggested	1.59	0.68	Low

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