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The issue of “Food Waste” and its impacts on environment

How to tackle the issue of “Food Waste” in Kazakhstan?

3261 words

#### **Authenticity Declaration**

I declare that the work in this research project is my own and is authentic. All resources and sources are acknowledged and cited, where sources and resources of other people have been used.

## **Acknowledgment**

I would like to express special gratitude to my teacher Kaziyev B.K, who provided me with complete guidance and support throughout the project work by giving recommendations on how to improve certain parts of the paper.

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## **Abstract**

*This paper focuses on the issue of food waste and aims to identify the main reasons of its occurrence, also find possible solutions, which could be implicated in Kazakhstan. Consequently, in order to reach the aims, mixed methods of data collection was used and with regards to it, the research clarified main causes such as improper storage, low rate of awareness and excessive buying, which have consequences including climate change, greenhouse gas emissions and loss of biodiversity due to increased demand to natural resources. However, because food is bio-degradable, there are solutions such as raising awareness, starting campaigns and encouraging citizens to avoid throwing leftovers.*

*Бұл мақала тамақ қалдықтары мәселесіне арналған және оның пайда болуының негізгі себептерін анықтауға, сондай-ақ Қазақстанда қолданылуға келетін ықтимал шешімдерді іздеуге бағытталған. Демек, алға қойылған мақсаттарға жету үшін деректерді жинаудың аралас әдісі қолданылды және климаттың өзгеруі, парниктік газдар шығарымы және табиғи ресурстарға сұраныстың артуына байланысты биоәртүрліліктің жоғалуы сияқты салдарының болуына дұрыс емес сақтау, хабардарлықтың төмендігі және шамадан тыс сатып алу сияқты негізгі себептер анықталды. Алайда, азық-түлік биологиялық ыдырауға бейім болғандықтан, хабардарлықты арттыру, науқандарды бастау және азаматтарды қалдықтарды тастамауға ынтыландыру сияқты шешімдер бар.*

*Данная статья посвящена проблеме пищевых отходов и направлена на выявление основных причин возникновения, а также на поиск возможных решений, которые будут использованы в Казахстане. Следовательно, для достижения поставленных целей был использован смешанный метод сбора данных, и в связи с этим были выяснены основные причины, такие как неправильное хранение, низкий уровень осведомленности и чрезмерные покупки, которые имеют последствия, включая изменение климата, выбросы парниковых газов и потерю биоразнообразия из-за возросшего спроса на природные ресурсы. Однако, поскольку продукты питания поддаются биологическому разложению, существуют такие решения, как повышение осведомленности, начало кампаний и поощрение граждан избегать выбрасывания остатков.*

**Key Words:** food waste, excessive buying, household waste, greenhouse effect, leftovers.

## **Introduction**

There are many global issues, which directly affect the future of humanity, however, nowadays one of the most urgent problems is food waste. It occurs when the food falls out of the consumption chain. According to Gustavsson et al. (2011), 1.3 billion tonnes of food are lost in the whole world, these numbers may seem unreal, and nevertheless, they indicate the occurrence of the problem. In addition, Schanes et al. (2018) stated that the effects of wasted food are accompanied by soil erosion, environmental pollution and deforestation. They mostly occur

because of transportation and preparation of food, so if these goods are squandered, it means that all efforts that were put into this process were in vain.

The aim of the research project is to clarify the reasons of occurrence of food waste and identify possible outcomes of solving this global issue. In order to find out, following questions have been taken into account:

1. What are the main factors that influence the problem of food waste in Kazakhstan?
2. What are the possible outcomes and benefits of solving this obstacle?
3. What measures can be taken in order to solve the problem of products' waste?

These questions will help to provide well-developed answers during research and clearly state the possible ways to tackle the issue, while providing positive environmental impacts.

Furthermore, many countries are very concerned about this worldwide problem because of its terrifying side effects, so if one can solve the obstacle or reduce the amount of damage, the experts will be able to tackle greenhouse effect, because Gustavsson et al. (2011) estimated that there are 3.6 Gt of carbon dioxide that was emitted because of product waste. Therefore, to take measures, it is necessary to observe what the main reasons are and Ghosh et al. (2016) stated them as buying without need, overconsumption and lack of knowledge. Overall, each cause is closely connected with people's households, which clearly demonstrates why this issue is solvable if humanity changes its attitude towards food. So, Goossens et al. (2019) offered that familiarizing citizens with the benefits of tackling this problem would be an incentive for people to be more considerate.

This obstacle is also widely acknowledged by Kazakhstan, because according to Inglezakis et al. (2018), the waste disposal facilities, which are designed in international standards, are present only in Nur-Sultan. It clearly states the fact that our country should raise awareness among citizens and consider the problem as a national one. As it was mentioned before, the way people behave towards their meals plays an important role in nature of this problem.

Furthermore, there were some personal reasons and motivations to choose this problem as a topic. Firstly, it is not rare for any citizen of our country to see homeless people who crave for food, that is why I thought that all wasted food before getting expired could be given to people in need. Secondly, in my perspective, meal is something very special that has come with great effort of many people who work to prepare it, so it should be treated properly and wasting it just contradicts this point. In addition, despite being harmless at the first sight, after some time wasted food will become a reason for many environmental issues.

## **Context**

### ***Food Waste as a Global Issue***

Nowadays the issue of food being wasted is addressed more directly, since it considers the future of the planet and sustainable development of humanity. First of all, according to Goossens et al. (2019), food waste is any food, and inedible parts of food, removed from the supply chain to be recovered or disposed. In addition, according to the United Nations (n.d.), 1/3 of food that is produced annually or to be more precise 1.3 billion tonnes are wasted, meanwhile, 2 billion people suffer from hunger and malnutrition. These numbers clearly indicate the fact that the issue is very serious, because while one part of population eats more than enough and is obese, another part as Ghosh et al. (2016) found, dies from hunger related causes and as Food Agriculture Organization (FAO) (2011) stated, one out of nine people go to bed at night hungry.

### ***People and their contribution***

A significant point to consider while analyzing the issue is finding its main cause, because there are plenty of factors that have an essential impact, however, not all of them play an important

role. The first thing to discuss is people's behavior since it can be taken as a major influence. According to Ghosh et al. (2016), excessive buying without need, products being purchased, but not used properly, their expiry or not suitable appearance at markets contribute to increasing amount of food waste in any country. Schanes et al. (2010) found that "private households represent the largest food-waste faction" (p.978), however, excluding people there are various roots of this problem to consider.

#### ***Various Causes***

FAO (2011) found that there are several types of food waste, such as losses due to mechanical damage or spillage, during washing and etc. Therefore, the types listed above can be also taken as causes of this global issue. On the other hand, Goossens et al. (2019) stated that the number of resources about food waste and its measures are limited, so the main reasons of occurrence of the problem are not clearly identified.

#### ***Effects of Food Waste at Global level***

Despite being the reason why hunger occurs, nowadays food waste is considered to be accompanied with other side effects, Schanes et al. (2018) stated them as soil erosion, deforestation, greenhouse emissions. It can be clearly seen why it receives growing interest from global perspective, because Ghosh et al. (2016) found that, 3.3 billion tonnes of CO<sub>2</sub> emissions are caused by food waste, which results in air and water pollution affecting humans' health and well-being. Moreover, any food production happens in the territories of separated countries, so from national and environmental perspective, according to Schanes et al. (2018), the food wasted at the end of the chain means that energy and effort put into its production, transportation and preparation is also lost. Furthermore, Ghosh et al. (2016) stated the losses as soil, water, fertilizers and pesticides. Consequently, it results not only in materials' waste, however, all the effort being in vain.

#### ***Solutions available for everyone***

This problem may seem as a global one, nevertheless, as major contributors to its occurrence, the human society can start altering their habits in order to tackle it, because it is commonly believed that anthropogenic factors have a huge impact on environmental negative changes. Research by Kilibarda et al. (2019) suggests that solving process of the issue requires improvement of awareness between societies, the usage of best practices and involvement of individuals and government. First of all, as it was claimed by Schanes et al. (2018), planning the shopping of grocery beforehand is an effective method in order to prevent excessive purchasing without apparent need. Secondly, according to Schanes et al. (2018), storing food correctly by organizing them in a way, which is categorized as older and newer one, will prevent it from expiring before being used. Furthermore, Schanes et al. (2018) have found that, no matter how easy it may sound, reusing leftovers is thought to be an effective method to tackle food waste issue, because people, who eat leftovers instead of throwing away, tend to produce less amount of goods going wasted. From financial and economical perspective, it is beneficial for both people and the environment, because it ensures that amount of cash spent on food will not be squandered. Thirdly, research by Payne (2014) showed that using wasted food as an animal feed is another way of boosting food efficiency and reusing food.

#### ***Benefits from Solving***

From ethical perspective, study done by Tielens and Candel (2014) showed that shortening wastage could increase food security for people in need of food. That's why reconsidering the way humanity uses food will bring the whole world benefits, because in that way reliance on natural resources and negative environmental effects will be reduced. Nevertheless, the biggest change will occur at a global level since amount of harmful substances that put resources of whole planet in danger and number of wasted beneficial goods will eventually decrease. Therefore, in the future the amount of food present now will be enough in order to provide the people from all over the world with food, so it is right to predict that level of hunger will decrease. From environmental view, after experiencing life-threatening global issue like this one, people will value and cherish the nature around them.

## Methods

There are two possible ways of gathering data – qualitative and quantitative methods, so in order to provide low level of inaccuracies both methods have been used during data collection process. In addition, according to Johnson & Onwuegbuzie (2004), the main aim of the researchers, who use mixed methods, is to benefit from the advantages and minimize the drawbacks of both types stated above. Consequently, the benefits of quantitative approach are the efficiency of collected information, ability to test the hypothesis and lack of subjective opinion of the researchers, which results in unbiased data. Whereas, the main features of qualitative research are detailed information, flexible approach and involvement of conductor in the process.

The **survey** was chosen as quantitative method based on its advantages stated above, in addition, Creswell (2003) said that quantitative research consists of data which then can be generalized and used as statistical results in the conclusion of research paper. Therefore, it was beneficial to choose this as a way of gathering information about the global issue, such as general attitude towards the problem and the actions citizens take to contribute to tackle it. However, it has several drawbacks too, because the responses may be misleading since during survey participants just answer given questions, which limits them from expressing personal opinion freely. Also, the answers of individuals cannot be applied as opinion of the whole population. Nevertheless, it has been useful to gather data from larger samples and it was predicted that almost 150 will answer the survey questions, which were sent through social media, but only 95 people have participated in it. Overall, 11 questions have been asked including dichotomous, multiple choice, ratio data and rating scales. Considering that age category is distinctive, both genders are present and survey was conducted with citizens of various towns, it can be concluded that the information from the questionnaire is totally unbiased and includes different thoughts about the research topic.

**Interview** was chosen as qualitative method to gather data because of its benefits such as rich information and in-depth conversation with the interviewee. So, this approach allowed one to better comprehend individuals' personal opinion towards the topic, to get a clear view of the condition of one country based on the answers of people who are closely connected with this field. However, there are some drawbacks, such as its inability to be represented as numerical data, the time it takes to take an interview from a single person is way too long and the information may be biased since answers are given by only one person. Thus, to make it less biased 5 people have been chosen to take interview from and the questions were open-ended to get honest answers, which then can be treated as qualitative data during examining results. These 5 people are a student, who majors in chemistry & biology, the teacher of chemistry, two university students, who major in biology as their future career perspective, and an employee from delivery service, which works to stop and prevent food waste. So, their opinions will be used in order to conclude the results of the research and provide data about experts' attitude towards the given issue.

All things considered, the process involved both methods to get a better view of the topic "Food Waste" and they allowed one to understand what could be done to prevent this issue. Nonetheless, there were some limitations during data collection, such as difficulty of finding an expert in this field, because not many people are aware of this problem. But availability of online services allowed one to contact experts from various places. Also, during survey it was difficult to encourage people to take part in survey, but with the help of social media, almost 100 people answered it.

## Results

While collecting useful data about research question, it was identified that food waste is global problem which is acknowledged by many countries. Furthermore, there are several reasons of its

occurrence such as excessive buying, overproduction of food, oversized portions and improper storage. This order of events will soon lead to horrifying consequences, for instance, greenhouse gas emissions, loss of biodiversity and climate change. Also, because huge amount of food is wasted at “consumer” stage, it is essential to understand the thoughts of citizens towards the issue. So, to get an overview, the survey was conducted. Moreover, 87.4% of participants are females, meanwhile, 12.6% are males. Information such as their age was included in appendices.

One of the first questions considered participants opinion about the obstacle (Figure-1) and it was “What is your opinion about the global problem?”, 58.9% of participants answered that they are concerned, while 16.8% are very concerned, however, 13.7% of survey takers are indifferent about it. These results clearly indicate that this issue makes many people worried.

If yes, what is your opinion about this global problem? / Иә болса, сіздің бұл жаһандық мәселе жайлы ойыңыз қандай? / Если да, то что вы думаете на счет данной глобальной проблемы?  
95 ответов



Figure-1. Opinions of participants about the issue.

Moreover, in order to understand the capability of citizens to manage products, the next question was about the amount of food they throw out weekly (Figure-2), and during data collection it was identified that 35.8% of people throw reasonable amount, whereas, 41.1% throw very little and, surprisingly, 13.7% do not throw leftovers. These numbers show that much of food is thrown, however, there are some citizens who manage food beneficially.

How much food do you throw out in one week? / Аптасына қанша мөлшерде қалдық азық-түлікті қоқысқа тастайсыз? / Какое количество еды вы выбрасываете в течении недели?  
95 ответов



Figure-2. Amount of food thrown out every week .

In order to comprehend the reasons, the next question was asked (Figure-3) and 49.5% of answers were about over-serving large portions, meanwhile, 32.6% and 31.6% of responses have chosen safety measures, bad taste of prepared food as main causes of throwing leftovers.

Consequently, people mostly make some mistakes when it comes to considering portion size and for most of the citizens, safety is a priority.

What could be the main reasons of throwing them out? / Оларды қоқысқа тастаудың басты себептері не болуы мүмкін? / Что могло бы быть главной причиной выбрасывания остатков еды?

95 ответов

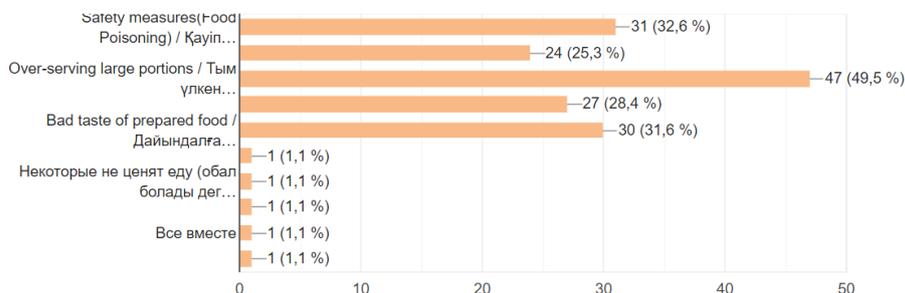


Figure-3. Main reasons of throwing out products/food.

There are many reasons of throwing out food, so, in order to look for possible solutions which could be useful, the next question was asked (Figure-4). The answers clearly indicated that actions such as avoiding excessive buying (51.6%), storing food at ideal conditions (50.5%) and raising public awareness (46.3%) are considered to be effective ways of tackling “food waste” issue.

Which are the best ways of solving this issue? / Осы мәселені шешудің ең тиімді жолдары қайсысы? / Что являются самыми эффективными методами решения данной проблемы?

95 ответов

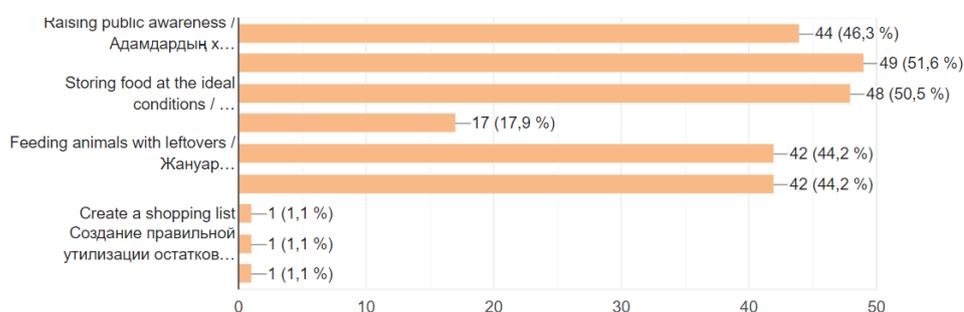


Figure-4. Some possible ways of solving the issue.

The interview was taken as qualitative approach and answers of 5 people were considered. Two of them are students of biology faculty, who are closely connected with this field, and, in their point of view, food waste is a problem of global level, because they say that it is a relevant issue. Other participants and in particular, second interviewee – chemistry teacher of NIS completely agreed with this, because it seems to him that wasting food is unacceptable practice. Since chemistry teachers are fully aware of consistency and compounds of food, his answers were taken as a perspective of expert. Next participant is a student of NIS, who has taken biology & chemistry as major subjects, her answers were useful when it came to acknowledging view of a person who has some knowledge about food waste problem. Nevertheless, by taking her responses into account, it was identified that even basic knowledge would be enough to have motivation to avoid wasting food. For example, she claims, “one of the effective ways to deal with leftovers is to avoid overbuying and cook in the right amount”. Since people who have been mentioned before are experts of this field in theoretical way, it was useful to conduct an

interview from a person fighting food waste in practical way. This individual works in a delivery service called “Imperfect Foods”, which produces products of high quality in order to prevent food from going wasted, and according to her answers, not paying enough attention to one’s food will result in greater landfill growth. So, she utterly advises “to freeze food and use ziplock bags”. By considering the solutions others have recommended, it can be concluded that storing food properly is the best way to fight waste.

Getting unbiased data with various perspectives provided researcher with complete knowledge of experts and citizens attitudes towards the issue.



Figure-5. Thematic map of Interview

## Conclusion

By taking answers of respondents and interviewees into account, it is possible to make a conclusion about the issue and answer research questions considering the acute topic.

The first aim was to find out the reasons and according to results of research, it has been identified that they are excessive buying, improper storage, overproduction, non-suitable appearance, oversized portions, confusing food labels and mistakes made at production, transportation stage by workers or weather. It means that mainly food is wasted at the consumer stage and responsibility should be taken by humanity.

Secondly, this type of issue has many side-effects which are very serious and terrifying, therefore, it is essential to consider them. For instance, food waste leads to greater landfill growth, which causes the deterioration of soil quality and large amount of greenhouse gas emissions. In addition, a lot of resources, such as energy, labor, facilities and bio-products are put in this process, so if all the food goes wasted, it means that everything was in vain. This soon leads to deforestation, loss of biodiversity and eroded land. Consequently, providing that this obstacle is solved, there will be many benefits for Kazakhstan, such as solution of problems like air, water pollution and improper use of bio-resources & food waste, which will result in better environmental condition.

Thirdly, since “Food Waste” ecological problem threatens whole world’s future, the solution can only be reached with the corporation of worldwide countries. In particular, considering that large amount of food is thrown out at consumer stage, there should be order of actions taken by each citizen of the planet. Firstly, it is crucial to avoid excessive buying and it could be attained by

making shopping lists, considering portions of each family member. Second of all, people should store food correctly by using special packages, putting them in fridge and paying attention to food labels. Another thing is raising awareness among people because not everyone is aware of the occurrence of the issue.

So, taking information mentioned above into account, it seems to me that it will be difficult to reach one solution since every country's condition is unique and international organizations such as UNESCO, FAO should unite all countries. Furthermore, every place should start environmental program considering its weather conditions and geographical location. Nevertheless, since food is organic product consisting of biodegradable compounds, issue just requires consistent and corporative effort. Also, during research, mixed method of data collection was used and it had benefits, however, there were limitations, because questionnaire was conducted among citizens of Aktobe, but to get overview of country, it could be useful to take it from citizens of various cities. Moreover, in interview there were questions which were difficult to answer, therefore, some of them could be altered to make participants more comfortable. In conclusion, I hope that my research and its results will be useful for certain spheres of ecology to improve current condition of the environment and provide citizens with necessary information.

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## **Appendices**

### **Appendix-1. Survey Questions**

Appendix-1.1. Your age: *12-18 / 19-30 / 30+*

Appendix-1.2. Your gender: *Male / Female / Other*

Appendix-1.3. Are you aware of the issue of “Food Waste”? : *Yes / Yes, but not so much / No, never heard of it*

Appendix-1.4. If yes, what is your opinion about this global problem? : *Very concerned / Indifferent / Never heard of it / Other*

Appendix-1.5. Do you throw out leftovers? : *Yes / No*

Appendix-1.6. If yes, how much of food do you throw out in one week? : *An excessive amount / More than you should / a reasonable amount / Very little / None / Other*

Appendix-1.7. What could be the main reason of throwing them out? : *Safety Measures (Food Poisoning) / Unawareness of negative effects / Over-serving large portions / Unpleasant appearance / Bad taste of prepared food / Other*

Appendix-1.8. Which is the best way of solving this issue? : *Raising public awareness / Avoiding excessive buying / Storing food at the ideal conditions / Carefulness of workers (during transportation, production) / Feeding animals with leftovers / Consider portion size*

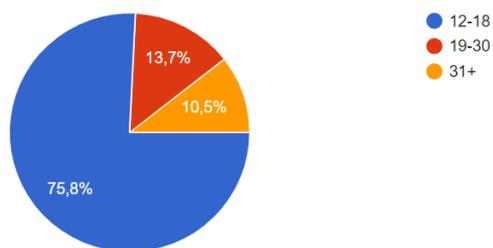
Appendix-1.9. From 1 to 5, how would you rate citizens of our country at managing food waste?: *1 / 2 / 3 / 4 / 5*

Appendix-1.10. What do we lack to solve “Food Waste” issue? : *Governmental Support / People’s awareness / Knowledge of conserving food / Motivation to avoid food waste / Other*

### **Appendix-2. Survey Results Diagrams**

Your Age / Сіздің жасыңыз / Ваш Возраст

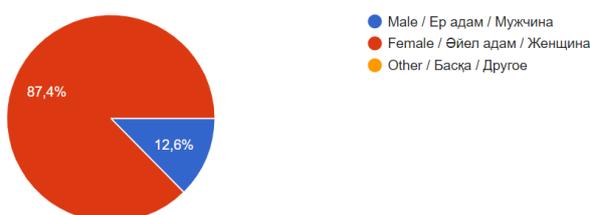
95 ответов



### Appendix-2.1. Age category of participants.

Your Gender / Сіздің жынысыңыз / Ваш Пол

95 ответов



### Appendix-2.2. Gender of participants.

Are you aware of the issue of "Food Waste"? / Сіз "Азық-түлік қалдықтары" мәселесі жайлы білесіз бе? / Знаете ли вы о проблеме "Пищевых отходов"?

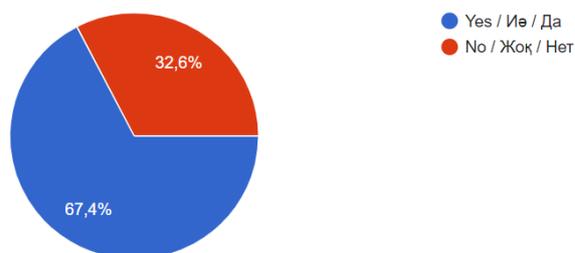
95 ответов



### Appendix-2.3. Participants' awareness of "Food Waste" issue.

Do you throw out leftovers? / Қалдық тамақты қоқысқа тастайсыз ба? / Выбрасываете ли вы отстатки еды?

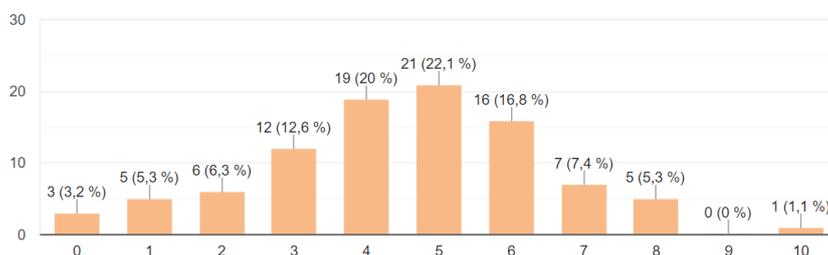
95 ответов



### Appendix-2.4. Information about throwing out leftovers.

How would you rate citizens of our country at managing food waste? / Біздің еліміздің тұрғындарын тамақ қалдықтарымен жұмыс жасауын қалай бағалар едіңіз? / Как бы вы оценили жителей нашей страны в управлении с пищевыми отходами?

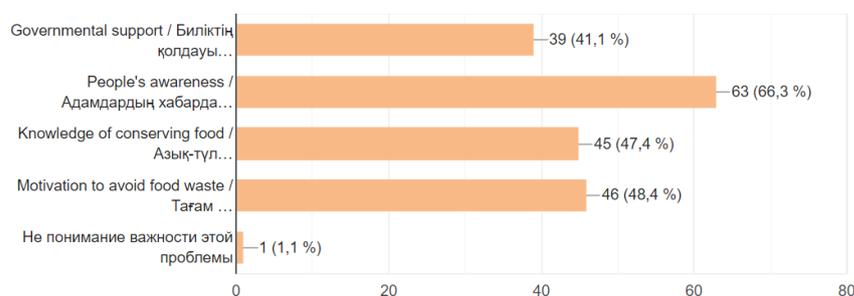
95 ответов



## Appendix-2.5. Rating of citizen's capability of managing products.

What do we lack to solve "Food Waste" issue? / "Тамақ қалдықтары" мәселесін шешу үшін бізге не жетіспейді? / Чего нам не хватает для решения проблемы "Пищевых отходов"?

95 ответов



## Appendix-2.6. Necessary skills to solve the issue.

### Appendix-3. Interview Questions

1. What is your opinion about the "Food Waste" issue?
2. Could you describe a situation when you encountered food going wasted in everyday life?
3. In your point of view, what stage of food chain wastes the largest amount of food and why?
4. What do you do in order to manage leftovers?
5. Other than wasted products, what kind of side effects this issue has?
6. Does the lack of knowledge of data on the package of product affect the issue and how?