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Reducing food waste in bread consumption as a means to achieve food security - A case study of the state of Setif -

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Abstract :

This paper aims to study the reality and background of food waste in bread consumption in Algeria, and specifically focuses on an analytical study of this issue in the state of Setif. Food loss and waste (FLW), especially in bread, is a problem that has often been neglected and not properly studied or documented, despite its serious implications for achieving food security in the region and improving the sustainability of the food system. Bread is a subsidized commodity in Algeria, sold at much lower costs than its production expenses, and the state allocates significant resources to provide the raw material, which is wheat that is mostly imported to cover any shortages. Therefore, this waste will inevitably affect food security in Algeria unless possible solutions are found to reduce it. The study concluded several results, including the absence of a structured policy to address the issue of waste in bread, and no direct relationship between population growth and the increase in bread waste.

Keywords: food waste, food security, bread, Algeria, Setif.

JEL Classification Codes: 013،055

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1. Introduction:

The problem of food in the world is considered one of the most important issues and one of the biggest challenges facing humanity in our current era, as it affects the lives of hundreds of millions of consumers in general. There are 25 million people, or 12.8% of the total population of North Africa and West Asia, who still suffer from malnutrition, according to statistics from the Food and Agriculture Organization (FAO) for the period from 2012 to 2014.

International estimates indicate that around one-third of the food produced worldwide annually (equivalent to about 5.1 billion tons of food) is lost, with a value of around one trillion US dollars annually, at a time when last year, about one-third of the world's population suffered from food insecurity, and more than 800 million people suffered from hunger, in addition to more than one-fifth of the world's children under the age of five being affected by malnutrition-related diseases such as stunting and wasting, according to the latest report on the state of food security and nutrition around the world in 2020, which was recently issued by several United Nations organizations.

Food losses and waste (FLW) is considered one of the biggest problems facing Algeria today, especially with regard to bread, given the economic, environmental, and social effects of this phenomenon, as well as its impact on food security, which is largely ignored. Therefore, reducing food waste is a promising strategy for achieving food security.

Based on this proposal, the problematic of the study can be formulated in the following central question :

What is the reality of food waste in bread in Algeria, and specifically in the state of Setif ? and what are the appropriate mechanisms to reduce food waste as a means to achieve food security ?

This question, in turn, led us to formulate the following sub-questions:

- What is meant by food losses and waste?

- What are the types of food losses and waste?

- How can food losses and waste be measured?

- What is the reality of food waste in bread consumption in Algeria?

- What is the reality of food waste in bread consumption in the state of Setif?

Study Hypotheses:

Based on the research problem, the following hypotheses can be proposed:

- The absence of a consumer culture is considered one of the main reasons for the increasing phenomenon of food waste of bread in Algeria.

- The lack of a clear and well-regulated policy by Algeria is a contributing factor to the issue of bread waste.

Literature review:

- Gene Gustavsson and Others' Study on ‘**’Food Loss and Food Waste in the World: Scope, Causes, and Prevention**," a paper presented at the World Conference on Food Preservation. Germany, 2011.

This study sheds light on the losses that occur throughout the entire food chain, evaluates their magnitude, and explores the causes and possible ways to prevent them. The study's findings indicate that approximately one-third of the food produced for human consumption is lost or wasted at the

global level, amounting to around 3.1 billion tons annually. This represents enormous amounts of resources used, and also indicates a growing trend in greenhouse gas emissions resulting from food production that is lost or wasted. The study revealed significant gaps in data related to knowledge of food losses and waste at the global level, and there is an urgent need for further research in this field.

- Hamid albilali study **Research on food losses and waste in North Africa''**

This study provides an overview of research on food loss and waste (FLW) in North Africa (Algeria, Egypt, Libya, Mauritania, Morocco, and Tunisia). The study found that research on this topic is still marginal in North Africa as a whole, especially in Libya and Mauritania. However, there are some interesting studies on the amount of FLW, its environmental and economic impacts, and its effect on food security that are largely ignored.

Study objectives:

Through this study, we aim to:

- Identify the various reasons and motivations behind the phenomenon of food waste and loss.
Highlight the reality of food waste in bread consumption in Algeria.
- Study and analyze the reality of waste in bread consumption in the state of Setif.
- Encourage the relevant authorities to adopt a clear policy to address the issue of waste in bread, by benefiting from successful experiences in this field.

The importance of the study:

The importance of studying lies in the importance of the topic itself. The issue of food waste and loss is one of the most important topics that occupies a large space at present, due to its association with the issue of food security and finding ways and methods to reduce this phenomenon that is alien to societies. In addition, there are challenges imposed by the current stage.

The importance of research can be understood from several other perspectives, one of which is the issue of state policy with a social dimension, given that bread is one of the subsidized materials in Algeria, sold at a much lower cost than its production cost, and the state covers any shortfall in the basic material for its production, which is wheat.

Study methodology:

This study will rely on a descriptive approach that starts by collecting data and information from various sources about the phenomenon under study, while taking into consideration the interaction between the different aspects that may affect the case study. In the end, we will use an analytical methodology based on the information, data, and statistics collected.

2. Concepts of food loss and food waste

There is a distinction between two terms in literature: "Food Loss" and "Food Waste." The former refers to food that is lost in the food production chain before reaching its final stage of use, such as during agriculture or pre-harvest. The latter refers to food that is fit for human consumption but has been spoiled or gone bad before being used due to poor storage, preservation, or exceeding its expiry date. Some foods are naturally perishable, such as vegetables, fruits, dairy products, and meat, which do not exceed their expiry date for more than a few days and sometimes a few hours in hot and humid conditions if they are not stored and preserved properly or converted into another form that prolongs their shelf life, such as drying fruits or juicing them.(alformani, 2021).

3. Types of food loss and waste:

Five systems in the food chain for plant and animal products have been identified, and the food loss and waste for each of these categories have been estimated. The following aspects were considered : (Jenny Gustavios et al, 2011)

- Plant-based goods and products :

Agricultural production: losses resulting from mechanical damage and/or spillage during the harvest process (such as bruising or fruit picking) and sorting of crops after harvest, etc

Post-harvest handling and storage: including losses resulting from spillage and deterioration during handling, storage, and transportation between farms and distribution.

- Processing: including losses resulting from spills and deterioration during industrial or household processing, such as juice production, canning, and baking. Losses may occur when crops are sorted if they are not suitable for processing, during washing, peeling, cutting, and boiling operations, or when processing is interrupted and accidental spills occur.

- Distribution: includes loss and waste in the market system, such as wholesale markets, supermarkets, retailers, and traditional markets.

- Consumption: includes loss and waste during household consumption.

4. Measuring food loss and waste:

There are several models for measuring food loss and waste. We will discuss the Food Waste Index released by the Food and Agriculture Organization and the United Nations Environment Programme. The Food Waste Index report for countries helps track progress in achieving the United Nations' Sustainable Development Goal to reduce food waste by half by 2030.

The food waste index approach relies on three levels as follows: (Alasqua workshop UNEP, 2021)

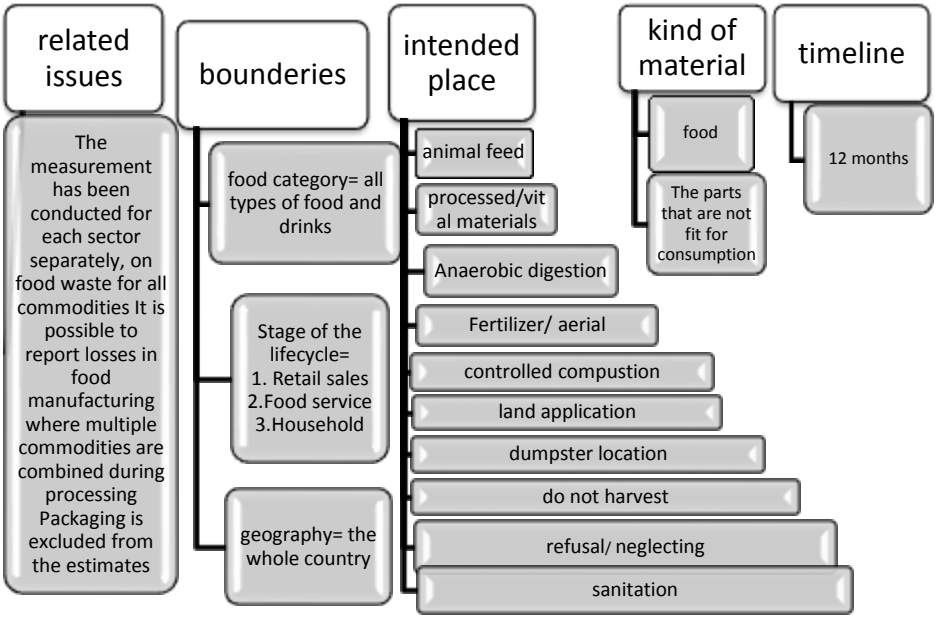
Figure (1): Food Waste Index Measurement Approach

Source: Alasqua workshop UNEP, **Baseline Measurement of Food Waste** ,2021, p10.

For the first level: It involves collecting data on individual income and the individual's share of food waste at retail level, as well as at the household and other levels.

For the second level: direct measurement of the extent of food waste through Figure (2).

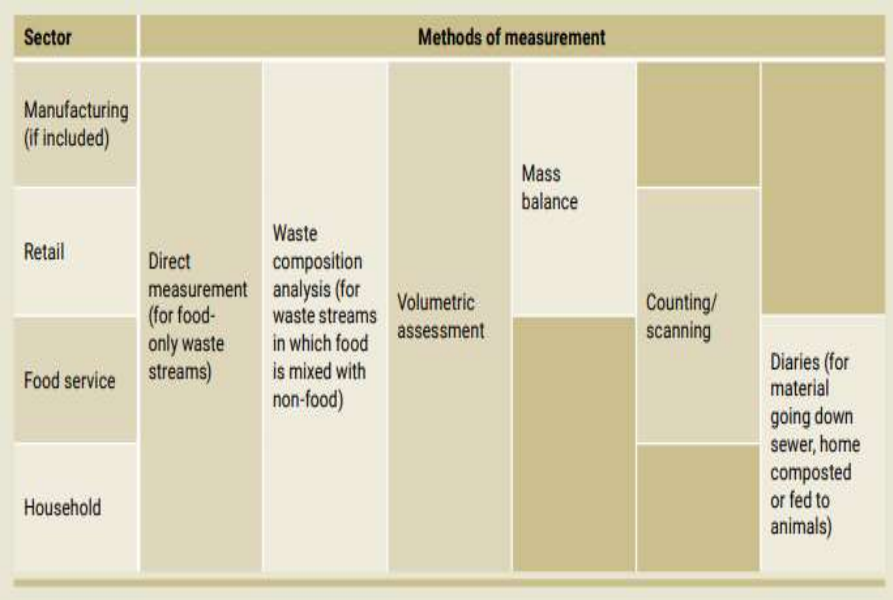
Figure (2): Scope of Food Waste



Source: Alasqua workshop UNEP, op. Cit, 2021, p10.

As for the measurement methods for each sector, they are carried out according to the following figure:

Figure (3): Appropriate methods of measurement for different sectors



Source: Alasqua workshop UNEP, op. Cit, 2021, p15.

5. Food waste in bread consumption in Algeria:

In Algeria, bread is consumed heavily, and periodic reports published by international organizations, including the United Nations Food and Agriculture Organization and other organizations in Algeria, have revealed that the share of bread consumption in Algeria ranges from 65 to 70 million loaves (a long, thin loaf of French bread), which is an average of 1.8 loaves per person per day. In the absence of a consumption culture, bread continues to be wasted. Official statistics indicate that, on average, 2.7 million loaves of bread are not consumed daily and end up in poultry or livestock farms, or even in the garbage. (Tunza Eco Generation, 2022)

University restaurants are considered one of the largest "waste cells" that affect bread on a daily basis, as organizers of these restaurants contract with bakeries to bring in unlimited amounts of bread, at least one loaf per student. Due to the large number of students, the amount of wasted bread is greater than the consumption.

The same thing happens in different educational hospitals. In school cafeterias, educational zones rely on pre-purchase studies for any quantity of bread, ranging from 40 to 45 loaves per 100 students (the same).

6. An analytical study of the reality of waste in bread consumption in the state of Setif:

The study aims to :

- Identify the amount of bread wastage at the state level.
- Attempt to identify the reasons for bread wastage at the state level.
- Identify how to deal with the quantities of wasted bread.
- Identify the areas that waste the most bread in the state.
- Determine the relationship between demographic factors (such as population size) and the amount of bread wasted.

In order to conduct an analytical study of the reality of waste in bread consumption in the state of Setif, we will use the report on household waste and similar waste in the state. The statistical process was carried out from April 13, 2021 to May 11, 2021 (see Appendix No. (1)) through Table No. (1).

Table (1): The amount of wasted bread by the population in the state of Setif during the period from April 13, 2021, until May 11, 2021.

state	Number of population (individuals)	Amount of waste produced (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of bread wasted by the population (tons/week)
setif	**1 951 416**	**16 016.66**	**1 692.2**	**15 271.35**	**318.25**

Source: Directorate of Environment for the state of Setif.

Based on Table (1), it is clear that the quantity of bread wasted by the population amounted to 318.25 tons per week, which represents 18.8% compared to the amount of waste produced per capita. However, compared to the quantity of waste generated from collection and transportation, it represents a percentage of 2.08%.

Table (2) shows the quantity of bread returned at the level of landfills and technical dumping centers in the Sétif province.

state	Number of population (individuals)	Amount of waste produced (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste generated from collection and transportation (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of bread retrieved at landfill and technical landfill sites (tons/week)
setif	**1 951 416**	**16 016.66**	**1 692.2**	**15 271.35**	**4 538.31**	**318.25**	**266.75**

The source: The Directorate of Environment for the Wilaya of Setif.

According to Table (2), it is evident that the quantity of bread retrieved at the level of landfills and technical dumping centers in the state of Setif reached 266.75 tons per week. Compared to the amount of bread thrown away by the population, this represents a percentage of 83.81%. This means that there are very large quantities that can be retrieved at the level of landfills and dumping centers.

Compared to the amount of waste processed at the municipal landfills or technical dumping centers, this represents a percentage of 5.87%.

- The quantity of wasted bread according to the geographic distribution in the state of Setif:

Upon reviewing the report on the quantity of wasted bread by the population and the amount retrieved at the level of landfills and technical dumping centers in the state (see Annex 1), it is evident that some municipalities have witnessed high levels of bread waste. These municipalities include Ain Arnat, Amoucha, Béda Bordj, Hammam Sokhna, Ain Kabira, and Tachouda, as follows: The municipality of Ain Arnat recorded a quantity of 1,176 tons per week.

- The municipality of Amoucha recorded a quantity of 536 tons/week.
- The municipality of Hammam El-Sokhna recorded a quantity of 8 tons/week.
- The municipality of Ain El-Kabira recorded a quantity of 31.5 tons/week.
- The municipality of Tachouda recorded a quantity of 17 tons/week.
- The municipality of Bir Hadada recorded a quantity of 37 tons/week.
- The municipality of Béda Bordj recorded a quantity of 237 tons/week.

Regarding the quantity of returned bread at the level of dumps and technical landfill sites in these areas, it was as follows:

- The municipality of Ain Arnat did not record any returned quantity of wasted bread.
- The municipality of Amousha recorded a quantity of 331 tons per week.
- The municipality of Hammam El-Sokhna did not record any returned quantity of wasted bread.
- The municipality of Ain El-Kabira did not record any returned quantity of wasted bread.
- The municipality of Tachouda did not record any returned quantity of wasted bread.
- The municipality of Bir Haddada did not record any returned quantity of wasted bread .
- The municipality of Béda bordj did not record any returned quantity of wasted bread.

Upon reviewing the report regarding the amount of wasted bread from the population and the amount recovered at landfills and technical disposal centers in the province, we find that there is no correlation between population size and the increasing phenomenon of bread waste. In some areas with a large population, there has been no significant waste of bread, such as the municipalities of Ain Oulmene and Ain Abessa, which have respective populations of 140,000 and 205,000 residents. The maximum amount of bread wasted in the containers in Ain Oulmene during the first week was 0.9 tons/week, while in Ain Abessa, the maximum amount of bread wasted in the containers during the second week was 0.206 tons/week.

7.Conclusion :

Wasting food has become a common habit for many people. A lot of individuals buy large quantities of food that exceed their needs or even their ability to consume, while many countries suffer from daily hunger. We lose tons of food either during the stages of agriculture, harvesting, or until it reaches retail shelves, and another chain starts, called food loss, which is related to retailers and consumers.

One of the most wasted and costly food items is bread, which is considered a staple diet for many people around the world. Through conducting this study on the reality and background of bread waste in consumption in Algeria, and performing an analytical study on this situation in the state of Setif, we have arrived at a range of results, including:

- Subsidized bread is considered a basic commodity and an authentic food style for the Algerian citizen.

- The prices of subsidized bread in Algeria are very low compared to its production cost, as it costs the government's budget huge amounts that are not reflected in its prices.

- The absence of a well-regulated policy to address the phenomenon of bread wastage.

- The amount of bread recovered at landfills and technical dumping centers does not reflect the true number of wasted bread, as there are huge quantities sold to poultry and sheep farmers at symbolic prices that do not reflect its true cost.

- There is no correlation between the population size and the increasing phenomenon of bread wastage.

- The disposal of wasted bread is done through informal methods, such as selling it to livestock farmers at nominal prices that do not reflect the production cost.

-Hypothesis testing:

- first Hypothesis: correct

The absence of a consumer culture is considered one of the main reasons for the increasing phenomenon of food waste of bread in Algeria.

- Second Hypothesis: correct

The lack of a clear and well-regulated policy by Algeria is a contributing factor to the issue of bread waste.

8 . Recommendations:

After reviewing the results, the following set of recommendations can be proposed:

- The necessity of conducting in-depth and accurate scientific studies on the true causes of bread waste phenomenon, through the involvement of several relevant ministries such as the ministries of industry, commerce, and agriculture…

- Adjust the bread support policy to only target its true beneficiaries through the use of well-thought-out mechanisms.

- The government should work on encouraging families to reduce bread waste through comprehensive plans that focus on individual awareness, as addressing the problem starts with the family as the primary place to find solutions, through:

- Improving consumption habits by purchasing only the individual's necessary amount of bread, which reduces waste and saves more money.

- Finding other ways to use the bread that has been discarded.

- Showing gratitude after a meal by not leaving food on the plate.

- Solving this problem by organizing campaigns to encourage people to finish everything on their plates.

- Following healthy storage systems to use excess bread and recycle it for future use.

-

9.List of references:

Articles:

- Yasmin Al-Sarabi, Ali Al-Khudar. (2016), ***Bread waste in Jordan***, Dirasat Journal, Humanities and Social Sciences, Volume 43.

- Mohammed Al-formani. (2021), ***Towards an integrated strategy to deal with food waste***, Al-Shorouk Magazine, available on the website: www.shorouknews.com

Interventions :

- Jenny Gustavios et al. (2011), ***Food loss and waste in the world***, Global Food Preservation Conference, Germany.

Reports:

-Alasqua workshop UNEP, ***Baseline Measurement of Food Waste*** ,2021.

- Eco-generation organisation, ***waste of Bread in Algeria***. Tunza Eco Generation Ambassador Report (eco-generation.org)(17/ 11/2022).

- Weekly report on household waste and its equivalents in the state of Setif.

10. Appendices:

Annex 1: Weekly Report on Household Waste and Similar Materials at the Level of Setif Province. Week 1: From 13/04/2021 to 19/04/2021.

The amount of bread retrieved at landfill and technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste produced (tons/week)	Number of population (individuals)	Municipal
0	**8**	**75.6**	**75.6**	**75.6**	**75.6**	**10733**	Hammam Sokhna
0	**0**	**0**	**15**	**15**	**15**	**14000**	Taya
0	**0**	**0**	**7**	**15**	**15**	**9548**	Tella
0	**0**	**98**	**98**	**6,08**	**98**	**16103**	Babor
0.003	**0.003**	**12**	**12**	**1,2**	**12**	**10000**	Serdj El Ghoul
0	**0.69**	**0**	**280**	**280**	**280**	**64821**	*Aïn Azel*
//	**0.09**	**0**	**224**	**224**	**224**	**43 000**	Aïn Lahdjar
//	**237**	**182**	**56**	**250**	**250**	**45786**	Beïda Bordj
//	**37**	**0**	**76**	**76**	**76**	**26500**	*Bir Haddada*
0	**0**	**0**	**64.5**	**4**	**70**	**18328**	*Maoklane*
0	**0**	**0**	**79.57**	**3,06**	**85.92**	**26000**	*Tala* Ifacen
331	**536**	**0**	**210**	**6,9**	**210**	**30319**	Amoucha
0.010	**0.038**	**9.59**	**9.59**	**9.59**	**9.59**	**4000**	Oued El Bered
0	**0**	**0**	**10**	**9**	**9**	**27000**	Tizi N'bechar
0	**30**	**0**	**280**	**9.02**	**280**	**34226**	Salah Bey
0	**0**	**0**	**0**	**0**	**0**	**0**	*Boutaleb*
0,202	**0,202**	**0**	**42**	**2.4**	**40**	**16530**	El Hamma
0,022	**0.022**	**0**	**14**	**1.02**	**14**	**13604**	*Ouled Tebben*
The amount of bread retrieved at landfill and technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste produced (tons/week)	Number of population (individuals)	Municipal

0	**0**	**0**	//	**5,25**	**102**	**18542**	Rasfa
0	**0**	**245**	**245**	**3.5**	**245**	**71000**	Ain Arnat
0	**0**	**140**	**140**	**5**	**140**	**27550**	*El Ouricia*
0	**0**	**61.25**	**61.25**	**3.06**	**61.25**	**205000**	Ain Abbessa
0	**0**	**120**	**120**	**1.7**	**120**	**20000**	Mezloug
0	**0,04**	**0**	**32**	**0.710**	**32**	**44036**	Ain El Kebira
0,03	**0.006**	//	**39.65**	**3.77**	**39.65**	**10500**	Dehamcha
0	**0.02**	**0**	**25-30**	**2.5**	**25-30**	**12571**	Ouled Adouane
0	**0,31**		**120**	**4**	**120**	**29456**	Bir El Arch
	0.129	**49**	**49**	**0,04**	**49**	**12366**	El Ouldja
5	**0.02**	**0**	**84**	**4.90**	**84**	**17172**	Bella
//	**0.14**	**0**	**105**	**7.79**	**149**	**19106**	Bouandas
0.00	**0**	**0**	**16**	**3 كغ**	**16**	**5341**	Ait Nawal M'zada
0	**0**	**20**	**30**	**3**	**36**	**12000**	Beni Ourtilane
0	**0.9**	**0**	**120**	**3.9**	**120**	**140000**	Aïn Oulmene
0	**0.8**	**0**	**60**	**3.87**	**120**	**31000**	*Ksar El Abtal*
0	**0.118**	**0**	**105**	**3.7**	**105**	**28365**	*Guellal*
0	**0**	**19**	**19**	**1.42**	**19**	**13092**	Ouled Si Ahmed
0	**0**	**46.5**	**46.5**	**2.80**	**58.9**	**21035**	Guelta Zerga
0	**0,094**	**0**	**104**	**3.02**	**104**	**34399**	Bazer Safhra
0	**0**	**75**	**75**	**4**	**75**	**19386**	*Beni Aziz*
0	**0.07**	**17.5**	**17.5**	**20**	**17.5**	**19000**	*Ain Sebt*
0	**0.5**	**120**	**120**	**2.5**	**20**	**8000**	M'aouia
0,052	**0,052**	**0**	**57,5**	**12,46**	**57,5**	**4613**	*Harbil*
5,637	**313,234**	**1080**	**2925,5**	**943,99**	**3306,5**	**1234028**	The amount

Source: Setif Province Directorate of Environment.

Week 2: From 20/04/2021 to 27/04/2021.

The amount of bread retrieved at landfill and technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste produced (tons/week)	Number of population (individuals)	Municipal

Source: Setif Province Directorate of Environment.

0	0,0019	78,5	78,5	7,313	78,5	10733	Hammam Sokhna
0	0	0	16	26,66	16	14000	Taya
0	0	0	7	7	15	9548	Tella
0	0	0	98	98	60	16103	Babor
0,008	0,008	11	11	102	11	10000	Serdj El Ghoul
0	0,49	0	280	4,81	280	64821	*Aïn Azel*
0	0,03	0	32	7	32	43 ألف نسمة	Aïn Lahdjar
0	0,001	90	0	3,71	170	45786	Beïda Bordj
0	0,14	0	76	2,9	76	26500	*Bir Haddada*
0	0	0	66	4	70	18328	*Maoklane*
0	0,008	0	73,92	2,48	85,92	26000	*Tala* Ifacen
0,29	0,319	0	224	7,28	224	30319	Amoucha
0,03	0,13	7,86	8,05	2,29	8,05	4000	Oued El Bered
0	0,36	0	20	2	20	27000	Tizi N'bechar
The amount of bread retrieved at landfill and technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste produced (tons/week)	Number of population (individuals)	Municipal
0	0,03	0	280	9,02	280	34226	Salah Bey
0	0	0	0	0	0	0	**Boutaleb**
0,105	0,105	0	43	2,5	42	16530	El Hamma
0,022	0,022	0	14	1,02	14	13604	*Ouled Tebben*
0	0,006	0	0	5,25	102	18542	Rasfa
0	1,176	285	245	3,5	245	71000	Ain Arnat
0	0,119	140	140	5	140	27550	*El Ouricia*
0	0,125	68,75	8,75	3,35	68,75	205000	Ain Abbessa
	0,405	115	115	2	115	20300	Mezloug
0,04	0,0448		32	0,71	32	44036	Ain El Kebira
	0,016		39,9	3,8	39,9	10500	Dehamcha
0	0,01	0	25-30	2,5	25-28	12571	Ouled Adouane
	0,093	0	63	5,67	70	12336	El Ouldja
0	0,037	0	85	4,9	85	17172	Bella
0	0,1	0	105	7,79	149	19106	Bouandas
0	0	0	24	3	24	7906	Aït Tizi
0	0	0	22	2,5	22	5341	Ait Nawal M'zada
0	0	25	25	2,5	30	12000	Beni Ourtilane
0,3102	0,3102	0	840	0,75	840	145000	Aïn Oulmene
0	0,02	0	50	2,45	85	31000	*Ksar El Abtal*
0	0,167	0	119	4	119	28365	*Guellal*
0	0,007	22	22	1,65	22	13292	Ouled Si Ahmed
0	0,015	0	35	9,28	35	3564	***Guenzet***
0,019	0,019	0	60	13	60	4613	*Harbil*
0,18	0,18	0	94	2	94	28700	Djemila
0,32	0,32	0	80	28	80	17574	***Beni Fouda***
1,3242	4,8149	843,11	3532,12	403,583	3940,12	1167666	The amount

Reducing food waste in bread consumption as a means to achieve food security - A case study of the state of Setif-

Week 3: From 28/04/2021 to 04/05/2021

Source: Setif Province Directorate of Environment.

The amount of bread retrieved at landfill and technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste produced (tons/week)	Number of population (individuals)	Municipal
0	**0,012**	**75,5**	**75,5**	**7,034**	**75,5**	**10733**	Hammam Sokhna
0	**0,0085**	**0**	**16**	**1,32**	**13**	**14000**	Taya
0	**0,093**	**0**	**8**	**6,5**	**13**	**9548**	Tella
0	**0,016**	**98**	**98**	**6,08**	**98**	**16103**	Babor
0,005	**0,005**	**14**	**14**	**1,4**	**14**	**10000**	Serdj El Ghoul
0	**0,004**	**0**	**55**	**3,5**	**65**	**18328**	Maoklane
0	**0,015**	**0**	**88,63**	**3,41**	**96,34**	**26000**	Tala Ifacen
0	**1,115**	**245**	**245**	**0,0035**	**245**	**71000**	Ain Arnat
0	**0,077**	**98**	**98**	**0,0035**	**98**	**27550**	El Ouricia
0	**0,206**	**67,2**	**67,2**	**0,00327**	**67,2**	**205000**	Ain Abbessa
0	**0,41**	**123**	**123**	**0,002**	**123**	**20000**	Mezloug
0,054	**0,0604**	**0**	**30**	**0,71**	**30**	**44036**	Ain El Kebira
0	**0,02**	**0**	**39,1**	**3,72**	**39,1**	**10500**	Dehamcha
0	**0,04**	**0**	**30**	**2,5**	**28**	**12571**	Ouled Adouane
0,05	**0,107**	**0**	**55**	**5,26**	**65**	**12366**	El Ouldja
0	**0,033**	**0**	**84**	**4,9**	**84**	**17172**	Bella
The amount of bread retrieved at landfill and technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste produced (tons/week)	Number of population (individuals)	Municipal
0	**0,02**	**0**	**21**	**3**	**21**	**5341**	Ait Nawal M'zada
0	**0**	**24**	**24**	**2,66**	**32**	**12000**	Beni Ourtilane
0	**0**	**0**	**0**	**0,004**	**64**	**15311**	**Ain Legredj**
0,3102	**0,3102**	**0**	**900**	**0,75**	**0**	**140000**	Aïn Oulmene
0	**0,02**	**0**	**50**	**2,74**	**85**	**31000**	Ksar El Abtal
0	**0,167**	**0**	**119**	**4**	**119**	**28365**	Guellal
0	**0,007**	**22**	**22**	**1,65**	**22**	**13092**	Ouled Si Ahmed
0,045	**0,045**	**0**	**17**	**5,7**	**217**	**38219**	**Bougaa**
0	**0,025**	**0**	**70**	**4,82**	**70,5**	**14633**	**Ain Roua**
0	**0**	**0**	**0**	**1**	**100**	**14249**	**Beni Hocine**
0,09	**0,09**	**0**	**94**	**3**	**94**	**28700**	Djemila
0,24	**0,24**	**0**	**90**	**0,035**	**85**	**17574**	**Beni Fouda**
0,7942	**3,1461**	**766,7**	**2533,43**	**75,70527**	**2063,64**	**883391**	The amount

Week 4: From 05/05/2021 to 11/05/2021

Source: Setif Province Directorate of Environment.

The amount of bread retrieved at landfill and	The amount of bread	The amount of waste processed at	Amount of waste generated	Amount of waste produced per	Amount of waste	Number of population (individuals)	Municipal

technical landfill sites (tons/week)	discarded by residents (tons/week)	municipal landfills or technical landfill sites (tons/week)	from collection and transportation (tons/week)	citizen (kg/week)	produced (tons/week)		
0	**0,024**	**76,5**	**76,5**	**7,12**	**76,5**	**10733**	Hammam Sokhna
0	**0,011**	**0**	**15**	**1,53**	**15**	**14000**	Taya
0	**0,031**	**0**	**8**	**6,5**	**13**	**9548**	Tella
0	**0,016**	**188**	**188**	**11,67**	**188**	**16103**	Babor
0,002	**0,002**	**12**	**12**	**1,2**	**12**	**10000**	Serdj El Ghoul
0	**1,063**	**245**	**245**	**0,0035**	**245**	**71000**	Ain Arnat
0	**0,073**	**238**	**238**	**0,0085**	**238**	**27550**	El Ouricia
0	**0,054**	**62,3**	**62,3**	**0,00303**	**62,3**	**205000**	Ain Abbessa
0	**0,375**	**117**	**117**	**0,002**	**117**	**20000**	Mezloug
0	**31,5**	**0**	**180**	**4,08**	**180**	**44036**	Ain El Kebira
0	**0,018**	**0**	**38,8**	**3,7**	**38,9**	**10500**	Dehamcha
0	**0,035**	**0**	**25**	**2,5**	**25**	**12571**	Ouled Adouane
0	**0,03**	**0**	**120**	**4**	**120**	**29456**	**Bir el arch**
0	**0,034**	**0**	**82**	**4,77**	**82**	**17172**	Bella
0	**17**	**60.5**	**60.5**	**7**	**60.5**	**8558**	**Tachouda**
0	**0**	**0**	**20**	**3,5**	**20**	**5341**	Ait Nawal M'zada
0,17	**0,17**	**0**	**840**	**0,75**	**840**	**140000**	Aïn Oulmene
0	**0,03**	**0**	**40**	**3,44**	**90**	**31000**	Ksar El Abtal
The amount of bread retrieved at landfill and technical landfill sites (tons/week)	The amount of bread discarded by residents (tons/week)	The amount of waste processed at municipal landfills or technical landfill sites (tons/week)	Amount of waste generated from collection and transportation (tons/week)	Amount of waste produced per citizen (kg/week)	Amount of waste produced (tons/week)	Number of population (individuals)	Municipal
0	**0,167**	**0**	**119**	**4**	**119**	**28365**	Guellal
0	**0,008**	**24**	**24**	**1,8**	**24**	**13092**	Ouled Si Ahmed
0,58	**0,12**	**0**	**203**	**5,31**	**32**	**38219**	**Bougaa**
0	**0,285**	**0**	**280**	**4,31**	**280**	**64821**	Aïn Azel
0	**0,13**	**0**	**29**	**0,66**	**29**	**43961**	Aïn Lahdjar
0	**0,01**	**0**	**10**	**4,37**	**200**	**45786**	Beïda Bordj
0	**0,31**	**0**	**76**	**0,96**	**76**	**26500**	Bir Haddada
0,12	**0,19**	**0**	**27**	**5,1**	**71**	**14633**	**Ain Roua**
0	**0**	**0**	**100**	**1**	**100**	**14249**	**Beni Hocine**
0,095	**0,,95**	**0**	**90**	**3,13**	**90**	**28700**	Djemila
0,27	**0,27**	**0**	**90**	**0,035**	**90**	**17574**	**Beni Fouda**
0,267	**0,394**	**0**	**237**	**7,81**	**237**	**30319**	**Amoucha**
0,035	**0,08**	**5,2**	**5,2**	**1,3**	**5,2**	**4000**	Oued El Bered
0	**0,08**	**0**	**87**	**3,1**	**87**	**27000**	Tizi N'bechar
0	**0**	**75**	**75**	**4**	**75**	**19386**	Beni Aziz
0	**0.07**	**17.5**	**17.5**	**20**	**17.5**	**19000**	Ain Sebt
0	**0.5**	**120**	**120**	**2.5**	**20**	**8000**	M'aouia
0	**0,06**	**0**	**28**	**5,49**	**28**	**3564**	**Guenzet**
0,06	**0,06**	**0**	**69**	**14,95**	**69**	**4613**	Harbil
0	**0,145**	**0**	**1120**	**36,08**	**1120**	**34226**	Salah Bey
0	**0**	**0**	**182**	**1,8**	**182**	**12800**	**Boutaleb**
0,503	**0,503**	**0**	**256**	**15,48**	**256**	**16530**	El Hamma
0,088	**0,088**	**0**	**60**	**4,41**	**60**	**13604**	Ouled Tebben
0	**0,04**	**0**	**0**	**21**	**408**	**18542**	Rasfa
2,19	**5.0495**	**1848,5**	**6280,3**	**263,92**	**6706,4**	**1266352**	The amount