# The Uniqueness of Israeli Food Production and Consumption

**Approximately 450,000 Israeli households suffer from food insecurity**

The household expenditure on food consumption in Israel stands at about 17% of the average household’s consumption basket and about 22% of the consumption basket of households in the lower two deciles of the population. Food is much more than an essential component of a household’s consumption basket. Food consumption is a basic existential need, and balanced nutrition is essential for ensuring the health of the general population and in particular the development of babies and children. Therefore, a shortage of food or insufficient consumption of essential nutrients can cause potential health issues, at a cost that exceeds the food’s market value, which represents its production cost through all stages of the value chain.

Israel is characterized by a food expenditure rate that is among the highest in the developed world; at the same time, it has the highest poverty rate among OECD countries[[1]](#footnote-1). As a result, food insecurity in Israel is a particularly severe problem. BDO's analysis of the report issued by the National Insurance Institute in December 2021 found that 16.2% of Israeli households suffer from food insecurity, which is equivalent to approximately 450 thousand households that suffer from food insecurity in Israel[[2]](#footnote-2). From an economic perspective, this indicates that a food insecure household spends approximately 30% less on food than those who enjoy normative levels of consumption.

Food is a unique commodity, not only in terms of its consumption characteristics, but also in terms of its production properties. Growing and producing food requires the use of natural resources that are relatively scarce or that have substantial economic costs: energy, water, and land. Many of these are non-renewable resources[[3]](#footnote-3) and their use also runs the risk of impacting water, land and air quality and harming biodiversity, along with greenhouse gas emissions that lead to climate change. Moreover, collecting and disposing of food surpluses in landfills carries additional environmental costs.

In a small, arid country like Israel, water and land are valuable, limited resources. The need to use land and water resources to grow surplus agricultural produce that is later lost or wasted, incurs further environmental and social costs, beyond the direct economic cost.

The nutritional components found in food are derived almost entirely from agricultural products, including vegetables, fruits, legumes, dairy products, eggs, meat, fish, oils etc. At the same time, agricultural production has an inherently high level of uncertainty resulting from external factors such as pests, weather, diseases, and more.

This report examines the issue of food waste and the economic, social and environmental viability of its rescue, based on quantifiable estimates and assessments. It includes updated data and methodological improvements based on experience accumulated during the preparation of the six previous reports. This year’s report also includes a special, expanded section presenting an international comparison of food waste and rescue policy, written in cooperation with the Harvard Law School Food Law and Policy Clinic (FLPC)[[4]](#footnote-4), and the Global FoodBanking Network (GFN)[[5]](#footnote-5) who have launched the Global Food Donation Policy Atlas[[6]](#footnote-6).

# 2. Food Waste: How Much Food is Wasted in Israel?

**2.6 million tons of food were wasted in Israel in 2021**

The findings of the 2021 National Food Waste Report indicate the scope of food waste was approximately 2.6 tons, an increase of approximately 5% in comparison to the previous report (the 2020 National Food Waste Report).

Households returned to consuming more food away from home, meaning in the institutional sector, which is characterized by high levels of food waste, rather than eating at home where food waste levels are lower. This transition made a significant contribution to the growth in food waste in 2021, compared to the previous year that was characterized by unchanged levels of food waste because of the steep decline in institutional consumption [more on this in the following chapters]. The nearly total restoration of the institutional sector (other than catering halls) made a significant contribution to both an increase in consumption and increase in food waste.

Food waste estimates in Israel are based on a unique value chain model for domestic food production.[[7]](#footnote-7) Estimated at approximately 2.6 billion tons, food waste in Israel constitutes about 37% of overall domestic food production. In the agricultural sector, the amount of food produced in 2021 was similar to that produced in recent years, about 6.9 million tons, and increase of 0.4% over 2020.

Total food waste in Israel through all stages of the value chain **is the equivalent of about NIS 675** per month per household:

**Estimated Food Waste in Israel\* in 2021**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Waste/ household****NIS/month** | **Agriculture** | **Processing & Packaging** | **Industry** | **Retail & Distribution** | **Institutional Consumption** | **Household Consumption** | **Total** |
| Fruit & Vegetables | 64 | 22 | 2 | 74 | 37 | 134 | 334 |
| Grains & Legumes | 2 | 1 | 1 | 21 | 35 | 92 | 152 |
| Meat, Fish & Eggs | 11 | 2 | 13 | 50 | 29 | 46 | 151 |
| Milk & Dairy | 4 | 1 | 1 | 5 | 4 | 23 | 38 |
| **Total** | **81** | **25** | **18** | **150** | **106** | **295** | **675** |

\* A waste of 675 NIS per household per month reflects the waste throughout the entire value chain, including direct household expenditure.

Source: BDO estimates

In monetary terms, about 20% of the value of the wasted food, which is equivalent to approximately NIS 4 billion, occurs during various stages of production. This loss of NIS 4 billion in value represents approximately 13% of the total value of agricultural production in Israel. Approximately 80% of the waste, equivalent to approximately NIS 16.5 billion, occurs during the retail stages of distribution and consumption.

Economically, the value of agricultural commodities per ton increases as they progress along the production value chain, and food entails the investment of additional costs for sorting, processing, transport, distribution, and retailing. The authors of this report assessed the waste value in the early stages of production (growing, packaging, and manufacturing) based on wholesale prices that were paid to farmers. Waste during the later stages in the value chain was estimated based on retail food prices.

A comprehensive value chain model for various food production and consumption stages was designed to assess food waste and the potential for food rescue in Israel. This model is based on a bottom-up approach and the analysis of data relevant to the agricultural production, storage, import, export, industrial aspects, distribution, and consumption of a sample of around 50 different types of food.[[8]](#footnote-8) The data includes processed produce that was translated to terms of fresh produce.

**Rate of Food Waste in Each Stage of the Value Chain (in Thousands of Tons)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Fruit & Vegetables** | **Grains & Legumes** | **Meat, Fish & Eggs** | **Milk & Dairy** | **Total** |
| **Amount of Agricultural Production**  | 4.148 | 372 | 742 | 1,659 | 6,922 |
| **Agricultural Production Waste** | 552 | 21 | 37 | 63 | 673 |
| **Waste Rate** | 13% | 6% | 5% | 4% | 10% |
| **Amount After Processing & Packaging** | 3,596 | 351 | 706 | 1,597 | 6,249 |
| **Waste After Processing and Packaging** | 187 | 13 | 5 | 8 | 213 |
| **Waste Rate** | 5% | 4% | 1% | 1% | 3% |
| **Industrial Uses** | 616 | 336 | 581 | 1,579 | 3,113 |
| **Industry & Packaging Waste** | 21 | 17 | 29 | 19 | 86 |
| **Waste Rate** | 3% | 5% | 5% | 1% | 3% |
| **Marketing**  | 3.640 | 1,511 | 831 | 1,780 | 7,762 |
| **Marketing Waste** | 331 | 45 | 40 | 30 | 445 |
| **Waste Rate** | 9% | 3% | 5% | 2% | 6% |
| **Consumption** | 3.296 | 1,466 | 791 | 1,700 | 7,253 |
| **Consumption Waste** | 671 | 298 | 95 | 105 | 1,168 |
| **Waste Rate** | 20% | 20% | 12% | 6% | 16% |
| **Total Waste** | 1,762 | 393 | 205 | 225 | 2,585 |

For each type of food, the volume of input and output was measured in terms of gross agricultural product and waste rate for every stage of the value chain of the food production, distribution, and consumption processes in Israel. The assessment presented here is based in part on agricultural waste surveys conducted and updated by the Volcani Center.[[9]](#footnote-9) The total estimated food waste for the economy as a whole and for each food type is based on the waste estimated for each stage and each product in the value chain.

The data on food waste presented in this report is based on estimates that weighted information from a wide range of sources and data that was available to the authors, with the cooperation of the Central Bureau of Statistics, the Ministry of Agriculture, the Ministry of Environmental Protection, and the Ministry of Social Affairs. Additional sources of information included conversations and interviews with experts working in the field, study findings, and results from previous reviews, international comparative studies and more.

**Estimated Food Waste in Israel, in Thousands of Tons per Year**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Waste in Thousands of Tons** | **Agriculture** | **Processing & Packaging** | **Industry\*** | **Retail & Distribution** | **Consumption** | **Total** |
| Fruit & Vegetables | 552 | 187 | 21 | 331 | 671 | 1,763 |
| Grains & Legumes | 21 | 13 | 17 | 45 | 298 | 393 |
| Meat, Fish & Eggs | 37 | 5 | 29 | 40 | 95 | 205 |
| Milk & Dairy | 63 | 8 | 19 | 30 | 105 | 225 |
| **Total** | **673** | **213** | **86** | **445** | **1,168** | **2,586** |

\* Food waste in the industrial segment does not include food waste that is recycled, primarily as animal feed.

Food waste is generally divided into two main stages of the value chain:

1. From agricultural production to the final stage of industrial food processing (food waste in the production process).
2. From retailing and distribution to the end consumer (food waste in consumption).

There are wide variations in food waste across the various food types and stages of the value chain. In each stage of the value chain, the amount of food wasted out of the total amount of food produced or consumed was examined. Thus, for example, 10% of the food produced in agriculture was wasted during the agricultural stage. Likewise, 16% of food in the consumption segment (household and institutional consumption) – goes to waste.

**The Rate of Food Waste throughout the Value Chain**

Fruit and vegetables constitute a major part of food waste in Israel, which stems both from the fact that they are a substantial part of Israel’s agricultural production and the high waste rate. High waste rates for fruit and vegetables are not unique to the Israeli economy. An international comparison shows similar rates for fruit and vegetable waste in Europe. Compared to the United States, the waste rate in Israel is lower, however it consists of lower waste rates in the agricultural and consumption stages and a higher waste rates in the intermediate stages.[[10]](#footnote-10)

**The economic value of wasted food in Israel is around NIS 23.1 billion, constituting approximately 1.4% of the national product, as estimated by the authors of this report.** Approximately 7% resulted from the unnecessary waste of natural resources (land and water). In addition, the unnecessary cost of greenhouse gas emissions and air pollutants in each stage of the value chain due to the growing and producing of unconsumed food, is estimated at around NIS 1.4 billion. The cost of processing and packaging wasted food is estimated at around NIS 820 million. Therefore, the total cost of wasted food, including the waste of natural resources, the cost of greenhouse gas emissions and air pollutants, and the cost of waste processing, stands at **approximately NIS 23.5 billion**.

|  |  |
| --- | --- |
| Value of Wasted Food[[11]](#footnote-11) | NIS 21.3 billion |
| Rate of Wasted Food Out of the GNP | 1.4% |
| Value of Wasted Food Up To and Including the Industry Stage | NIS 4.1 billion |
| Rate of Wasted Food Up To the Industry Stage Out of the Total Value of Agricultural Produce in Israel | 13% |
| Value of wasted food from the Retail and Distribution Stage Up To Consumption | NIS 17.2 billion |
| Rate of Wasted Food From the Retail and Distribution Stage Out of the Value of Consumed Food | 18% |

Source: BDO estimates

In quantitative terms, approximately 55% of the waste occurs in the stages of production, industry, retail, and distribution, even before the food has reached the household or institutional consumer. In monetary terms, approximately 58% of the value of the food is lost in the stages of private and institutional consumption.

1. **Food Waste and Rescue in the Retail and Distribution Sector[[12]](#footnote-12)**

**NIS 5 billion worth of food waste in the retail and distribution sector; an increase in food waste in 2021 in the retail sector compared to 2020**

The volume of food sales in Israel in 2021 stood at about NIS 90 billion a year, sold to consumers through supermarkets, open markets, grocery stores, small retailers, and the institutional sector. The total loss in the retail and distribution sector stood at around 445 thousand tons of food, valued at approximately NIS 4.5 billion, which constitute about 5.5% of retail food sales. Of this, the amount of rescuable food was about 356 thousand tons, valued at approximately NIS 4 billion.[[13]](#footnote-13) In addition, the environmental cost of food waste in the retail and distribution sector was approximately NIS 785 million.[[14]](#footnote-14)

**Economic Waste in the Retail and Distribution Sector**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Waste Rate** | **Value in Billions of NIS** | **Wasted Food in Thousands of Tons** |
| Fresh Fruit & Vegetables | 11% | 2,400 | 328 |
| Bread & Baked Goods | 11% | 275 | 18 |
| Grains & Legumes | 2% | 400 | 37 |
| Meat, Fish & Eggs | 5% | 1,600 | 27 |
| Milk & Dairy | 2% | 200 | 30 |
| Frozen & Other | 1% | 80 | 6 |
| **Total** | **5.5%** | **4,955** | **445** |

The main causes of food waste in the retail and distribution sector are food that has reached or will soon reach its expiration date, food with aesthetic defects on the packaging or the product itself, and food damaged in the sales process. Food manufacturers, distributors, and retailers have a economic incentive to minimize food waste by managing their supply chain effectively, maintaining proper storage conditions, and planning their inventory. That said, it should be noted that there are return agreements between retailers and distributors and food manufacturers whereby unsold food can be returned to the manufacturer at no cost.[[15]](#footnote-15) In these instance, there is no incentive.

Nevertheless, it should be noted that surplus food in the retail and distribution sector is inevitable, even when the distribution and sales systems are planned optimally. This is because retailers must ensure that a wide variety of food is available to their customers at all times, as consumers do not tolerate shortages of food items they desire. Hence, the potential loss to retailers due to the unavailability of food products is far greater than the cost of creating surpluses. In other words, food surpluses are an inherent part of the retail selling process.

From an economic perspective, the fact that surplus food is wasted rather than rescued reflects a market failure. Therefore, one of the government's policy challenges is to create a system of incentives for rescuing these surpluses and getting them to those in need.

Naturally, the waste rate is higher for fresh produce and products with short shelf-lives, such as fruit, vegetables, bread, and baked goods.

**Food Waste Rate in the Retail and Distribution Sector for Selected Food Categories**

An international comparison shows that the waste rate in the Israeli retail and distribution sector is similar to that accepted in the developed world, even though there is potential for higher waste rates due to Israel’s warmer climate. This is a testament to the relatively high standards of inventory management practiced by the Israeli retail and distribution sector. The rate of food waste in developing countries is higher, primarily due to inadequate distribution, storage, and selling conditions.

**Quantitative Waste Rates in the Retail and Distribution Sector – An International Comparison**

Source: FAO data and BDO analyses

The investment food sellers made in establishing advanced logistical centers, online inventory management and demand planning systems, and keeping an unbroken cold chain have contributed to reducing the volume of waste in the retail and distribution sector.

During 2021, customers returned to at a higher rate of purchasing from stores and markets where the waste rates are relatively high. Therefore, there was a slight increase in the food waste in this segment.

**Consumers Transition to Buying from Stores with Lower Waste Rates**

שיעורי אובדן נמוכים מאוד

שיעורי אובדן נמוכים

שיעורי אובדן גבוהים

That said, consumers did continue purchasing from online retailers in 2021. Online retail may be more environmentally friendly than traditional retail, in part due to the decrease in number of individual trips to various stores and consolidation of many items being delivered to multiple addresses in a single trip. A study conducted by the University of Washington and published in 2014[[16]](#footnote-16) found that if routes are planned efficiently, delivery services could potentially reduce up to 80% of carbon emissions produced by consumers travelling to stores.

Waste in the retail and distribution sector has high economic value as it includes all the previous investments made in growing, manufacturing, packaging, and transporting the food. This waste refers to food that was ready to be sold and consumed but was wasted before it reached the end consumer. Due to the characteristics of this waste, the vast majority of the food at this stage is rescuable. Indeed, out of food valued at NIS 5 million that is wasted, approximately NIS 4 billion is rescuable. Food waste in the retail and distribution sector stems from three primary causes.

**Three primary causes of food waste in the retail and distribution sector:**

1. **Short expiration dates**

Food products by nature have a limited shelf life and inevitably, some products will reach their expiration date before they are sold. Food that has reached its expiration date can no longer be sold or distributed to the needy. Therefore, rescuing food in the retail and distribution sector requires incentives to facilitate inventory management that ensures food with a short expiration date is sold at a lower price or distributed to the needy before it expires. This type of inventory management is feasible, as the amount likely to be consumed can be statistically estimated and compared to the current inventory, allowing surpluses to be donated at an earlier stage and certainly before the food expires. Similarly, the food expiration classification policy should be reviewed and the meaning and differences between various labels related to expiration dates should be explained to consumers.

1. **Aesthetic defects in the product and packaging defects**

Aesthetic defects lower the market value of food products, but in most cases do not reflect damage to these products’ nutritional value. When such food is wasted, this reflects a market failure, because while the market value of the defective product is low, the nutritional value it holds is completely intact.

1. **Damaged food**

Damage caused to food in the logistical process is a relatively minor cause of food waste. Damage can be caused in various stages of the retail and distribution process and includes broken eggs, spilt products, fruit and vegetables that have fallen or been damaged, leftovers from butcher shops and deli departments, etc. This food cannot be rescued, but its volume is relatively small as maximal efforts are made to limit it. Moreover, it can be transferred for uses other than human consumption, such as animal feed and industrial use.

**Activity to Reduce Food Waster in the Retail and Distribution Sector**

Retailers and food manufacturers sometimes work to reduce waste and rescue food based on economic considerations. Food waste is reduced in several ways:

* **Discounts on surpluses -** when products are about to expire or their packaging has defects, retailers sometimes offer them at a discount.
* **Food donation –** this is done in acentralized and coordinated manner, based on agreements with food rescue non-profit organizations or in other cases, as local initiatives in supermarket branches.

Food manufacturers are also involved in food rescue activities. Some contract with non-profit organizations and donate production surpluses and food that is about to expire. In addition, products with aesthetic defects or defective packaging detected in the factory are sold in various secondary markets if the food is still safe and fit for human consumption.

1. OECD, Poverty rate, 2020. [↑](#footnote-ref-1)
2. National Insurance Institute, *Measures of poverty, and income inequality, according to data from 2020 and an estimate for 2021*. [↑](#footnote-ref-2)
3. *Value Chain Management Centre, Cut Waste, GROW PROFIT: How to reduce and manage food waste, leading to increased profitability and environmental sustainability*, Background paper, 2012. [↑](#footnote-ref-3)
4. https://hls.harvard.edu/clinics/in-house-clinics/food-law-and-policy-clinic/ [↑](#footnote-ref-4)
5. https://www.foodbanking.org [↑](#footnote-ref-5)
6. https://atlas.foodbanking.org/atlas.html [↑](#footnote-ref-6)
7. The value chain model does not include beverages, energy boosters, sugar, honey, and candy. [↑](#footnote-ref-7)
8. These estimates may include deviations or inaccuracies that are inevitable due to the lack of official data. Likewise, the amount of annual food waste also depends on random variables, such as extreme weather conditions, natural disasters, and pests, deviations in demand, etc. The data is indicative and intended to serve as a basis for public debate and further research and analysis. [↑](#footnote-ref-8)
9. Dr. Ron Porat, 2015 and 2016. [↑](#footnote-ref-9)
10. “Global Food Losses and Food Waste,” FAO, 2011 [↑](#footnote-ref-10)
11. Direct economic cost, without the cost of greenhouse gas emissions and air pollutants. [↑](#footnote-ref-11)
12. For waste analysis purposes, this report refers to the retail and distribution sector as a single sector and includes waste occurring from the end of the production stage until the produce is sold to the consumer. This includes finished produce that goes to waste at the manufacturers’ facilities, wholesale waste, returns from retailers to manufacturers, and food wasted by retailers. [↑](#footnote-ref-12)
13. The amount of rescuable food in the retail and distribution sector is based on BDO’s model for the retail sector, which is based on data from the Central Bureau of Statistics and information from the leading supermarket chains. [↑](#footnote-ref-13)
14. The environmental cost is not included in the market price of the wasted food, meaning that the natural resources wasted due to food waste in this sector are excluded. [↑](#footnote-ref-14)
15. These agreement permit returning a certain percentage (as agreed) of the unsold merchandise. [↑](#footnote-ref-15)
16. http://depts.washington.edu/sctlctr/sites/default/files/research\_pub\_files/PacTrans-Changing+Retail\_Business\_Models.pdf [↑](#footnote-ref-16)