

Food waste worldwide - Top 10 countries

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Abstract

Food waste worldwide is beginning to become a "heavy" problem of one billion tons. It is almost unbelievable that in 2021, global food waste reached an extraordinary value of 931 million tons. Of these, over 60% is represented by food waste at the household level. In this context, the research analysed which countries have the highest level of food waste, presenting a double Top 10: the first - Top 10 of the countries with the highest food waste at national level and the second - Top 10 countries with the highest food waste per capita, based on data collected from external sources, data provided by organizations and institutions, as well as reference publications in the field.

Keywords: Food waste, level, country, top, household, food security

1. Introduction

Current food waste, worldwide, should be a much better managed priority than it is currently, at the level of each country, but also in a global context. Although all countries, especially the developed ones, publicly state that they are taking sustained steps to reduce food waste, in fact this is not at all consistent, effective, and efficient, considering the fact that this influences, and even determines, global food security. [1-3]

The fact that different institutions and organizations worldwide (FAO, WHO, WWF)

present approximate data, which are often exceeded by those from certain sources, by others from different sources, denotes an inconsistency between data collection methods, which is why and measures to reduce food waste are hampered. [4-6]

At the same time, the food chain within the national food systems is often insufficiently monitored, and the states are content to *post-factum* the accumulated food waste and losses.[7]

2. Materials and methods

The research analyzes data collected from external sources, data provided by organizations and institutions, as well as reference publications in the field, in order to identify which are the top 10 countries in relation to the amount of total food waste, at national level, as well as the amount of

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food waste reported per capita. The data were collected from the 2021 reports, related to 2020. [8-10]

We considered food waste *per capita* more relevant because it more accurately expresses the extent of food waste. The fact that the consumers from one country wastes food more than consumers from another country reflects, on the one hand, the level of responsibility of the citizens of the respective country, their level of education regarding natural resources and responsibility towards their conservation, but, in the case of developing or underdeveloped countries, it also reflects the level of national infrastructure, access to energy sources for food preservation, as well as household equipment for this food preservation, which could reduce the level of food waste.[11-13]

3. Results and discussion

Food waste can have different causes, depending on the economic conditions of the respective country, the level of education of the population, the climatic and geo-political conditions, as well as other more or less objective factors.

As Statista [8] shows, the countries with the biggest quantities of food waste are countries where the economic conditions are generally precarious or totally precarious. (Table 1)

Table 1. The countries with the largest quantities of total food waste

STATE	TOTAL FOOD WASTE PER YEAR (tonnes)
CHINA	91,646,231
INDIA	68,760,163
USA	19,359,951
JAPAN	8,159,891
GERMANY	6,263,775
FRANCE	5,522,358
UNITED KINGDOM	5,199,825
RUSSIA	4,868,564
SPAIN	3,613,954
AUSTRALIA	2,563,110

Source: Statista

In large part, these enormous quantities of food waste are generated by the infrastructure in agriculture, namely the non-existence or insufficient existence of food preservation

technologies, at the level of primary productions (farms). [14-16]

At the same time, on the food chain in these countries, the situation is similar. Both, transport (logistics companies) and retail (regional traditional market) in these countries, do not provide optimal conditions for food preservation, which is why both losses and food waste are on a high level. Being countries with a large population, with very large geographical areas, the quantity of food waste and loss are high. [3, 17-19]. Thus, India and China together represent over 70% of the global quantity of food waste. (Figure 1).

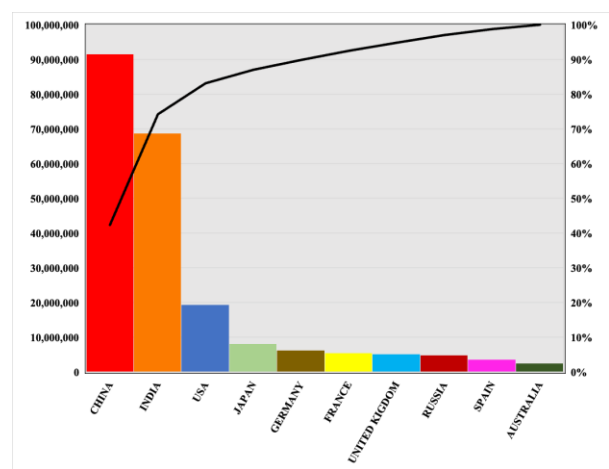


Figure 1. Total food waste quantities and cumulative percentages

As the Figure 3 shows, it can be concluded that Australia, for example, has the lowest total level of food waste among the top 10 countries ranked worldwide. Australia's total food waste is below 2.8% of China's and a little over 3.7% above India's. But at the level of food waste per capita, the situation is completely different.

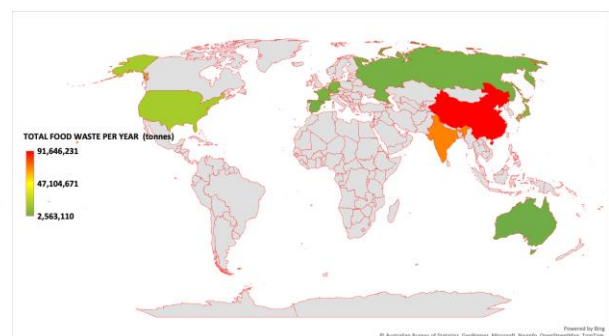


Figure 2. The geographical distribution of the largest quantity of total food waste per year at national level

It is appreciated that this assessment, at the national level, is synthetic and not exactly relevant, if the country's surface is taken into consideration and, above all, if it is not considered, first of all, the quantities of food waste at the level of each household. [20,21]

Thus, the quantities of food waste per household, and implicitly, per capita, is a much more objective and relevant indicator related to the responsibility of citizens and the state, towards foods and the natural resources that contributed to their production, processing, and distribution. (Table 2)

Table 2. The countries with the largest quantities of food waste per capita per years

State	Food waste per capita per year (kg)
China	64
India	50
USA	59
Japan	64
Germany	75
France	85
United Kingdom	77
Russia	33
Spain	77
Australia	102

Source: Statista - Forbes

In relation to food waste per capita, Australia, from the last place of the Top 10 of the countries with the highest food waste at national level, moves to the first place of the Top 10 countries with the highest food waste per capita. (Figure 2)

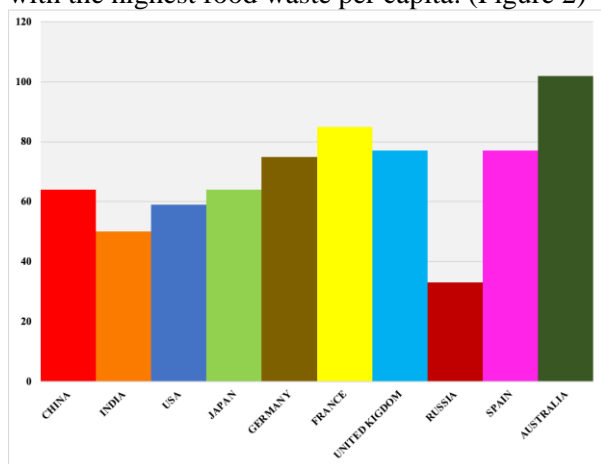


Figure 3. Food waste per capita per year

Although the economic level of Australia is not a low one, the geo-political situation is good and stable, but with all this, Australia is in first position worldwide in terms of food waste

reported per capita. Of course, this situation is debatable from a scientific point of view, because, as we have shown previously, different sources present different data, but even so, the situation in Australia is a worrying one.

To keep the same comparison, food waste per capita per year in 2020 in Australia was 204% higher than that of India, almost 160% higher than that of China and almost 310% higher than that of Russia, which is in the last position of food waste per capita per year, presented in the Figure 4.

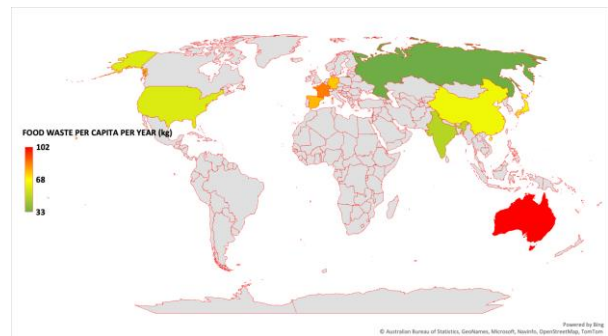


Figure 4. The geographical distribution of the largest quantity of food waste per capita per year

It is very relevant to analyze the constituents of these enormous quantities of food waste. According to WWF Report 2021, the largest amount of food waste is represented by fish and seafood. About 44% of fish and seafoods are wasted. [7, 22-24] (Table 3.)

Table 3. The percentages of food waste by food category

Category	% of wastage
Fish and seafoods	44
Fruits and vegetables	26
Roots, tubers, and oil crops	15
Cereals and pulses	14
Meat and meat products	12
Other	6

Source: WWF (World Wildlife Fund, U.S. World Wildlife Fund WWF. United States, 2001)

This situation can be justified by the fact that fish and seafoods are extremely perishable foods, which require low and constant storage temperature conditions throughout the food chain. It is already well known that sea and ocean fishing produce high food losses and that a large amount of the catch is dumped back into the sea or the ocean. On the other hand, at the consumer level, in households, fish and seafoods are among the first to deteriorate in personal refrigerators. [25,16,27]

But even under these conditions, the quantities of fish and seafood wasted are enormous, being wasted, moreover, important sources of animal proteins and valuable natural resources, which contributed and were consumed for their production and/or capture.

On the other hand, on the second position are fruits and vegetables. These are wasted in percentages of 26%, but according to other sources even over 30%. [27,28,29] (Figure 5.)

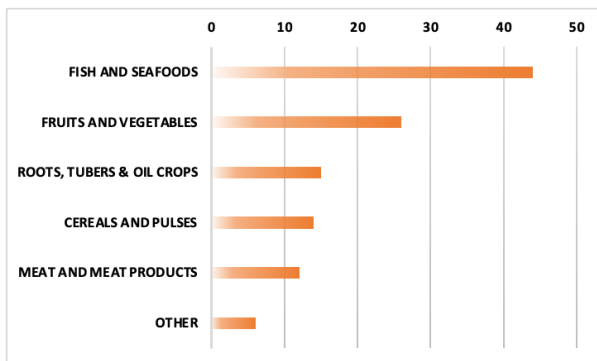


Figure 5. Food categories and related waste percentages worldwide

Vegetable products are not as perishable as fish and seafood, which, in a correct situation, should present very low losses and food waste. [30-33]

One of the reasons for vegetable productions are wasted, in general, is the aesthetic aspect. [9,13,22,31]. In supermarkets in urban areas, consumers choose the most aesthetic vegetable products, preferring them to those with irregular shapes or small imperfections. After a while, they deteriorate and are removed from the trade. At the same time, at household level, vegetables that are no longer very fresh are easily thrown away, without trying to process them or preserve them. [14,17,21]

At the same time, the roots, tubers, oil crops, cereals and pulses are wasted in percentages of 14-15%, although their preservation is higher, and they do not require very special transport, storage and marketing conditions. If the quantities of these wasted food products were analyzed, compared to the productions obtained, it would be definitely established that, in total, these products are in the first position of food waste. [18,22,25]

At the global level, the roots, tubers, oil crops, cereals and pulses represent the products with the highest productions, so that, quantitatively, the total food waste in these product categories

exceeds the food waste in other product categories, such as fish and seafoods, e.g.

4. Conclusions

Food waste is an aspect that is debated quite a lot in public spaces, but the measures applied to reduce it are not up to the debate. States with strong economies, with stable socio-political conditions, with a level of education of the population that could be assessed as satisfactory, present high levels of food waste. [1,3,6,7]

Most of the time, at the individual level, the impact of food waste on the environment, on the implicit waste of natural resources, is neglected or insufficiently assumed. If countries that do not have satisfactory production, transport, processing, conservation, or distribution infrastructures find themselves effectively unable to reduce food waste, thus having some mitigating circumstances, the states that have a high level of the quality of these infrastructures, cannot allocate any mitigating circumstance. [3,6,7]

And it is precisely these countries that are in the first positions of the Top 10 countries regarding food waste on a worldwide level. The population of these countries, such as Australia, Germany, France or the USA, have the educational level and sources of information sufficient for them to be aware and, implicitly, to undertake campaigns to reduce food waste, at the level of their own households, at a personal level. But this does not happen in fact. Of course, the respective states have the greatest responsibility in this regard, the young generation being the one that must be educated and trained in order to reduce food waste, first of all at the per capita level, and then at the national level.

The developed countries, in some cases, are content to ascertain post-factum the amount of food waste and to calculate what was the impact on the environment, generated by this food waste, but the measures adopted are not proportional at all to the amplitude of the phenomenon of exacerbated food waste.

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