

Shoresh Research Paper

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Food security in Israel Challenges and policies

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Abstract

The state of food security in Israel is better than in most countries, but the threats to food security arising from climate change, international conflicts and disruptions in global supply chains require better preparation for the future. Israel's population growth and the slowdown in the growth rate of its agricultural production are leading the country to increasingly rely on food imports. Such imports expose Israel to even greater global risks, and require the formulation of a risk management strategy. This necessitates the establishment of a governmental authority to oversee the formulation of the strategy, break it down into feasible objectives and policy measures, and supervise their implementation.

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Introduction

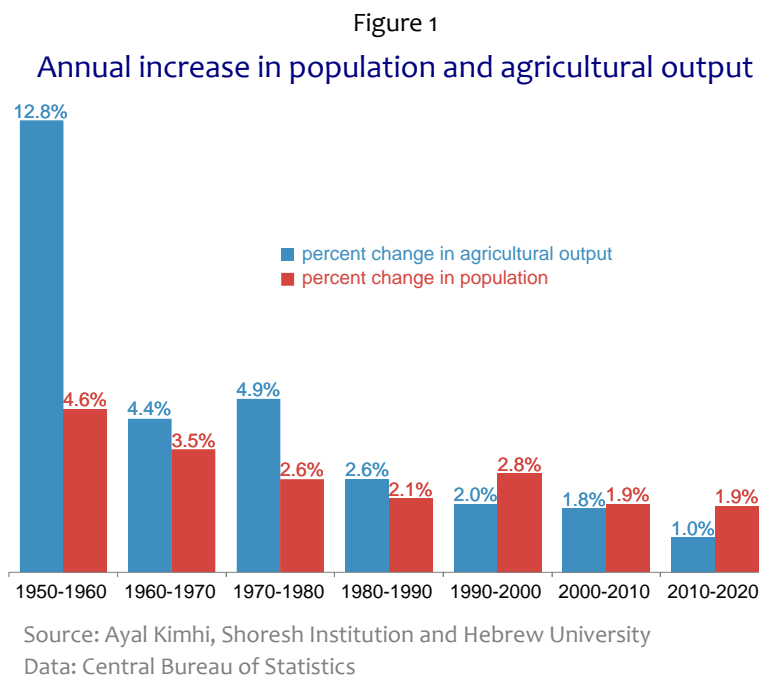
The internationally accepted definition of food security is that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food

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preferences and dietary needs for an active and healthy life. Measuring the level of food security – at the global level, at the country level, at the household level, or at the individual level – is a non-negligible challenge, but all governments, and many NGOs, see themselves as having an obligation to ensure food security for the citizens of their country. Ensuring food security requires a combination of policy measures in the fields of welfare, health, agriculture, environmental quality and international trade – and it’s an important component of national security. Modern food systems have increasingly succeeded in improving individuals’ access to food, in terms of both quantity and price. But they have been less successful in improving the nutritional and health value of the food basket, in protecting the environment (Ambikapathi et al., 2022), and in allowing all population groups to benefit equally from the improvements (Hawkes et al., 2022).

In the first years following Israel’s independence, there was not enough food in the country to feed the rapidly growing population resulting from the massive waves of immigration. Consequently, the government had to implement food rationing. However, the massive investments in agriculture bore fruit. In Israel’s first four decades, the quantity of agricultural output grew faster than the country’s population (Figure 1). In fact, since the 1950s, Israel has never again experienced food shortages.

The next time food security entered the public discourse was in 2007-2008, when the prices of agricultural commodities in international markets soared and led to a significant increase in the price of food in Israel as well (Figure 2). The real increase in Israeli food prices (that is, the increase in food prices above



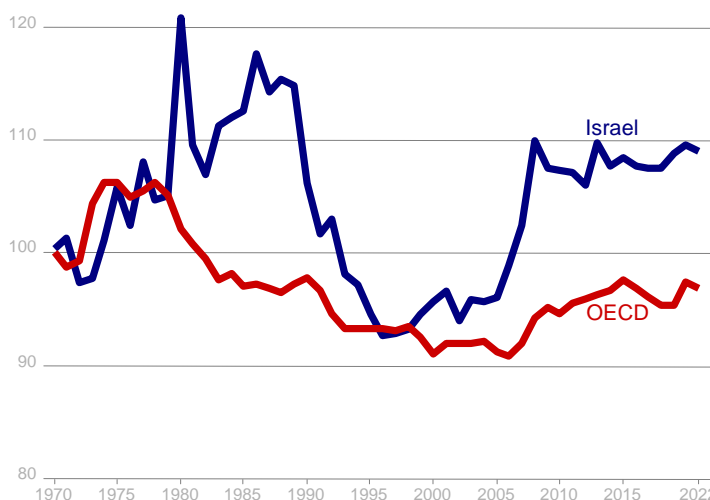
and beyond the growth of the consumer price index) was higher than the average real increase in the price of food in the OECD. This contributed to the outbreak of social protests in the summer of 2011.

The Commission for Economic and Social Change (the “Trachtenberg Commission”) was established following the social protests. Its report listed the food sector among the sectors needing a price reduction policy. At the same time, an “Inter-ministerial Commission for Examining the Level of Competitiveness

and Prices in the Markets for Food and Consumer Products” (“Kedmi Committee”) was established to study the characteristics of the food and consumer products markets, to locate market failures, if any, and to formulate recommendations for the target of improving consumer welfare.

The Kedmi committee report (Ministry of Industry, Commerce and Tourism, 2012) placed most of the responsibility for the sharp increase in the food price that began in 2005 on the low competitiveness of the food sector. Competitiveness in the food sector declined significantly in 2005 with the purchase of the Clubmarket retail chain by Shufersal, which resulted in an increase in the market share of the two largest chains (Shufersal and Mega). Market concentration allowed the large chains to raise food prices when producer prices rose due to the increase in the price of agricultural inputs, and to not lower food prices when producer prices fell – so that food prices remained high even after 2008, when the global recession led to a sharp drop in input prices, and the exchange rate also fell, which should make imported food cheaper.¹ The committee’s policy

Figure 2
Food price index in real terms*
Israel and OECD average, 1970-2022



* Food price index discounted by consumer price index

Source: Ayal Kimhi, Shoresh Institution and Hebrew University

Data: OECD

¹ This phenomenon is called “asymmetric price transmission”.

recommendations focused on reducing import tariffs on imported food products and actions in the consumer sector, as well as actions to reduce concentration in the markets. The bulk of these recommendations were not implemented.

The discourse on food security following the social protest focused on food prices. However, disruptions in global supply chains following the outbreak of the Covid pandemic in 2020 turned the spotlight on the danger of a possible food shortages in Israel. For the first time in decades, a serious public discussion began on the limitations of globalization and the importance of self-production of basic consumer goods. This discussion intensified with the onset of Russia's war on Ukraine, as both countries are large exporters of both energy and food. The damage to these countries' exports caused global price increases of agricultural commodities such as wheat and sunflower oil, as well as various energy products. Since modern agriculture needs a considerable amount of energy for its production and transport, higher energy prices lead to food price increases. In light of the emerging threats to food security in Israel, several key questions arise:

1. How does Israel's food security compare internationally?
2. To what extent can (or should) Israel rely on self-production of its food?
3. To what extent does the rise in food prices, and especially the prices of fresh agricultural produce, pose a threat to food security?
4. How successful are existing policy measures in dealing with these threats, and what is the potential of other policy measures?

This study addresses these questions, primarily within the context of the World Bank's food security index, which brings together a long list of elements affecting food security.

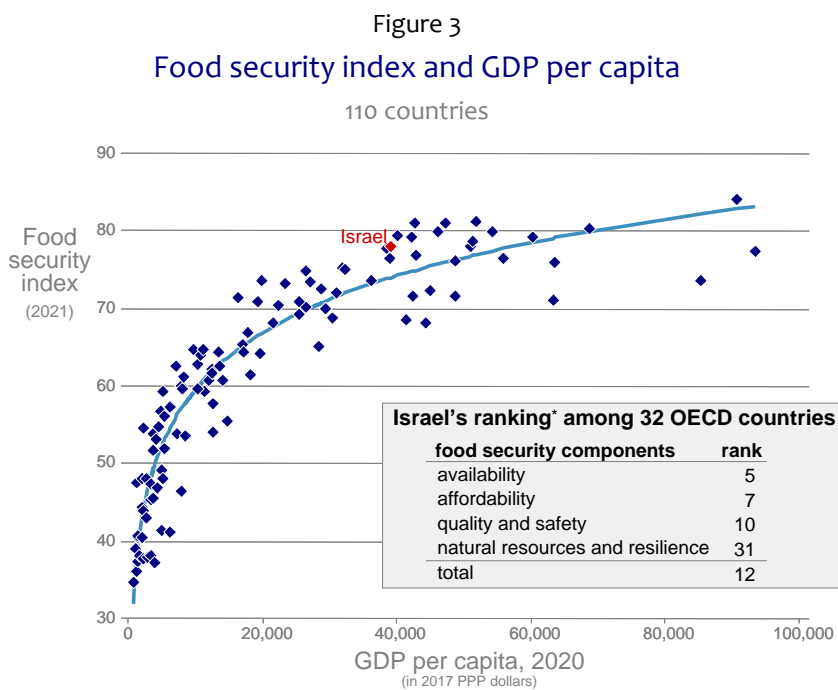
Food security in Israel compared with other countries

Figure 3 shows the composite food security index created by the World Bank and other organizations. This index, compiled with the help of a team of experts, is shown in the figure as a function of GDP per capita (commonly used to indicate national living standards). Not

surprisingly, food security increases as GDP per capita increases. Specifically, the food security index increases faster with at lower levels of GDP per capita – i.e., among the poorest countries. The growth in the index declines as countries becomes wealthier. Israel’s food security places it in 12th place among the 32 OECD countries that participated in the ranking (the country ranked first enjoys the highest food security). However, a

closer look at the components of the index provides a slightly less optimistic picture about the future, as it pertains to food security in Israel. In terms of food availability and affordability, Israel ranks fifth and seventh, respectively. In terms of food quality and safety, Israel ranks tenth. These rankings represent the state of food security in Israel today.

However, in the field of natural resources and resilience, Israel is ranked second to last. This implies that if appropriate measures are not taken, food security in Israel is expected to deteriorate in the future. To gain a better understanding about what these rankings mean, this study delves into each of these components separately. Table 1 shows the complete breakdown of the index components.



* The higher the rank, the higher food security index

Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: UNICEF 2022)

Table 1
Israel's ranking in the various components of the food security index (2021)¹

Food security indicators	weight	Israel's rank	Food security indicators	weight	Israel's rank
Availability	32.4%	5	Natural resources and resilience	17.6%	31
Sufficiency of supply	26.3%	2	Exposure	21.1%	9
Agricultural R&D	9.1%	32	Temperature rise	27.3%	10
Public expenditure on agricultural R&D	50.0%	15	Drought	25.0%	23-32
Access to agricultural technology, education and resources	50.0%	32	Flooding	22.7%	3
Agricultural infrastructure	14.1%	24	Sea level rise	25.0%	14
Road infrastructure	35.7%	24-30	Water	14.0%	15-25
Air, port and rail infrastructure	35.7%	22	Agricultural water risk - quantity	80.0%	15-32
Irrigation infrastructure	28.5%	2	Agricultural water risk - quality	20.0%	1-19
Volatility of agricultural production	15.2%	7	Land	14.0%	7
Political and social barriers to access	12.1%	28	Land degradation	60.0%	6
Armed conflict	29.4%	26-29	Grassland	20.0%	1
Political stability risk	23.5%	27	Forest change	20.0%	29
Corruption	23.5%	19-28	Oceans, rivers and lakes	12.3%	5
Gender inequality	23.5%	19	Eutrophication	50.0%	4-32
Food loss	14.1%	9	Marine biodiversity	50.0%	3
Food security and access policy commitments	9.1%	1-17	Sensitivity	10.5%	32
Food security strategy	50.0%	18-32	Food import dependency	60.0%	32
Food security council	50.0%	1-3	Dependence on natural capital	40.0%	13
Affordability	32.4%	7	Political commitment to adaptation	21.1%	31
Change in average food cost	29.8%	2	Demographic stress	7.0%	32
Proportion of population under global poverty line ²	27.0%	20	Projected population growth	75.0%	32
Inequality-adjusted income index ³	29.8%	27	Urban absorbment capacity	25.0%	31
Agricultural import tariffs	13.6%	24			
Quality and safety	17.6%	10			
Dietary diversity	20.3%	24			
Nutritional standards	13.6%	13-21			
Micronutrient availability	25.4%	2			
Protein quality	23.7%	1			
Food safety	16.9%	1-8			

¹ Primary components in bold; secondary components in black; secondary subcomponents in gray. The sum of the weights of the components in each group or subgroup of components adds up to 100%.

² The proportion of the population whose daily income is less than \$3.20 per day (at 2011 exchange rates adjusted for purchasing power parity).

³ GNI per capita at 2011 PPP adjusted for level of inequality (Alkire and Foster, 2010).

Source: UNICEF (2022)

Food availability

Israel's high ranking in the field of food availability is primarily due to the fact that the country's current food supply is able to satisfy the energy requirements (in terms of calories) of the population and much more.² However, in the area of agricultural R&D, which is intended to advance future food security, Israel receives much lower scores. On the one hand, public expenditure on agricultural R&D relative to the total agricultural product is about 42% of total government investment as a share of GDP, which places Israel in the center of the distribution of the OECD countries (15th place among 32 countries). On the other hand, total factor productivity (TFP) in Israel's agriculture sector increased by only 3.4% between 2012-2021, one of the lowest growth rates in the OECD. An increase in TFP reflects the ability to increase output without changing the quantities of inputs, while indirectly reflecting the contribution of agricultural R&D, which in Israel's case is relatively modest.³

Israel also ranks low in indicators of infrastructure quality. It is ranked at the bottom of the OECD countries in the areas of transport infrastructure, including roads, railways and ports. On the other hand, it receives a high score in the field of irrigation infrastructure, since nearly half of its cultivated agricultural land is connected to an irrigation network. Israel ranks relatively high in the area of volatility in agricultural production. The reason for this may be the high percentage of land with an irrigation infrastructure, which makes crops less vulnerable to fluctuations in precipitation.

The rating of Israeli agriculture in terms of political and social barriers is quite low. This stems from the danger of armed conflict, political instability, corruption and gender inequality. In the area of commitment to a food security policy, Israel is ranked in the upper part of the distribution, apparently due to the existence of a national food security council. However, it is

² Each person's energy requirement is the minimum number of calories they need to receive from food in order to fully function and to have an active immune system.

³ It should be noted that there is an academic debate about the methodology used to calculate TFP changes and the adaptation of this measure to the unique conditions of Israeli agriculture.

ranked in the lower part of the distribution in the area of food security strategy, probably because no such strategy exists in Israel (Adler, Tepper and Tzachor, 2021).

As in other developed countries, about a third of the food produced in Israel does not reach the plate. Food loss occurs throughout the supply chain, but mainly at both ends: in consumers' homes and in agricultural farms (Kronfeld-Schor, 2022). However, food loss in Israel is not particularly high in comparison with other developed countries - with Israel ranking 9th in the OECD.

Ironically, food loss in consumers' homes might have been lower if food prices were higher. Consumers purchase food in larger quantities than necessary because there is uncertainty about the amount of food they will need. Increased food purchases can be viewed as "insurance" against a greater than expected demand for food. The cost of insurance is the cost of the food that is ultimately thrown away – and the higher the price of food, the less insurance consumers will settle for.

Another facet of this phenomenon is food that is thrown away by institutional consumers, such as banquet halls. Loss of food in agricultural farms is also to a large extent a result of the low prices of agricultural produce. When the price is too low, a farmer may make a decision (which is right for him) not to harvest the crop and thus save the cost of harvesting, sorting and transportation. It follows that striving for zero food loss is impractical (Hamilton, Richards and Roe, 2022).

However, the decisions, which may be correct from the point of view of individual consumers and producers, are not necessarily the right ones at the national and global level. This is because the production of food, which is incompletely consumed, has environmental costs that are not taken into account (State Comptroller, 2015). Hence, countries have an interest in reducing food loss, often doing so through civil society organizations, which deal with saving agricultural produce and transferring it to those in need. However, such actions also have side effects. For example, distributing surplus food to the needy is likely to reduce their food purchases, which will

lead to lower agricultural produce prices – and as a result, larger quantities of crops may not be harvested.

Food affordability

As shown in Figure 2, food prices in Israel rose during the 1980s (a period of three-digit inflation and a major debt crisis in agriculture, which drove many farms out of business), relative to food prices in other developed countries. This trend reversed in the 1990s, with food prices in Israel falling sharply during the decade. Food prices rose again in the following decade, and especially in the years 2005-2008, when world food prices rose substantially.

However, the increase in Israeli food prices was above and beyond the price increases in most OECD countries. An underlying reason for this may be the “Shufersal” chain's purchase of the “Clubmarket” retail chain, which was the third largest at the time. This purchase greatly increased the concentration in the food retail sector. Since 2008, food prices in Israel have remained more or less stable. Overall, food prices in Israel increased since the end of the 1990s much more than in the OECD. It is possible that the strengthening of the shekel had a contribution to this, since the proportion of imports in the food basket in Israel is relatively high. Ben-David and Kimhi (2021) found that compared to the total consumption basket, food prices in Israel were about 3% lower than the OECD average in 2005, while in 2017 they were about 3% higher.

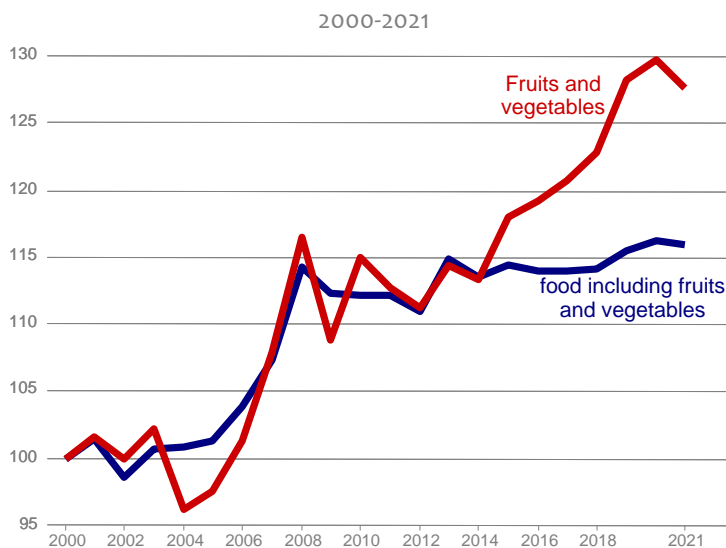
One of the food types that has become more expensive than others in recent years is fruits and vegetables. Figure 4 shows that the price of fruits and vegetables moved closely with the price of the total food basket between 2000 and 2014. Starting in 2015, there was a steep increase in the price of fruits and vegetables relative to the total food basket. The findings of Ben-David and Kimhi (2021) indicate that this phenomenon is not unique to Israel. Fruits and vegetables became more expensive during this period in other developed countries as well. In fact, Ben-David and Kimhi (2021) showed that fruits and vegetables in Israel are cheaper than the average of the OECD countries when compared to the total consumption basket, both in 2005 and 2017. In addition, they

showed that while the median wage in Israel enables the purchase of 15% fewer standard food baskets than the median wage in the OECD countries, it allows the purchase of 21% more fruit and vegetable baskets.

The fact that fruits and vegetables in Israel are more affordable than in other developed countries is perhaps relevant to the question of whether the removal of import barriers will succeed in reducing prices. Nonetheless, their price increase in recent years has been a concern for Israeli consumers. Fruits and vegetables are a significant component of the healthy food basket recommended by the Ministry of Health (2021). As such, their price increases hinder the recommended change in dietary habits. This conclusion is supported by Figure 5, which shows that the local per capita supply of fruits and vegetables in Israel has been declining since 2005.

However, Israel's ranking in the food security index places it in second place in the area of food prices. This is

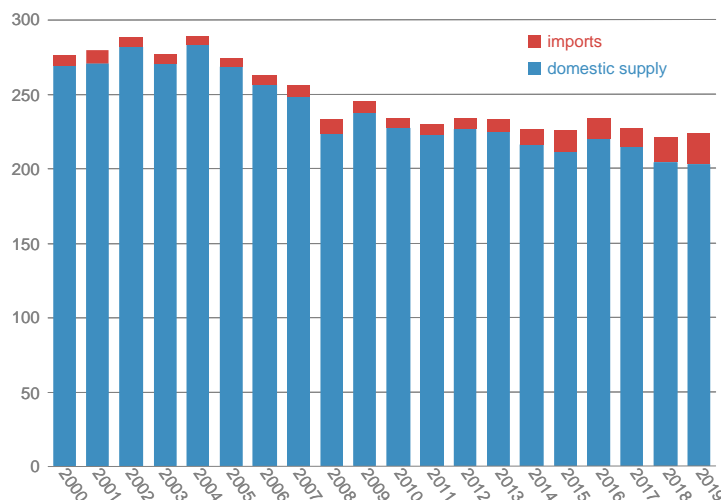
Figure 4
Real prices of food and of fruits and vegetables*



* Food price index discounted by consumer price index

Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: Central Bureau of Statistics

Figure 5
Supply of fruits and vegetables in Israel
kilograms per person annually

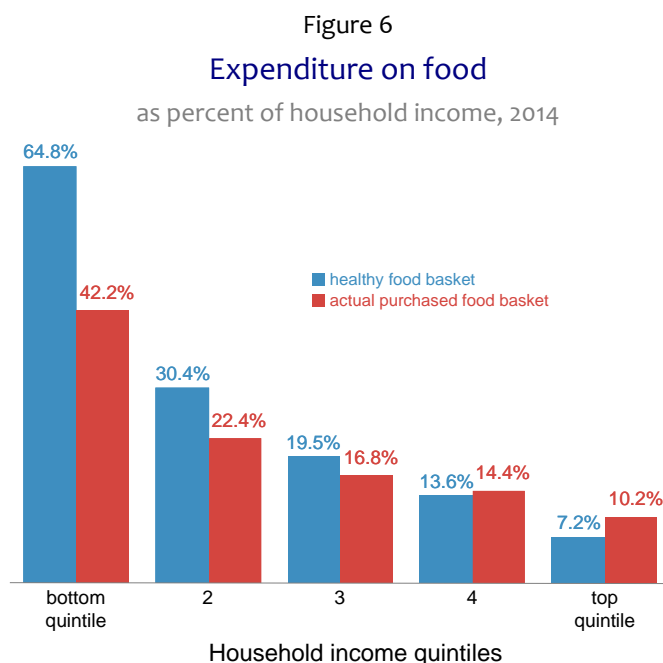


Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: Ministry of Agriculture and Rural Development

because food prices in Israel have increased at a moderate rate relative to most OECD countries since 2010. Specifically, food prices in Israel increased by 1.6% between 2010 and 2021, while the average price increase in the OECD countries was 2.4%. Conversely, import tariffs on agricultural products place Israel in 24th place in the OECD in this area, since they are seen as a factor that makes food more expensive.

Israel’s poverty rates place it in 20th place among the OECD countries, and 27th in the area of income per capita adjusted for inequality (Table 1).⁴ Since Israel is one of the least equal developed countries (Ben-David and Kimhi, 2017), the concern for the public’s ability to purchase a basket of healthy food is focused on the weaker populations. Azarieva and others (2016) showed that in Israel, as in any other country, the share of food expenditures out of total household income rises as incomes fall. Specifically, 42% of the income of the lowest income quintile (the fifth of all households with the lowest income) are spent on food (Figure 6).

In the second quintile from the bottom, only 22% of income are devoted to food, and this proportion continues to decrease as one moves up the income distribution. If the households in the lowest quintile were to consume a healthy food basket as defined by the Ministry of Health (2021), they would have to spend almost two thirds of their income on it, which is unrealistic.⁵ Even in the second and third quintiles from the bottom, the cost of a basket of healthy food is higher than the basket of food actually bought.



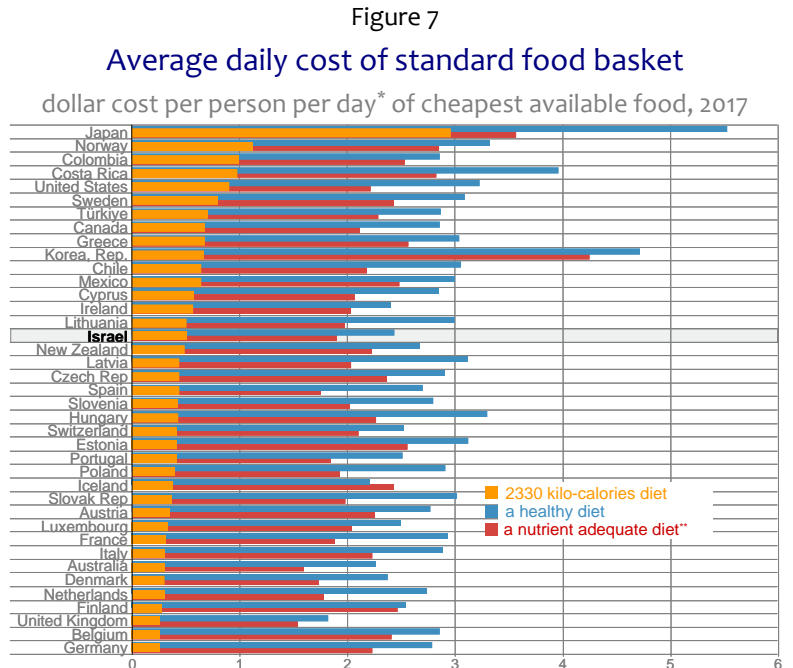
Source: Azarieva et al (2016)

⁴ Per capita income at 2011 prices according to purchasing power parity, adjusted for inequality according to the methodology of Alkire and Foster (2010), which means that the greater the inequality, the smaller the adjusted income.

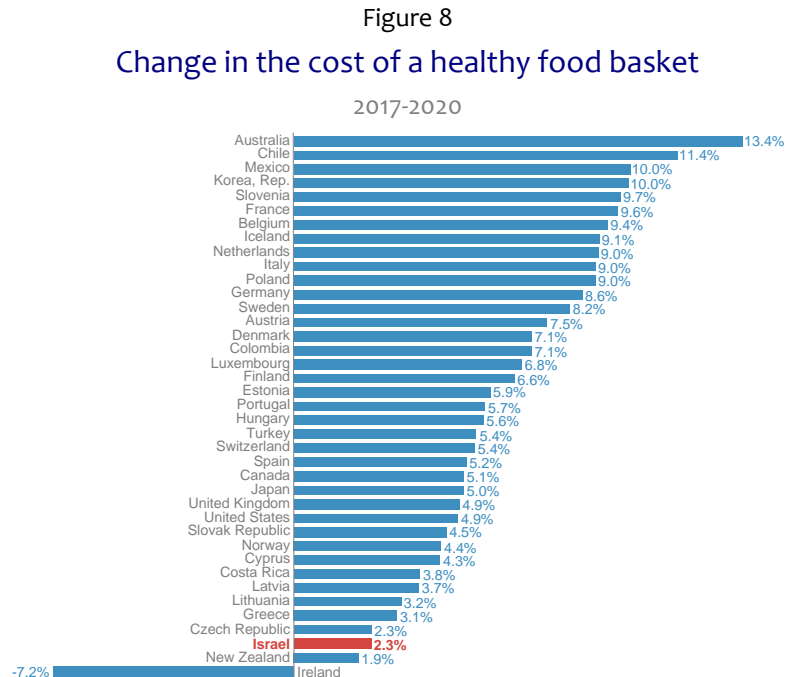
⁵ The cost of a healthy food basket is defined as the cheapest way to purchase a food basket assembled according to the recommendations of the Ministry of Health.

These findings turn the spotlight towards the prices of healthy food items. In an international comparison for 2017 (Figure 7), Israel is located in the center of the OECD distribution in terms of the prices of a standard food basket that meets the caloric needs of the population. When comparing the prices of a food basket that provides all the necessary nutrients, the prices in Israel are lower than in most OECD countries. This is also the case when comparing the prices of a healthy food basket. In addition, between 2017 and 2020, the price of the healthy food basket in Israel increased by a little more than 2%, much less than in most developed countries (Figure 8). This implies that the problem of the weaker households who cannot afford a healthy food basket is not a problem of price increases but of purchasing power.

In this context, it is important to note that for decades, Israel has been implementing price controls on products considered basic so that poorer populations will be able to purchase them



* in 2017 PPP dollars per day
** providing the recommended quantities of nutrients
Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: World Bank



Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: World Bank

at reasonable prices. Today, the list of price-controlled products includes bread, salt, dairy products and eggs (Azarjeva and others, 2016). Of the various bread products, price controls are applied to dark bread, white bread and challah, products that are not considered to contribute to health. In contrast, the healthy food basket includes whole wheat bread, whose price is double or more than the price of controlled bread, while its production cost is not much higher (Economic Projects Rationale, 2014). Similarly, salt, whose price is controlled, does not contribute to health. The control over the prices of milk products and eggs is related to the planning policy of the milk and egg production system. However, the milk products whose prices are controlled include butter, cream and hard cheeses which are high in fat. In general, it can be said that the food price control policy does not coincide with the promotion of the consumption of a healthy food basket.

Another way to support a healthy diet among vulnerable populations is through direct aid. Civil society organizations operate several programs to supply food directly to needy households, some of which receive government support. The flagship program is the “Food Security Initiative” under which each family receives monthly assistance of three types: a magnetic card worth NIS 250 for use in food chains (without the option of purchasing alcohol or tobacco), fruits and vegetables worth NIS 125, and “dry” food products worth NIS 125. According to the findings of the National Insurance Institute (Endweld, 2022), in 2021 there were about 265,000 families in Israel – constituting roughly 8% of the population, that suffered from considerable food insecurity. Of these, only about 11,000 were supported by the food security initiative.

Quality and safety

Israel is at the top of the list of developed countries in the areas of protein quality, micronutrient availability and food safety (Table 1). The areas that slightly lowers Israel’s position in the field of quality and safety are the low dietary diversity (24th place) and the nutritional standard, which places Israel in the center of the distribution of the OECD countries.⁶

⁶ The score in the area of nutritional standard is based on four components: has the government issued guidelines or managed a public program to encourage a balanced diet?; Does the government have a national plan to improve

Natural resources and sustainability

Israel is suffering from the depletion of the natural resources needed to produce food, especially land and water. The agriculture sector is gradually losing farmland, especially quality land in the central region, in favor of other land uses such as housing and non-agricultural businesses. Also, the natural water resources that used to be available for agriculture are increasingly being taken for other uses, while the desalinated water replacing them is much more expensive.⁷ The root of the problem, both in terms of land and water availability, is Israel's rapid population growth and its increasing population density, both of which are unique among developed countries (Ben-David 2018).

The problem of the resilience of the food supply in Israel to risks is derived from three main types of risks. One is due to climate change, which is expected to lead to an increase in temperatures, a decrease in precipitation, and above all, more and more extreme weather events that impair local food production. The eastern Mediterranean region that Israel belongs to is considered one of the regions where the impact of climate change is expected to be the most severe.

However, when compared to other developed countries, Israel's situation in the area of exposure to climate change is not particularly bad. It is ranked ninth in the OECD in this area – the risk of drought is particularly high, while the risk of flooding is particularly low. The risks of temperature increases and sea levels rising place Israel in the 10th and 14th places in the OECD, respectively (Table 1). Even in a global ranking of nearly 200 countries, Israel is less vulnerable to climate change than most (Figure 9). In contrast, Israel's ranking in the field of readiness to deal

nutrition?; Does the government require nutritional labeling on food product packaging?; and does the government monitor the nutritional status of the population?

⁷ On the other hand, more and more treated sewage water is available for agriculture, but this water is not suitable for all crops, and its cost to farmers is at the center of an intense public debate that has not yet been decided.

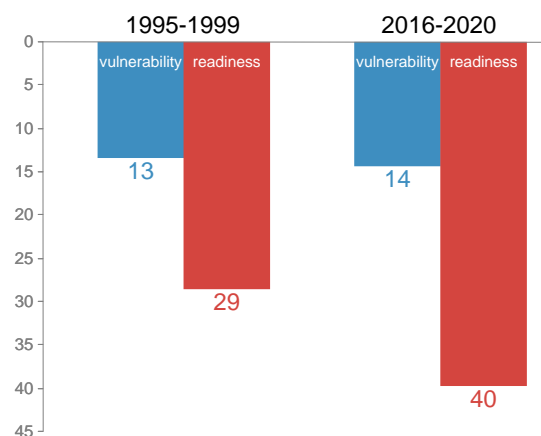
with climate change is much lower. Moreover, while Israel's ranking in the field of vulnerability is relatively stable and ranges from 13 to 15 in the period 1995-2020, the ranking in the field of readiness has been steadily declining, from the 28th position in 1995 to 41st in 2020.⁸

Another type of risk arises from the growing dependence of agricultural production on energy products, most of which are imported to Israel, and whose prices are subject to considerable volatility. The third

type of risk lies in the prices of imported food, which are affected by climate change, by supply chain disruptions – such as the one that occurred as a result of the Covid pandemic – and by violent conflicts damaging global food supply, such as Russia's invasion of Ukraine. In this context it should be noted that Israel imports almost half of its food supply, and if one also adds the import of animal feed, which is necessary for the local production of meat, milk and eggs, then Israel imports much more than half of its food supply. Although supply sensitivity contributes only 10% of the general resilience index, the dependence on food imports places Israel in last place in the OECD in this area.

Figure 10 shows the percentage of self-sufficiency of main food groups. It can be seen that Israel supplies itself with the lion's share of fresh agricultural produce, while in other food products, which are responsible for a larger share of its caloric supply, the country relies mainly on imports. A calculation based on figure 10 shows that 56% of Israel's caloric supply relies on imports – and hence, the country's considerable exposure to the risks emanating from global price

Figure 9
Ranking of Israel in terms of vulnerability and readiness to climate change*



* The higher the rank, the less vulnerable and the greater the readiness of the country to climate change.

Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: ND-GAIN (2022)

⁸ The vulnerability index represents objective conditions such as climate change over which the state has no influence. The readiness index reflects the actions taken by the state in order to deal with the challenges.

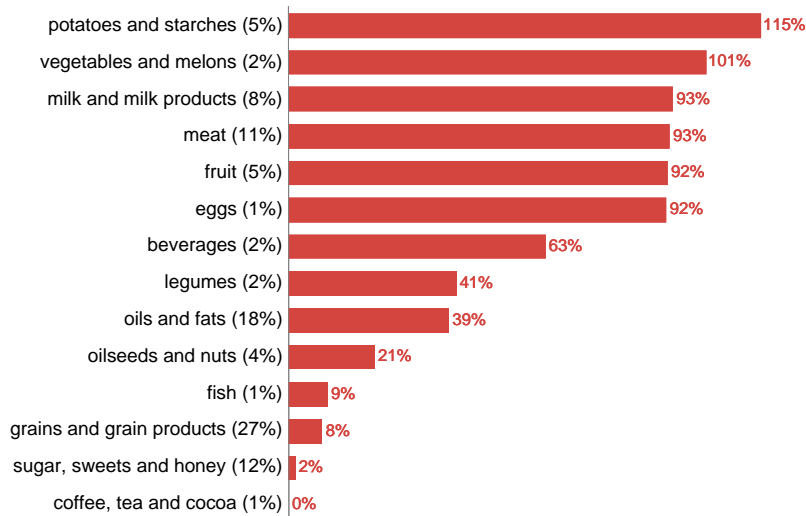
fluctuations. Regarding the fresh agricultural produce, the high percentage of self-supply is largely rooted in the import restrictions and tariffs. The implementation of import reforms, a political issue that has yet to be resolved (as of this writing on November 2022), may lead to a reduction in produce prices in the short term, but will certainly increase the exposure of Israel’s food supply to global risks.

Israel’s population is expected to double by 2065 (Central Bureau of Statistics, 2018). The rate of increase in agricultural output has been on a downward trend for four decades (Figure 1), and given the continued shrinking of cultivated land areas, no significant change is expected. This implies that the food supply in Israel will be forced to rely increasingly on imports, with all the attendant risks. In order to preserve the local production component of food, there will be a need for a significant technological advancement in agriculture that will make it possible to produce more output with fewer inputs, and at a reasonable cost.

The role of agriculture

The growing reliance on food imports in general and the import of fresh agricultural produce in particular, does not diminish – and perhaps even increases – the importance of local agriculture as an important component of Israel’s food supply. In recent decades, there has been a noticeable slowdown in the growth of total factor productivity in global agriculture, both due to a

Figure 10
Share of food supplied domestically*, 2020



* Numbers in parentheses reflect percent of total energy supply.

Source: Ayal Kimhi, Shoresh Institution and Hebrew University

Data: Ministry of Agriculture and Rural Development

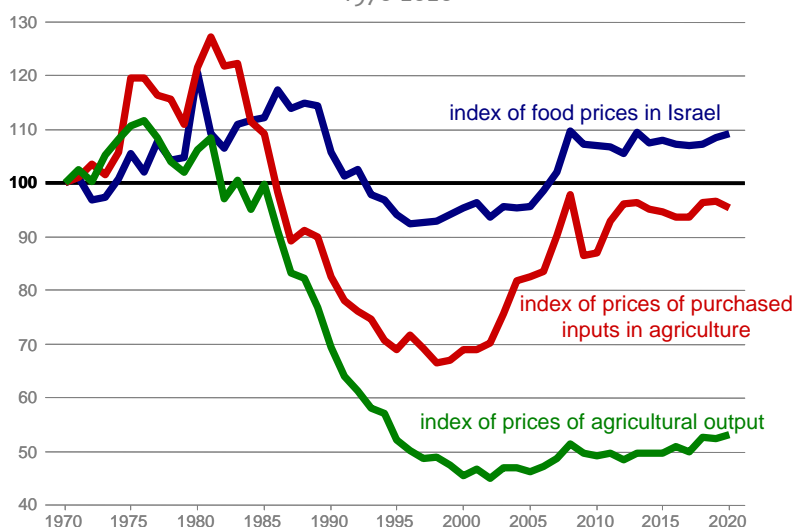
decrease in public funding of research and development, and due to the effects of climate change which are already reflected in damage to crops (Barrett et al., 2022).⁹

In addition, the volatility of prices and supply in world markets is rising, as a result of both climate change and crises such as the Covid pandemic and Russia’s war in Ukraine (Anderson, 2022). This implies that – especially during this period – it is important for the optimal portfolio of the food basket to include a component of locally-produced food, in order to minimize the risk of shortage or a price hike. Calculations conducted by the Ministry of Agriculture (Toporov and others, 2018) revealed that Israel is technically capable of producing food on its own that will satisfy most of the nutritional needs of its residents. However, it is not clear what the cost of such an autarkic policy would be, so these calculations are not particularly relevant. The more relevant question is which crops can be grown in Israel at a reasonable cost, taking into account both the current alternatives and the future risks. Amdur (2022) examined a limited number of agricultural products and found that most of them are

imported or can be imported from countries subject to a higher climate risk than Israel, which calls into question the ability to rely on imports of these products in the long term.

Maintaining the local production capacity of fresh agricultural produce requires an adequate income for farmers. Figure 11 shows that since the 1980s, prices of agricultural inputs have risen faster than the price of output. If agriculture had not benefited from

Figure 11
Real prices* of food and agricultural inputs and output
1970-2020



* Price indices discounted by consumer price index

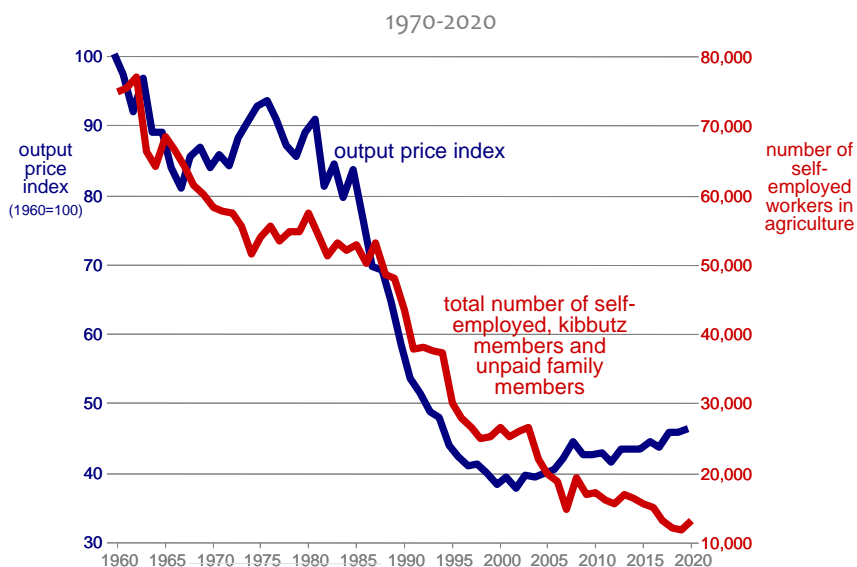
Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: Yoav Kislef and Shaul Zaban, “Statistical Atlas of Israeli Agriculture,” 2013 (updated)

⁹ An increase in total factor productivity reflects the increase that would have occurred in the quantity of output had the quantities of the factors of production not changed.

technological advancements and improvements in productivity during this period, it could be concluded that over the years the profitability of agriculture gradually eroded. Improvements in productivity without price changes would have resulted in an increase in profitability. In the absence of a reliable measure of the profitability of agriculture, the fact that many farms have stopped their productive activities over the years suggests that profitability has fallen. At the same time, the gap between the price of food for consumers and the price received by farmers has been widening, so that even during periods when the price of food has increased, farmers did not necessarily benefit from this.

The decrease in the number of farms is reflected in the decrease in the number of self-employed persons whose main source of income is agriculture.¹⁰ Figure 12 shows that the rate of decrease in the number of farmers is correlated with the rate of decrease in agricultural output prices. Between 1960 and 2020, the prices of agricultural output fell by more than half in real terms, while the number of independent farmers fell from about 75 thousand to about 13 thousand, a decrease of more than 80 percent. In the 1970s, output prices stabilized (thanks to the opening of export markets), and at the same time there was a slowdown in the rate of decline in the number of self-employed farmers. The accelerated decline in the prices of agricultural output in the 1980s and

Figure 12
Output price index and number of self-employed workers in agriculture



Source: Ayal Kimhi, Shoresh Institution and Hebrew University
Data: Yoav Kislev and Shaul Zaban, "Statistical Atlas of Israeli Agriculture," 2013 (updated)

¹⁰ Many farmers also make a living from other gainful activities, either because the income from agriculture is not sufficient or in order to diversify the sources of income due to the large volatility of agricultural income.

1990s was accompanied by the acceleration of farmers leaving the field. However, the change in the trend in the prices of agricultural output that occurred in the last two decades did not stop the trend of farmers leaving, since the prices of agricultural inputs rose more than the prices of output, suggesting that profitability continued to erode, at least for small and less productive farms.¹¹

The meaning of the decrease in the number of farms at the same time as the increase in agricultural output is that the scope of production of the average farm increased, and even increased greatly. On the one hand, larger farms can become more efficient by exploiting economies of scale, thereby contributing to food security. On the other hand, the decreasing number of farms may increase the instability of the food supply. For example, it is enough for a number of large farms to stop producing to create an unexpected shortage of certain crops. From this it follows that it is desirable to create a balance between the need to increase agricultural output and the need to preserve family farming. Studies have shown that concentration in a certain industry may have negative consequences not only on competitiveness, but also on innovation in the industry, and on the environment, health and animal welfare (Crespi and MacDonald, 2022).

Increasing investments in agricultural R&D and advanced mechanization may help increase agricultural output. Indeed, one of the components of the agricultural reform proposed by the Ministry of Finance and the Ministry of Agriculture is an increased budget for R&D and capital investments. However, another significant component of the reform is a gradual (over five years) exposure of many crops to competing imports. It is doubtful whether the increase in R&D budgets will bear fruit in such a short period of time, so that only those farms managing to survive will benefit from it – and the question is, how many of these there will be? Assuming that it will indeed be possible to import certain fruits and vegetables from nearby countries (mainly Turkey, Jordan

¹¹ The agricultural sector consists of large farms (mainly in Kibbutzim) and smaller family farms (mainly in Moshavim). The Kibbutzim did not abandon agriculture even if the number of Kibbutz members involved in agriculture is small. In the family farm sector, on the other hand, a decrease in the number of self-employed persons in agriculture means the exit of the farm from production, and this exit is almost always irreversible. Of course, when small farms exit the sector, other farms have access to more inputs (land and water) and can increase production. This can enhance their own profitability, even when overall profitability in agriculture declines.

and Egypt) at low prices, the local production of those fruits and vegetables will certainly decrease, thereby accelerating the exit – especially among small family farms – from agriculture.

In the long term, the danger inherent in such a scenario is threefold. Those neighboring countries are much less prepared to deal with climate change than Israel, so the possibility of importing from them at low prices could very well diminish over the years. In addition to this, the political instability in these countries, and the fluctuations in their diplomatic relations with Israel, endanger the regular supply of agricultural products from them. Finally, it is not clear to what extent the quality of the produce imported from these countries and the environmental and health standards of their farmers can be effectively monitored. The bottom line is that even if the reform will lead to cheaper fruits and vegetables in the short term, it endangers food security in Israel in the long term.

Summary

Food security in Israel places it in the upper part – that is, in a good place – of the distribution of developed countries in this measure, though Israel is ranked at the bottom of the list in several areas. The intensifying threats reflected by climate change, international conflicts and the consequences of epidemics such as the Covid virus require greater attention from policymakers with an eye to the future. Israel's rapid population growth, which is expected to continue into the foreseeable future, and the slowdown in the rate of growth of its agricultural production over the years, indicate that Israel's reliance on food imports will continue to increase. Importing food exposes Israel even more to global risks, and requires the formulation of a risk management strategy. Such a strategy must include strengthening local production, especially in products where Israel does not have a significant relative disadvantage.

The current government's import exposure policy may contribute to lowering the cost of living in the short term, but it increases the country's exposure to risk. Specifically, the reduction of tariffs on fruits and vegetables – which, despite their increase in price in recent years, are still

cheaper in Israel than in most developed countries – endangers local production capacity and exposes the Israeli consumer to greater future risk. Imports of fruits and vegetables from neighboring countries such as Turkey, Jordan and Egypt may be attractive under current conditions. However, the reliance on imports from these countries, which are expected to suffer more from climate change than Israel, may be problematic in the long term, not to mention the inherent risk of geopolitical developments in these countries and relations between them and Israel. The combination of the internal risks of climate change in Israel and the external risks associated with food imports places the durability of the food supply in Israel at a problematic point.

The food security of specific population groups in Israel is affected not only by the availability and price of food, but also by their purchasing power. As Israel is one of the least equal countries in the developed world, it needs a policy focused on its weaker population groups in order to help them obtain a food basket that meets their needs. Moreover, it is necessary to strive for a food basket that will bring these population groups as close as possible to what is defined as a “healthy food basket”. Promoting health through healthy food is not only a private interest of each household, but also of society as a whole. In this context, the food price control policy, which currently includes many products that are not considered healthy, and the food aid policy for needy families, which suffers from a rather low budget, must be reconsidered. Many families tend to consume unhealthy food not for economic reasons but out of lack of awareness or lack of understanding of the health consequences (Masters, Finaret and Block, 2022). It follows that nutritional education and advocacy (including limiting the advertising of harmful food) should be an integral part of food policy. Economic incentives may also help in cases where education and advocacy are not effective enough. Such incentives may include, for example, taxation of harmful products and price controls of healthy products. Economic incentives generally have negative effects on market efficiency, so their application should be carefully considered subject to a cost-benefit analysis.

There is no shortage of organizations in Israel that deal with food security, but it is necessary for a national body to be established with powers that will enable it to coordinate the activity, supervise the formulation of the strategy, break it down into goals and feasible policy measures, and supervise their implementation. As in the European Union (Grant, 2022), such a body should adopt a holistic approach that deals with all aspects of the food chain, from production in the field, through processing and marketing, to household consumption.

References

English

- Alkire, Sabina, and James Foster (2010), “Designing the Inequality-Adjusted Human Development Index (IHDI),” Human Development Research Paper 2010/28, UNDP.
- Ambikapathi, Ramya, Kate R. Schneider, Benjamin Davis, Mario Herrero, Paul Winters, and Jessica C. Fanzo (2022), “Global food systems transitions have enabled affordable diets but had less favourable outcomes for nutrition, environmental health, inclusion and equity,” *Nature Food*: pp. 1-16.
- Anderson, Kym (2022), “Agriculture in a More Uncertain Global Trade Environment,” *Agricultural Economics* 53, 4: 563-579.
- Azarieva, Janetta, Ben Arian, Rebecca Goldsmith, Avidor Ginsberg, Ran Milman, and Dov Chernichovsky (2016), “Healthy food basket in Israel,” in Avi Weiss (ed.), *State of the Nation Report: Society, Economy and Policy in Israel 2016*, Taub Center for Social Policy Research in Israel, pp. 421-436.
- Barrett, Chris B., Tim Benton, Jessica Fanzo, Mario Herrero, Rebecca J. Nelson, Elizabeth Bageant, Edward Buckler, Karen Cooper, Isabella Culotta, Shenggen Fan, Rikin Gandhi, Steven James, Mark Kahn, Laté Lawson-Lartego, Jiali Liu, Quinn Marshall, Daniel Mason-D’Croz, Alexander Mathys, Cynthia Mathys, Veronica Mazariegos-Anastassiou, Alesha Miller, Kamakhya Misra, Andrew Mude, Jianbo Shen, Lindiwe Majele Sibanda, Claire Song, Roy Steiner, Philip Thornton and Stephen Wood (2022), “The State of Agri-Food Systems and Agri-Food Value Chains in 2020,” in *Socio-Technical Innovation Bundles for Agri-Food Systems Transformation*. Sustainable Development Goals Series. Palgrave Macmillan, Cambridge. https://doi.org/10.1007/978-3-030-88802-2_2
- Ben-David, Dan (2018), “Overpopulation and demography in Israel: directions, perceptions, illustrations and solutions,” Shoresh Institution for Socioeconomic Research, Policy Brief.
- Ben-David, Dan, and Ayal Kimhi (2017), “Israel’s primary socioeconomic challenges and policy areas requiring core treatment,” Shoresh Institution for Socioeconomic Research, Policy Brief.
- Ben-David, Dan, and Ayal Kimhi (2021), High prices in Israel? Beware of international comparisons. Shoresh Institution for Socioeconomic Research, Policy Research Paper.
- Crespi, John M., and James M. MacDonald (2022). “Concentration in food and agricultural markets,” *Handbook of Agricultural Economics* 6: pp. 4781-4843.
- Grant, Wym P. (2022), *Rethinking Agriculture and Food Policy*, Edward Elgar.
- Hawkes, Corinna, Ramya Ambikapathi, Kim Anastasiou, Jessica Brock, Luciana Castronuovo, Naomi Fallon, Hazel Malapit, *Assumpta Ndumi, Folake Samuel, Maryse Umugwaneza, Milkah N Wanjohi, and Christina Zorbas* (2022), “From food price crisis to an equitable food system,” *The Lancet* 400, no. 10350: pp. 413-416.
- Hamilton, Stephen F., Timothy J. Richards, and Brian E. Roe (2022), “Food Waste: Farms, distributors, retailers, and households,” *Handbook of Agricultural Economics* 6: pp. 4653-4703.
- Masters, William A., Amelia B. Finaret, and Steven A. Block (2022), “The economics of malnutrition: Dietary transition and food system transformation.” *Handbook of Agricultural Economics* 6: pp. 4997-5083.
- ND-GAIN, *Notre Dame Global Adaptation Initiative* (accessed September 2022). <https://gain.nd.edu/>
- Unicef, *The State of Food Security and Nutrition in the World 2022*. FAO, IFAD, UNICEF, WFP and WHO (2022).

Hebrew

Adler, Dorit, Sigal Tepper, and Assaf Tzachor (2021), “Food security and national resilience in an era of changing climate,” in Kobi Michael, Alon Tal, Galia Lindenstraus, Shira Bukchin-Peles, Dov Hanin, Victor Weiss (eds), “Environment, Climate and National Security: A New Front for Israel,” Memorandum 209, Institute for National Security Studies, pp. 271-301.

<https://www.inss.org.il/he/publication/environment-and-national-security>

Amdur, Liron (2022), “The climate crisis and our plate: how will global climate change affect the food Central Bureau of Statistics, (2018), population forecasts for Israel 2015-2065.

https://www.cbs.gov.il/he/publications/doclib/2019/forcast65/2065/forcast_2016_15.pdf

Endweld, Miri (2022), “Food insecurity and poverty – Israel in the last decade,” Lecture at the conference of the National Academy of Sciences.

Kislev, Yoav, and Shaul Zaban (2013), The Statistical Atlas of Israeli Agriculture.

www.zenovar.com/en/wp-content/uploads/sites/2/2015/06/-----pdf

Kronfeld-Schor, Noga (2022), “The climate crisis and food systems,” Lecture at the 33rd meeting of the round table for the changing rural space.

<https://ihaklai.org.il/images/PDF/%E2%80%8E%E2%81%A8%D7%A9%D7%95%D7%9C%D7%97%D7%A0%D7%95%D7%AA%20%D7%A2%D7%92%D7%95%D7%9C%D7%99%D7%9D%20%D7%97%D7%A7%D7%9C%D7%90%D7%95%D7%AA%20%D7%9E%D7%93%D7%A2%D7%A0%D7%99%D7%AA%20%D7%9E%D7%A9%D7%A8%D7%93%20%D7%9C%D7%94%D7%92%D7%A0%D7%AA%20%D7%94%D7%A1%D7%91%D7%99%D7%91%D7%94%E2%81%A9.pdf>

Ministry of Health (2021), healthy food basket.

<https://www.gov.il/he/departments/publications/reports/healthy-food-basket-presentation>

Ministry of Industry, Commerce and Tourism (2012), The final report of the team for checking the competitiveness and prices in the food and consumer products sectors.

https://www.gov.il/he/Departments/publications/reports/food_products_prices_kedmi_report_2012

Rationale Economic Projects (2014), economic assessment – whole wheat bread.

State Comptroller (2015), “Food loss – social, environmental and economic consequences”, Annual Report 65c, pp. 163-235.

Toporov, Gideon, Zafir Greenhut, Anat Lowengart, Hanan Bezek, Uri Zuk-Bar and Yael Kachel (2018), “Sustainable nutrition and nutritional security in agriculture in Israel – quantitative data from crops,” Ecology and Environment 9 (4), pp. 18-27.

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