ISSN:3030-332X
*Impact factor: 9,493*
International journal of scientific researchers

# FOOD IMPORT DEPENDENCE AND EXTERNAL VULNERABILITY: IMPLICATIONS FOR NATIONAL FOOD SECURITY

**Zhang Hailan**
Toshkent State University of Economics (TSUE) /
Economics faculty, Tashkent, Uzbekistan
Email: haialnzhang987@gmail.com
https://doi.org/10.5281/zenodo.23921235

**Abstract**

Food import dependence is usually reduced to a single percentage, yet its consequences for national food security depend on what is imported, from whom, and with what buffers. This paper asks how the form of external dependence, the channels through which shocks are transmitted, and the policy buffers in place compare across five contrasting economies: Japan, Egypt, Brazil, India and China. Using a qualitative-comparative design in the IMRAD format, it synthesises scholarly studies and institutional reports, compares one policy-relevant dependence indicator per country using the latest available figures (2022–2026), and codes the evidence against three dimensions (exposure, supplier concentration, buffer capacity) and four transmission channels (prices, external and fiscal position, input costs, trade policy). The evidence indicates that (i) each country is exposed through a different item: calories in Japan (about 62% imported on a calorie-supply basis, derived), wheat in Egypt (about 62% of use), edible oil in India (56%), soybeans in China (84%) and fertilizer in Brazil (85%); (ii) vulnerability is greatest where heavy dependence meets concentrated suppliers, as in Egypt and China; and (iii) Brazil shows that a leading exporter can be exposed through imported inputs. The paper concludes that national food security depends less on the headline level of import dependence than on its composition, supplier concentration and the buffers that absorb shocks, and it proposes a harmonised panel design for formal testing.

**Keywords:** food import dependence, external vulnerability, food security, supplier concentration, fertilizer, comparative case study

## 1. Introduction

Every country that eats more than it grows, or grows with inputs it does not make, has handed part of its food security to world markets. Trade can lower costs and widen choice, but it also lets distant shocks reach domestic plates. The food price spikes of 2007–08 and 2022 made the point: in March 2022 the FAO Food Price Index averaged 159.3 points, a record, up 12.6% in one month, with cereal prices up 17.1% and vegetable oils up 23.2% (FAO, 2022). Whether a price spike becomes a national food-security problem depends on the country it hits.

The five economies studied here show why. Japan produced only 38% of its food supply on a calorie basis in fiscal 2024 (Adnkronos, 2025). Egypt imports about 62% of the wheat it uses, and wheat supplies 35–39% of per-capita calories (IFPRI, 2022). India met only 44% of its edible-oil demand from domestic production in 2023–24 (Press Information Bureau [PIB], 2025). China imported about 84% of its soybean supply in 2024 (Colussi et al., 2025). Brazil, one of the world's largest food exporters, imports about 85% of its fertilizer (Fastmarkets, 2022). The same label, "import dependence", covers five different problems.

The concept of food security is itself multidimensional. The 1996 World Food Summit defined it as physical and economic access to sufficient, safe and nutritious food (FAO, 1996), which FAO now frames through four dimensions: availability, access, utilisation and stability. Sen (1981) showed that hunger can

follow from lost purchasing power rather than from a lack of food. External dependence can threaten each dimension in a different way: a price shock cuts affordability, a supplier ban cuts availability, and a currency crisis cuts a government's ability to buy at all.

A gap remains. Much of the literature treats self-sufficiency and trade as opposites (Clapp, 2017), uses aggregate indicators that hide which item is exposed, or studies single countries or global averages (Kummu et al., 2020). Few studies compare countries that differ fundamentally in income, agricultural capacity and policy, and fewer separate dependence on food itself from dependence on agricultural inputs.

This paper therefore asks three questions. **RQ1:** In what form is external food dependence concentrated in Japan, Egypt, Brazil, India and China? **RQ2:** Through which channels do external shocks reach national food security in each case? **RQ3:** Which buffers do these countries use, and how well do they match the exposure? Three propositions are assessed qualitatively. **P1:** the form of dependence matters more than its headline level. **P2:** vulnerability rises with supplier concentration and falls with buffer capacity. **P3:** being a major exporter does not remove external vulnerability when inputs are imported. The thesis is that external vulnerability in food is a product of composition, concentration and buffers, not of import share alone.

The paper proceeds as follows: Section 2 reviews the literature, Section 3 sets out the methods, Section 4 reports the results, Section 5 discusses them, and Section 6 concludes.

## 2. Literature Review

### 2.1 Food security is multidimensional, and trade cuts both ways

Early policy thinking equated food security with national food production. Sen's (1981) entitlement approach broke that link: people go hungry when they lose the means to command food, even where supply is adequate. This matters for import-dependent countries, because the means to command food on world markets are foreign exchange and fiscal capacity. A country can therefore be food-secure in physical terms and insecure in economic terms, or the reverse.

### 2.2 Self-sufficiency is a continuum, not an alternative to trade

Clapp (2017) argues that the choice is not between relying only on domestic food and fully open trade. Self-sufficiency can be defined and measured in several ways, so it is better seen along a continuum, which leaves room for domestic production policies where they are justified politically and economically. The strength of this view is that it replaces slogans with questions about which items and which degree. Its limit is that it offers no direct measure of exposure to a specific shock, which is what a vulnerability analysis requires.

### 2.3 Price shocks and trade policy

Headey and Fan (2008) reviewed the 2007–08 crisis and found that rising oil prices, a weaker US dollar, biofuel demand and commodity-specific factors best explained the surge. They also noted that macro- and micro-level indicators often point to different countries as most vulnerable, so a country can be fiscally exposed while its households are not, and the reverse. Martin and Anderson (2012) examined the 1973–74, 2006–08 and 2010–11 spikes and stressed the role of trade-policy responses, because export restrictions by some countries to insulate their own markets push prices higher for importers. Together these studies imply that importers are exposed both to the original shock and to other governments' reactions to it.

### 2.4 Supplier concentration and resilience

Kummu et al. (2020) studied the period 1987–2013 and found that food supply diversity rose for most of the world's population, but at the cost of greater dependence on imports. Although more people relied heavily on imports, the number of import partners fell more often than it rose, which the authors read as vulnerability to disruptions in linked food systems. This shifts attention from how much is imported to how many suppliers provide it.

### 2.5 Research gap

The literature is strong on concepts, on price spikes and on global trade networks, but weak in three respects. First, it seldom compares countries that differ in income and agricultural capacity under one framework. Second, it treats food and agricultural inputs separately, so exporters such as Brazil fall outside "import dependence" studies. Third, it rarely links the form of dependence to the specific buffer a government uses. This paper addresses these gaps by comparing five contrasting economies on exposure, supplier concentration and buffer capacity.

## 3. Methodology

### 3.1 Research design

The study uses a qualitative-comparative multiple-case design with three components: (1) a structured review of scholarly and institutional sources; (2) a comparison of one policy-relevant dependence indicator for each country; and (3) five country cases coded against common dimensions. A formal regression was considered and rejected: five countries, indicators measured for different items and years, and no harmonised annual series would make conventional inference unreliable. The design follows the logic of a comparative evidence synthesis, in which the aim is to explain why similar-looking dependence produces different vulnerability, not to estimate an average effect.

### 3.2 Case selection

The five countries were chosen purposively, to maximise contrast in the form of dependence, income level and agricultural capacity, and China was included as a required comparative case.

| Country | Form of dependence examined | Why selected |
|---|---|---|
| Japan | Overall calorie supply | Wealthy, technologically advanced, structurally import-dependent |
| Egypt | Staple grain (wheat) | Large staple import need, geopolitical supplier exposure |
| Brazil | Agricultural inputs (fertilizer) | Leading exporter that still depends on imports to produce |
| India | Selective commodity (edible oil) | Staple self-sufficiency alongside a large import gap in one item |
| China | Feed and oilseed (soybeans) | Major economy with managed, concentrated dependence |

### 3.3 Indicators and data

For each country the study uses the dependence measure most relevant to its form of exposure, recorded with its year and source: the share of calorie supply produced domestically (Japan), the share of wheat use that is imported (Egypt), the share of fertilizer demand that is imported (Brazil), the share of edible-oil demand met by imports (India) and the share of soybean supply that is imported (China). These measures are not interchangeable and are not ranked against one another as numbers; they are compared

by form and by dimension. Japan's imported share is derived as 100% minus the self-sufficiency rate, and is labelled as such. Supplier concentration is taken from reported shares of the main supplier or supplier region where a source gives one.

### 3.4 Source search and inclusion

Searches in November 2026 combined the terms food import dependence, food security, supplier concentration, price shock, export restrictions, fertilizer imports, edible oil imports, soybean imports, wheat imports and each country name, using web searches of publisher, repository and institutional records. Sources were included if they (a) addressed external dependence in food or agricultural inputs, or its transmission to food security; (b) were peer-reviewed, or issued by a recognised international or national institution; and (c) gave a figure or mechanism that could be traced to a date. Trade-press items were used only for facts attributed there to an official or industry source, and are flagged in the text and references. Unsourced commentary was not used as evidence of effects.

### 3.5 Analysis

Evidence was coded against three dimensions (exposure, supplier concentration, buffer capacity) and four transmission channels (prices, external and fiscal position, input costs, trade policy). Ratings of exposure, concentration and buffers use three levels (higher, moderate, lower) assigned by the author from the evidence in Section 4; where a source gave no figure the cell is marked as not documented and not rated. Each proposition was then rated supported, partly supported or not testable according to the number, quality and consistency of the evidence.

### 3.6 Ethical considerations

No human participants were involved, and all data are secondary and public, so ethical approval and informed consent were not required. Limitations are discussed in Section 5.3.

## 4. Results

### 4.1 Form and level of dependence

Table 1 shows that the five countries depend on imports for different things. The shares range from 44% to 85%, but they describe different items (calories, a staple, an oilseed, an input) and different years, so they are read as profiles, not ranked.

**Table 1. Dependence profile of the five countries (author's synthesis)**

| Country | Dependence measure | Reported value | Year | Source |
|---|---|---|---|---|
| Japan | Calorie self-sufficiency, supply basis | 38% (imported share about 62%, derived); 64% on a production-value basis | FY2024 | Adnkronos (2025); MAFF (2025) |
| Egypt | Imports as a share of wheat use | About 62% usually; wheat supplies 35–39% of calories. Imports needed in 2026/27: 13.5 Mt against production of about 10 Mt | c. 2022; 2026/27 | IFPRI (2022); FAO (2026) |
| Brazil | Imports as a share of fertilizer needs | 85% (reported nutrient shares: nitrogen about 96%, phosphorus about 55%, potassium about 97%) | 2022 report | StoneX (2022); Fastmarkets (2022) |

| Country | Dependence measure | Reported value | Year | Source |
|---|---|---|---|---|
| India | Imports as a share of edible-oil demand | 56.25% (63.2% in 2015–16); imports 15.66 Mt, domestic production 12.18 Mt | 2023–24 | PIB (2025) |
| China | Imports as a share of soybean supply | About 84%; production 21 Mt against consumption of 129 Mt | 2024 | Colussi et al. (2025) |

A press report dated 8 August 2026 states that Japan's calorie-basis rate fell to 37% in the fiscal year ended March 2026 (Devdiscourse, 2026); it is not used in the comparison because the original ministry release was not consulted.

### 4.2 Evidence by dimension

Exposure is rated by combining the imported share with the item's weight in diet or production, and buffer capacity by the policies documented for each country. Table 2 summarises the coding.

**Table 2. Coding of exposure, concentration, channels and buffers**

| Country | Exposure | Supplier concentration | Main transmission channel | Buffer evidence | Buffer capacity |
|---|---|---|---|---|---|
| Japan | Higher | Not documented in sources used | Prices and external position | 2030 target of 45% (supply basis); revised Basic Act in force 5 June 2024; rate unchanged at 38% for four years | Moderate |
| Egypt | Higher | Higher: Black Sea suppliers about 80% of import needs (GTR, c. 2022); Russia "continues to dominate" (Milling MEA, 2026) | Prices and external-fiscal position: wheat import bill could nearly double from US$3bn to US$5.7bn (GTR, c. 2022) | Reserves of 4.5 Mt, about four months of consumption; state procurement of over 6 Mt, about 60% of the harvest (GTR, c. 2022) | Moderate, fiscally constrained |
| Brazil | Moderate | Moderate: about a quarter of fertilizers from Russia; Russia the only ammonium nitrate supplier (StoneX, 2022) | Input costs | National Fertilizer Plan: cut import dependence from 85% to 45% by 2050 | Lower in the near term |

| Country | Exposure | Supplier concentration | Main transmission channel | Buffer evidence | Buffer capacity |
|---|---|---|---|---|---|
| India | Moderate | Not documented in sources used | Prices and trade policy | Duty on crude palm, soybean and sunflower oils raised from 5.5% to 16.5%; import share down from 63.2% to 56.25% in eight years | Moderate |
| China | Higher | Higher: Brazil supplied 67% of soybean imports in 2024 | Supplier concentration and trade policy | Domestic soybean capacity programmes; projected 2030 self-sufficiency of 18.6–24.7% (Kong et al., 2024) | Lower |

**4.3 Country evidence**

**Japan.** Japan's calorie self-sufficiency has been stuck at 38% for four consecutive years, while its production-value rate rose to 64% in fiscal 2024; weather damage to wheat and soybeans held the calorie rate down, and rice and sugar crops helped it (Adnkronos, 2025). The 2030 target is 45% on a supply basis and 53% on an intake basis, against a current intake-basis rate of 45% (MAFF, 2025).

**Egypt.** Imports usually cover about 62% of wheat use, and wheat supplies 35–39% of calories (IFPRI, 2022). At the time of the Ukraine war, reporting put Black Sea suppliers at about 80% of import needs and warned that a price rise could nearly double the annual wheat import bill from about US$3bn to US$5.7bn (GTR, c. 2022). FAO (2026) forecasts 2026/27 wheat import needs of 13.5 Mt, 8% above average, against production of about 10 Mt. Reserves of about 4.5 Mt covering roughly four months were reported in February 2026 (Milling MEA, 2026).

**Brazil.** Brazil imports about 85% of its fertilizer needs and about a quarter of its fertilizers from Russia, which is the only source of ammonium nitrate (StoneX, 2022). The National Fertilizer Plan aims to cut import dependence from 85% to 45% by 2050 (Fastmarkets, 2022).

**India.** Imports met 56.25% of edible-oil demand in 2023–24, down from 63.2% in 2015–16, and domestic production met 44% (PIB, 2025). The government raised the customs duty on crude palm, soybean and sunflower oils from 5.5% to 16.5%. The vulnerability is to world vegetable-oil prices, which the FAO index showed rising 23.2% in a single month in March 2022 (FAO, 2022).

**China.** Imports were about 84% of soybean supply in 2024, with Brazil supplying 67% of them and 73% of Brazil's soybean exports going to China (Colussi et al., 2025). Domestic production grew 26% from 2005 to 2024 while consumption grew 190%. Kong et al. (2024) project 2030 self-sufficiency of only 18.6–24.7%, and about 30% with added incentives.

### 4.4 Assessment of the propositions

**Table 3. Assessment of the propositions**

| Proposition | Evidence | Assessment |
|---|---|---|
| P1: The form of dependence matters more than its headline level | Shares of 44–85% sit on five different items; each case has a different main channel (Table 2) | Supported (qualitative, five cases) |
| P2: Vulnerability rises with supplier concentration and falls with buffer capacity | Concentration documented for Egypt and China, where exposure is also higher; not documented for Japan and India; no outcome measure across cases | Partly supported |
| P3: Major exporters remain vulnerable through imported inputs | Brazil: about 85% fertilizer import dependence with a quarter from one country | Supported (one case) |

## 5. Discussion

### 5.1 Interpretation

The evidence answers the research questions in a qualified way. On RQ1, external dependence takes a different form in each country: it is a calorie problem in Japan, a staple problem in Egypt, an input problem in Brazil, a single-commodity problem in India and a feed-and-oilseed problem in China. Japan's high value-based rate (64%) beside a low calorie-based rate (38%) suggests that the country produces high-value food and imports cheap calories, which is why a single self-sufficiency figure misleads.

On RQ2, the channels differ with the form. Egypt is exposed through prices and the state's ability to pay, because its wheat import bill could nearly double in a price spike; China through reliance on one dominant supplier; Brazil through production costs and exporter income rather than household food supply; India through world vegetable-oil prices. On RQ3, buffers are real but uneven. Egypt holds about four months of reserves but is fiscally constrained. Brazil's and China's measures are long-horizon: a 2050 target and a 2030 projection of under 25% soybean self-sufficiency. Japan has a 2030 target and a revised Basic Act, yet its rate has not moved in four years.

### 5.2 Comparison with the literature and implications

The results fit Clapp's (2017) continuum: the five countries occupy different points, and the useful question is which item and how far, not whether to trade. They also fit Kummu et al. (2020): the two cases with documented supplier concentration, Egypt and China, are the two where heavy import dependence is paired with few suppliers, the combination those authors associate with vulnerability. The Egyptian and Indian cases illustrate the point made by Martin and Anderson (2012) and Headey and Fan (2008): importers are exposed to world price spikes and to other governments' reactions, and macro-level exposure (Egypt's import bill) can differ from household-level exposure.

Three policy implications follow. First, measure dependence by item and by supplier, not by aggregate share. Second, match the buffer to the channel: reserves and financing facilities for price and payment shocks (Egypt), supplier diversification for concentration risk (China), and domestic input capacity for input shocks (Brazil). Third, treat self-sufficiency targets as one tool among several, since Japan's experience shows that a legislated target does not by itself change the rate.

### 5.3 Limitations and future research

Several limitations qualify these conclusions. The study relies on secondary evidence and estimates no causal effects. The indicators are not harmonised: they cover different items and years, and several

figures date from 2022 and come from trade-press or industry sources that attribute them to officials. Supplier concentration is not documented for Japan or India in the sources used, so P2 can be only partly assessed. The three-level ratings are the author's judgement and could be reproduced differently. Japan's 2025 rate of 37% rests on a press report. Future research should build a harmonised panel using FAO cereal import dependency ratios, supplier concentration indices (such as a Herfindahl–Hirschman index) computed from UN Comtrade data, and fertilizer trade data, with outcome measures such as food price volatility and food import bills as a share of export earnings. Interviews with ministry and grain-agency officials would help explain why buffers differ.

## 6. Conclusion

External vulnerability in food is best understood as the product of three things: what a country imports, how concentrated its suppliers are, and what buffers it can use when a shock arrives. Japan, Egypt, Brazil, India and China show five different combinations. Egypt and China pair heavy dependence with documented supplier concentration; Brazil shows that a leading exporter is exposed through imported fertilizer; Japan and India show that large import shares can coexist with moderate buffers and policy action. These findings support the thesis that headline import dependence is a poor guide to national food security.

The wider lesson is that targets alone do not create security. Governments need item-level and supplier-level data, buffers matched to the channel through which shocks arrive, and published, comparable indicators. Until such indicators exist for all five countries on the same items and years, the argument made here can be defended but not fully tested.

## References

1. Adnkronos. (2025, October 10). FY 2024 Japan food self-sufficiency rate remains at 38 pct. https://english.adnkronos.com/2025/10/10/fy-2024-japan-food-self-sufficiency-rate-remains-at-38-pct/
2. Clapp, J. (2017). Food self-sufficiency: Making sense of it, and when it makes sense. Food Policy, 66, 88–96. https://doi.org/10.1016/j.foodpol.2016.12.001
3. Colussi, J., Schnitkey, G., Paulson, N., & Coppess, J. (2025, May 7). Brazil and China's strong ag relationship: Opportunity or overdependence? farmdoc daily, 15(85). https://farmdocdaily.illinois.edu/2025/05/brazil-and-chinas-strong-ag-relationship-opportunity-or-overdependence.html
4. Devdiscourse. (2026, August 8). Japan's food self-sufficiency falls to 37%: Can Tokyo secure its food future amid global risks? https://www.devdiscourse.com/article/other/3960927-japans-food-self-sufficiency-falls-to-37-can-tokyo-secure-its-food-future-amid-global-risks
5. Fastmarkets. (2022, March 16). Brazil announces National Fertilizer Plan to reduce dependency on imports. https://www.fastmarkets.com/insights/brazil-announces-national-fertilizer-plan-to-reduce-dependency-on-imports
6. Food and Agriculture Organization of the United Nations. (1996). Rome Declaration on World Food Security and World Food Summit Plan of Action. FAO.
7. Food and Agriculture Organization of the United Nations. (2022). FAO Food Price Index posts significant leap in March. https://www.fao.org/newsroom/detail/fao-food-price-index-posts-significant-leap-in-march/en
8. Food and Agriculture Organization of the United Nations. (2026, June 30). GIEWS country brief: Egypt. https://cb.apps.fao.org/country/EGY/pdf/EGY.pdf

9. Global Trade Review. (n.d.). Going local: Egypt's plans to slash its import dependency. https://www.gtreview.com/?p=99957
10. Headey, D., & Fan, S. (2008). Anatomy of a crisis: The causes and consequences of surging food prices. Agricultural Economics, 39(s1), 375–391. https://doi.org/10.1111/j.1574-0862.2008.00345.x
11. International Food Policy Research Institute. (2022). The Russia-Ukraine crisis poses a serious food security threat for Egypt. https://www.ifpri.org/node/69622
12. Kong, W., Wei, M., Khan, N., Liang, J., Han, D., & Zhang, H. (2024). Assessing sustainable future of import-independent domestic soybean production in China: Policy implications and projections for 2030. Frontiers in Sustainable Food Systems, 8, Article 1387609. https://doi.org/10.3389/fsufs.2024.1387609
13. Kummu, M., Kinnunen, P., Lehikoinen, E., Porkka, M., Queiroz, C., Röös, E., Troell, M., & Weil, C. (2020). Interplay of trade and food system resilience: Gains on supply diversity over time at the cost of trade independency. Global Food Security, 24, Article 100360.
14. Martin, W., & Anderson, K. (2012). Export restrictions and price insulation during commodity price booms. American Journal of Agricultural Economics, 94(2), 422–427. https://doi.org/10.1093/ajae/aar105
15. Milling MEA. (2026, March 5). Egypt's wheat reserves sufficient to cover four months demand. https://millingmea.com/?p=2038973
16. Ministry of Agriculture, Forestry and Fisheries of Japan. (2025). Keypoints 2025. https://www.maff.go.jp/e/policies/law_plan/attach/pdf/Keypoints_2025.pdf
17. Press Information Bureau, Government of India. (2025, December). [Document on the National Mission on Edible Oils] [PDF]. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/dec/doc2025129725001.pdf
18. Sen, A. (1981). Poverty and famines: An essay on entitlement and deprivation. Oxford University Press.
19. StoneX. (2022, March 9). Brazil agriculture seeks remedies for potential fertilizer disruptions. https://www.stonex.com/en/insights/brazil-agriculture-seeks-remedies-for-potential-fertilizer-disruptions/