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A few facts and figures on nitrogen fertiliser in the context of the Persian Gulf conflict

Since the beginning of the armed conflict in the Persian Gulf, there has been a lot of talk on the media regarding the risks of this event creating “famine” in the world, especially in Africa.

The main issue usually discussed, in this context, is that of fertiliser, particularly the availability of **nitrogen fertiliser**, an energy-intensive agricultural input produced through the Haber-Bosch process. This process relies on energy drawn from fossil gas to fix nitrogen present in the air and synthesise ammonia that is used to manufacture nitrogen fertiliser. The Gulf being a major gas extractor, it manufactures large quantities of nitrogen fertiliser.

These discussions have mostly made only limited explicit reference to facts and even less to figures (i.e. statistics).

At hungerexplained, the need was felt to look a bit more in detail into this matter.

The Gulf, an important nitrogen fertiliser exporter

'**Gulf riparian countries**'[1] have been **nitrogen fertiliser exporters** for decades.

In **2000**, these countries exported around 2.5 million tons of nitrogen nutrients, representing **9.9% of world exports**. The three main exporting countries were, by order of importance, Saudi Arabia, Qatar and Kuwait.

In **2023**, their exports had grown to more than 5.7 million tons of nitrogen nutrients, approximately **13% of world exports**. The three top-exporting countries were, by order of importance, Qatar, Saudi Arabia and Oman (see **table 1**).

Table 1 - Exports of nitrogen nutrients by Gulf riparian countries in 2000 and 2023 (thousand tons)

	2000	2023
Bahrain	244,5	265,6
Iran	3,2	34,6
Iraq	0,0	0,2
Kuwait	284,3	0,0
Oman	0,4	1022,8
Qatar	753,5	2226,4
Saudi Arabia	1002,8	2205,1
United Arab Emirates	207,1	6,5
Total	**2495,8**	**5761,2**

Source: computed from FAOSTAT data

Yet, could blocking exports from a group of countries representing 13% of the global nitrogen fertiliser market supply really disrupt the world market to the extent that it would generate a famine?

Who is self-sufficient, who exports and who imports nitrogen fertilisers?

Fertilisers providing nitrogen nutrients to crops have **a central role in today's agriculture**. However, the use of nitrogen fertiliser varies considerably. **Table 2** shows the level of use of nitrogen nutrients in different regions of the world.

Use of nitrogen fertiliser

Asia is by far the **greatest user** of nitrogen fertiliser. It is also the region in which the amount of this fertiliser applied per hectare is the largest, double from what it is in **America** and almost triple from **Europe**. It is in **Africa** that this type of fertiliser is the least used - nearly 8 times less than in Asia.

[1] In this article, 'Gulf riparian countries' include Bahrain, Iraq, Iran, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Table 2 - The use of nitrogen nutrients in different regions in 2023 (in kg/ha)

	Total use (in million tons)	Use per hectare (in kg/ha)
Africa	4,5	14,4
America	25,7	60,5
Asia	65,3	113,4
Europe	13,6	43,4
Oceania	2,6	59,1

Source: computed from FAOSTAT data

Producers and exporters

China, **India** and the **United States** are both the top producers and agricultural users of nitrogen nutrients. They are responsible for **more than half** of global nitrogen fertiliser production.

The main exporters are **Russia**, **China** and **Qatar**. The largest importers are **Brazil**, **India** and the **United States**.

Out of the 184 countries for which statistics are available on FAOSTAT for 2023, **118 rely entirely on imports** to have access to nitrogen fertilisers, out of which 40 in **Africa**. In **sub-saharan Africa**, only 2 countries are producers (**Nigeria** and **Senegal**)[2], while all the countries in **Northern Africa** are producers, this sub-region exporting a sizeable surplus.

Import dependency

In **America**, all sub-regions are net importers, South America covering only 13.6% of its needs by its own production.

In **Asia,** South Asia and South-East Asia are net importers, with a self-sufficiency ratio[3] of respectively 77% and 86% in 2024, while other sub-regions are net exporters.

In **Europe,** the situation is quite contrasted with Eastern Europe a net exporter, Northern and Southern Europe as net importers and Western Europe as almost self-sufficient but very much involved in trading, the quantities produced, imported and exported being practically equivalent.

[2] Recent investments have been made in **South Africa** for producing nitrogen fertiliser based on a biological (not chemical industrial) process [read].

[3] The self-sufficiency ratio (SSR), expressed in percentage, is equal to the ratio between local production divided by total availability (= production + imports -exports). An SSR greater than 100% means that the entity has a net surplus and that it exports, while an SSR smaller than 100% means that it has a net deficit and that it imports.

Oceania is in deficit and very much import-dependant.

Table 3 summarises the data in production, imports, exports and self-sufficiency ratio.

Table 3 – Production, trade and self-sufficiency in nitrogen nutrients of world regions (2023)

	Share of world production	Share of world imports	Share of world exports	Self-sufficiency ratio
Africa	6 %	8 %	16 %	173 %
America	13 %	32 %	9 %	59 %
Asia	61 %	30 %	39 %	105 %
Europe	19 %	25 %	36 %	123 %
Oceania	0 %	5 %	0 %	18 %

Source: computed from FAOSTAT data

What implications for food security of the Persian Gulf conflict?

Uncertainty

At this stage, it is difficult to answer this question, as the situation is quite uncertain and **the narratives and actions of the main actors change continuously**, giving limited hints regarding their likely long-term behaviour.

Food security implications will **depend on a number of factors**, such as

- **how long** the blockade of the Strait of Hormuz will actually last,
- **how strict** it will be (will some ships be allowed by the belligerents to cross the Strait depending on the nature of their shipment and their destination?),[4]
- the amount of **fertiliser stocks** existing in different countries,
- the period of the **agricultural season** in various countries, and
- the **needs** of fertiliser for the weeks/months to come.

They will also depend on the extent of **damage caused by the bombing** of gas extraction and fertiliser manufacturing units in Gulf countries.

The impact of the conflict could be reduced if some fertiliser can be transported by land to Saudi ports from Gulf riparian countries and shipped out through the Red Sea to the countries they were meant to be sent to.[5]

[4] In the case of the embargo on the Black Sea in 2022, negotiations between Ukraine and Russia under the aegis of the UN and Turkey made it possible to ship cereals required to avoid food shortages, particularly in parts of Africa, even after Russia withdrew from the agreement. Couldn't a similar arrangement be envisaged with the United States and Iran, under the aegis of the UN and, perhaps, Pakistan?

[5] As had been the case for Ukrainian cereals transported out of the country by train to European ports.

Yet, even with such arrangements, the **price of fertiliser could go up** and this would impact the capacity of farmers (particularly poor farmers) to buy fertiliser. This price increase is also likely to occur for fertilisers coming from other parts of the world (the fertiliser market being globalised), depending on the nature of contractual arrangements of supply agreements regarding prices at delivery, if they are specified.

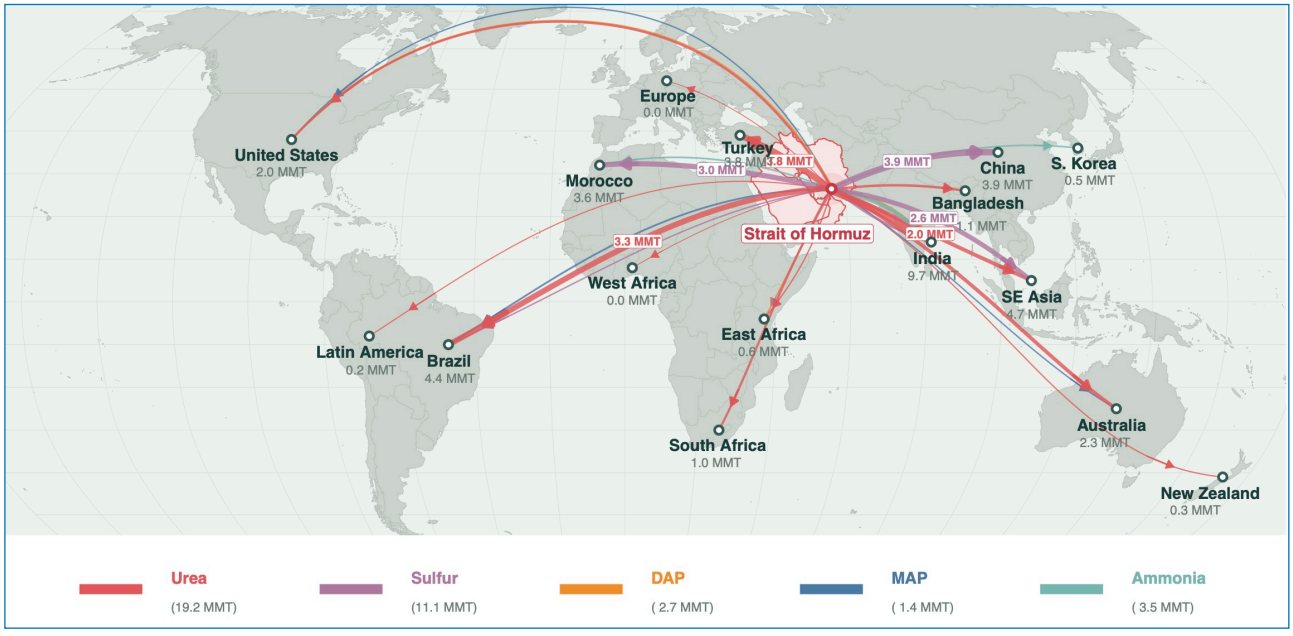
More at stake than just nitrogen fertiliser

The map in **figure 1** shows how the blockade of the Strait of Hormuz impacts main fertiliser flows at world level.

It is quite clear from the picture that the most important destinations of nitrogen fertiliser (mainly urea and some ammonia) from the Gulf are **Turkey**, **Brazil**, and **India**, and, to a lesser extent, **Australia** and the **United States**, and in relatively smaller quantities **Southern and East Africa**.

Also of importance are the exports of **sulfur,** which is a key **ingredient for processing phosphate fertiliser** and is exported to **Morocco** (a major phosphate producer and exporter), to **China** and **South-East Asia**. Unavailability of sulfur would **disrupt phosphate production and supply** throughout the world.

Figure 1 – Global fertiliser exports through the Strait of Hormuz: major trade flows (2024)



Source: Arita, S., et al., 2026

Finally, the **Gulf riparian countries are very dependent on imports for their food**. **Table 4** (on next page) shows that **Kuwait**, **Qatar** and **the United Arab Emirates** rely totally on imports for their cereals. Imports covered 89% of their

needs for **Oman** and **Saudi Arabia**. **Iran** and **Iraq** were less dependent on imports than the other countries.[6]

Table 4 – Import dependency for cereals of Gulf riparian countries (2023)*

	Cereal import dependency ratio
Iran	41
Iraq	63
Kuwait	99
Oman	89
Qatar	100
Saudi Arabia	89
United Arab Emirates	100

Source: FAOSTAT

*The cereal import dependency ratio is computed by the ratio: (cereal imports – cereal exports)/(cereal production + cereal imports – cereal exports) * 100.
This ratio is computed as a three-year average over the period 2021-2023.

Clearly, should the blockade of the Strait of Hormuz continue, it would create **a high risk of food insecurity** in all these countries, as supplying them with sufficient food by land or by air would be difficult[7] and expensive, making access to sufficient food impossible for a large part of their population. It would also affect food security of the most vulnerable population groups in many other countries throughout the world.

Meanwhile, the crews of the ships stranded in the Gulf are facing increasing problems to eat and live in extreme conditions.

However, at the time this article is being drafted, **it seems far too early and excessive to talk of a potential global "famine".**[8]

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To know more:

- Arita, S., et al., Strait of Hormuz Closure and Global Fertilizer Trade Disruptions, NDSU Agricultural Trade Monitor 2026.3 (2026): 1-26, 2026.

[6] There are no data available in FAOSTAT regarding Bahrain.

[7] In the case of Iran, there are reports that some key infrastructure (railroads and bridges) has been destroyed by US and Israeli bombing.

[8] It is fit to recall here that "Famine exists in areas where, even with the benefit of any delivered humanitarian assistance, at least one in five households has an extreme lack of food and other basic needs. Extreme hunger and destitution is evident. Significant mortality, directly attributable to outright starvation or to the interaction of malnutrition and disease is occurring." (Guidelines on Key parameters for IPC Famine classification).

- Venter, I., South African nitrogen fixation fertiliser manufacturer eyes the global stage, Engineering News, 2026.
- IPC Global Steering Committee Members, Guidelines on Key parameters for IPC Famine classification, Integrated Food Security Phase Classification, 2016.

Websites consulted

- FAO, FAOSTAT – Suite of Food Security Indicators
- FAO, FAOSTAT – Fertilizers by Nutrient

Selection of earlier articles published on hungerexplained related to this topic:

- The food weapon: a never-ending and horrendous story… 2025.
- In the media: food crisis and invasion of Ukraine: what happened to Africa? 2022.
- Ukraine war and food crisis: facts and debates, 2022.
- Why famines in a world of plenty? 2017.