Nutritional Assessment of Food Aid Delivered to Gaza by land and air drops, during the 2024 War

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Abstract

Background

The continuing Gaza-Israel war puts the civilian population in Gaza at risk of food and nutrition insecurity. We aimed to assess the nutritional content of the humanitarian food aid supplied to Gaza. We assembled and analyzed data on the quantity of food aid delivered to the Gaza Strip, and analyzed its compliance with population needs, as established by Sphere international humanitarian guidelines.

Methods

We obtained the registry of all food aid delivered to Gaza via air drops and land crossings between January - April 2024 from Israel's Coordinator of Government Activities in the Territories (COGAT). For every truck or airdrop of food, we categorized, quantified, and assessed the nutrient composition of individual food items. We then summed the energy, protein, fat, and iron content of all shipments, and calculated supply per capita per day, according to the size of Gaza's population. Finally, we compared the findings to the Sphere standards for food security and nutrition in conflict-affected populations.

Results

Between January and April 2024, 14,916 trucks conveying 227,854 tons, and 95 airdrops weighing 3,694 tons of food entered Gaza. On average, 3,729 food trucks per month entered Gaza, with a continuous increase of 431 trucks per month since January. Between January and April, the overall weight of food shipments increased by 57%. Food group diversity increased. The crude mean per capita per day energy supplied was 3,374 kcal, protein was 101 gr (12.1% of energy), fat was 80.6 gr (21.5% of energy), and iron was 25.2 mg. Energy, protein, and fat amounts exceed Sphere recommendations. Although the amount of iron supplied improved over time, it remained lower than the Sphere standard.

Conclusions

Of the four pillars of food security - availability, access, utilization, and stability - this study focuses on the availability pillar. The quantity and quality of food aid delivered to Gaza have steadily improved since January 2024 and supply sufficient energy, protein, and fat for the population's needs. In addition to monitoring the quality and quantity of food available to Gaza, reliable data on food distribution and population access will be necessary for securing the civilian population's nutrition.

Introduction

The 2024 "Swords of Iron" war between Israel and Hamas began on October 7, 2023, after a planned raid by thousands of terrorists who murdered and wounded thousands of Israelis of all ages, abducted hundreds of civilians, including elderly, women, and children, and destroyed whole civilian communities. Official UN reports confirm the perpetration of severe atrocities, including maiming, torture, and execution of extreme sexual violence on October 7th against both male and female victims (1, 2). At the time this report was written, 132 Israelis of all ages were still held hostage by Hamas in Gaza (3). Following these events, nearly 200,000 Israeli citizens were internally displaced from their homes on Israel's southern borders (3). On October 27, the Israeli Defense Forces (IDF) entered Gaza in pursuit of the terrorists and to eliminate military infrastructure and rescue the abducted people, while calling civilians to evacuate via a humanitarian corridor. In the ensuing fighting, extensive damage displaced much of the civilian population, exacerbating food insecurity and creating a humanitarian crisis.

Despite deplorable populist statements by Israeli politicians, de facto, Israel has facilitated the delivery of humanitarian aid donated by allies, Arab countries, and international humanitarian agencies to the civilian population of Gaza. Israel's Coordinator of the Government Activities in the Territories (COGAT)(4) is responsible for facilitating the delivery of humanitarian aid into Gaza under complicated and dangerous conditions. The food is supplied by international donors, and aid agencies who distribute it to the population once it enters Gaza. These donors include United Nations (UN) agencies, Arab countries, and international humanitarian non-governmental organizations (NGOs).

The Nitsana-Rafah land crossing was re-opened on October 21, and the Kerem Shalom land crossing opened on December 12, 2023, to increase the food supply to Gaza. As of May 2024, despite continued fighting, Israel and its allies have progressively increased the influx of aid into Gaza. Israel recently opened three additional land crossings to facilitate delivery of aid in Central and Northern Gaza, a floating pier recently built by the United States military permits delivery of aid by sea, and Israel is working to facilitate the inspection and shipment of humanitarian aid to Gaza via the Israeli port of Ashdod (4).

We undertook the present study with a sense of urgency following the publication of two Integrated Food Security Phase Classification (IPC) reports (5, 6). Our study provides essential and verifiable data on the quantity and nutritional value of food items crossing into Gaza. Reliable and verifiable data on food distribution and accessibility and utilization within Gaza are not yet available.

Methods

We analyzed the food shipments delivered into the Gaza Strip by land between January to April 2024, as recorded by COGAT. Beginning in December 2023, COGAT established a registry documenting authorized aid requests supplied to the Gaza Strip. The registry includes the amounts and content of aid supplied, based on information provided by donors and recorded at crossing points. These records systematically list the date of shipment, the consignee, the weight,

and the content of trucks entering Gaza via the Nitzana and Kerem Shalom crossing points and by airdrops. Unlike the data posted by the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA)(7), the COGAT data lists the gross weight of each consignment and its content. Shipment weights are manually estimated and recorded at the crossing point. The registry also includes data on aid delivered from multiple sources, such as national and private sector donations, and not just UN agencies.

We collected data on food delivered to the Gaza Strip from January 2024, at which point the registry was complete, and its data quality was sufficient for analysis. Food aid trucks constituted the majority of aid to Gaza. Other trucks supplied tents and shelters (15%), medical supplies (8%), bottled water, and various other mixed goods (7%)(4). Trucks that did not contain food were excluded from the analysis. We classified the food consignments listed for each truck into several categories:

1. Specific food commodities; 2. Standardized food parcels containing the food items recommended by the UN humanitarian agencies and the International Federation of the Red Cross and Red Crescent Society (IFRC ICRC); 3. Non-standardized food parcels, calculated based on their documented content; 4. Mixed food parcels (with standard and non-food components and other aid such as medical and hygiene supply); 5. Cooked meals; and 6. Food items for infants (from 6 to 12 months of age) (Table 1). Food items were further categorized according to food groups (Supplementary Table 1). The proportional weight of each food item within ready meals and standardized parcels was also categorized by food groups.

The energy (kcal/ton) and protein (gr/ton), fat (gr/ton), and iron (mg/ton) content of each shipment was estimated according to the food composition values. (Supplementary table 1). The shipment weight was adjusted for each category. The weight of food in standardized food aid parcels was available, allowing us to calculate the non-food items (e.g., packages), and adjust the weight accordingly. In cases of mixed shipments including food, and other aid such as clothing and medical supplies, we adopted a conservative approach, adjusting the net weight of food to 50% of the consignment’s weight. We adjusted the shipment weight for all other food items, decreasing the available weight by 15% (Table 1).

Table 1
Supply categories included in the analysis and nutritional value

Supply category	Calculations of nutritional value	Weight adjustment factor	Protein (gr/100gr)	Energy (kcal/100gr)	Fat (gr/100gr)	Iron (mg/100gr)
Specific food commodities	Nutritional value was extracted from the USDA's comprehensive source of food composition data. Each food item was categorized by specific food group: grains and fortified grains, legumes, vegetables, potatoes, fruit, dairy products and eggs, meat, fish and poultry, oils, sweets, sugar-sweetened beverages, and others (Supplementary table 1).	Adjustment for 15% loss [a].	Please see supplementary table 1			
Standardized parcels	The IFRC food parcel is used as a reference for all standardized parcels. Each IFRC parcel contains 2 kg of grains (pasta and rice), 1 kg of legumes (beans), 790 gr oil (canola), 1 kg of sweets (sugar). Nutritional values for 100 gr are calculated according to food weight (approximately 7 kg) (Supplementary table 3).	Since the total parcel weight (including packaging) is reported as 12kg, we adjusted the parcel weight accordingly (60%)[b].	8.4	357	13.8	2.2
Non-standardized parcels	The nutritional value was calculated as the weighted mean of nutritional values of all foods supplied as specific food commodities (Supplementary table 1).	Weight was adjusted by 15% loss [a].	12	353.2	5.4	2.9
Standardized parcels (mixed)	We used the nutritional content of the standardized food parcel (Supplementary table 4).	Measured food weight was assumed as 50% of the supply weight (while the rest is medical or other humanitarian supply). Further adjustment was made by 60% [b].	8.4	357	13.8	2.2
Non-standardized parcels (mixed)	The nutritional value was calculated as the weighted mean of nutritional values of each of the food items in the parcels (supplementary table 1).	Measured food weight was assumed as 50% of supply weight (while the rest is medical or other humanitarian supply), with additional adjustment by 15% loss [a].	12	353.2	5.4	2.9
Ready meals	The nutritional value of a standard main meal was used, including: 1 cup cooked grains (133 gr), 1 cup red meat in vegetable sauce (222 gr), pita bread (1 unit), vegetable-based spread (4tbsp), tahini (2tbsp), and dessert (3 Baklawa pieces). Nutritional values were calculated as assumed weight (after reducing for 30% loss), and adjusted to parcel weight (truck weight) (Supplementary table 2).	Weight was adjusted by 15% loss [a].	8.0	204	8.4	1.5
Foods for infants and toddlers						
Complementary food for infants > 6 months of age (mashed vegetables)	Food labels provided by the commercial international brand.	Weight was adjusted by 15% loss [a].	1.0	40.0	0	0.6
Infant nutritional supplementation (IFRC catalogue)(8)	Food labels provided.		13.4	535.0	13	45
Infant formula for 6–12 months of age.	Food label of a commercial international brand for stage 2 + 3 formulas.		155.0	4260.0	11	10

[a] Adjustment of food aid delivery weight was adjusted as acceptable by international aid agencies as 15%.

[b] IFRC ICRC catalogue https://itemscatalogue.redcross.int/relief--4/food--5/food-parcels--40/food-parcels--KRELFOPA01P.aspx

Finally, we summed the contribution of energy (kcal), protein (gr, and % of kcal), fat (gr, and % of kcal), and iron (mg) delivered per month to the Gaza Strip, and calculated the mean amount of nutrients per capita per day, based on Gazan population size, as reported by the Gaza Central Bureau of Statistics (n = 2,028,761 excluding infants < 6 months)(9).

This allowed us to compare the amounts of nutrients (kcal, protein, fat, iron) in food shipments delivered to the Gaza Strip with the needs of the Gazan population according to the gold standard of crises affected population's dietary needs, the Sphere Standards "Essential concepts in food security and nutrition" guidelines(10).

For sensitivity analysis, we also tested the ability of shipments to deliver the dietary needs of the Gazan population using a stringent food-loss factor of 30% (Table 5). We performed an additional stringent, non-standard analysis, in which we calculated the theoretical age-adjusted energy, protein, and iron supply(11), required by a healthy population with the Gazan age distribution, including a predominantly higher proportion of children. Daily per capita amounts of these nutrient requirements were calculated using an assumed 30% food-loss factor (Supplementary table 4).

Results

We analyzed data from 14,916 trucks conveying food weighing 227,854 tons, and 95 airdrops weighing 3,694 tons recorded in the COGAT database. The mean number of trucks crossing per month was 3729 (124.3 per day), with a mean increase of 430.6 trucks per month from January to April 2024. The weight of food airdrops grew from 76.5 tons in January to 1959.9 tons in April. About 89% of the aid entering the Gaza Strip was delivered from humanitarian aid agencies, 10.3% from the private sector, and 0.6% from airdrops.

After adjusting for packaging and other non-food weight, the proportional weight (tons) of shipments indicates that most food supply can be attributed to standardized food parcels, and specific food commodities (Table 2).

Table 2
Amounts (tons) of food supplied to the Gaza Strip, by supply category, between January-April

	January	February	March	April	Total weight [a] (Tons)	Proportional weight (%) of all shipments
Specific food commodities	27,238	14,707	39,264	56,105	137,314	59.30
Standardized food parcels	23,836	15,164	19,146	22,962	81,108	35.03
Cooked meals	327	218	2,422	2,639	5,606	2.42
Standardized food parcels (Mixed)	1,396	1,301	968	654	4,318	1.86
Non-standardized food parcels	523	83	349	1,679	2,633	1.14
Infant food [b]	259	29	119	60	467	0.20
Non-standardized food parcels (mixed)	6		19	77	102	0.04
Total weight (Tons)	53,586	31,501	62,286	84,175	231,548	100

[a] Total weight is the sum of food weight across 4 months, adjusted to losses as depicted in Table 1: specific food commodities, cooked meals, non-standardized parcels, and infant food were adjusted by 15%, and standardized food aid parcels were adjusted by 40%. In addition, for mixed shipments, we regarded the weight of food as 50% of the mixed shipment weight.

[b] Infant food includes complementary infant food, infant nutritional supplements, and Infant formula for six months of age and older

The weight of food items and food groups from all aid categories demonstrates that shipments delivered a wide variety of foods (Supplementary table 2), and these increased each month (Fig. 1). From January to April, the amount of food grew by 57%, especially in the following food groups: fruit (2,851%), vegetables (2,657%), nuts and seeds (1435%), Dairy and eggs (934%), Potatoes (662%), and chicken, fish, and meat (97%). The amount of food delivered increased in March, and even more so in April.

Likewise, the nutrient content increased over the analysis period, with the highest amount in April. The mean monthly energy supply over 4 months was 3,374 kcal per capita per day. The mean amount of protein was 101 gr per capita per day, comprising 12.1% of the energy intake. The mean amount of fat was 80.6 gr per capita per day (21.5% of daily kcal), and iron was 25.2 mg per capita per day (Table 3).

Figure 1. The amount (tons) of food, by food groups, between January-April

Table 3
Nutrient content of food supplied to the Gaza Strip, between January-April

	January (31 days)	February (28 days)	March (31 days)	April (30 days)	Total Nutrients [a] (120 days)
Energy (kcal) per month	195,044,393,625	110,736,963,011	220,747,939,970	294,833,010,863	821,362,307,469
Average kcal per capita per day [b]	3,101	1,949	3,510	4,844	3,374
Protein (gr) per month	5,935,597,662	3,206,406,118	6,600,484,981	9,020,446,063	24,762,934,825
Average gr protein per capita per day [b]	94.4	56.4	105.0	148.2	101.7
Average % of kcal from protein per capita per day [b]	12.2%	11.6%	12.0%	12.2%	12.1%
Fat (gr) per month	4,082,313,225	3,059,471,565	5,701,217,498	6,785,734,781	19,628,737,068
Average gr fat per capita per day [b]	64.9	53.9	90.7	111.5	80.6
% of kcal from fat per Average capita per day [b]	18.8%	24.9%	23.2%	20.7%	21.5%
Iron (mg) per month	1,491,500,105	798,551,809	1,594,505,737	2,252,090,530	6,136,648,182
Average Mg iron per capita per day [b]	23.7	14.1	25.4	37.0	25.2

[a] "Total Nutrients" is the sum of nutrients across 4 months, calculated according to the nutritional value of each food/supply category and weight-adjusted as depicted in Table 1

[b] Per capita per day analysis was performed by dividing the total amount of each nutrient by the population of Gaza (2,028,762 people), and the number of days (30 days per month and 120 days per 4-month period).

A comparison of the nutrients supplied by food aid to the Sphere recommendations demonstrates that the amounts of energy, protein, and fat supplied to Gaza exceed the Sphere recommendations for conflict-affected populations (Table 4).

Table 4
Comparison between foods supplied to the Gaza Strip and Sphere guidelines for humanitarian aid supply to conflict-affected populations

Average Individual Daily Requirements	Sphere guidelines for humanitarian food supply [a]	Nutrients Supplied to Gaza	Percent of Sphere guideline met by supply
Energy (Kcal/day)	2,100	3,374	161%
Protein (gr/day)	53	101.7	192%
Protein (% as a proportion of total energy supply)	10%	12.1%	121%
Fat (gr/day)	40	80.6	202%
Fat (% as a proportion of total energy supply)	17%	21.5%	127%
Iron (mg/day)	32	25.2	79%

[a] Population dietary needs according to Sphere recommendations were calculated by multiplying Sphere personal needs, with Gaza population size in 2023 (2,028,762 people).

Sensitivity analysis

To validate our results, we performed a sensitivity analysis using a more stringent precautionary approach with a food-loss factor of 30%. This sensitivity yielded similar results, with energy and protein compliant with Sphere standards (Table 5). In a final stringency, we calculated the age-adjusted energy, protein, and iron supply(11), required by a healthy population with the Gazan age distribution. The mean weighted theoretical daily requirements per capita were 1,898 kcal, 43 gr protein, and 11 mg of iron. Considering 30% food loss, the theoretical nutrient supply required by a healthy population with the Gazan age distribution would be 2711 kcal, 61.4 gr protein, and 15.7 mg iron per capita per day (Supplementary table 4). The food supplied to the Gaza Strip between January and April also exceeded these more stringent thresholds.

Table 5
Mean amount of nutrients supplied to the Gaza Strip, between January-April: Sensitivity analysis accounting for 30% food loss

	January (31 days)	February (28 days)	March (31 days)	April (30 days)	Total Nutrients [a] (120 days)
Total food weight (Tons)	48,582	28,847	54,843	73,489	205,762
Energy (kcal) per month	175,846,969,562	101,469,439,929	193,997,055,736	255,407,926,920	726,721,392,148
Average kcal per capita per day [b]	2,796	1,786	3,085	4,196	2,985
Protein (gr) per month	5,242,385,081	2,882,352,185	5,720,270,551	7,709,024,330	21,554,032,147
Average gr protein per capita per day [b]	83.4	50.7	91.0	126.7	88.5
Average % of kcal from protein per capita per day [b]	11.9%	11.4%	11.8%	12.1%	11.9%
Fat (gr) per month	3,957,470,708	2,917,815,258	5,171,853,998	6,099,333,804	18,146,473,768
Average gr fat per capita per day [b]	62.9	51.4	82.2	100.2	74.5
Average % of kcal from fat per capita per day [b]	20.3%	25.9%	24.0%	21.5%	22.5%
Iron (mg) per month	1,320,703,388	720,232,669	1,387,260,466	1,930,074,832	5,358,271,355
Average Mg iron per capita per day [b]	21.0	12.7	22.1	31.7	22.0

[a] "Total Nutrients" is the sum of nutrients across 4 months, calculated according to the nutritional value of each food/supply category and weight-adjusted as depicted in Table 1

[b] Per capita per day analysis was performed by dividing the total amount of each nutrient by the Gaza population size (2,080,982 people), and the number of days (30 days per month analysis and 120 days per 4-month period)

Discussion

This detailed analysis highlights the fact that the amount of food per capita, delivered to Gaza between January and April 2024, meets Sphere humanitarian recommendations for food aid delivery to conflict-affected populations, and should be sufficient to provide the nutritional needs of the entire Gazan population. The food content of the shipments increased monthly in both amounts and nutritional values. April showed the highest amount of food crossing into Gaza, energy, protein, fat and iron. The results of our analysis remained consistent even after we applied stringent assumptions of food loss and exclusion. Though the amounts of energy, protein and fat reached the Sphere standard during these months, the supply of dietary iron per capita did not reach the standards during January-March. Sub-optimal supply of dietary iron could result in anemia, already prevalent in the Gazan population(12). Our nutritional assessment also shows relatively low amounts of fruits and vegetables. This could result in low micronutrient availability. It is important to note that nutritional supplements were included in shipments, but were not accounted for in this analysis, and might have increased the supply of iron and other micronutrients. Nevertheless, we recommend that the Nutrition and Food Security Clusters encourage humanitarian aid organizations to increase donations of iron-rich food. Further investigation is needed to gauge the availability and diversity of different food groups in Gaza.

To evaluate the effects of the war on the nutritional security of the Gazan population, it is important to account for the status before October 7^{th,} 2023. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) online dashboard(13) indicates that during January-September 2023, in the period preceding the war, the average daily rate of trucks entering Gaza was 321 (87,707 in total over 273 days), of which 100 per day were carrying food (27,434 trucks). According to UNRWA's dashboard(7), which provides information regarding UN agency aid alone, the average number of trucks carrying food into Gaza daily increased from 55 in November to 97 in January and 118 in March 2024 (a number that approximates those in our analysis of COGAT data). Israel's stated policy places no restrictions on the quantity of humanitarian aid that is ready to be transferred into the Gaza Strip provided it is coordinated and passes security screening. To date, COGAT reports that 98.7% of all aid trucks sent were allowed to enter the Gaza Strip. Only 1.3% of the trucks (307 trucks) were rejected or sent for repackaging, as they carried unauthorized dual-use items that could be reprocessed for warfare and terrorist activities(4).

Among numerous reports that have warned of decreasing nutritional security, imminent hunger, and famine, two stand out. One report is based on a food insecurity analysis conducted in December 2023 by the Integrated Food Security Phase Classification (IPC) Famine Review Committee (FRC) (5). The other is a report by the Global Nutrition Cluster Nutrition Vulnerability and Situation Analysis/Gaza published in February 2024(14). Both reports rely on essentially the same set of data. The IPC report warned of a high risk of famine in Gaza between mid-March and mid-July in projections of a worst-case scenario. Our results suggest that if famine were to occur in Gaza, it is unlikely to be due to any limitations posed by Israel on the food supply entering the Gaza Strip. Rather, the issues may be related to how food aid is distributed, made accessible, and utilized by the population once it reaches Gaza. Several key factors hinder efforts to increase the amount of aid reaching civilians in the Gaza Strip, which must be addressed in further research. These include theft, looting, and hoarding of food and other supplies, abetted by Hamas or others, and limit of the capacity of Israel and international organizations operating inside Gaza to ensure access (15–17). It must also be mentioned that military attacks by Hamas at humanitarian aid crossing points and corridors interrupt humanitarian efforts. For example, Hamas fires rockets from within, nearby, and even towards humanitarian zones, at IDF forces protecting humanitarian corridors, and at

such critical infrastructures as a desalination plant funded by the international community. Kerem Shalom, a major crossing point for humanitarian aid trucks, repeatedly came under fire and endured three mortar barrages (8/5/24), and 16 rocket attacks (5/5/24, 7/5/24). The northern pier and humanitarian corridor endured fire and rocket attacks for several days (3–6/5/24)(18–20). Hamas must be held accountable for deliberately interfering with efforts to provide the passage of aid to the civilian population in Gaza.

This study includes key strengths. First, it is based on continuous and systematically gathered data, supplied mostly by UN and non-UN donor agencies themselves. Information could, therefore, be validated and reproduced. Second, it is more comprehensive than other data records of aid supplied to the Gaza Strip since it contains information on various donors and crossing points. Furthermore, it is noteworthy that food accounted for 63% of the total number of trucks entering the Gaza Strip. As this report distinguishes between the total number of trucks and the nutritional value of the food supply, it allows a more accurate assessment of the available food in the Gaza Strip. Importantly, we asked if the food supply met the Sphere recommendations for crisis-affected populations. Sphere recommendations take into account the dietary requirements of all age groups and both sexes, including pregnant and breastfeeding women, and the potential conflict-related dietary needs of the population, including rehabilitation and previous malnutrition (10).

This study has several limitations. First, it only examines the first pillar of food security, namely, food availability, and not accessibility, utilization, or stability. Our analysis does not evaluate food accessibility and utilization by the conflict-affected people in Gaza. Because gross food weight was manually estimated and recorded, we used stringent adjustment factors to account for the potential overestimation of the food supply. Finally, the study does not include food entering via a new sea pier and three new, additional land crossings (Western Erez, Eastern Erez, and Gate 96). These crossings facilitate aid delivery to Gaza's northern governates (21). Future analyses should monitor food delivered by these routes as well.

Conclusions

The continuing Gaza-Israel war puts the civilian population in Gaza at risk of food and nutrition insecurity. Our data shows that the food entering Gaza meets or exceeds the calorie, protein, fat, and recently also the iron requirements of the Sphere standards for humanitarian aid delivery to crises-affected populations. Yet delivery alone is not sufficient. Ensuring the population's equitable distribution and access to humanitarian aid requires a sustained cooperative effort. Donors should closely monitor and improve the iron content and diversity of the food that they provide. Addressing the food needs of Gaza's civilian population requires a thorough assessment "from border to consumption." Such a crucial project will require cooperation between Israeli, Palestinian, and international agencies, health practitioners, and researchers, united to ensure the nutritional security of the citizens of Gaza. Historically, Israeli and Palestinian health and nutrition professionals cooperated to improve the well-being of both peoples (22, 23). Health professionals from all sides must work together now to mitigate suffering, even before "the day after," and to provide a bridge to a more secure shared future for citizens on both sides of the border.

Abbreviations

COGAT
Coordinator of Government Activities in the Territories
IDF
Israeli Defense Forces
UN
United Nations
NGO
Nongovernmental organizations
IPC
Integrated Food Security Phase Classification
UNRWA
United Nations Relief and Works Agency for Palestine Refugees in the Near East
ICRC
International Committee of the Red Cross
IFRC
International Federation of the Red Cross and Red Crescent Societies
USDA
United States Department of Agriculture
RDA
Recommended Dietary Allowance

Declarations

Ethics approval and consent to participate –This study analyzed logistics data provided by COGAT. Ethical approval is not needed for research that does not involve human subjects.

Consent for publication-not relevant

Availability of data and materials – data available upon request

Competing interests - The authors declare that they have no competing interests

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Authors' contributions –

NFI – data analysis, manuscript draft writing.

DN, AMT, RE, MBM – analysis supervision, revision, and critical review of manuscript.

JM, SAP and GT- critical review of the manuscript.

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Figures

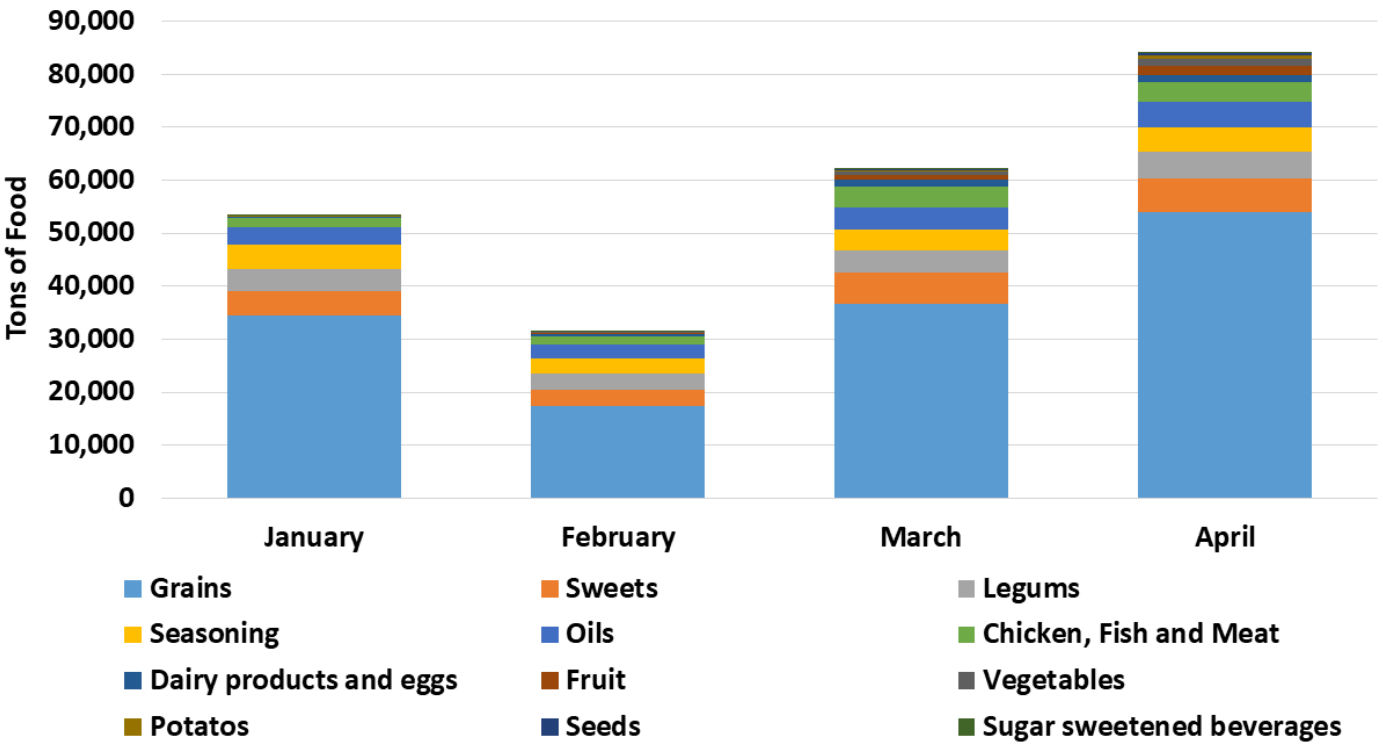

Figure 1

The amount (tons) of food, by food groups, between January-April

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