



The Impact of Food Deprivation and Starvation on Mental Health: Blockade on Artsakh (Nagorno - Karabakh)

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ABSTRACT

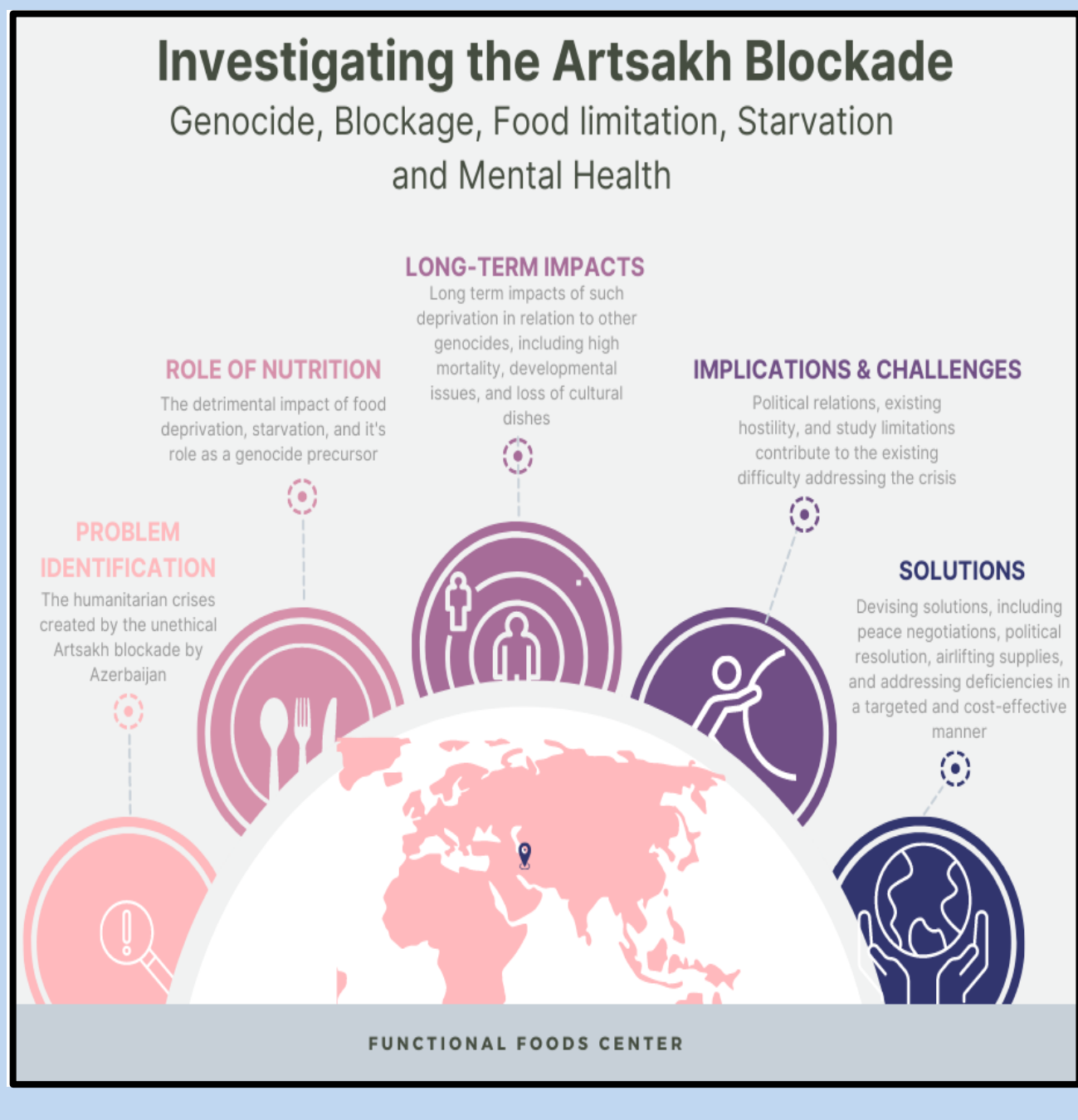
Starvation is the deliberate deprivation of food that occurs when perpetrators impede the victims from accessing the necessities to sustain life. Throughout history, starvation had been utilized as a form of genocide by many past regimes. It is used as a method to enforce a surrender from the victim or as a military strategy during warfare. Genocide, one of the most devastating crimes against humanity, as defined by Rafael Lemkin and categorized by the United Nations Genocide Convention, is the deliberate attempt to annihilate a certain ethnic, religious, or social group of people. The purpose of this article is to examine the immediate and lasting effects of the cognitive, psychological, and mental aspects of starvation.

In this current blockade of Artsakh, a dispute arises in the Artsakh region, also known as the Nagorno-Karabakh region, between Azerbaijan and the Republic (unrecognized) of Artsakh. Since December 12, 2022, ecologists from Azerbaijan have blocked the Berdzor (Lachin) Corridor, the only route that linked Artsakh to the world, thus preventing the transportation of fuel, medicine, and food. Russian peacekeepers have been stationed at the Corridor in Artsakh; however, the Azerbaijan government has consolidated its blockade and has disregarded the appeals made by the Russian peacekeepers.

In this article, the effects of starvation on the cognitive, psychological, and mental functioning of the human body are presented as they related to historical genocide. The impacts of starvation and malnutrition can be highly detrimental, leading to long-lasting impacts, and can disrupt the balance of essential nutrients and neurotransmitters in the brain, such as serotonin and dopamine. Malnourishment also impairs cognitive function, leading to symptoms like fatigue, weakness, irritation, poor memory, and attention deficit. Fluctuating blood sugar levels and imbalanced

hormones caused by starvation impact emotional regulation and increase the risk of developing mood disorders. The blockade of Artsakh could potentially cause both severe short term and long-term damage to the mental health of the victims. Since the blockade occurred more than 250 days ago, detrimental damages have already occurred. This article strongly calls upon the international community to take immediate action against this blockade and help prevent future genocide.

Key Words: Starvation, Genocide, Artsakh (Nagorno-Karabakh), blockade, Lachin corridor, bioactive compound, functional foods



Graphical abstract: Laying out article components and areas of interest.

INTRODUCTION

This review article aims to explore the severe consequences of starvation on a person's cognitive processes and mental well-being. By examining historical instances of starvation and recent research on the impacts of starvation, it is possible to gain insights into the profound mental challenges faced by individuals subjected to prolonged food deprivation. Genocide, one of the most devastating crimes against humanity, is categorized by United Nations Genocide Convention as a deliberate attempt to annihilate a certain ethnic, religious, or social group of people. The act of killing, inflicting physical or mental pain, imposing living conditions with the bad intention, preventing births, and forcibly transferring children out of the group are all part of the five main categories of genocide [1]. Rafael Lempk, an anti-genocide advocate, stated that "starvation was a weapon of subjugation and/or extermination", referring to starvation as a tool for genocide [2].

Despite a ceasefire agreement, Azerbaijan initiated a war against Artsakh and Armenia in September 2020. Russia established a ceasefire in November of that same year and stationed peacekeepers at the Lachin Corridor in Artsakh. Yet, since December 12, 2022, Azerbaijan has imposed a blockade on the Lachin Corridor, the only road connecting Artsakh and Armenia [3]. On 22 February 2023 the International Court published the decision regarding the request submitted by Armenia and stated that since the disruption of the Lachin corridor, "hindrances to the importation into Nagorno-Karabakh of essential goods [has occurred], causing shortages of food, medicine and other life-saving medical supplies", which can cause irreparable damage [4].

The people of Artsakh rely on the Lachin Corridor to access medical care, paramedic services, food, fuel, and other basic necessities. Armenia is set to send 400 tons of humanitarian aid to the residents of Artsakh, who have been deprived of essential goods due to a blockade by Azerbaijan for more than six months. Armenian prime minister, Nikol Pashinyan, has decried Azerbaijan's

blockade of trucks carrying humanitarian aid from Armenia to Artsakh at the entrance to the Lachin Corridor, describing it as proof that Baku pursues a policy of genocide regarding the Armenians of Artsakh. Aliyev, the president of Azerbaijan, exploits such a geopolitical advantage to take control of Nagorno-Karabakh by employing starvation and malnutrition. The Azerbaijan government deliberately cut off the natural gas pipeline and the electricity grid, leaving hundreds of thousands of Artsakh people exposed to the weather without any means of warmth [5]. Many children had also been separated from their guardians due to the blockade. Hence, UNICEF issued a warning stating that as the situation prolongs, many children will suffer from the lack of food and essential services that are critical for their survival, growth, and overall well-being.

Throughout history, genocides have inflicted immeasurable suffering, leaving effects that persist for generations. Many perpetrators, like Aliyev, have utilized food deprivation as a tactic to systematically eliminate targeted groups. Aliyev's regime strives for an alternative goal of attempting to ethnically cleanse the Artsakh region of Armenia. As part of this strategy, many churches, cultural heritage sites, and historical monuments were destroyed. Destruction of cultural attractions with deep historical significance to the Armenian people represents a form of cultural erasure that suppresses the Armenian identity in the region.

The goal of this article is to understand the immediate and lasting cognitive and neurological impacts of starvation, and how it impacts an individual's mental wellbeing. Understanding how a human body is influenced by long-term food deprivation provides insights into the detrimental impacts of past genocides.

MATERIALS AND METHODS:

A systematic review of published studies concerning the short term and long-term effects of food deprivation was conducted electronically utilizing PubMed®, Google Scholar, UCLA library, and www.ffhdj.com journals. Both

review and research papers were included. Eligible articles provided reasonable, scientific evidence on the effects of food deprivation on human health. Articles not available in English were excluded. Keywords for the search included: famine, starvation, blockade, food shortage, nutritional deficiency, malnutrition, depression, anxiety, food aid, refugees, bioactive compounds, Azerbaijan, blockade of Artsakh, and genocide.

The Role of Nutrition in Mental Health: A healthy, well-balanced diet is essential to maintaining stable mental well-being, reducing stress, improving concentration, and increasing cognitive function. On the other hand, a nutrient-deficient diet may lead to fatigue, mood swings, and worsening mental health symptoms. Therefore, it's essential to understand the roles of nutrition and how malnutrition can be a prevalent issue happening currently in the blockade of Artsakh [7].

There are six essential nutrients that an individual needs to regulate bodily functions: carbohydrates, fats, proteins, water, vitamins, and minerals. Since humans cannot produce these basic nutrients on their own, such nutrients need to be obtained through food. Each essential nutrient plays a unique role in supporting the body and understanding those relationships between specific nutrients and mental well-being can be valuable in understanding how the genocide and blockade in Artsakh can impact the victims' cognitive and mental functions. During such environmental challenges, the mental health of the oppressed individuals may be at risk due to stress, and limited access to food and health care.

Omega-3 fatty acids are fats found in certain fish, flaxseeds, and walnuts, and are essential for maintaining the structural integrity and fluidity of the human cell membrane [8]. Omega-3 is crucial for brain development and function and has been linked to improved mood and cognitive performance. Patients with severe depressive symptoms exhibit a lower omega-3 concentration compared to those with no depressive symptoms [9]. A

study conducted by Maes et al., also suggested that major depressive patients had a significantly higher proportion of overall omega-3 levels and omega-3 to omega-6 ratios [10]. Hence, researchers have proposed that a significantly lower omega-3 concentration could contribute to the development of major depression [11].

B Vitamins are heavily involved in energy production, neurotransmitter synthesis, and the maintenance of nerve cells [12]. Found in whole grains, leafy green vegetables, legumes, nuts, and animal products (e.g. lean meat, fish, and dairy), B vitamins act as an important role in the regulation and synthesis of dopamine and serotonin neurotransmitters. This function explains the close link to mood regulation, depression, and anxiety [13, 14]. Experiments conducted by Bryan et al. revealed a significant impact of vitamin B-12 intake on differences in the memory performance test of the Auditory-Verbal Learning Test (RAVLT). Further, there is a significant correlation of vitamin B-6 intake on the difference in the words recalled from the RAVLT [15].

Vitamin D is produced by our body when the skin is exposed to sunlight, however, it can also be obtained through alternative dietary sources like fatty fish, dairy products, and supplements [16].

Vitamin D plays a crucial function in the body by promoting calcium absorption, maintaining bone strength, reducing inflammation, and releasing essential neurotransmitters like serotonin and dopamine [17]. Hence, vitamin D deficiency has been associated with the risk of depression and cognitive impairment. Elizabeth et al. investigated the impact of vitamin D intake and found that the women who reported a greater intake of vitamin D3 had a reduction of depressive symptoms compared to those who reported a lesser intake. Since vitamin D is heavily involved in the blood-brain connection, the connection between vitamin D and depression may be caused by the homeostatic and immunomodulatory properties of vitamin D [18].

Antioxidants, such as vitamins A, C, and E, prevent free radicals from damaging bodily cells and protect the

brain from oxidative stress, which can cause cognitive decline and neurological disorders. Diabetes mellitus is associated with high oxidative stress, stress, and anxiety which are the most common characteristics of diabetic patients. Hence, Zohreh et al. conducted a study to show that there is a significant decrease in the anxiety levels of treatment patients that took vitamin C supplements. Short-term intake of vitamin C supplements is both safe and beneficial for reducing anxiety levels for diabetic patients [19].

Magnesium is an essential mineral that plays a role in nerve function and mood regulation. Because of its crucial role in facilitating optimal neurotransmission and its involvement in the synthesis of membrane phospholipids, it is needed for the proper functioning of the central nervous system [20]. Magnesium can enhance learning abilities and memory by inducing synaptic plasticity and increasing synaptic transmission in the hippocampus of lab rats [21].

Iron takes part in oxygen transportation, cellular respiration, and DNA synthesis, but most importantly, it is essential in the transportation of neurotransmitters like serotonin and dopamine [22]. Iron deficiency can

lead to fatigue, poor cognitive function, and impaired mood. Lozoff et al. designed a longitudinal study and found that children with iron deficiency as infants had significantly lower mental and motor functions once they matured as adults. Many of the children with iron deficiency found themselves repeating a grade or being sent to a special aid class. Hence, the research team concluded that children with severe iron-deficient history, after the iron treatment, developed behavior and developmental risks up to 10 years or more [23].

Examining Worldwide Genocides Through Starvation and Food Disruption:

This section delves into a distressing aspect of past genocides, exploring the manipulation of food access as a tool of oppression. Presented in Table 1, this analysis sheds light on instances such as the Holocaust and the Armenian Genocide, revealing how control over food resources was used to subjugate and harm targeted communities. The table provides a comprehensive overview of the affected time periods, populations, methods employed, and the resulting impacts, offering insight into the profound effects of food deprivation during times of crisis.

Table 1: The Use of Food during Genocide

	Holocaust	Armenian Genocide	Rwandan Genocide	Cambodian Genocide	Rohingya Genocide	Maya Genocide	Artsakh Genocide*
Years Occurring	1933-1945 [24]	1915-1923 [29] [30]	1994 [36]	1975 - 1979 [38]	2016 - 2017 [44]	1960-1996 [50]	2023
Number of Impacted Individuals	6,000,000 killed [25]	1,500,000 killed [31]	~800,000 killed [37]	~3,000,000 killed [41]	>980,000 displaced [45]	>200,000 killed [51] >40,000 displaced [51] ≤9000 killed [45]	120,000 impacted (trapped) [53]
Populations Involved	European Jews	Armenians	Tutsi ethnic group Hutu ethnic group	Cambodian citizens	Rohingya Muslims	Maya civilians	Republic of Artsakh (Armenian ethnics)
Victims; Perpetrators	Nazi Germany	Ottomans		Khmer Rouge	Rakhine State	Guatemalan Government	Azerbaijan
Subjects Receiving Imposed Food Limitations	European Jews	Armenians	Tutsi ethnic group	Cambodian citizens	Rohingya Muslims	Maya civilians	Armenians in the Republic of Artsakh

	Holocaust	Armenian Genocide	Rwandan Genocide	Cambodian Genocide	Rohingya Genocide	Maya Genocide	Artsakh Genocide*
Use of Food Restriction to Inflict Harm	Calcium and vitamin D deficiency Hungerplan: Nazi confiscation of Soviet food supply Forced and intended starvation	Forcibly taking away food [32] Destroying crops [32] Not allowing access to water [32]	Disruption of farming and food production (forced to flee) [38] Lasting impact today with general malnourishment [39]	Created famine. Loss of cultural and ethnic foods/recipes High rate of mortality due to starvation [42]	Military cutting off food rations [46] Aid restrictions on Myanmar camps and villages [47]	Barebones diet causing widespread illness and death [52]	Removal of natural gas and energy supply [54] Food supply cut off causing food shortages and threats of starvation [54]
Effects on Subjects	Osteoporosis (hunger osteopathy) [26] Delayed menarche and secondary amenorrhea Food hoarding behaviors (at risk of severely spoiled food) Psychological fears towards portion sizes and textural changes Religious internal conflict: "new kosher" [27]	Increased mortality rates Delayed menarche and secondary amenorrhea	Lasting impact on food infrastructure, leading to higher malnourishment rates [40]	High mortality rate [43] Edema, swollen legs, weight loss [44]	High starvation [48] Forced migration out of homeland [49] Severe weight loss	High mortality due to malnutrition [52] Current and future child developmental issues Marasmus and kwashiorkor [40]	High mortality rate [55] Decreased function of digestive, nervous and skeletal system [55] Increased rate of miscarriages and premature births [56]
Long-Term Impacts on:	Psychological effects and PTSD related to food	Loss of cultural dishes [33] Psychologically influenced traditional hospitality [34]	Current food infrastructure issues, inability to feed population [41]	Famine made future generations vulnerable to obesity, heart disease, high blood pressure, and diabetes. [45] Inability to limit food intake [46]	Child nutrient deficiency (future developmental issues)	Current and future child developmental issues	Ongoing genocide with long-term effects yet to be determined
Existing/Proposed Solution to address Nutritional Deficiency	Tip sheets on healthy kosher eating [28] Nutritional education guides for survivors [28] Meals in cans with essential nutrients [28]	Targeted supplementation [35] Custom health plans	Post-genocide recovery guide via Maslow's Hierarchy of Needs: providing basic food, water, shelter [42] Study assessment for intervention: GESUQ [43]	Targeted supplementation [42] Restoration of cultural dishes with a focus on essential nutrients and healthy eating	Targeted supplementation [42] Halal meal plans with targeted nutritional and health guidelines	Targeted supplementation [42] Implementing holistic cultural diet	Targeted population supplementation with financial analysis [36]

*The current Artsakh Blockade has not been officially declared a genocide. The parameters for what constitute a genocide are defined by the United Nation's Office on Genocide Prevention and the Responsibility to Protect [57]. Via the United Nation's Office on Genocide Prevention and the Responsibility to Protect: "In the present Convention, genocide means any of the following acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, as such: Killing members of the group; Causing serious bodily or mental harm to members of the group; Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part; Imposing measures intended to prevent births within the group; Forcibly transferring children of the group to another group" [58]. Genocide involves both a physical and mental component, and there are several precursors to genocide (including starvation and physical harm), which can be seen in the current Artsakh blockade.

FOOD-RELATED TACTICS DURING GENOCIDAL WARTIME:

Malnutrition: Malnutrition, defined by the World Health Organization, is a deficiency or imbalance in a person's intake of energy and/or nutrients [59]. There are four main types of malnutrition: stunting (low height for age), wasting (low weight for height), underweight (low weight for age), and micronutrient deficiencies (a lack of vitamins and minerals). Malnutrition occurs when a population is denied access to nutritious foods, such as forced starvation. Chronic malnutrition has many detrimental impacts on physical health. These include stunted growth, declines in muscle function, decreased cardiac-respiratory function, loss of gastrointestinal function, and delayed wound healing. Malnourished patients are more at risk for type two diabetes and are also more likely to have cognitive impairments and irreversible effects on their physical health [60].

Ultimately, the main consequence of chronic malnutrition is an increased risk of mortality.

Genocides in history have been known to implement tactics of deprivation and starvation on their targets to use further methods of violence. As referred to in Table 1, the instances of genocide are discussed as follows in historical order, the Holocaust, the Armenian genocide, the Rwandan genocide, the Cambodian genocide, the Rohingya genocide, the Mayan genocide, and the currently ongoing Artsakh genocide.

The Holocaust: Nazi Germany enforced harsh rules over the Soviet Union, specifically targeting European Jews. The "Hunger Plan" was a major tactic during the war as well as forced starvation within concentration camps. There was a prescribed meal plan set in place by the SS and Reichssicherheitshauptamt which was never followed and was later recognized as an advertisement meant to hide concentration camp conditions. The initial meal consisted of a sugar-free coffee substitute, the second meal comprised a liter of soup containing root vegetables and grains. As for the third meal, it encompassed 300 grams of dense bread accompanied by options such as sausage, margarine, cheese, or a dollop of jam.

However, it was reported that bread rations were down to 50g/day during the final year of the war [61]. Starvation during the holocaust led not only to physical impacts but also psychological issues and religious internal conflict. A new idea, known as "new-kosher," rippled among the Jewish community affected by Nazi rule and food deprivation. During food insecurity, Orthodox rabbis continued to be strict about the consumption of kosher meat, in fear that this would spread to other countries and kosher/religious practices would be threatened. On the other hand, liberal rabbis wanted to prevent unnecessary stress during food insecurity and decided that the "new kosher" would include meat from animals that were slaughtered after being stunned [62]. This idea brought fears of further

conflict and division among the Jewish community. The long-term impacts, as briefly described in Table 1, were psychological stresses concerning food portions that have been seen in Holocaust survivors. Some people need to see more food on their plates than recommended because they fear that they will be starved, some cannot have too much food on their plates for fear that they will waste food, and some people refuse to throw out old and expired food products because after being starved they prized their day-to-day food items. There are survivors who will not follow current dietary recommendations because food changes, especially textural, can revive memories from the Holocaust [28].

Armenian Genocide: During the Armenian genocide, tactics of forced starvation were implemented through more violent and preventative measures to make living a more strenuous task. The burning of crops would keep cattle from feeding which would decrease the amount of

meat, poultry, eggs, and dairy products to be sold. Their food yields decreased and the rations they had left were stolen by Ottoman officers while many Armenians died of starvation. Trauma in Armenians was presented as becoming guarded in their identity to cease the Armenian-influenced portions of their identity. This was named “Komitas syndrome” and was an involuntary act that caused the loss of Armenian traces in genocide survivors [63]. Although, the genocide brought new symbols to Armenian heritage such as the pomegranate, which was said to be hidden in the clothes of Armenians when trekking through the desert for refuge. Along this sentiment, a new tradition exemplified through hospitality is seen today that resembles the long-term effects seen in Holocaust survivors. Armenians place importance on having a full table when dining, especially with guests so that there is enough left over. This tradition spawned from the starvation and food insecurity that they experienced during the genocide [61].



Image 2. Armenian deportees forced to march toward an execution site, 1915 [64]

Rwandan Genocide: During this genocidal civil war between the Tutsi and Hutu ethnic groups, severe malnourishment and starvation plagued the country. A large number of Tutsi people fled the country for safety and were unable to feed themselves in the areas they traveled to. For those who remained in the country, the food and trade markets were severely disrupted due to the displacement of people, increasing the difficulty for the already malnourished to access food [65]. Moreover, in 1979, heavy floods hit Rwanda, causing damage to the agricultural land which created the inability for farmers to cultivate crops. Such disruptions led to food shortages among the vulnerable ethnic population of Rwanda, greatly contributing to food security [65]. The World Food Programme (WFP) provided food assistance and send aid, however, due to the large scale of the genocide, these efforts were often insufficient to meet the needs of the undernourished population [66]. Since the genocide, the Rwandan population has grown significantly, yet, farmers had little means to provide for their families. In 2011, Rwanda signed a cessation clause to end the refugee status of Rwandans in neighboring countries. Since then, many had returned home and received their three months-worth of food rations from the WFP. Still, starvation and blockades to food and proper nutrition heavily impact Rwanda. More than 40% of children under five in Rwanda are currently chronically malnourished [65].

Cambodian Genocide: Harsh conditions during the Cambodian genocide from 1975 - 1979 presented death and starvation not unlike other genocides discussed in Table 1, but it is clear that the nutrient diversity was more limited than others. For example, despite violent and morbid conditions, Jews who were not in concentration camps had access to higher-density protein foods as well as carbohydrates. Those who were in the camps were

given an appalling ration of food, but it could vary between bread, margarine, and a vegetable [67]. Cambodians were only given carbohydrates in two meals per day, a thin rice soup described as water with about a “handful of rice” and some Asian watercress, even though later in the war an entire meal may be compromised or burned [68]. In this case, it seems as though the perpetrators allowed Jewish prisoners a more diverse diet of extremely low quantity, while the Khmer Rouge allowed greater food quantities with less nutritional diversity. Cambodians were not allowed to grow their own food but worked in the rice fields of their oppressors. Some desperate civilians would steal from the Khmer Rouge, resulting in death if caught, or eating unusual items such as banana tree roots, tubers, grass, tadpoles, crickets and frogs. They experienced physical effects from malnutrition, Table 1, and today, there are survivors who are unable to control their eating habits to become healthy. They are unable to fathom that foods that once saved them during famine can make them sick; they continue to eat meat with fat or chicken with skin despite health warnings.

These sentiments are similar to both Jews and Armenians today, creating the idea that genocides alter psychological views on food based on fear. Additionally, physical effects are seen today as one study by Peterman et al. found a strong positive correlation between starvation during the genocide and current obesity based on literature [68]. Implying an unhealthy relationship with food and fear of starvation, leading to overeating and taking advantage of access to a diversity of foods, especially nutrient-poor foods. Moreover, starvation during pregnancy has left lasting epigenetic effects in which patterns have been recognized, such as diabetes, heart disease, and high blood pressure, but these epidemics cannot be directly drawn from starvation during the genocide [69].

Rohingya Crisis: For centuries, the Rohingya, an ethnically Muslim minority group, have faced institutionalized discrimination in Myanmar [70]. In August 2017, Tatmadaw, Myanmar's military, launched a massive campaign involving widespread and systematic violence which included killings, mass rape, torture, and unjustified arrests [71]. Many Rohingya people were forcefully locked down in their villages and homes, preventing them from fishing, farming, and working [72]. The confiscation of their farmlands and inability to perform work severely disrupted the Rohingya people's source of income and also resulted in a plunge in food production. Moreover, the Tatmadaw imposed strict restrictions on humanitarian access, making it difficult for

third parties to assist the Rohingya population [73]. This lack of access and aid blockage had heavily contributed to the lack of food, clean water, and other necessities. It has also hindered the ability to address health issues such as malnutrition and mental health. The widespread incineration and devastation of Rohingya residences resulted in over 700,000 individuals being displaced to Bangladesh, seeking refuge, safety, and employment prospects [73]. Many Rohingya were farmers or relied on agriculture for sustenance, and such migration disrupted their food production, preventing them from meeting their basic nutritional needs. Similar to the Artsakh, the blockade of food and necessities led to disastrous consequences and human rights violations.



Image 4: Rohingya men waiting in line for rice distribution in Balu Khali refugee camp. [74]

Mayan Genocide: The genocide which occurred in Guatemala caused an epidemic of hunger and starvation due to their resources being taken away such as food and medical care. The typical diet, recognized as the "barebones diet" (refer to Table 1), included three

tortillas, a small amount of beans, and sometimes rice. This was the amount of food that they had for the entire day, leading to severe malnutrition and death [75]. Their intake, despite the severely low quantity, included carbohydrates and plant protein from the beans. The

small quantities would lead to illnesses such as marasmus, a “deficiency of all macronutrients”, and kwashiorkor, a protein deficiency that affects both physical and mental development and is usually seen in infants [76].

Artsakh Genocide: The Artsakh genocide brought a cessation of many products being sold due to the border being closed off by Azerbaijan. Gas and energy being cut off are limiting cooking methods. Armenian ethnicities are faced with a complete lack of eggs, sugar, grains, dairy products, and cooking oil, while poultry farm products and baby formula are scarce [77]. The long-term effects are yet to be present but will most likely appear post-war. Increased mortality and decreased body function, however, are already being experienced by victims undergoing a lack of proper nutrition and medications as well as severe stress [78].

The Purpose of Starvation: Throughout history, genocide perpetrators have adopted various tactics to pursue their political goals. While direct execution can be a swift and brutal method of wiping out the targeted population, many chose starvation to torture their targets.

The Nazi’s “Hunger Plan” was a nefarious scheme developed by the Wehrmacht to use starvation as a regime to invade the Soviet Union in June 1941. To address Germany's lack of resources to sustain its military, the agricultural production of Ukraine and Belorussia was seized. Consequently, a scene of “unbelievable hunger” spread throughout northern Russia and industrial areas, where the prospects of permanent decline were imminent [79]. As Marshal Karl Rudolf Gerd von Rundstedt explained at the Reich War Academy in Berlin, the utilization of “organized underfeeding [was] better than machine guns” [80]. In some ways, the strategic use of starvation avoids the involvement of manpower and gunpowder, making it an

inexpensive way of exerting control, and many political leaders in the past had exploited such a deliberate strategy.

Similar trends can also be witnessed during the Armenian Genocide. As World War 1 erupted, Ottoman authorities detained and expelled numerous religious, intellectual, and political figures from the Armenian community. After healthy Armenian males were conscripted into the army, only women, children, the elderly, and people with disabilities were left in Armenia. Under the order of Talaat Pasha, 1.2 million deportees were sent to the Syrian Desert where only 10-20% of the population survived [73]. The deportees were on the road for months without clothes, showers, shelter, food, and water. The few deportees who made it to Syria were dispersed into concentration camps, where they endured further sufferings. The concentration camps there were designed to favor the spread of disease [79]. The strategic planning by the Committee Union of Progress wiped out the majority of the Armenian deportees during the death march and then placed the remaining people in camps for a more prolonged death. The sole purpose of such dehumanizing deportation was to kill the deportees and food starvation was the primary method of achieving that goal. Vehip Pasha, the commander of the Ottoman Army, revealed that “the purpose of the deportation was the destruction of the Armenian community” [79]. The Holodomor and the Hunger Plan incident reflect the distressing reality of why oppressive regimes choose starvation as a method of exerting pressure, power, and control. By examining historical genocides, it becomes evident that starvation was employed as a method of the political regime due to its cost-effective and efficient nature.

The Impact of Long-Term Food and Nutrition Deficiency on Mental Health: The blockade has resulted in more than 1200,000 Armenians with little to no access to food, medicine, fuel, and other necessities [81]. The

blockade primarily affects the most vulnerable segments of the population, including children, expectant mothers, senior citizens, and individuals with disabilities or pre-existing medical conditions [81]. People with disabilities were unable to access public or private transportation due to the absence of fuel. Hence, those with limited mobility were unable to leave their homes throughout the blockade [82]. The limited access to essential resources during the Artsakh blockade is severely jeopardizing the cognitive and mental well-being of the Armenian victims.

It became difficult for the victims of the Artsakh blockade to obtain the necessary essential nutrients to maintain basic cognitive and psychological functions. The typical diet of a singular person included “half a kilo of rice, pasta, and one liter of oil and a little sugar” [82]. The main providers of crucial nutrients, vegetables, and fresh fruits have also vanished from the shelves of stores. “We have not had any fruits or vegetables for over a month now,” a mother of two shared [82].

A research study conducted by Bhoomika et al. investigated the association between cognitive development and chronic protein energy malnutrition [83]. The team discovered that the malnourished group of children performed significantly worse on an exam that assessed attention, learning, memory, and visuospatial functions when compared to the nourished children's control group [83]. These cognitive impairments cause challenges for people to perform well in academic settings, professional environments, and other daily activities.

Varden Lalayan, a cardiologist working at a hospital in Stepanakert, witnessed a significant decrease in patients, with only five to six patients per month. According to Lalayan, many elderly patients in need of stenting checks are unable to access the necessary medical attention [82]. Proper nutrition is crucial for brain development, and chronic malnutrition can disrupt

this process. Essential nutrients like protein, vitamins (e.g. vitamin A, B vitamins, and iron), and fatty acids play critical roles in the formation and maintenance of brain cells and neural connections [84]. Inadequate intake of these nutrients can lead to impaired cognitive function, reduced attention span, and difficulties in learning and problem-solving [84]. Cusick et al. aimed to investigate the role of nutrition in brain development. Early-life malnutrition models suggested that protein deficiencies can lead to several major structural and biochemical changes in the brain. The changes include a decrease in brain size, DNA and RNA content, neurotransmitter concentration, and fewer neurons [84,85].

Children often represent the future of a country as they are the next leaders and policymakers; yet with more than 30,000 children isolated during this Artsakh blockade crisis, there are serious concerns about the impact on the country's future [81]. Moreover, research has also indicated that starvation and malnutrition can inflict even more detrimental effects on children and infants [86]. The human brain and body undergo rapid growth and development during early childhood, and proper nutrition is especially essential for the formation and organization of cognitive functions [86]. Malnutrition during critical periods of brain development has been shown to result in lower IQ scores [87]. Children who experience chronic malnutrition often exhibit lower cognitive abilities compared to well-nourished peers [87]. This impact can have long-lasting effects on educational attainment and overall intellectual potential. In a literature review of 60 studies and 52,822 children conducted by Chiara et al., results showed that children who had intrauterine growth restriction had significantly lower cognitive scores than others [88].

Hence, with the blockade persisting for longer than 220 days, it is important to acknowledge that the children of Artsakh are at risk of many mentioned impaired cognitive functions. Therefore, it becomes imperative to

take immediate action to prevent any further damage to their mental and cognitive well-being.

Implications and Challenges: Implications of the aforementioned research findings are extremely relevant when devising public interventions in crises such as the Artsakh blockade. The research studies provided that malnutrition via forced starvation can cause stunted growth, delayed wound healing, loss of gastrointestinal function, as well as decreased cardio-respiratory function. In regard to mental health, the effects of forced starvation are also wide-ranging and include cognitive impairment, increased risks of mental health disorders and emotional/behavioral issues, and impaired social functioning. These impacts are even more dangerous for children, whose growing bodies require a certain amount of food, vitamins, and minerals to ensure they don't have any persisting developmental issues in adulthood. As long-term food and nutrition deficiency has demonstrated detrimental impacts on both physical and mental health, each component must be evaluated when planning a strategy to alleviate the situation. In addition to a slew of negative impacts, it must be noted that "starvation is an act of genocide under Genocide Convention Article 2(c): 'Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part'" [89]. As such, given the dire situation and growing risk/precursors to genocide, there is an existing need for strong action to provide victims with the necessary food and resources. In this case, strong action paraphrased via Genocide Watch includes but is not limited to UN condemnation and demanding the opening of the Lachin Corridor, airlifting humanitarian supplies, international promotion of peace negotiations, and decisive sanctions. While malnutrition itself unfortunately is present in all countries with varying prevalence, alleviating the malnutrition caused by the forced starvation in the Artsakh blockade crisis will

require specific and targeted steps. A loose, three-prong proposed strategy has been laid out throughout this portion. The first step will involve finding a means to deliver supplies, ideally without hostility/blocking from Azerbaijan. To do so, this step emphasizes the need for peace negotiations, involving international powers such as the US, EU, and NATO. Due to the nature of the situation, it is likely that this step will be the most arduous and time-taking. Peace negotiations are often lengthy processes, but the first step to resolving a large portion of this humanitarian crisis is getting one foot in the door and showing a willingness to make strides towards resolution. The first step is a precursor to airlifting/delivering resources, which is the second step. Additionally, the second step involves a technical and financial analysis of the most appropriate food resources that should be provided to address malnutrition. A 2020 study found that a "greater focus on complementing nutrition-specific interventions with nutrition-sensitive ones that address the social determinants of health is critical" when addressing malnutrition with respect to SDG (Sustainable Development Goal) targets [35]. To this point, specific vitamins, and nutrients such as Vitamin A, and lipid-based nutrition supplements "for children produced 88% of the total impact on stunting, with average costs per case averted of US\$103, US\$267, US\$556 and US\$1795 when interventions were consecutively scaled up, respectively" [35]. This strategy of providing targeted supplements based on status (children, pregnant individuals, immunocompromised, general populous, etc.) serves to address specific malnutrition concerns as opposed to distributing standard resources. Additionally, analyzing which supplements are the most effective financially serves to persuade countries to donate such resources, as there is both a lesser financial cost and greater humanitarian benefit. The last and third phase of the outlined strategy involves identifying a method to monitor and document

the reactions to the resources that have been supplied. Analyzing the impact of each nutrient, vitamin, or combination serves as a means of perhaps adjusting supplementation in the future, changing supplies to better address current concerns, and so on.

However, as with all studies, there are limitations within the studies provided. Some significant limitations include but are not limited to overestimating the impact of certain interventions, missing data from certain regional areas, “subnational variation in progress,” and an inability to obtain larger sample sizes. Despite limitations, the provided studies serve as important evidence when analyzing the effects of malnutrition, as well as the ways in which it can be combated. In situations such as the Artsakh blockade, these studies are invaluable in understanding both what is at stake, and what action needs to be taken as the situation grows worse with every passing day.

Management through Functional Foods and Bioactive Compounds: Starvation and malnutrition have had and will continue to have many adverse effects on the Artsakh population, as highlighted in the above sections. These effects include a higher mortality rate, higher susceptibility to disease, decreased function of digestive/muscle/nervous systems, and a reduced mental state [55]

A lack of omega-3 fatty acids, vitamin B, and vitamin D can cause adverse mental health issues, including stress and depression. Changes in the microbial composition of the gut have previously been associated with Alzheimer's, dementia, stress, anxiety, and depression [90]. Anxiety is described as a state of persistent and excessive worry which interferes with a person's daily life. Symptoms include restlessness, muscle tension, and panic disorders. Probiotics are viable microorganisms that, when ingested in sufficient quantities, confer health advantages to the host. These

advantageous bacteria and yeasts are commonly present in fermented foods or can be ingested as part of dietary supplements. Probiotics are known for their positive effects on the digestive system and overall gut health. In a previous study, 86 healthy college students were given probiotics every day for 28 days, which resulted in enhanced symptoms related to panic anxiety, neurophysiological anxiety, negative emotional state, excessive worrying, and bolstered the ability to regulate negative moods [91]. Another study on 63 elders supplied with probiotics for 12 weeks saw a promotion of mental flexibility and a decrease in overall stress [92]. Depression is described as feelings of sadness and loss of interest in daily activities, with symptoms such as weight loss, loss of energy, and difficulty thinking [93]. A study of 71 participants diagnosed with depression found a dramatic improvement in symptoms after consuming a probiotic daily over the span of 8 weeks [94]. Therefore, the consumption of probiotic foods such as fermented foods or supplements could be successful in reducing the anxiety and depression of the people of Artsakh.

Another cause for a reduced mental state is a lack of magnesium and vitamin B6. A previous study found that adults who were given magnesium combined with vitamin B6 for 8 weeks had significantly decreased depression and anxiety levels compared to the placebo group [95]. Another study following 478 young adults who were supplemented with vitamin B6 found reduced self-reported anxiety and depression [96]. Foods rich in magnesium include almonds, black beans, yogurt, spinach, and bananas amongst other foods. Foods rich in vitamin B6 include chickpeas, poultry, oranges, beef liver, and dark leafy greens. Regular consumption of these foods or the consumption of supplements such as magnesium and vitamin B6 could prove successful in reducing the symptoms of reduced mental illnesses such as depression and anxiety.

During periods of famine, a reduction in vitamin E if omega 3 fatty acids can also lead to a reduced mental state, with depressive and anxiety-like symptoms. A study on the supplementation of walnuts to supply vitamin E and crucial omega 3 fatty acids found that adults who were supplemented with walnuts every day found a better improvement in mood than those who were given a placebo walnut [97]. Another study on the

effect of omega-3 fatty acids on symptoms of depression used fish as their supplementation. Moreover, 6587 participants who ate fish regularly were studied and it was found that moderate consumption of fish was associated with lower odds of depression [98]. Therefore, the omega-3 fatty acids found in fish could be used as supplementation to reduce depressive symptoms.

Table 2: Dietary Recommendations for Improved Mental State

Food Recommendation	Examples
Probiotic foods	3 cups of Yogurt, kefir, pickles, sauerkraut or miso [95]
Supplementation	100 mg vitamin B6, 400 mg magnesium, 15 mg vitamin E, omega 3 fatty acids [99]
Nutrient-rich foods	Almonds, walnuts, black beans, spinach, bananas, seafood, beef liver [97-98]

Solution: Addressing starvation and malnourishment caused by genocide is a complex yet essential task needed to alleviate the consequences of genocide. A solution requires a comprehensive approach that not only provides humanitarian aid to the victims of the current blockade but also fixes the root cause of the genocide and works toward reconciliation. Due to the mass displacement of people, destruction of agricultural lands, and the disruption of the food distribution system, many victims of genocide are left without access to food and clean water, leading to severe malnutrition.

Hence, to combat such issues, immediate aid and relief efforts are needed. Food, water, and medical assistance should be provided to the affected areas. The participation of entities such as the United Nations World Food Program (WFP) and diverse non-governmental organizations (NGOs) is crucial for delivering humanitarian aid in Artsakh. WFP is collaborating with the Ministries of Labor and Social Affairs of Armenia to assist and enhance social-assistance policies to tackle food insecurity and malnutrition issues [100]. WFP is

currently experimenting with the “Food Card” to empower individuals to purchase food from a designated supermarket, thereby promoting greater access to essential nutrition. While having access to essential food is necessary, having a safe drinking water source and sanitized facilities is also important to lower water-related illnesses [100]. The involvement of various humanitarian organizations and NGOs is strongly urged to provide aid and support to the people of Artsakh during this ongoing blockade.

Once basic aid and relief care is provided, internal protection like a safe zone is necessary to further protect the victims from the violence. Safe zones are designated areas where vulnerable people and refugees can reside for support [101,102]. These areas are structured and intended to be a secure place where assistance can be delivered quickly and safely [101,102]. Moreover, these zones should be monitored and protected by peacekeeping forces to prevent further violence and ensure the delivery of humanitarian assistance. Russian peacekeepers were deployed at the Lachin Corridor to

help aid the Artsakh people. Even though their efforts to stop the blockade were disregarded, it is still essential for peacekeepers to get involved and strive to protect civilians [103].

Additionally, there is a strong need for international action, pressure, and unity with the victims of the blockade. Decisive actions such as sanctions and peace talks can force the offending parties to make strides toward resolution, changing their aggressive stance, and so on. For international action and communication to take place, there needs to be a higher level of awareness and recognition of the situation at hand. As a precursor

to international action, media attention and public action is highly necessary. An effective means of doing so may include reaching out to student/youth action groups, staging awareness events, and writing to local representatives. If sufficient awareness is raised, then it is more likely that Western powers and associated countries will intervene in the situation at hand. In the phases of genocide described in "The International Response to Conflict and Genocide: Lessons from the Rwanda Experience," peace talks fall into phase II, thus constituting a more urgent action after the precursors to genocide have been acknowledged [104].



Image 7: Nagorno Karabakh - Armenian trucks carrying aid are seen stranded not far from the entry to the Lachin corridor, July 30, 2023. [105]

With the establishment of peace talks and international action, there is also a needed conversation regarding long-term development and how resources can be allocated to best support the victims. This includes creating and implementing infrastructure for education, healthcare, and city/social framework. In the face of an existing conflict, this is the step known as "response" in the 2022 United States Strategy to Anticipate, Prevent, and Respond to atrocities [106]. This also includes defense support to prevent the repetition of an atrocity,

in addition to implementing certain civil policies. The crux of this strategy is that the prevention of such atrocities is

central to US security, and works through collaboration with "partner governments, and international, civil society, and local partners" [106]. The aid of the international community in helping reinstate social structures and support systems is essential in situations of deep crisis, such as that of the Artsakh blockade. In this aspect, one of the core stresses is sustainability, ensuring that the system functions long after it is laid in place. Implementing sustainable systems requires a high level of planning and coordination, and thus should be started as soon as possible after conflict resolution.

Refugee programs already in place should be strengthened and focused on the current Artsakh blockade. This would entail the support of those who are

displaced, but likely will not be able to fully reach those who have not yet immigrated. These programs should be most strongly based in Armenia since more than 91,000 people have already been displaced to Armenia to escape the ongoing conflict [107]. The Inter-Agency Response Plan (IARP), as issued by the UNHCR, provides a solid framework for what a refugee program should aim to achieve. Its goals include protecting the refugee population, aiding access to food, shelter, healthcare, and mental resources, strengthening the refugee population to return to Nagorno-Karabakh, and implementing other humanitarian frameworks such as the United Nations Sustainable Development Cooperation Framework (UNSDCF). Support and materials are to be provided to the education system, rental costs and repairs of shelters will be provided with domestic supplies, and restoration of food access will occur. As for healthcare and mental well-being, nutritional monitoring and the prioritization of malnourishment prevention in children and infants would be pertinent. Furthermore, access to healthcare and mobile clinics will increase and psychological services will be provided. To regain self-sustainability, micro-loans will be provided to small businesses and entrepreneurial and employment opportunities will increase through assistance [108]. Despite the desired efforts of the written plan and action that has already been taken with the partners in the document, there is still a great financial need and other issues outlined in the document. It states that stronger and more consistent programs should be established by the government and there is not yet a plan for “post-distribution monitoring” [108]. Additionally, further mental health and employment services should be implemented to prevent long-term effects as seen in other genocides. Psychological support is vital and psychiatric physician volunteers should offer services at this time with government support to fund this. As already observed, in Table 1, survivors from the Holocaust and the Cambodian genocide have skewed

ideas in terms of food, which is affecting their health greatly and chronically.

The Armenian genocide already left a lasting impact on the traditional customs of food and hospitality, but now with a second genocide, the impacts could create a worse psychological effect. Not only are lasting effects observed psychologically, but physically, the Rwandan genocide left the population malnourished since they are unable to support themselves despite aid being provided. Education and services must be provided in-detail to learn how to acquire employment opportunities or create entrepreneurial businesses, have access to advertised employment, and sustainable agricultural education and opportunities. Instead of food being provided by supporting organizations, fresh soil, tools, machinery, and infrastructure for farming should be provided so that the refugee populations can establish sustainable living for themselves without requiring recurring food supplementation by outside organizations.

With aid as a pertinent solution and funding of humanitarian efforts still unresolved, advocacy and awareness are needed to acquire a greater audience to create change. Educating the public can put pressure on the government by focusing widespread attention on the ongoing conflict [109]. Awareness can also aid the accumulation of public funding for campaigns and programs such as the IARP. With plans set in place and public knowledge of these plans, change is more likely to occur.

Recent Situation: Defining the crisis as “genocide” would be a valuable next step to ensure international legal action is taken to protect Armenians in Artsakh from starvation. To cite the crisis as genocide is particularly challenging to do, as, at face level, the situation is less violent than genocides in the past. Still, starvation is a lethal weapon capable of being utilized to the extent of genocide.

On August 8th, 2023, the former chief prosecutor of the International Criminal Court issued a report pressing for the U.N. Security Council to discuss the possibility of genocide against the Armenians in Artsakh by Azerbaijan with the international tribunal [110]. The report called attention to starvation being used as the ultimate “invisible genocide weapon” and emphasized the inability of food and medical suppliers to cross the border. Additionally, a crisis management group representative has mentioned that after asking for permission from Azerbaijan to have necessities delivered via Russian peacekeepers, they received no response from Azerbaijan. Russia is also being criticized for inaction against the blockade. In response to the recent report, a group of California attorneys named The Center for Truth and Justice called upon the U.S. and international organizations to take immediate action to assist Armenians in Artsakh [111].

Not long before, the president of Artsakh spoke about the disaster at a press conference on July 24th. He discussed the food shortage, declaring that “over the past 40 days, not a single kilogram of food has entered Artsakh [112].” He noted that Artsakh is experiencing a humanitarian crisis on its way to genocide and highlighted that he remains open to the possibility of peaceful negotiation with Azerbaijan. He concluded that Artsakh must be internationally declared a “disaster zone” to prevent the situation from becoming increasingly dire. Finally, he requested that the U.N., the International Court of Justice, the European Court of Human Rights, and the World Health Organization “live up to their mandates and responsibilities” by helping alleviate the situation [112]. As well, the Red Cross has expressed concern and frustration over being unable to provide necessary products, such as baby formula, certain medications, and basic food items [113]. In California, citizens continue organizing protests to increase public awareness of the issue. On August 9th,

hundreds of protestors blocked part of the 134 freeway, demanding that U.S. congressman and co-chair of the Congressional Caucus on Armenian Issues, Adam Schiff, take action [114]. On August 7th, Schiff released a statement urging President Biden to address the situation [115]. The Lemkin Institute has officially called for an active genocide alert in Artsakh, seeing as the blockade has officially led to direct deaths from starvation [116]. Within the last month, it has become critical that the U.N. and the International Criminal Court, as well as other international organizations, draw greater attention to the situation to help improve access to food and other necessities in Artsakh and, ultimately, prevent genocide caused by starvation. The psychological consequences of starvation can’t be ignored, with food insecurity being significantly associated with signs of psychological distress [117].

Concluding Summary: The sections covered throughout the course of this paper discuss the background of the Artsakh blockade, the relation of this blockade to nutrition, food limitation, and starvation; as well as the steps that can be taken towards resolution and crisis management. The Artsakh blockade is a politically motivated blockade by Azerbaijan, which has trapped 120,000 people without access to natural gas, food, and medicine. This humanitarian crisis mirrors other genocides and ethnic cleansings in history, in which an ethnic minority (in this case, Armenians) was denied basic resources and actively antagonized. The use of food and starvation has a slew of deadly impacts on the victims, including long-term impacts on mental health and physical health. To name a few, victims of starvation may suffer from cognitive dysfunction, decreased emotional regulation, and long-term developmental issues. They may also suffer from increased emotional responsiveness and dysphoria and distractibility [118]. In this paper, several proposed solutions have been laid out to resolve

this ongoing crisis. The first proposed step is to garner the involvement of other international (namely Western) nations and negotiate a peace treaty of some sort. This kind of action would require public involvement and awareness. The following step would involve airlifting supplies into Artsakh and using the financially beneficial targeted supplementation plan. Lastly, the condition and responses to the supplementation should be monitored in case changes need to be made to better benefit the victims. Refugee programs should also be carefully reviewed and considered when devising a long-term plan, post-blockade. As shown, there is an imperative need to act in order to resolve the Artsakh blockade and ensure the safety and health of the victims. This paper exists as a means of drawing attention to the situation, informing the public, and providing feasible solutions that may aid resolution.

The Novelty of this Work: Through examining the cognitive, psychological, and mental repercussions of starvation in the human body, we aim to understand the immediate and long-term effects experienced by the refugees in this current Artsakh blockade. By drawing comparison to past genocides, we can gain insight into the profound impacts of starvation caused by the blockade.

List of Abbreviations: United Nations World Food Program: WFP, NATO: North Atlantic Treaty Organization, EU: European Union, US: United States, non-governmental organizations: NGOs

Conflict of Interest: There is no conflict of interest associated with this review.

Author's Contribution: DM conceived the idea of analyzing the implication of starvation and mental health on this current Artsakh blockade and discussed it with THO, IS, LB, AA, and PD. THO, IS, LB, AA, PD, and CH

conducted research, data gathering, and worked on writing the manuscript. DM participated in reviewing the article and editing the manuscript.

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