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Syria, Conflict

The Syrian Government's Hand in Starvation, Dehydration, and Deadly Attacks: Stability Becomes the Key to Alleviating Syrian Food Insecurity

Syria's conflict is one of the most devastating humanitarian crises in history. It has resulted in the internal displacement of 6.7 million individuals and forced 5.5 million more to seek refuge outside of Syria [1]. Various parties have attempted to intervene, but 9.3 million Syrians continue to experience food insecurity due to war and a historic drought. Syria no longer has the capacity to promote much-needed economic and agricultural growth; however, through United Nations (UN) policy reform and public-private partnerships (PPP), stability may be achieved [2,3].

In 1958, Syria briefly joined the United Arab Republic under the guidance of Egypt's President Nasser [4]. However, that junction failed in 1961, and a rigid dichotomy between the Sunni and Alawite ethnic groups emerged. The Sunnis obtained power over the Alawites and other minorities, but their short-lived power ended in 1963 when the Arab Socialist Ba'ath Party overthrew the government [4,5]. Hafez al-Assad assumed power in 1971 and implemented polarizing governing tactics and ordered violent attacks against his own people [6]. He initiated the Hama Massacre of 1982, which resulted in the killing, jailing, or exiling of 40,000 people over a 27-day period [7,8]. His presidency marked the beginning of an era of poverty, brutality, and government instability.

In 2006, Syria's most devastating drought exacerbated existing poverty [9]. Syria heavily depended on the production of wheat, barley, and olives to feed their nation and utilized cotton as a cash crop, which was valued at 2.5 percent GDP. However, these crops necessitate high volumes of water, so for Syria, and most of the Middle Eastern world, agriculture claims 85% of their freshwater [10]. During this time, Syria received less than half of the minimum amount of precipitation necessary to sustain agriculture. Subsequently, three-quarters of crops died and only 15 percent of livestock could be sustained [11].

Farmers began tapping into aquifers to irrigate crops, which further depleted reservoirs. Groundwater became inaccessible for consumption and irrigation, and water deprivation stripped 800,000 small farmers of their harvesting seasons [11]. The government did little to alleviate lost crop yields, and instead, lifted subsidies that worked against private farmers [12,13]. By 2009, the drought conditions had forced almost 1.5 million people to abandon their homes, resulting in a rapid increase in food insecurity and the need for humanitarian aid [11,14]. National family incomes were reduced by approximately 20 percent due to drought and other factors associated with global warming [15].

Syria's brewing conflict, a cultivation of government genocide and a historic drought, reached its ultimate turning point in March of 2011. Enraged Syrian Rebels officially declared war against their country's leaders after peaceful protestors were brutally assaulted [4]. The Free Syrian Army was formed, and a civil war had begun. Since then, the war's death toll has exceeded 321,000 people, and for Syrians, the new "normal" has been far from anything anyone could have imagined [4].

Typical for the average Syrian family became either living in a state of desperation or fleeing home for elsewhere. Eleven million Syrians lack bare necessities, and most survive on less than \$1.90 USD a day, which has reduced 80 percent of these families to living in poverty [11,16]. Less than 5 percent of citizens have sufficient access to healthcare, and only 30 percent have access to potable water [11]. Consequently, 12 million people, half of whom are children, have escaped to Turkey, Lebanon, Jordan, Iraq, and Egypt [16].

As a result, Syrians relied on neighboring countries, such as Lebanon and Jordan, to provide food. Unfortunately, these nations have found it increasingly difficult to reach areas of Syria due to dangerous militant-occupied routes [12,17]. In 2000, Hafez's son, Bashar al-Assad, continued his brutal reign. In 2011, the "kneel or starve" strategy began weaponizing necessities by obstructing humanitarian aid from 2.4 million people through military blockades and sieges [6,18]. Moreover, thriving agricultural areas, water treatment centers, and dams became targets of missile attacks. Almost one-third of households now spend 20 percent of their incomes on water alone, and Aleppo saw an 800 percent increase in rice, sugar, and milk costs [15,18,19].

These circumstances have shifted the typical family dynamic within Syrian families. In their culture, men lead a three-generational household, which has a mean size of 6.30 people; however, due to the conflict, 20 percent of families are currently led by women [20,21]. Many refugee families have accrued massive amounts of debt for food, rent, and medicine and forced 15 percent of Syrian women to find work opportunities [20,22]. Financial struggles have forced some families to remain dependent on relatives employed outside of the country to send money back home [23].

The level of displacement, unemployment, and hunger has forced some families to marry their children off or withdraw them from school. Child marriage has always been common practice in Syrian culture, but the rate of occurrence has exceeded the prewar rate of 13 percent [24]. In other cases, young boys will seek labor-intensive jobs to make ends meet while young girls stay home from school to assist their mothers. Conversely, some parents sacrifice their own meals to send their children to school with hopes that one day they may be able to pull their family out of poverty. However, this leaves only a fraction of Syrian children with access to a formal education [22].

In 2014, Syria had the second-lowest school enrollment rate globally after formerly holding a 70 percent secondary school participation rate [25]. Schools have been repurposed as sanctuaries for internally displaced persons, and Syria's once stable education system is now a prime target of violent weapon attacks where more than half of the casualties are children [25]. UNICEF has reported that 4,200 schools have been obliterated, which comprises more than 30 percent of all Syrian schools [25,26]. It was reported in 2018 that 58 percent of Syrian refugee children had inconsistent access to education [27]. The United Nations Office for the Coordination of Humanitarian Affairs has determined that one-quarter of the remaining 4 million children attending school are at risk of dropping out [25].

Educational opportunities have become scarce due to the Syrian conflict, and the inability to receive an education leaves millions of children vulnerable to military recruitment, child marriages, and child enslavement [28]. Subsequently, the unemployment rate has risen to 55 percent, which has intensified Syrians' financial struggles [29,30]. The government has offered employment opportunities but has fallen short of these promises in most cases. Repercussions of the Syrian conflict by way of foreign economic sanctions have resulted in unlivable wages for government employees [27].

The Syrian economy has been reduced by two-thirds and is unable to accommodate more than one hundred thousand highly skilled workers who have graduated from Syria's universities [27,31,32]. As a result, various organizations are working to provide programs that assist in sufficiently integrating Syrian migrants into the workforce. Paper Airplanes, a nonprofit organization, has programs designed to teach Syrian refugees English, offer resources to apply for foreign universities, and teach women to learn to code [33].

Concurrently, Syria's government, backed by Russia and Iran, has been yielding water as a weapon and committing war crimes against civilians and the rebels. Although the rebels have received support from, most notably, Turkey, Qatar, the United States, and Saudi Arabia, they have been powerless within this conflict [11,34]. After the Syrian government carried out hundreds of chemical weapon attacks against

civilians, the UN attempted to confiscate Syria's weapons under the Organization for the Prohibition of Chemical Weapons. This notion was vetoed by Russia and China, leading to little international intervention [35,36]. It is apparent the UN's infrastructure has enabled Syria's devastation as their policies have been unable to hold the Syrian government accountable for the atrocities they have committed [34].

The UN has attempted to enact several resolutions offering relief to Syria but continues to uphold a 76-year-old policy that requires no vetoes and nine affirmative votes to pass [37]. According to Article 23 of the UN Charter, Britain, China, France, Russia, and the United States have permanent seats on the UN Security Council and veto rights [37,38]. Over five years, Russia has vetoed seven resolutions aimed at aiding civilians or militarily intervening [39]. Russia's unwavering support has been evident through \$2 billion weaponry investments and the support of Syria's militia [5]. Russia continues to veto resolutions concerning Syria, which bars any legal action that can be taken against al-Assad [38].

In 2014, the UN proposed an operation that would provide humanitarian aid to Syrians via four border crossings located in Turkey, Iraq, and Jordan [40]. However, in January of 2020, Russia and China capitalized on their veto power to reduce the four border crossings to two. Then again in July 2020, they vetoed another resolution leaving the Turkish entry point the only remaining route, but this was set to expire on July 10, 2021. Concerns were discussed at the 2021 Geneva Summit as it became imperative that the UN Security Council pass an extension, or 3.4 million Syrians would starve to death [40,41,42,43]. The United States pushed for the addition of two other border entries, but Russia remained rigid in its stance and only passed the extension of the Turkish crossing. Ireland and Norway proposed the resolution that gained unanimous support from the fifteen UN Security Council members, which will allow millions of Syrians to continue receiving humanitarian aid for the next 12 months [42].

Russia's role in Syria's conflict has revealed that permanent positions in the UN Security Council possess too much power, and the council does not have the infrastructure to provide stability to Syrians. UN governing principles have forced abstention from the Syrian conflict and are aiding and abetting the calamity taking place in Syria [38]. To protect Syrians, the UN must dismantle the current procedures that facilitate power being used to advance personal relationships [37]. Lifetime terms should be relinquished, and all nations should hold an elected position with two-year terms [44]. Undermining the UN Council by eliminating permanent memberships will allow Syria to receive essential aid and intervention. Not only will these actions assist in stabilizing Syria, but they will also protect other nations from falling victim to this policy flaw.

As of now, Hand in Hand for Syria and Mercy Corps are among various parties that have provided food to more than 4.5 million people, delivered water to 7.6 million people, and assisted almost 2 million farmers in rebuilding Syria's agriculture [45,46]. However, these programs cannot sufficiently continue to provide for Syrian refugees. In 2017, Lebanon possessed only 36% of the necessary resources to support refugees [47]. Although these efforts are crucial to lessening some level of food insecurity, relying on other nations cannot be the only intervention to save Syria from this crisis. The next step in permanently remedying Syria's food insecurity is implementing techniques that will allow Syrians to be self-sufficient in producing food, obtaining water, and ultimately bettering themselves.

UNICEF and Mercy Corps are two organizations that have stepped in to teach the citizenry water-saving techniques, along with assisting them in developing and spreading new technologies. UNICEF has initiated a program within the Za'atari refugee camp in Jordan, which currently depends on 1 million liters of daily imported water. Through the program, UNICEF aims at educating refugees on ways they can maintain hygiene and utilize water. A representative visits various families and shares brochures and posters with them, which assists in teaching them ways they can practice water-saving techniques in their day-to-day lives [48]. Along with supporting UNICEF in this mission, Mercy Corps has implemented

rainwater harvesting systems, fixed leaks in the camp's water infrastructure, and built wells in the Za'atari Camp making water more accessible to the refugees [49].

According to the FAO, Syria is in dire need of improved water management and agricultural techniques due to the effects of drought and climate change. These techniques include shifting from water-intensive crops to more drought-resistant crops and implementing irrigation systems that increase productivity [50]. To achieve this, ICARDA and USAID have invested in programs that educate Syrian farmers on the most efficacious agricultural techniques and technologies that aim to maximize crop yields [51]. USAID offers informational sessions on improved cultivation practices to Syrian farmers. Training sessions assist farmers in the usage of money-saving practices, which can fund costly technologies, such as groundwater pumps and drip irrigation systems [51]. ICARDA focuses on training programs, such as irrigation, water efficiency and productivity, and the implementation of modern techniques, which maximize crop production. Farmers apply their knowledge and assist in spreading these effective methods to their communities [50,51].

Finding alternative ways to obtain fresh water is pivotal due to anthropogenic climate change, which steadily worsens the effects of drought [13]. For decades, Saudi Arabia and the United Arab Emirates have used desalination and currently produce 25% of the world's desalinated water [52]. This method has reduced hydrological poverty in many nations and can do the same for Syria. Historically, desalination warrants examination of environmental, energy, and economic concerns with cost being the most deterring limitation [53,54]. Other methods, such as drip irrigation, can cost upwards of \$3,000 USD per acre to install, making it similarly expensive [33]. Recently, desalination and drip irrigation have seen production costs cut in half, and with PPP, these methods may be promising solutions [53,55].

The use of PPP to finance public projects has been modeled by Jordan and Egypt, who have enacted policies to support PPP projects. These efforts strive to achieve national stability through varying modalities, including water security [56]. The PPP approach would offer economic support and the necessary guidance to implement desalination in Syria [57]. Almar Water Solutions donated over a billion dollars towards solving water scarcity problems through PPP and has constructed dozens of desalination plants in Saudi Arabia, Kenya, and Egypt [57]. Grassroots organizations are essential in minimizing the ramifications of drought, but the local government's support is vital in the country's rehabilitation. These operations would need to be initiated by a reformed government and planned, constructed, and managed by Syrians allowing for self-sufficiency. These alternatives to conventional ways of obtaining freshwater would soon become economically feasible for Syria.

The Syrian government may be willing to subsidize drip irrigation or desalination as it has historically provided subsidies to the agricultural sector [58]. In previous years, the government offered opportunities for farmers to subsidize loans, fuel, irrigation pumps, and fertilizer, which tremendously supported them in the production of their crops and the economy [58,59,60,61]. The subsidies accounted for 4 percent of the GDP, and 70 percent of this budget was allocated to irrigation alone. These subsidies, however, were revoked as political tension was rising, and the government funds were reallocated for military purposes [60].

External organizations are attempting to support the implementation of modern irrigation systems for local farmers by subsidizing interest rates on loans that can be offered to them. This would work towards shifting from dated irrigation technologies to advanced, efficient irrigation systems with these new subsidies [62]. As al-Assad has claimed victory and control of Syria, he will try to rebuild his country, and subsidizing drip irrigation and desalination could be the modality in which he could revive his country [63]. There is a chance the Syrian government and external organizations would unite to subsidize these vital technologies to replace existing infrastructure.

Despite Syria being a developing country, the implementation of desalination and drip irrigation may be appropriate technologies. There are more localized solutions that involve agricultural-based modifications; however, climate change is an impending concern that emphasizes the need for a more stable supply of water. Twelve of the most arid countries in the world, including Syria, reside in the Middle East, and the effects of climate change will greatly affect these nations [64,65]. They will experience temperatures that are double the global average and be the first place to see a 20-40 percent decrease in precipitation within the next 30 years [64,65]. Syria will become more unstable due to climate change making it imperative that Syrians seek additional methods to obtain more water as opposed to relying on existing precipitation or conservation methods.

The Euphrates-Tigris River has been instrumental in creating a hospitable region for Syria, Turkey, Iraq, and Iran, but climate change is projected to cause this resource to dry up within the next century [58,66,67]. Experts worry that this finite reservoir will strain the relationship of the Syrian, Turkish, Iraqi, and Iranian borders and soon instigate a water war within these nations [58,66]. A once flourishing area will be reduced to nonarable land in which, mainly, Syria and Iraq will struggle to provide hospitable conditions [67]. Within the near future, precipitation will decrease, and shared bodies of water will be depleted. The only solution is to find other methods that will produce more water because water conservation will no longer be sufficient.

The most appropriate technology for communities in developing countries should maximize productivity while minimizing cost. Programs within Syria have taken these steps by educating farmers in techniques that conserve water and increase efficacy in its use. Yet, global warming will further inhibit current farmers from succeeding in supporting Syria's agriculture demand. So, although desalination and drip irrigation are inherently more costly than ideal for a developing nation, existing technologies do not have the capacity to rebuild Syria's agricultural infrastructure given these environmental changes.

Desalination cannot be the only solution, but it may be what Syria needs to be pulled out of a positive feedback loop of water shortages and agricultural collapses. Drought, displacement, and violence at the hands of the al-Assad Regime have impeded agricultural stability. Change starts with the UN protecting Syrians from al-Assad. Only with stability can Syrians work towards achieving autonomy by means of public-private partnerships in support of economic and agricultural growth.

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