

## Yemen: Conflict and Food Insecurity

Updated 9 November 2021

### Highlights

- Prior to modern-day conflict, Yemen's cereal production was already constrained by the natural landscape, climate, and instability. In 2016, a year into the conflict, production further declined to about two-thirds of the already marginal five-year average due to higher production and fuel costs, increased insecurity, and reduced availability of agricultural inputs.<sup>1</sup>
- Six years of conflict has exacerbated an already difficult pre-war situation in which much of the population lacked secure access to food.<sup>2</sup>
- In the first half of 2021, the fighting had been focused around the northern governorate and city of Marib where the country's oil and gas reserves are located (Figure 1). This led to decreased crude oil export earnings that in turn further depreciated the Yemeni rial, decreased household purchasing power, and increased food prices.<sup>3</sup>
- From January to June 2021, 16.2 million Yemenis, 54 percent of the population, were projected to face Crisis (IPC Phase 3) or above levels of food insecurity.<sup>4</sup>

**Density of Violent Attacks in Yemen from January to June 2021**

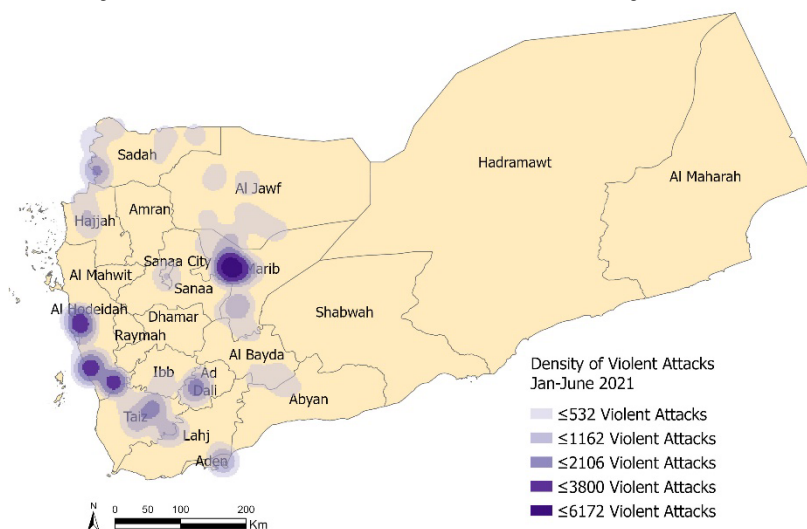


Figure 1: Density of violent attacks in Yemen from January 1 to June 30, 2021. Number of events extrapolated from ACLED data warehouse using violent event types (battles, explosions/remote violence, and violence against civilians). Source: ACLED

### Overview

Throughout the 1990s, Yemen accelerated its dependence on imports, especially for food items, as oil export earnings and remittances supported a strong domestic currency. Given the high cost of local food production, imports became comparatively cheaper than domestic production. Additionally, many farmers shifted from staple crop production to more lucrative cash crops such as qat. As a result of Yemen's already limited ability to grow food as well as the high cost of domestic production, the country relies on imports for the vast majority of its food needs. In March 2015, Saudi Arabia launched a coalition effort to end the influence of the anti-government group known as the Houthis in Yemen, marking the start of modern-day armed and political conflict that has since destabilized the central governance and devastated the Yemeni economy. While agriculture remains a vital source of food and livelihood for many rural Yemenis in the absence of other livelihood alternatives, years of conflict and related impacts have further degraded the sector.

Although domestic cereal production has always been constrained by natural endowments of the country's land area, production had declined by one-third from 2012 to 2015 due in part to waves of instability leading up to the official onset of conflict in 2015. Three years later in 2018, production declined a further 14 percent. The rapid degradation of cereal production can be attributed partly to the impacts of conflict on the number of farmers and their ability to access agricultural land, cost and availability of productive assets, and livestock and fishing productivity. Over 4 million Yemenis had been displaced as of January 2021, resulting in a decline in the number of rural households engaged in agricultural production. Additionally, conflict-related attacks since 2015 have been primarily focused on civilian infrastructure, in turn impacting agricultural infrastructure, and conflict-related factors such as economic downturn, currency depreciation, import restrictions, and fuel crisis have drastically increased the cost of agricultural inputs and production as well as food prices. Also, due to the relatively small share of domestic production in total food needs, domestic food prices are highly vulnerable to international price shocks. As a result, 54 percent of the population was projected to face Crisis (IPC Phase 3) or above levels of food insecurity in the first half of 2021. Furthermore, COVID-19 related economic downturn has also impacted agricultural value chains and worsened the food security situation.

## Background of Conflict

In May 1990, the independent countries of North and South Yemen agreed to merge into the single modern Republic of Yemen under president Ali Abdullah Saleh.<sup>5</sup> However, tensions between the two regions persisted, and in 1992, the Zaydi Shi'a affiliated Ansar Allah/Houthi movement (hereinafter referred to as the Houthis) emerged in the north in opposition to the president and majority Sunni government.<sup>6</sup> Then in 1994, the south called an end to the unity, igniting civil war from May to July of that year.<sup>7</sup> Afterwards, the Houthis continued to gain widespread support, and from 2004, the group fought several battles against the central government until 2010.<sup>8</sup>

In 2010, a wave of protests, uprisings, and armed rebellions known as the Arab Spring spread across the Middle East and North Africa, and by January 2011, related anti-Government protests spread throughout Yemen.<sup>9</sup> Taking advantage of the political turmoil, the terrorist organization known as Al Qaeda in the Arabian Peninsula (AQAP) seized control over several southern towns and villages. Though they were driven out by an army offensive the following year, AQAP remains a prominent influence in some small parts of the country (Figure 2).<sup>10</sup>

In February 2012, the protests led president Saleh to transfer power to his deputy, Abdrabbuh Mansour Hadi, in a two-year transitional arrangement known as the Gulf Cooperation Council (GCC) initiative. However, the situation further degraded as the country's primary issues persisted, including the southern separatist movement, AQAP attacks, some security forces remaining loyal to Saleh instead of Hadi, unemployment, and food insecurity.<sup>11</sup> Soon after, Saleh sided with the Houthi movement in opposing Hadi.<sup>12</sup> With his support, the rebel Houthi forces advanced south from Sadah and captured the capital and largest city of Sanaa in September 2014.<sup>13</sup> The group's power spread rapidly southward from the capital to Aden on the Arabian Sea, and in March 2015, president Hadi departed to Saudi Arabia.<sup>14</sup> In response, Saudi Arabia and eight other primarily Sunni states, known as the Saudi-led coalition, launched efforts to end Shi'a-affiliated Houthi and Iran influences in Yemen and restore Hadi to power. The Saudi-led coalition also received support from the US, UK, and France.<sup>15</sup> Months later, the coalition drove the Houthis from Aden and Marib, and in September 2015, Hadi rescinded his resignation and returned to Aden, inciting further conflict that continues today.<sup>16</sup>

From December 2020, the fighting had been focused around the northern governorate and city of Marib, where the country's oil and gas reserves are located, as well as in parts of Shabwah, Abyan, Al Bayda, and Al Hodeidah. As of early 2021, the Republic of Yemen Government and allies were in control of the majority of the country's land area while the Houthis remained in control of Sanaa and the west, which includes approximately 70 percent of the country's population.<sup>17</sup> Additionally, the Southern Transitional Council, which formed out of the southern separatist movement, held most of Yemen's four southern governorates (Figure 2).<sup>18</sup>

## Yemen Conflict Timeline



Distribution of Zones of Influence in Yemen as of February 2021

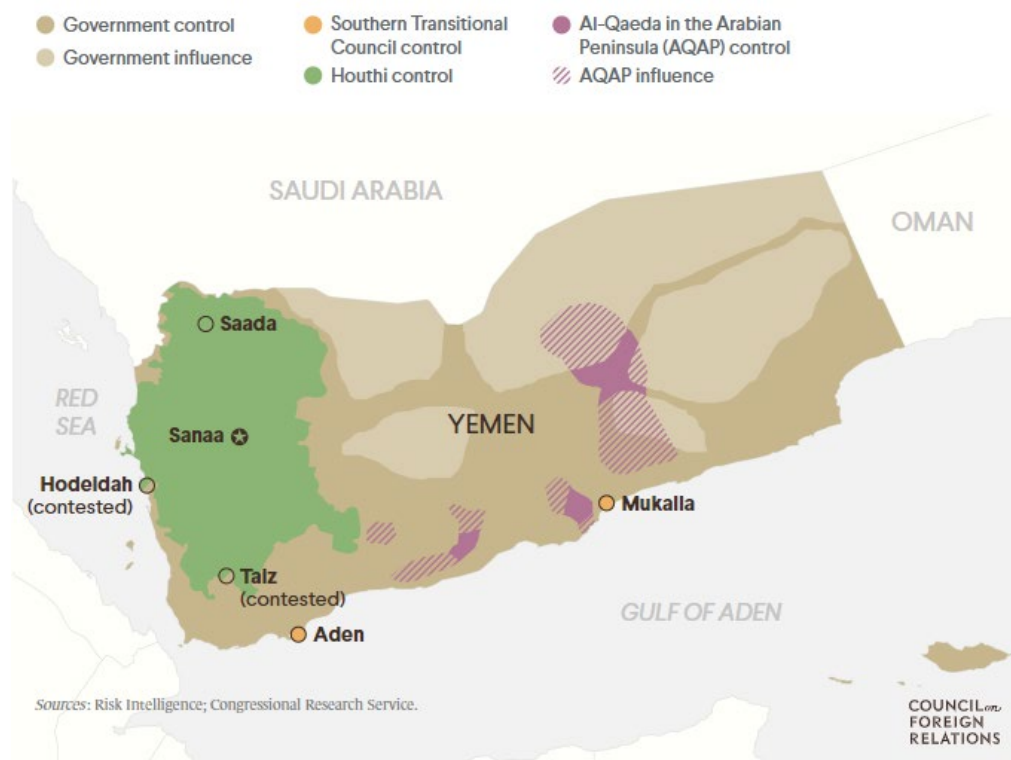


Figure 2: Distribution of zones of influence by primary groups in Yemen as of February 2021. Source: "How Severe Is Yemen's Humanitarian Crisis?" Council on Foreign Relations. February 4, 2021. <https://www.cfr.org>.

## Background of Agricultural Production

### Agro-Ecological Zones and Cropland Area

While the majority of Yemen's land area is mountainous and arid, there are broad regions with sufficient rainfall to allow limited agricultural production. The country can be divided into six agro-ecological zones, as depicted in Figure 3.<sup>19</sup> The Upper and Lower Highlands (Zones 1 and 2) receive the highest amount of rainfall between 500 to 800mm a year, particularly near Taiz and Ibb governorates in the southwest, and are used for terrace cultivation.<sup>20</sup> The Tihamah Plain (Zone 3) and Arabian Sea Coast (Zone 4) receive rainfall averages of less than 130mm per year; however, they are important agricultural areas that consists of numerous *wadi* flood plains used to support spate agricultural systems.<sup>21</sup> From parts of the coast to the desert interior (Zones 4, 5, and 6), rainfall averages less than 50mm a year, and in the east, the Desert (Zone 6) contains the Rub al Khali ("Empty Quarter") that consists of sand desert land.<sup>22</sup>

Only 3 percent of the country's land area is arable, primarily in the west, while close to a third of the land area is suitable for grazing.<sup>23</sup> Since 2015, already limited agricultural production levels have fallen drastically as the farming sector has been among the worst hit by the crisis.<sup>24</sup> Two years into the conflict, the agricultural sector contributed 13 percent to GDP, three-fourths of which was produced in the Upper and Lower Highlands (Zones 1 and 2) which constitute 30 and 40 percent of the population respectively. The next largest contributors to agriculture and overall GDP in 2017 respectively include the Tihamah Plain (Zone 3), the Internal Plateau (Zone 5), the Arabian Sea Coast (Zone 4), and the Desert (Zone 6).<sup>25</sup>

Within the cropland areas of Yemen, the primary cereal crops, in order of share of total cereal cropping area, include sorghum, millet, wheat, maize, and barley.<sup>26</sup> While wheat is the country's main staple crop, it is estimated to have contributed only 5 to 10 percent of total annual food consumption in the last ten years, mostly as a result of landscape and natural conditions but partially due to limited domestic production and the country's reliance on imports.<sup>27</sup>



## Agro-Ecological Zones and Cropland Areas in Yemen

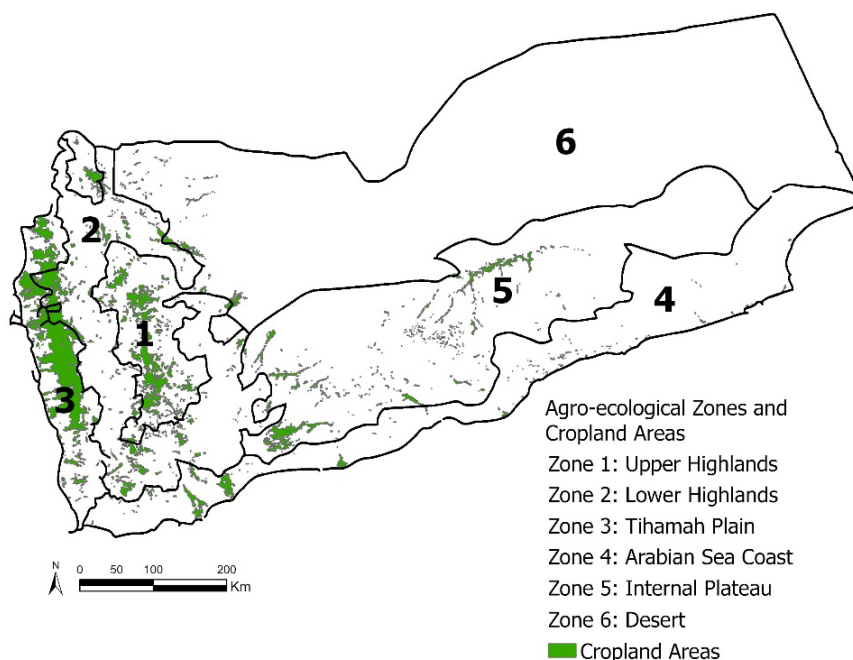


Figure 3: Agro-ecological zones and Croplands in Yemen. Agro-ecological zones map adapted from the following source: Breisinger, Clemens, Olivier Ecker, Perrihan Al-Riffai, Richard Robertson, and Rainer Thiele. "Climate Change, Agricultural Production and Food Security: Evidence from Yemen." *Researchgate*. December 2010. <https://www.researchgate.net>. Source for cropland areas: JRC ASAP

### Reliance on Imports

Beginning in the 1970s, the country experienced emigration of large numbers of young men for employment opportunities abroad. Then in the 1990s, oil export earnings and remittances from emigrants abroad supported a strong domestic currency, and imports became comparatively cheaper than domestic food production. As local food production could not compete with cheap imports, agriculture shifted towards the production of local cash crops.<sup>28</sup> Also, irregular rainfall in combination with a shift to water-intensive export crops increased the use of irrigation and drastically lowered the water table, decimating local farming.<sup>29</sup> As a result of these events in combination with the country's limited arable land and other natural conditions, Yemen relies on imports for the vast majority of its domestic food needs. As of 2017, domestic food production accounted for only 25 percent of available food in Yemen and less than 10 percent of staple foods. Even so, 65 percent of the country's population resided in rural areas, and 60 percent of the population relied on the agricultural sector as a main source of income.<sup>30</sup> Throughout the conflict, agriculture has remained an important source of livelihoods in rural areas.

### Impacts of Conflict on Agricultural Production

In Yemen, the agricultural sector has been significantly affected by the conflict, and local food production has decreased from an already low base level.<sup>31</sup> From 2012 to 2015, total cereal production had declined by one-third due in part to waves of instability leading up to the official onset of modern-day conflict in 2015 that resulted in limited access to farmlands and high prices of agricultural inputs. Just one year later in 2016, cereal production fell another 11 percent, and two years later in 2018, sharp increases in fuel prices further constrained fuel-dependent farming in the northern governorates, and cereal production fell another 3 percent.<sup>32</sup>

Overall from 2012 to 2018, cultivated area of cereals decreased 41 percent, and cereal production decreased 62 percent from an already limited base level (Figure 4).<sup>33</sup> Since 2015, the primary factors behind the continued decline of land cropped with cereals as well as the decline of agricultural production include a combination of impacts of conflict, climate variability, and natural disasters, though the extent to which each factor contributes proves to be a complex dynamic and varies from region to region.<sup>34</sup> Additionally in 2020, the crisis was further exacerbated by an escalation of conflict, the COVID-19 pandemic, heavy rains and flooding from April to August that coincided with cropping activities, the desert locust outbreak, economic collapse (particularly in the north), fuel crisis in northern governorates, and reduced flows of humanitarian aid.<sup>35</sup>



Figure 4: Annual area of cultivation (ha) and cereal production (MT) from 2009 to 2018 by crop type in Yemen. Sources: "Agricultural Statistics Book 2013." Yemen Ministry of Agriculture and Irrigation. November 18, 2014. <http://agricultureyemen.com>; "Agricultural Statistics Book 2016." Yemen Ministry of Agriculture and Irrigation. March 10, 2018. <http://agricultureyemen.com>; "Agricultural Statistics Book 2018." Yemen Ministry of Agriculture and Irrigation. February 26, 2020. <http://agricultureyemen.com>.

While imported food accounts for the majority of domestic consumption, agricultural production remains a vital source of food and livelihood for many rural Yemenis.<sup>36</sup> However, as outlined in this report, conflict has drastically affected (1) the number of agricultural producers and safe access to land as well as (2) the cost and availability of agricultural assets. It has also (3) impacted livestock and fisheries sectors, which many households rely on as their primary or supplemental income. While poor soil conditions and water scarcity were impacting the farming sector even before the war, ongoing conflict since 2015 has compounded these challenges.<sup>37</sup>

## 1. Impacts of Conflict on The Number of Agricultural Producers and Safe Access to Land

### Widespread Displacement

From 2014 to the onset of conflict in 2015, the escalation of violence dramatically increased the number of internally displaced persons (IDPs) from 100,000 to 2.2 million. While the number of new displacements each year has since declined, a total of 3.6 million people remained displaced as of 2020 (Figure 5), and 80 percent of them had been displaced for over a year.<sup>38</sup> Even before the war, deteriorating rural conditions resulted in rural to urban migration. The onset of conflict further declined conditions, leading to loss of livelihoods and leaving many IDPs from rural areas nowhere to return. For instance, in a 2019 report, IDPs interviewed in Quebeitah district in Lahj governorate that previously raised livestock or worked in agriculture have since not had access to

livelihood opportunities and relied on humanitarian assistance. While many families affected only fled a few kilometres, they have been unable to return to their villages and fields due to ongoing insecurity and presence of unexploded ordinances.<sup>39</sup> By 2019, agricultural production declined even more as displaced farmers and agricultural workers resulted in land abandonment.<sup>40</sup> For example, in Al Dhale'e governorate, 73 percent of the displaced population were farmers that were forced to flee their land and were unable to find work.<sup>41</sup>

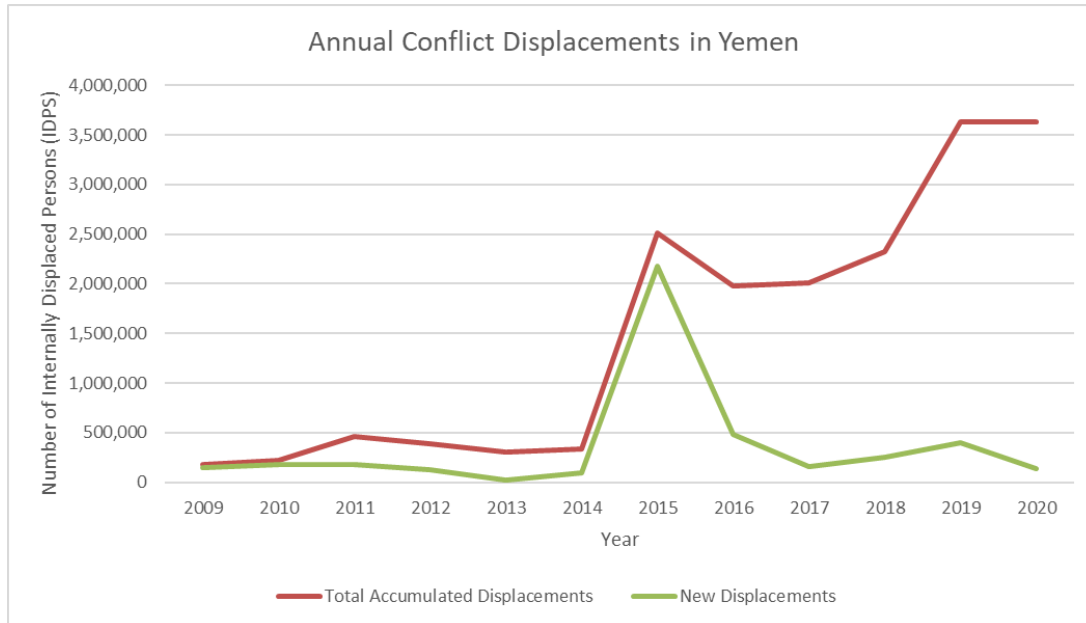


Figure 5: Annual conflict displacement figures for Yemen from 2009 to 2019. Source: "Yemen." Internal Displacement Monitoring Centre. 2020. <https://www.internal-displacement.org>.

### Loss of Agricultural Land

The Tihamah Plain runs along the Red Sea coast and is one of the most important agricultural regions of the country due to the flow of water from the western highlands in a series of *wadi* systems.<sup>42</sup> According to the latest available data from the Ministry of Agriculture and Irrigation in Yemen as of 2018, Al Hodeidah governorate in the Tihamah Plain accounted for close to a quarter of domestic cereal production.<sup>43</sup> In the early years of conflict from 2015 through 2017, there were relatively few conflict-related incidents affecting agriculture in the Tihamah Plain.<sup>44</sup> However, from 2018, the number of incidents increased dramatically as civilian infrastructure was intentionally targeted as part of military strategy, resulting in collateral damage to agricultural infrastructure. The majority of these incidents were from airstrikes as well as ground combat between the conflict parties that resulted in trenches being dug on some farms.<sup>45</sup> Additionally, as of September 2020, farms throughout Yemen had been hit at least 918 times by airstrikes and shelling since January 2018, an average of almost one incident a day, according to data collected by the Civilian Impact Monitoring Project.<sup>46</sup>

Furthermore, according to satellite imagery analysis by the Conflict and Environment Observatory in October 2020, 46 percent of the cropland area in *wadis* Zabid and Rima of the Tihamah Plain experienced significant biomass losses between the pre-conflict period from 2009 to 2013 and the conflict period from 2014 to 2019. As the region had little resilience prior to the conflict due to unsustainable water management practices, there was a significant decline in cultivation and yields due to the economic impacts of the conflict. Additionally, population loss, infrastructure damage, agricultural input loss, and reduction of management contributed to the decline, in turn significantly impacting livelihoods and food security of the region.<sup>47</sup>

### Decreased Field Access Due to Presence of Explosive Devices

While landmines are conventionally placed in patterns where they can be removed post-conflict, in Yemen, they have often been placed by hand with no discernible pattern. Throughout the conflict, landmines have been laid along the coast, along the Saudi Arabia border, in and around key towns and cities, and along transportation routes.<sup>48</sup> Landmines and Improvised Explosive Devices (IEDs) laid on farms and grazing lands have left fields and wells inaccessible, preventing Yemenis from harvesting crops and drawing water for irrigation and livestock.<sup>49</sup> Explosives have also hindered farmers' movement, damaged vehicles and agricultural equipment, and resulted in field abandonment, leaving many farmers without their sole source of income.<sup>50</sup> Throughout the past six years of conflict, 34 percent of all recorded remote explosives, landmines, and IED detonations occurred on land suitable for farming (Figure 6). Landmines have also impacted fishing activities, particularly in Al Hodeidah where there are numerous mines along coastal roads, in turn affecting availability and market price of fish.<sup>51</sup> As of

February 2021, Taiz, Al Jawf, Hajjah, Al Hodeidah, Sadah, and Marib governorates were the most affected by explosive ordinances. Additionally, the most affected area was agricultural lands, particularly in Taiz and Al Hodeida, and incidents have often been reported while civilians are engaged in farming activities.<sup>52</sup>

**Density of Remote Explosive/Landmine/IED Detonations from 2015 to 2021 and Cropland Areas in Yemen**

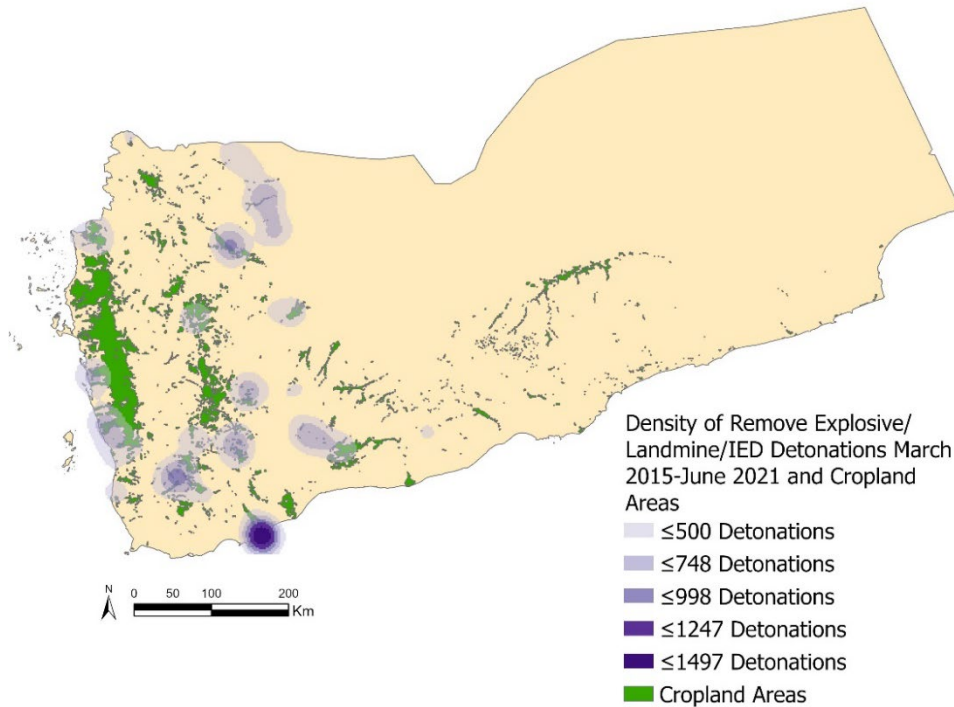


Figure 6: Density of remote explosive/landmine/IED detonations from March 1, 2015 to June 30, 2021 and cropland areas in Yemen. Number of detonations extrapolated from ACLED data warehouse. This sub-event type is coded whenever remotely- or victim-activated devices are detonated in the absence of any other engagement. Examples include landmines, improvised explosive devices (IEDs) whether alone or attached to a vehicle, or any other sort of remotely detonated or triggered explosive. Unexploded ordinances (UXOs) also fall under this category. Source for remote explosive/landmine/IED detonations data: ACLED. Source for cropland areas: JRC ASAP

**2. Impacts of Conflict on Price and Availability of Productive Assets**

**Economic Downturn, Currency Depreciation, and Increased Cost of Production**

While Yemen’s economy had already been in decline prior to 2015, it has further contracted since the onset of conflict due to factors such as volatile fuel prices, the depletion of hard currency reserves, decline in remittances, and currency depreciation.<sup>53</sup> From the onset of conflict in March 2015 through 2018, instability and trade restrictions devastated Yemen’s economy, the country’s Gross Domestic Product (GDP) declined 41 percent, and the country’s currency lost 80 percent of its value.<sup>54</sup> From November 2019 onward, exchange rates between southern and northern governorates started diverging as the separation of the Central Bank of Yemen in Aden and in Sanaa resulted in detached and contradicting monetary policies.<sup>55</sup> As a result, the exchange rate varies significantly between areas under different control, with the differences up to 49 percent (Figure 7). Instability in the foreign exchange market and depreciation of the rial have direct impacts on cost of domestic cereal production. Drastic price increases of agricultural inputs since the onset of conflict have caused many farmers to give up cultivating land altogether, weakening the already small share of domestic production in covering domestic food needs.<sup>56</sup>

### Exchange Rate Divergence Between IRG and SBA Controlled Areas

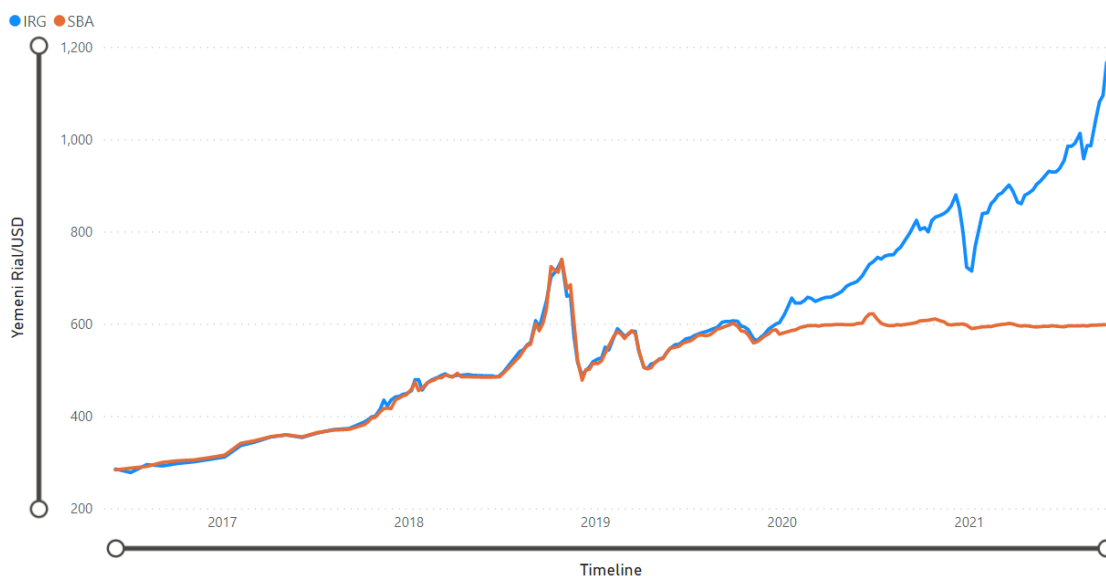


Figure 7: Exchange rate divergence in YER/USD between the International Recognized Government (IRG) and Sanaa Based Authority (SBA) controlled areas in Yemen from June 2016 to September 2021. Source: "Exchange Rate." FAO Market Information and Early Warning System - Yemen. September 2021. <https://app.powerbi.com>.

#### Limited Availability and Increased Costs of Inputs

Since the onset of conflict, economic instability and currency depreciation have resulted in limited availability and increased prices of agricultural inputs such as seeds, agrochemicals, fuel, and labour.<sup>57</sup> Just four years into the conflict, steep price increases for farming inputs as well as fluctuating currency values led to the failure of many small farms.<sup>58</sup> This has in turn decreased domestic productivity and resulted in dramatic losses to the agricultural sector.<sup>59</sup> In 2020 and 2021, agricultural inputs, which are mostly imported, remained scarce, expensive, and in short supply as persistent conflict has constrained economic activities.<sup>60</sup>

#### Seeds

In Yemen, there are two main sources of seeds for agricultural use. For locally produced cereals and legumes, farmers typically use their own seed stores from the previous season, resulting in poor seed selection and low yield. Conversely, vegetable seeds are generally imported, and due to the depreciation of local currency and an increase in prices, many farmers are unable to purchase necessary quantities. Inadequate seed supply has reduced vegetable production, though other factors such as costly irrigation and limited fertilizer use are also likely to have impacted overall production.

In 2017, 85 percent of households that were engaged in agriculture lacked inputs such as seeds, fertilizers, or fuel for irrigation.<sup>61</sup> However, the crisis-induced absence of adequate electricity and fuel supply as well as direct damage to production facilities has resulted in disruption of locally produced supplies of agricultural inputs, including seeds.<sup>62</sup> Also, many of the market seeds are extremely susceptible to disease as they are not native to the traditional food crops of the region.<sup>63</sup>

#### Agrochemicals

Due to rapid currency depreciation as well as decreased household purchasing power, the cost of agrochemicals has made it difficult for farmers to improve crop yield with fertilizers and herbicides and control crop pests and diseases with pesticides, negatively affecting crop production. According to the January 2021 FAO report on agricultural livelihoods and food security in the context of COVID-19, 66 percent of surveyed households reported general production difficulties due to both pest infestations and high prices of agricultural inputs resulting from currency depreciation. As a result, 43 percent of households anticipated their production to be lower than the previous year, particularly in Al Hodeidah, Marib, Sanaa, Raymah, and Hadramawt governorates.<sup>64</sup>

#### Fuel

From the start of conflict, warring parties have applied air and sea blockades to restrict imports in order to prevent weapon smuggling and the appropriation of port revenues.<sup>65</sup> For instance, in 2018, an operation was undertaken to seize control of Al Hodeidah port, a key access point for humanitarian and other imports. Restrictions on imports and port access in turn contributed to fuel shortages in the country and overall inflation,



increasing the cost of production and transportation of goods to markets.<sup>66</sup> As a result, fuel prices in 2018 increased by more than 150 percent compared to pre-crisis levels (Figure 8), and the costs of trucked water as well as groundwater pumping costs for irrigation dramatically increased.<sup>67</sup>

In April and September 2019 and in June 2020, further competition to control fuel imports and collect tax-generated revenues at Al Hodeidah port led to fuel shortages and price increases in territories under Houthis control.<sup>68</sup> As of March 2021, the supply of fuel remained scarce, and national average prices remained over 250 percent above the February 2015 levels. In turn, high fuel prices further increased the cost of inputs such as irrigation, prompting some farmers to shift from irrigated to rainfed crops which have lower yields and higher labour requirements.<sup>69</sup> Additionally, as of August 2021, fuel shortages have resurfaced in SBA-controlled areas, which widely rely on the unofficial market, due to port restrictions. While diesel and fuel were largely unavailable at official stations, private stations were selling fuel at unofficial prices, which remain significantly higher than official prices (Figure 8).<sup>70</sup>

**Average Official and Unofficial Price of Petrol (YER) Compared to National Average Exchange Rate (YER/USD)**

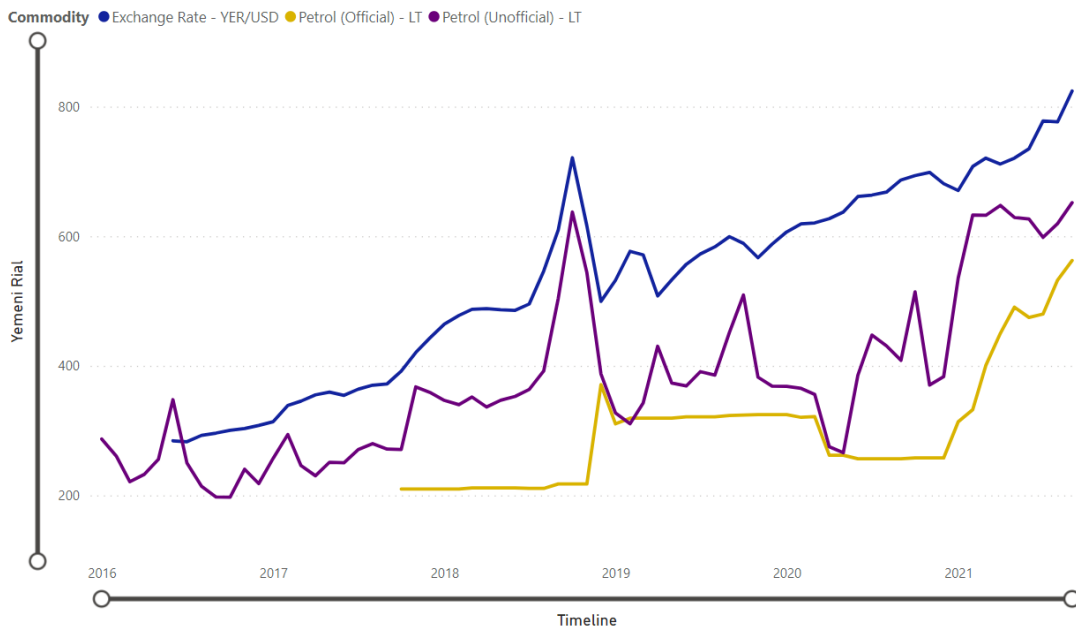


Figure 8: Average official and unofficial price of petrol (YER) compared to the national average exchange rate (YER/USD) in Yemen from January 2016 to September 2021. Source: " Multiple Commodities." FAO Market Information and Early Warning System - Yemen. September 2021. <https://app.powerbi.com>.

**Destruction of Agricultural Infrastructure**

Between 2010 and 2014, there were relatively few attacks on civilian infrastructure, and they were driven by non-state actors focused on sabotage to gas and oil pipelines as well as electrical systems. However, after the escalation of conflict in 2015, the targeting of civilian infrastructure increased, and airstrikes and shelling consequently affected farms, markets, civilian houses, and local businesses (Figure 9). Water and energy infrastructure such as water pipelines, drilling sites, pumps, and irrigation networks were also affected, limiting availability of irrigation water for cropping.<sup>71</sup>

With the increase in attacks on civilian infrastructure starting in 2015, post-production infrastructure such as food processing, storage, and transportation infrastructure were also impacted, further limiting domestic production and driving up food costs.<sup>72</sup> For instance, the Red Sea Mills in Al Hodeidah were a major wheat storage and processing site. Prior to the conflict, the Mills had enough wheat storage capacity to feed 3.7 million people for a month. As such, the Mills have been the target of several attacks from multiple groups through mortar shelling, mine planting, and IEDs. The attacks on the Mills also affected the distribution and storage capacity of food aid as they contained in-country stock of food assistance supplies.<sup>73</sup> Furthermore, according to the Civilian Aviation and Meteorology Authority in Yemen, more than 60 percent of the climate monitoring stations have been destroyed, mostly due to lack of maintenance and resources, negatively affecting early warning to climate-related shocks and limiting farmers’ ability to prepare for such events.

**Increased Irrigation Costs**

Yemen is one of the most water-scarce countries in the world and relies mainly on irrigation for crop production.<sup>74</sup> Approximately 90 percent of the country’s area is classified as arid, semi-arid, or desert, and even prior to the crisis, availability of water was an increasing problem.<sup>75</sup> In the 1970s and 80s, out-migration of Yemeni men to Saudi Arabia caused a significant labour shortage as well as a decrease in land area under terraced-agriculture. Increased remittances sent home in combination with fuel subsidies resulted in increased affordability and use of groundwater extraction. Subsequently, investments were made into irrigated agriculture at the expense of drought-tolerant crops.<sup>76</sup> Prior to 2010, almost 90 percent of the available water was estimated to be used for agriculture, largely due to inefficient irrigation techniques as well as the expansion of qat cultivation between 2000 and 2010, a cash crop that accounts for 30 percent of water use.<sup>77</sup>

According to the Ministry of Agriculture and Irrigation in Yemen, over 90 percent of land was at risk of desertification as of 2014, and unregulated drilling of wells to draw water from underground aquifers had contributed to the problem.<sup>78</sup> From 2015, the conflict-induced fuel crisis has also affected thousands of farmers that rely on fuel operated pumps to irrigate their crops, though this likely had a positive impact on aquifer replenishment.<sup>79</sup>

Only two years into the conflict in 2017, only 10 percent of Yemenis had access to central electricity, compared to two-thirds before the conflict, so people instead relied on diesel generators.<sup>80</sup> However, due to increased costs of fuel, the cost of water pumping for irrigation has increased, and wheat has become more expensive to grow.<sup>81</sup> In response to high fuel prices, many farmers shifted from irrigated to rainfed crops.<sup>82</sup> While a growing number of farmers are turning to solar power to irrigate their fields, the high upfront costs of solar arrays limit their implementation.<sup>83</sup>

**3. Impacts of Conflict on Livestock and Fisheries Production**

**Decrease in Livestock and Pastureland Productivity**

For small farmers engaged in a mixed farming system prior to the onset of conflict, livestock was a primary source of income, including mainly sheep, goats, cattle, camels, and poultry.<sup>84</sup> In 2008, animal production contributed 28 percent of the total production income for the agricultural sector in Yemen.<sup>85</sup> However, by 2018, conflict decimated livestock herds for pastoral and agro-pastoral households (Figure 10), especially for IDPs who were unable to take their livestock assets with them.<sup>86</sup>

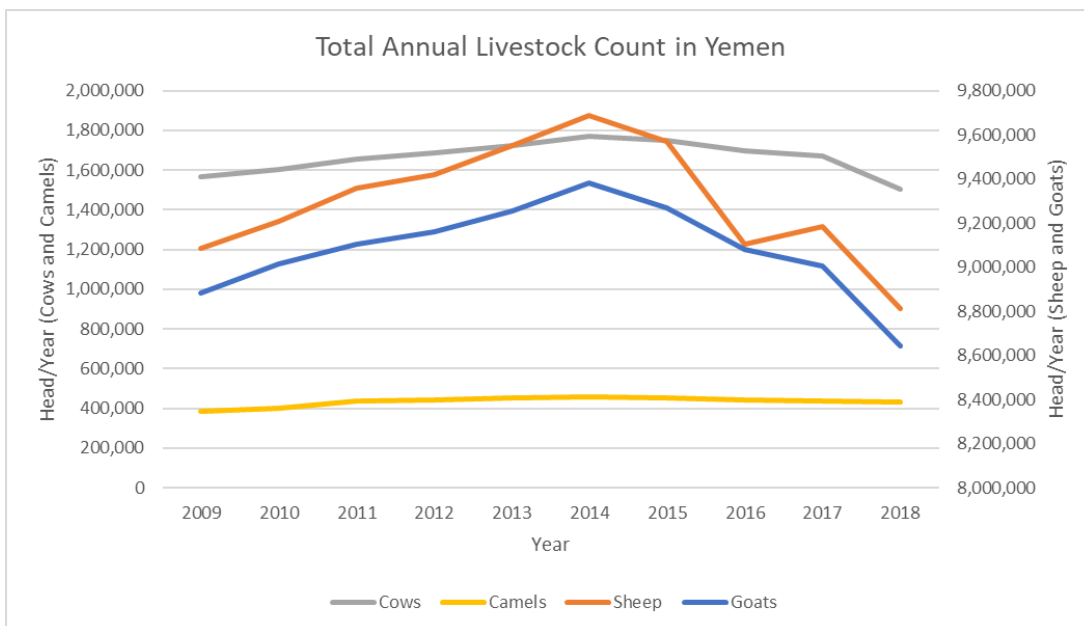


Figure 10: Total annual livestock count (head/year) from 2009 to 2018 in Yemen. Livestock type includes sheep, goats, cows, and camels (poultry numbers not recorded). Sources: "Agricultural Statistics Book 2013." Yemen Ministry of Agriculture and Irrigation. November 18, 2014. <http://agricultureyemen.com>; "Agricultural Statistics Book 2016." Yemen Ministry of Agriculture and Irrigation. March 10, 2018. <http://agricultureyemen.com>; "Agricultural Statistics Book 2018." Yemen Ministry of Agriculture and Irrigation. February 26, 2020. <http://agricultureyemen.com>.

Also, limited veterinary services in combination with scarcity and high cost of veterinary supplies, including vaccines, proliferated the spread of endemic diseases among herds.<sup>87</sup> However, the spread of diseases can also be attributed to general temperature increments. For instance, a June 2021 report indicates that several animals

such as sheep, goats, and poultry died as a result of temperature increase as well as dust, particularly in the plateaus, Central Highlands, and desert boundary areas.<sup>88</sup> Furthermore, farmers have not been able to afford the high cost of animal feed, resulting in limited livestock productivity and high animal mortality due to poor nutritional status of the animals. Fuel price increases have also resulted in a decline in poultry production, and poor households have been particularly affected as poultry was relatively accessible and a major source of protein and income in the form of meat and eggs.<sup>89</sup>

According to the January 2021 FAO report on agricultural livelihoods and food security in the context of COVID-19, 68 percent of surveyed households were small-scale producers of primarily sheep, cattle, and goats. However, half of the surveyed households reported difficulties in livestock production, including, in order of significance, animal pests and diseases, limited feed access, limited veterinary service access, limited pasture access, and limited water source access. The primary reasoning of limited veterinary service access was due to higher prices as a result of damaged infrastructure from protracted conflict, and the primary reasoning of limited feeding and watering system access included escalated conflict and displacement. Overall, 40 percent of households reported a decline in the number of livestock owned compared to the previous year.<sup>90</sup>

### ***Decrease in Fishing Productivity***

Prior to the crisis, Yemen's fishing industry was one of the most productive sectors; however, the conflict has resulted in significant declines in the fisheries sector as a result of restricted sea access, increased fuel prices, export disruptions, inadequate access to lucrative international markets, destruction of fishing equipment, and limited and expensive cold storage facilities.<sup>91</sup> Two years into the conflict, the fishing sector was still the most important source of income and food security in coastal areas. However, only half of all fishermen were able to work, and those who were still able to fish faced danger of attacks from warring parties on fishing boats.<sup>92</sup> For instance, fishing boats and fishermen have been attacked due to accusations of arms smuggling, primarily around Al Hodeidah and Al Mukha ports and the Red Sea islands.<sup>93</sup>

According to the January 2021 FAO report on agricultural livelihoods and food security in the context of COVID-19, the fishing industry has further declined due to conflict-induced displacement of fishers and their workforce. Also, half of the fisheries households reported a 50 percent or more decline in production, primarily due to limited fishing equipment, reduced demand, high fuel prices, and lower numbers of fish caught. The decline in fish yields is likely due to insufficient fishing materials as well as high fuel prices for transportation.<sup>94</sup>

## **Impacts of Conflict on Food Security**

Even prior to the escalation of conflict in March 2015, the country was already experiencing extensive levels of poverty, food insecurity, malnutrition, water shortages, and land degradation. Since 2015, conflict, economic decline, and collapsing essential services have exacerbated these issues.<sup>95</sup> In 2016, 40 percent of all farming households experienced a decline in cereal production due to higher production costs (particularly fuel), insecurity, and reduced availability of materials. As a result, rural households were highly vulnerable to food price increases. While Yemen has always imported the majority of its domestic food needs, inspection requirements, port congestion, and destroyed infrastructure from the onset of conflict contributed to the rapid increase in prices of imported goods. Food was still widely available in the market; however, increased food prices in combination with the economic decline of the private sector, non-payment of public sector salaries, and loss of livelihoods left many unable to purchase food necessities. More than half of households had to resort to buying food on credit, and 80 percent of Yemenis were in debt and resorted to reducing food intake or skipping meals.<sup>96</sup>

From March 2015 to the end of 2017, the food insecure population in Yemen increased 64 percent. By 2019, food prices doubled and continue to rise. As of December 2020, retailers reported that higher internal transportation costs and reduced demands were driving their increased food prices.<sup>97</sup> Additionally, pockets of famine-like conditions (IPC Phase 5) returned for the first time in two years due to impacts from the ongoing conflict and economic crisis which have been exacerbated by COVID-19 related challenges.<sup>98</sup> As such, 16.2 million Yemenis, 54 percent of the analyzed population, were projected to face Crisis (IPC Phase 3) or above levels of food insecurity in the first half of 2021, with the highest concern in Al Jawf and Sadah governorates in the northwest where conflict is most prevalent (Figure 11). Of these, the number of people likely to face Catastrophe (IPC Phase 5) level of food insecurity increased to 47,000.<sup>99</sup> The high levels of food insecurity in Yemen are a result of (1) loss of resources as a result of displacement, (2) supply chain disruptions and increased transportation costs, and (3) increased food prices and reduced incomes.<sup>100</sup>

**Projected Food Insecurity in Yemen from January to June 2021**

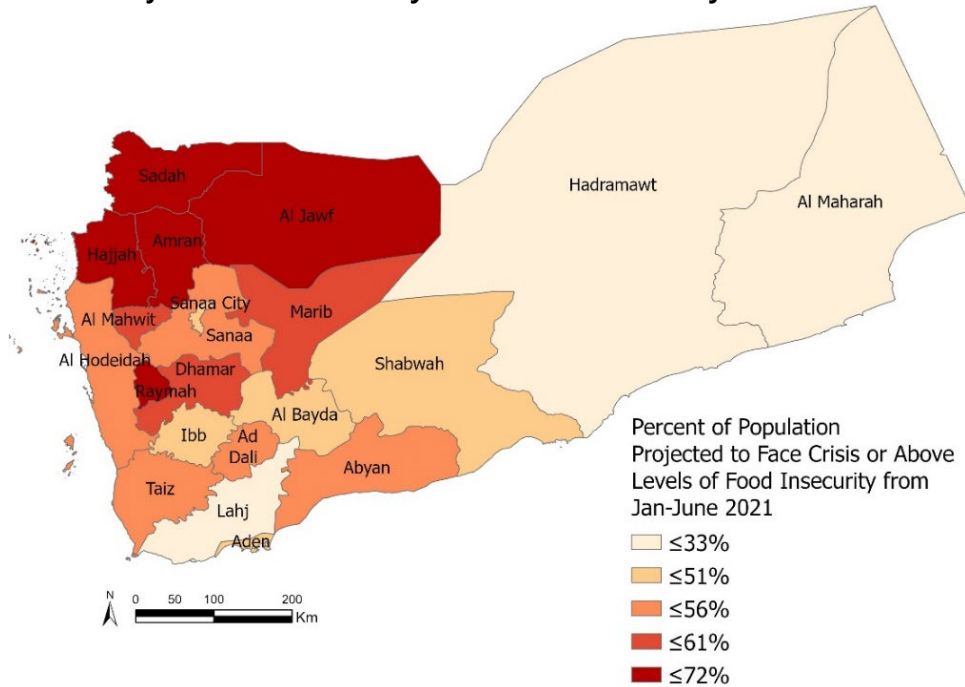


Figure 11: Percent of each governorate’s population projected to face Crisis or above (IPC phase 3+) levels of food insecurity in Yemen from January to June 2021. Source: "Yemen: Acute Food Insecurity Situation October - December 2020 and Projection for January - June 2021." Integrated Food Security Phase Classification. <http://www.ipcinfo.org>.

**1. Increased Displacements in 2020 and Loss of Resources**

From January through March 2020, fighting in the northern areas increased sharply.<sup>101</sup> These clashes triggered 143,000 new displacements throughout the country.<sup>102</sup> Of the total new displacements, more than 40,000 people fled to displacement sites in Al Suwayda near the city of Marib, with many fleeing for the second or third time since the start of the conflict. By March 2020, the city hosted 750,000 displaced people, outnumbering its pre-conflict population of 500,000 people and putting additional pressure on host communities already facing challenges with limited food supplies.<sup>103</sup>

Due to the combined impacts of rampant inflation and livelihood losses, purchasing power of displaced households declined significantly, resulting in increased vulnerability to food insecurity. Also, as of June 2020, close to a third of the IDP population had been displaced more than once, undermining their capacity to adapt and further contributing to the loss of resources and ability to purchase staple food items.<sup>104</sup> For example, displaced persons in Lahj and Shabwah governorates, which were mostly in Crisis levels (IPC Phase 3) as of December 2020, reported that their food issues were a result of increased prices of essential commodities in local markets. Also, half of displaced families in Lahj and close to 90 percent in Shabwah lived with host families and did not pay rent, putting further strain on limited resources of the host communities and resulting in shortages of household food supplies. In Shabwah governorate, many IDPs worked as civil servants and faced reductions or pauses in their government salaries, further diminishing their ability to afford food. In Ad Dali governorate, 73 percent of IDPs were previously farmers forced to flee their land and thus unable to find work, and despite 40 percent of those newly displaced not paying rent, they were still unable to afford food. In Marib governorate where over 60 percent of the displacements in 2020 occurred, populations were already facing Emergency levels (IPC Phase 4) of food insecurity in December 2020 due to ongoing hostilities and limited availability of humanitarian assistance.<sup>105</sup>

As of February 2021, more than 4 million people have been displaced since 2015, many of whom have been displaced for more than two years and multiple times. While 1 million former IDPs have returned home, they often struggle to access resources and support amid the ongoing conflict.<sup>106</sup>

**2. Supply Chain Disruptions and Increased Transportation Costs**

From October 2019 to September 2020, import volumes were 19.4 percent above pre-conflict levels, primarily due to an increased amount of food assistance in kind entering the country. However, each stage of the food supply chain has been impacted both directly and indirectly by ongoing conflict, resulting in increased



transportation costs as well as complicated supply chain logistics.<sup>107</sup> Food prices in Yemen have soared as a result of economic downturn in combination with the fuel crisis and land, sea, and air blockades that have reduced the country's ability to import goods.<sup>108</sup> For instance, in August 2015, conflict-related destruction of cranes at Al Hodeidah port and a ban on commercial containers diverted container traffic to Aden. While Aden has been able to handle the increased container volumes throughout the conflict, goods passing through to the north are subject to double taxation, resulting in increased prices that are ultimately passed to the consumer.<sup>109</sup>

Additionally, in November 2017, a ballistic missile attack towards Riyadh airport resulted in the subsequent closure of all air, sea, and land ports two days later, preventing 500,000 metric tons of food and fuel and 1,476 metric tons of aid from being imported. These restrictions particularly impacted the primary ports of Al Hodeidah and Saleef where 80 percent of imports were flowing through, and two-thirds of the population lived in areas directly served by the imports. The two ports as well as Sanaa airport remained closed until November 23<sup>rd</sup>. While the restrictions were eased for humanitarian imports after 16 days, the closure put significant strain on the food availability in markets and contributed to the skyrocketing food prices. Additionally, the blockade increased fuel prices drastically, limiting food transport as well as market supply across the country. Import delays through Al Hodeidah port in combination with road taxes throughout the country are estimated to have increased basic food prices an average of 30 percent by December 2020.<sup>110</sup>

Furthermore, increased shipping and insurance costs, transport times, and fuel shortages have further contributed to increased transportation and food costs. From 2017 to 2020, international shipping and insurance costs increased 50 percent, and shipping fees in 2020 remained high due to inspection and clearance mechanism delays. Also, from 2015 to 2020, overland transport costs have doubled, partially due to inland checkpoints that have been established by warring parties to tax incoming goods arriving from areas outside of their control. Supply chain disruptions have also increased the time it takes to bring food into the country. For instance, as of December 2020, it took between six and nine days to transport food from Aden to Sanaa, compared to the pre-conflict timeline of one day.<sup>111</sup> Continued high transportation costs due to fuel shortages have further complicated supply chains, and traders have consequently experienced a decline in the number of customers as household purchasing power has diminished amidst depreciation and increased food prices since the start of conflict.<sup>112</sup>

### 3. Increase in Food Prices and Reduced Incomes

Despite declines in domestic food production and conflict-related supply chain disruptions, market access and affordability of food items have been more of a problem than market supply.<sup>113</sup> In recent years, rapid currency depreciation, shortage of foreign exchange, increased cost of living, decreased remittances, and lower government revenues have vastly reduced people's ability to afford even a small amount of food supplies.<sup>114</sup> Between 2014 and 2019, prices of imported staple goods in Yemen increased more than 100 percent, with a 248 percent increase in rice, a 110 percent increase in wheat, and a 98 percent increase in flour, reflecting a devaluation of the Yemeni rial and changes in the YER/USD exchange rate.<sup>115</sup>

Just three years into the conflict, Yemen's economy had contracted to half of its size, and depreciation after mid-2018 increased food prices beyond what many Yemenis could afford.<sup>116</sup> In 2018, fuel price increases contributed to a substantial increase in essential food items.<sup>117</sup> Even in periods of currency appreciation, such as in November 2018 when the rial rebounded, retailers maintained higher prices to recoup previous losses during periods of depreciation.<sup>118</sup> In August 2020, inflation in the cost of the Minimum Food Basket, the minimum essential food needs required per person per month, crossed the October 2018 crisis level by 15 percent (Figure 12), and as of September 2020, food prices were 140 percent higher than before the war.<sup>119</sup> According to Yemeni traders and experts, exchange rate instability as well as challenges in accessing credit, which many households relied on to purchase goods prior to the conflict, were the largest drivers of food price increases.<sup>120</sup> By January 2021, most food commodities exceeded their pre-crisis February 2015 levels by two or three times, severely constraining household ability to afford food.<sup>121</sup>

Despite drastic food price increases, many public employees are not paid for their services. For instance, half a million doctors, teachers, and other public servants have not received their earned salary in four years as of January 2021.<sup>122</sup> The irregular or non-payment of salaries since 2016 of most civil servants has decreased many people's access to necessities such as food, water, medicine, and fuel.<sup>123</sup> In July 2020, 58 percent of households reported unemployment or reduced wages were a primary contributor to poor food access, and 17 percent reported high food prices as a key shock.<sup>124</sup> As a result, households have resorted to negative coping strategies to meet food needs, such as buying food on credit, reducing essential non-food expenditures, and reducing input expenses for agricultural, livestock, or fisheries production.<sup>125</sup>

### Average Cost of Minimum Food Basket (YER)

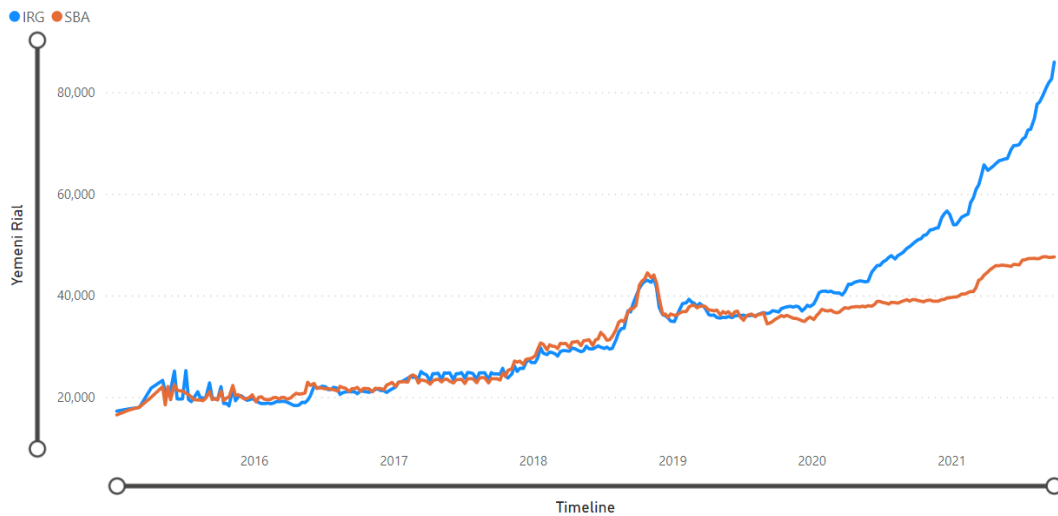


Figure 12: Average cost of the minimum food basket in Internationally Recognized Government (IRG) and Sanaa Based Authority (SBA) controlled areas in Yemen from January 2015 to September 2021. Source: "Minimum Food Basket." FAO Market Information and Early Warning System - Yemen. May 2021. <https://app.powerbi.com>.

## COVID-19 Compounds Hardships

Due to the ongoing conflict and loss of central governance and limited testing capacity, there is limited evidence and understanding of the extent of the COVID-19 outbreak in Yemen.<sup>126</sup> However, it is likely that the pandemic impacted the entire economy, including agricultural supply chains, and has worsened the food security situation as a result of economic downturn and movement restrictions. For example, previous restrictions put in place to mitigate the spread in 2020 had resulted in limited access to agricultural inputs, pastureland, water, and transportation to markets for agricultural workers. Additionally, livestock and fisheries producers were reported to have faced the most challenges concerning restriction measures.<sup>127</sup> Humanitarian support and access had also been constrained due to containment measures, movement restrictions, curfews, and 14-day quarantine for vessels at ports, altogether impacting the distribution of food and agricultural inputs.<sup>128</sup>

Out of 53.6 percent of households that reported experiencing moderate or worse levels of food insecurity in the January 2021 FAO report on agricultural livelihoods and food security in the context of COVID-19, 19 percent attributed their food insecurity to COVID-19 related challenges.<sup>129</sup> Specifically, previous movement restrictions had limited market access, and economic downturn resulted in decreased remittances and income-earning opportunities, in turn reducing household purchasing power and further worsening the food security situation.<sup>130</sup> Between January and April 2021, remittances dropped by 80 percent as immigrant workers lost their incomes due to lockdowns, resulting in further food insecurity for vulnerable households.<sup>131</sup>

## Conclusions

While Yemen is heavily dependent on commercial and aid imports for the majority of its domestic food utilization, many rural households depend on agricultural production for their food needs and livelihoods. However, conflict has both directly and indirectly impacted the agricultural sector, in turn degrading the country's ability to produce food domestically as well as household ability to afford mostly imported food items. In particular, civilian infrastructure has been a direct target of warring parties, destroying farms and agricultural infrastructure in the process, and millions of Yemenis have been displaced since the onset of modern-day conflict. As a result, the already low productive capacity of Yemen's arable land has further diminished, and many people have abandoned their farms and given up production altogether. Additionally, years of conflict have degraded the country's economic situation, and rapid currency depreciation and inflation have reduced household ability to both produce and afford basic food items. Ongoing insecurity and related socio-economic challenges continue to threaten agricultural livelihoods and remain primary drivers of decreased production potential and food insecurity throughout Yemen.

## Endnotes

- <sup>1</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Oxfam. December 2017. [https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file\\_attachments/bn-missiles-food-security-yemen-201217-en.pdf](https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file_attachments/bn-missiles-food-security-yemen-201217-en.pdf).
- <sup>2</sup> Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021. [https://www.researchgate.net/publication/348455746\\_Humanitarian\\_challenges\\_and\\_the\\_targeting\\_of\\_civilian\\_infrastructure\\_in\\_the\\_Yemen\\_war](https://www.researchgate.net/publication/348455746_Humanitarian_challenges_and_the_targeting_of_civilian_infrastructure_in_the_Yemen_war).
- <sup>3</sup> "Yemen: Civil War and Regional Intervention." Congressional Research Service. December 8, 2020. <https://fas.org/spp/crs/mideast/R43960.pdf>. Summary and Pg. 5; "Conflict Escalation in Marib And Potential Humanitarian and Economic Impacts: Scenario." ACAPS. July 2021. [https://www.acaps.org/sites/acaps/files/products/files/20210726\\_acaps\\_yemen\\_analysis\\_hub\\_marib\\_scenario.pdf](https://www.acaps.org/sites/acaps/files/products/files/20210726_acaps_yemen_analysis_hub_marib_scenario.pdf). Pg. 3
- <sup>4</sup> "Yemen: Acute Food Insecurity Situation October - December 2020 and Projection for January - June 2021." Integrated Food Security Phase Classification. <http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1152947/?iso3=YEM>.
- <sup>5</sup> "Yemen Profile - Timeline." BBC News. November 6, 2019. <https://www.bbc.com/news/world-middle-east-14704951>; "Great Decisions in Foreign Policy: Yemen: A History of Conflict." Kpbs. July 8, 2020. <https://www.kpbs.org/news/2020/jul/08/great-decisions-foreign-policy-yemen-history-confl/>; "Timeline: Yemen's Slide into Political Crisis and War." Reuters. March 21, 2019. <https://www.reuters.com/article/us-yemen-security-timeline/timeline-yemens-slide-into-political-crisis-and-war-idUSKCN1R20HO>.
- <sup>6</sup> "Who Are Yemen's Houthis?" Reuters. May 20, 2015. <https://www.reuters.com/article/idUS312582283620150520>.
- <sup>7</sup> "Yemen Profile - Timeline." BBC News. November 6, 2019. <https://www.bbc.com/news/world-middle-east-14704951>; "Timeline: Yemen's Slide into Political Crisis and War." Reuters. March 21, 2019. <https://www.reuters.com/article/us-yemen-security-timeline/timeline-yemens-slide-into-political-crisis-and-war-idUSKCN1R20HO>.
- <sup>8</sup> McKernan, Bethen. "Who Are the Houthis and Why Are They Fighting the Saudi Coalition in Yemen?" The Guardian. November 21, 2018. [https://www.theguardian.com/world/2018/nov/21/who-are-the-houthis-fighting-the-saudi-led-coalition-in-yemen/](https://www.theguardian.com/world/2018/nov/21/who-are-the-houthis-fighting-the-saudi-led-coalition-in-yemen;); "Great Decisions in Foreign Policy: Yemen: A History of Conflict." Kpbs. July 8, 2020. <https://www.kpbs.org/news/2020/jul/08/great-decisions-foreign-policy-yemen-history-confl/>; "Yemen: Civil War and Regional Intervention." Congressional Research Service. December 8, 2020. <https://fas.org/spp/crs/mideast/R43960.pdf>. Pg. 3
- <sup>9</sup> "Arab Spring." History.com. January 17, 2020. <https://www.history.com/topics/middle-east/arab-spring>; "Yemen: Civil War and Regional Intervention." Congressional Research Service. December 8, 2020. <https://fas.org/spp/crs/mideast/R43960.pdf>. Pg. 2 timeline
- <sup>10</sup> "Profile: Al-Qaeda in the Arabian Peninsula." BBC News. June 16, 2015. <https://www.bbc.com/news/world-middle-east-11483095>.
- <sup>11</sup> "Yemen Crisis: Why Is There a War?" BBC News. June 19, 2020. <https://www.bbc.com/news/world-middle-east-29319423>.
- <sup>12</sup> Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021. [https://www.researchgate.net/publication/348455746\\_Humanitarian\\_challenges\\_and\\_the\\_targeting\\_of\\_civilian\\_infrastructure\\_in\\_the\\_Yemen\\_war](https://www.researchgate.net/publication/348455746_Humanitarian_challenges_and_the_targeting_of_civilian_infrastructure_in_the_Yemen_war).
- <sup>13</sup> "Timeline: Yemen's Slide into Political Crisis and War." Reuters. March 21, 2019. <https://www.reuters.com/article/us-yemen-security-timeline/timeline-yemens-slide-into-political-crisis-and-war-idUSKCN1R20HO>.
- <sup>14</sup> "Great Decisions in Foreign Policy: Yemen: A History of Conflict." Kpbs. July 8, 2020. <https://www.kpbs.org/news/2020/jul/08/great-decisions-foreign-policy-yemen-history-confl/>; "Yemen: Civil War and Regional Intervention." Congressional Research Service. December 8, 2020. <https://fas.org/spp/crs/mideast/R43960.pdf>. Summary
- <sup>15</sup> "Timeline: Yemen's Slide into Political Crisis and War." Reuters. March 21, 2019. <https://www.reuters.com/article/us-yemen-security-timeline/timeline-yemens-slide-into-political-crisis-and-war-idUSKCN1R20HO>.
- <sup>16</sup> "Yemen Crisis: Why Is There a War?" BBC News. June 19, 2020. <https://www.bbc.com/news/world-middle-east-29319423>.
- <sup>17</sup> "Timeline: Yemen's Slide into Political Crisis and War." Reuters. March 21, 2019. <https://www.reuters.com/article/us-yemen-security-timeline/timeline-yemens-slide-into-political-crisis-and-war-idUSKCN1R20HO>; "War in Yemen." Council on Foreign Relations. January 14, 2021. <https://www.cfr.org/global-conflict-tracker/conflict/war-yemen>.
- <sup>18</sup> "Yemen: Civil War and Regional Intervention." Congressional Research Service. December 8, 2020. <https://fas.org/spp/crs/mideast/R43960.pdf>. Summary and Pg. 5; Robinson, Kali. "How Severe Is Yemen's Humanitarian Crisis?" Council on Foreign Relations. February 4, 2021. <https://www.cfr.org/in-brief/how-severe-yemens-humanitarian-crisis>; Carboni, Andre. "The Myth of Stability: Infighting and Repression in Houthi-Controlled Territories." ACLED. February 9, 2021. <https://acleddata.com/2021/02/09/the-myth-of-stability-infighting-and-repression-in-houthi-controlled-territories/>.
- <sup>19</sup> "Yemen's Southern Transitional Council: A Delicate Balancing Act." International Crisis Group. March 30, 2021. <https://www.crisisgroup.org/middle-east-north-africa/gulf-and-arabian-peninsula/yemen/yemens-southern-transitional-council-delicate-balancing-act>.
- <sup>20</sup> Wenner, Manfred W., and Robert Burrowes. "Yemen." Britannica. January 19, 2021. <https://www.britannica.com/place/Yemen>.
- <sup>21</sup> Mohamed, Hadil, Moosa Elayah, and Lau Schuplen. "Yemen between the Impact of the Climate Change and the Ongoing Saudi-Yemen War: A Real Tragedy." Researchgate. October 2017. [https://www.researchgate.net/publication/321426816\\_Yemen\\_between\\_the\\_Impact\\_of\\_the\\_Climate\\_Change\\_and\\_the\\_Ongoing\\_Saudi-Yemen\\_War\\_A\\_Real\\_Tragedy\\_An\\_Analytical\\_Report\\_Published\\_by\\_the\\_Centre\\_For\\_Governance\\_and\\_Peace-building-Yemen\\_in\\_Collaboration\\_with](https://www.researchgate.net/publication/321426816_Yemen_between_the_Impact_of_the_Climate_Change_and_the_Ongoing_Saudi-Yemen_War_A_Real_Tragedy_An_Analytical_Report_Published_by_the_Centre_For_Governance_and_Peace-building-Yemen_in_Collaboration_with); Wenner, Manfred W., and Robert Burrowes. "Yemen." Britannica. January 19, 2021. <https://www.britannica.com/place/Yemen>; "Country Profile - Yemen." New Agriculturalist. March 2010. <http://www.new-ag.info/en/country/profile.php?a=1371#:~:text=More than 70 per cent,are the main food crops>.
- <sup>22</sup> Mohamed, Hadil, Moosa Elayah, and Lau Schuplen. "Yemen between the Impact of the Climate Change and the Ongoing Saudi-Yemen War: A Real Tragedy." Researchgate. October 2017. [https://www.researchgate.net/publication/321426816\\_Yemen\\_between\\_the\\_Impact\\_of\\_the\\_Climate\\_Change\\_and\\_the\\_Ongoing\\_Saudi-Yemen\\_War\\_A\\_Real\\_Tragedy\\_An\\_Analytical\\_Report\\_Published\\_by\\_the\\_Centre\\_For\\_Governance\\_and\\_Peace-building-Yemen\\_in\\_Collaboration\\_with](https://www.researchgate.net/publication/321426816_Yemen_between_the_Impact_of_the_Climate_Change_and_the_Ongoing_Saudi-Yemen_War_A_Real_Tragedy_An_Analytical_Report_Published_by_the_Centre_For_Governance_and_Peace-building-Yemen_in_Collaboration_with); "Report: Yemen's Agriculture in Distress." Conflict and Environment Observatory. October 2020. <https://ceobs.org/yemens-agriculture-in-distress/>.
- <sup>23</sup> Mohamed, Hadil, Moosa Elayah, and Lau Schuplen. "Yemen between the Impact of the Climate Change and the Ongoing Saudi-Yemen War: A Real Tragedy." Researchgate. October 2017. [https://www.researchgate.net/publication/321426816\\_Yemen\\_between\\_the\\_Impact\\_of\\_the\\_Climate\\_Change\\_and\\_the\\_Ongoing\\_Saudi-Yemen\\_War\\_A\\_Real\\_Tragedy\\_An\\_Analytical\\_Report\\_Published\\_by\\_the\\_Centre\\_For\\_Governance\\_and\\_Peace-building-Yemen\\_in\\_Collaboration\\_with](https://www.researchgate.net/publication/321426816_Yemen_between_the_Impact_of_the_Climate_Change_and_the_Ongoing_Saudi-Yemen_War_A_Real_Tragedy_An_Analytical_Report_Published_by_the_Centre_For_Governance_and_Peace-building-Yemen_in_Collaboration_with).
- <sup>24</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Oxfam. December 2017. [https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file\\_attachments/bn-missiles-food-security-yemen-201217-en.pdf](https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file_attachments/bn-missiles-food-security-yemen-201217-en.pdf).
- <sup>25</sup> "Yemen Middle East." SPARC Knowledge. <https://www.sparc-knowledge.org/regions/middle-east/yemen>.
- <sup>26</sup> Mohamed, Hadil, Moosa Elayah, and Lau Schuplen. "Yemen between the Impact of the Climate Change and the Ongoing Saudi-Yemen War: A Real Tragedy." Researchgate. October 2017. [https://www.researchgate.net/publication/321426816\\_Yemen\\_between\\_the\\_Impact\\_of\\_the\\_Climate\\_Change\\_and\\_the\\_Ongoing\\_Saudi-Yemen\\_War\\_A\\_Real\\_Tragedy\\_An\\_Analytical\\_Report\\_Published\\_by\\_the\\_Centre\\_For\\_Governance\\_and\\_Peace-building-Yemen\\_in\\_Collaboration\\_with](https://www.researchgate.net/publication/321426816_Yemen_between_the_Impact_of_the_Climate_Change_and_the_Ongoing_Saudi-Yemen_War_A_Real_Tragedy_An_Analytical_Report_Published_by_the_Centre_For_Governance_and_Peace-building-Yemen_in_Collaboration_with).
- <sup>27</sup> "Agricultural Statistics Book 2013." Yemen Ministry of Agriculture and Irrigation. November 18, 2014. <http://agricultureyemen.com/page.php?id=463>; "Agricultural Statistics Book 2016." Yemen Ministry of Agriculture and Irrigation. March 10, 2018. <http://agricultureyemen.com/page.php?id=488>; "Agricultural Statistics Book 2018." Yemen Ministry of Agriculture and Irrigation. February 26, 2020. <http://agricultureyemen.com/page.php?id=501>.
- <sup>28</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.
- <sup>29</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020. [https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf). Pg. 4
- <sup>30</sup> "UnSettlement: Urban Displacement in the 21st Century." Internal Displacement Monitoring Centre. October 2019. [https://www.internal-displacement.org/sites/default/files/publications/documents/201910-urban-yemen\\_0.pdf](https://www.internal-displacement.org/sites/default/files/publications/documents/201910-urban-yemen_0.pdf).
- <sup>31</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Oxfam. December 2017. [https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file\\_attachments/bn-missiles-food-security-yemen-201217-en.pdf](https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file_attachments/bn-missiles-food-security-yemen-201217-en.pdf).

- <sup>31</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.
- <sup>32</sup> "Agricultural Statistics Book 2013." Yemen Ministry of Agriculture and Irrigation. November 18, 2014. <http://agricultureyemen.com/page.php?id=463>;
- "Agricultural Statistics Book 2016." Yemen Ministry of Agriculture and Irrigation. March 10, 2018. <http://agricultureyemen.com/page.php?id=488>; "Agricultural Statistics Book 2018." Yemen Ministry of Agriculture and Irrigation. February 26, 2020. <http://agricultureyemen.com/page.php?id=501>; "Planting Food Security for Yemeni Farmers." Reliefweb. March 20, 2018. <https://reliefweb.int/report/yemen/planting-food-security-yemeni-farmers>.
- <sup>33</sup> "Agricultural Statistics Book 2013." Yemen Ministry of Agriculture and Irrigation. November 18, 2014. <http://agricultureyemen.com/page.php?id=463>;
- "Agricultural Statistics Book 2016." Yemen Ministry of Agriculture and Irrigation. March 10, 2018. <http://agricultureyemen.com/page.php?id=488>; "Agricultural Statistics Book 2018." Yemen Ministry of Agriculture and Irrigation. February 26, 2020. <http://agricultureyemen.com/page.php?id=501>.
- <sup>34</sup> Zwijnenburg, Wim. "Yemen Environmental Bulletin: The Decline of Tihamah Date Production and Yemen's Agricultural Collapse." Sanaa Center for Strategic Studies. August 14, 2020. <https://sanaacenter.org/publications/analysis/10403>.
- <sup>35</sup> "GIEWS Country Brief Yemen Archive." June 10, 2020. [https://www.fao.org/giews/countrybrief/country/YEM/pdf\\_archive/YEM\\_Archive.pdf](https://www.fao.org/giews/countrybrief/country/YEM/pdf_archive/YEM_Archive.pdf) ;
- "Yemen Humanitarian Response Plan 2021 (March 2021)." Reliefweb. May 16, 2021. <https://reliefweb.int/report/yemen/yemen-humanitarian-response-plan-2021-march-2021>.
- <sup>36</sup> Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021. [https://www.researchgate.net/publication/348455746\\_Humanitarian\\_challenges\\_and\\_the\\_targeting\\_of\\_civilian\\_infrastructure\\_in\\_the\\_Yemen\\_war](https://www.researchgate.net/publication/348455746_Humanitarian_challenges_and_the_targeting_of_civilian_infrastructure_in_the_Yemen_war).
- <sup>37</sup> "In Raymah Governorate, Yemen, ACTED Is Helping Farmers Sow the Seeds of a Brighter Future." ACTED. <https://www.acted.org/en/https-www-acted-org-en-p1271831previewtrue/>.
- <sup>38</sup> Karasapan, Omar. "Yemen's Civilians: Besieged on All Sides." Brookings. March 31, 2020. <https://www.brookings.edu/blog/future-development/2020/03/31/yemens-civilians-besieged-on-all-sides/>.
- <sup>39</sup> "UnSettlement: Urban Displacement in the 21st Century." Internal Displacement Monitoring Centre. October 2019. [https://www.internal-displacement.org/sites/default/files/publications/documents/201910-urban-yemen\\_0.pdf](https://www.internal-displacement.org/sites/default/files/publications/documents/201910-urban-yemen_0.pdf).
- <sup>40</sup> Moyer, Jonathan D., David Bohl, Taylor Hanna, Brendan R. Mapes, and Mickey Rafa. "Assessing the Impact of War of Development in Yemen." United Nations Development Programme (UNDP). 2019. [https://yemen.un.org/sites/default/files/2019-09/Assessing the Impact of War on Development in Yemen.pdf](https://yemen.un.org/sites/default/files/2019-09/Assessing%20the%20Impact%20of%20War%20on%20Development%20in%20Yemen.pdf).
- <sup>41</sup> "IOM Concerned about Impact of Yemen Famine Predictions on Displaced Persons, Migrants." IOM UN Migration. December 4, 2020. <https://www.iom.int/news/iom-concerned-about-impact-yemen-famine-predictions-displaced-persons-migrants>.
- <sup>42</sup> Mundy, Martha. "The Strategies of the Coalition in the Yemen War: Aerial Bombardment and Food War." Reliefweb. October 9, 2018. [https://reliefweb.int/sites/reliefweb.int/files/resources/Strategies of Coalition in Yemen War.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Strategies%20of%20Coalition%20in%20Yemen%20War.pdf).
- <sup>43</sup> "Agricultural Statistics Book 2013." Yemen Ministry of Agriculture and Irrigation. November 18, 2014. <http://agricultureyemen.com/page.php?id=463>;
- "Agricultural Statistics Book 2016." Yemen Ministry of Agriculture and Irrigation. March 10, 2018. <http://agricultureyemen.com/page.php?id=488>; "Agricultural Statistics Book 2018." Yemen Ministry of Agriculture and Irrigation. February 26, 2020. <http://agricultureyemen.com/page.php?id=501>.
- <sup>44</sup> "Yemen: 900 Airstrike and Shelling Hits on Farms in Three Years." Norwegian Refugee Council. September 24, 2020. <https://www.nrc.no/news/2020/september/yemen-900-airstrike-and-shelling-hits-on-farms-in-three-years/>.
- <sup>45</sup> "Yemen's Agriculture in Distress: A Case Study of Wadis Zabid and Rima, the Tihamah." Conflict and Environment Observatory. October 2020. <https://ceobs.org/how-has-the-conflict-impacted-agriculture-in-the-Tihamah/#s1>.
- <sup>46</sup> "Yemen: 900 Airstrike and Shelling Hits on Farms in Three Years." Norwegian Refugee Council. September 24, 2020. <https://www.nrc.no/news/2020/september/yemen-900-airstrike-and-shelling-hits-on-farms-in-three-years/>.
- <sup>47</sup> "Yemen's Agriculture in Distress: A Case Study of Wadis Zabid and Rima, the Tihamah." Conflict and Environment Observatory. October 2020. <https://ceobs.org/how-has-the-conflict-impacted-agriculture-in-the-Tihamah/#s1>.
- <sup>48</sup> DeLozier, Elana. "The Problem of Landmine Proliferation in Yemen." The Washington Institute for Near East Policy. July 3, 2018. <https://www.washingtoninstitute.org/policy-analysis/problem-landmine-proliferation-yemen>.
- <sup>49</sup> "Yemen: Houthi Landmines Kill Civilians, Block Aid." Human Rights Watch. April 22, 2019. <https://www.hrw.org/news/2019/04/22/yemen-houthi-landmines-kill-civilians-block-aid>.
- <sup>50</sup> "Large Landmine Fields Threaten People's Lives in War-ravaged Yemen." China Global Television Network. December 1, 2020. <https://newsaf.cgtn.com/news/2020-12-01/Large-landmine-fields-threaten-people-s-lives-in-war-ravaged-Yemen-VQL9emFsXK/index.html>; "Civilian Harm and Local Protection Measures in Yemen." Center for Civilians in Conflict. January 16, 2020. [https://civiliansinconflict.org/wp-content/uploads/2020/01/YEMEN\\_BulletinHunger\\_FINAL\\_PROOF.pdf](https://civiliansinconflict.org/wp-content/uploads/2020/01/YEMEN_BulletinHunger_FINAL_PROOF.pdf).
- <sup>51</sup> "Situation of Human Rights in Yemen, including Violations and Abuses since September 2014." Human Rights Council. September 28, 2020. <https://www.ohchr.org/Documents/HRBodies/HRCouncil/GEE-Yemen/2020-09-09-report.pdf>. Pg. 9
- <sup>52</sup> "Humanitarian Needs Overview Yemen." OCHA. February 2021. [https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/yemen\\_hno\\_2021\\_final\\_version\\_1.pdf](https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/yemen_hno_2021_final_version_1.pdf).
- <sup>53</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.
- <sup>54</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.
- <sup>55</sup> "Country Briefs: Yemen." Food and Agriculture Organization of the United Nations. March 10, 2021. <http://www.fao.org/giews/countrybrief/country.jsp?code=YEM>.
- <sup>56</sup> "Yemen | Food Security and Price Monitoring." World Food Programme. August 14, 2020. <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000119039.pdf>. Pg. 1 and Pg. 2; "Yemen Food Supply Chain." ACAPS. December 16, 2020. [https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).
- <sup>57</sup> "Yemen | Food Security and Price Monitoring." World Food Programme. August 14, 2020. <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000119039.pdf>. Pg. 1 and Pg. 2
- <sup>58</sup> "In Raymah Governorate, Yemen, ACTED Is Helping Farmers Sow the Seeds of a Brighter Future." ACTED. <https://www.acted.org/en/https-www-acted-org-en-p1271831previewtrue/>.
- <sup>59</sup> "FAO Warns of Rapidly Deteriorating Food Security in Yemen." Food and Agriculture Organization of the United Nations. January 28, 2016. <http://www.fao.org/news/story/en/item/380653/icode/>.
- <sup>60</sup> "Country Briefs: Yemen." Global Information and Early Warning System. June 10, 2020. [http://www.fao.org/giews/countrybrief/country.jsp?code=YEM](http://www.fao.org/giews/countrybrief/country.jsp?code=YEM;);
- "Country Briefs: Yemen." Food and Agriculture Organization of the United Nations. March 10, 2021. <http://www.fao.org/giews/countrybrief/country.jsp?code=YEM>.
- <sup>61</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Oxfam. December 2017. [https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file\\_attachments/bn-missiles-food-security-yemen-201217-en.pdf](https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file_attachments/bn-missiles-food-security-yemen-201217-en.pdf).
- <sup>62</sup> "Republic of Yemen Global Agriculture and Food Security Program (GAFSP)." Food and Agriculture Organization of the United Nations. June 2017. [https://www.sfd-yemen.org/uploads/issues/FAO-YEMEN\\_SAPREP\\_ESMF-English.pdf](https://www.sfd-yemen.org/uploads/issues/FAO-YEMEN_SAPREP_ESMF-English.pdf).
- <sup>63</sup> Brown, Charlotte. "Yemeni Communities Becoming Resilient One Seed at a Time." Danish Refugee Council. <https://drc.ngo/our-work/what-we-do/drc-climate-action/news-stories-from-the-field/yemeni-communities-becoming-resilient-one-seed-at-a-time/>.
- <sup>64</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.
- <sup>65</sup> "Yemen Government Approves More Fuel Ships to Dock at Hodeidah Port." Reuters. April 15, 2021. <https://www.reuters.com/world/middle-east/yemen-government-approves-more-fuel-ships-dock-hodeidah-port-2021-04-15/>.
- <sup>66</sup> "Situation of Human Rights in Yemen, including Violations and Abuses since September 2014." Human Rights Council. September 28, 2020. <https://www.ohchr.org/Documents/HRBodies/HRCouncil/GEE-Yemen/2020-09-09-report.pdf>. Pg. 10
- <sup>67</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.
- <sup>68</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020.



[https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf). Pg. 2

<sup>69</sup> "Country Briefs: Yemen." Food and Agriculture Organization of the United Nations. March 10, 2021.

<http://www.fao.org/giews/countrybrief/country.jsp?code=YEM>.

<sup>70</sup> "Yemen Food Security and Price Monitoring." World Food Programme. July 2020. <https://docs.wfp.org/api/documents/WFP-0000118844/download/>; "High Food Prices and Low Purchasing Power Remain a Significant Concern for Millions of Households." FEWS NET. August 2021. <https://fews.net/east-africa/yemen/food-security-outlook-update/august-2021>.

<sup>71</sup> Sowers, Jeannie, and Erika Weinthal. "Saudi-led Attacks Devastated Yemen's Civilian Infrastructure, Dramatically Worsening the Humanitarian Crisis." The Washington Post. February 22, 2021. <https://www.washingtonpost.com/politics/2021/02/22/saudi-led-attacks-devastated-yemens-civilian-infrastructure-dramatically-worsening-humanitarian-crisis/>; Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021.

<sup>72</sup> Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021. [https://www.researchgate.net/publication/348455746\\_Humanitarian\\_challenges\\_and\\_the\\_targeting\\_of\\_civilian\\_infrastructure\\_in\\_the\\_Yemen\\_war](https://www.researchgate.net/publication/348455746_Humanitarian_challenges_and_the_targeting_of_civilian_infrastructure_in_the_Yemen_war).

<sup>73</sup> "Situation of Human Rights in Yemen, including Violations and Abuses since September 2014." Human Rights Council. September 28, 2020.

<https://www.ohchr.org/Documents/HRBodies/HRCouncil/GEE-Yemen/2020-09-09-report.pdf>. Pg. 9

<sup>74</sup> "FAO Warns of Rapidly Deteriorating Food Security in Yemen." Food and Agriculture Organization of the United Nations. January 28, 2016.

<http://www.fao.org/news/story/en/item/380653/icode/>.

<sup>75</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.

<sup>76</sup> Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021. [https://www.researchgate.net/publication/348455746\\_Humanitarian\\_challenges\\_and\\_the\\_targeting\\_of\\_civilian\\_infrastructure\\_in\\_the\\_Yemen\\_war](https://www.researchgate.net/publication/348455746_Humanitarian_challenges_and_the_targeting_of_civilian_infrastructure_in_the_Yemen_war).

<sup>77</sup> "Country Profile - Yemen." New Agriculturalist. March 2010. <http://www.new-ag.info/en/country/profile.php?a=1371#:~:text=More than 70 per cent,are the main food crops>.

<sup>78</sup> "Desertification a Threat to Millions of Yemenis." Reliefweb. July 1, 2014. <https://reliefweb.int/report/yemen/desertification-threat-millions-yemenis>.

<sup>79</sup> "Solar Powered Water Pumps Help Yemeni Farmers Restore Their Agricultural Livelihoods." Reliefweb. January 13, 2020.

<https://reliefweb.int/report/yemen/solar-powered-water-pumps-help-yemeni-farmers-restore-their-agricultural-livelihoods>.

<sup>80</sup> Raven, Andrew. "In Yemen, Solar Power Has Become a Lifeline." International Finance Corporation. January 2021.

[https://www.ifc.org/wps/wcm/connect/news\\_ext\\_content/ifc\\_external\\_corporate\\_site/news\\_and\\_events/news/202101-yemen-solar](https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news_and_events/news/202101-yemen-solar).

<sup>81</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020.

[https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).

<sup>82</sup> "Country Briefs: Yemen." Food and Agriculture Organization of the United Nations. March 10, 2021.

<http://www.fao.org/giews/countrybrief/country.jsp?code=YEM>.

<sup>83</sup> Raven, Andrew. "In Yemen, Solar Power Has Become a Lifeline." International Finance Corporation. January 2021.

[https://www.ifc.org/wps/wcm/connect/news\\_ext\\_content/ifc\\_external\\_corporate\\_site/news\\_and\\_events/news/202101-yemen-solar](https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news_and_events/news/202101-yemen-solar).

<sup>84</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.

<sup>85</sup> Mundy, Martha. "The War on Yemen and Its Agricultural Sector." Elikadura 21. April 26, 2017. <http://elikadura21.eus/wp-content/uploads/2017/04/50-Mundy.pdf>.

<sup>86</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.

<sup>87</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.

<sup>88</sup> "Yemen Agrometeorological Update." Food and Agriculture Organization of the United Nations. June 2021.

<sup>89</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.

<sup>90</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021.

<https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.

<sup>91</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.

<sup>92</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Reliefweb. December 2017. <https://reliefweb.int/sites/reliefweb.int/files/resources/bn-missiles-food-security-yemen-201217-en.pdf>.

<sup>93</sup> Sowers, Jeannie, and Erika Weinthal. "Saudi-led Attacks Devastated Yemen's Civilian Infrastructure, Dramatically Worsening the Humanitarian Crisis." The Washington Post. February 22, 2021. <https://www.washingtonpost.com/politics/2021/02/22/saudi-led-attacks-devastated-yemens-civilian-infrastructure-dramatically-worsening-humanitarian-crisis/>; Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021.

<sup>94</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021.

<https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.

<sup>95</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/I9054EN/i9054en.pdf>.

<sup>96</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Oxfam. December 2017. [https://d1tn3vjxz9fdh.cloudfront.net/s3fs-public/file\\_attachments/bn-missiles-food-security-yemen-201217-en.pdf](https://d1tn3vjxz9fdh.cloudfront.net/s3fs-public/file_attachments/bn-missiles-food-security-yemen-201217-en.pdf).

<sup>97</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Reliefweb. December 2017. <https://reliefweb.int/sites/reliefweb.int/files/resources/bn-missiles-food-security-yemen-201217-en.pdf>. Pg. 2; "Yemen Food Supply Chain." ACAPS. December 16, 2020.

[https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).

<sup>98</sup> "IOM Concerned about Impact of Yemen Famine Predictions on Displaced Persons, Migrants." IOM UN Migration. December 4, 2020.

<https://www.iom.int/news/iom-concerned-about-impact-yemen-famine-predictions-displaced-persons-migrants>.

<sup>99</sup> "Yemen: Acute Food Insecurity Situation October - December 2020 and Projection for January - June 2021." Integrated Food Security Phase Classification. <http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1152947/?iso3=YEM>.

<sup>100</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020.

[https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).

<sup>101</sup> "Yemen Sees Fresh Displacement after Five Years of Conflict." The UN Refugee Agency. March 27, 2020. <https://www.unhcr.org/en-us/news/latest/2020/3/5e7dba1e4/yemen-sees-fresh-displacement-five-years-conflict.html>; "Yemen: Displaced at Heightened Covid-19 Risk." Human Rights Watch. May 22, 2020. <https://www.hrw.org/news/2020/05/22/yemen-displaced-heightened-covid-19-risk>.

<sup>102</sup> "Yemen: The Implications of Forced Immobility." Internal Displacement Monitoring Centre. June 2020. <https://www.internal-displacement.org/sites/default/files/publications/documents/202006-yemen-policy-paper.pdf>; "Yemen." Internal Displacement Monitoring Centre. December 2020. <https://www.internal-displacement.org/countries/yemen>; "Annual Conflict and Disaster Displacement Figures." Internal Displacement Monitoring Centre. 2020. <https://www.internal-displacement.org/countries/yemen>.

<sup>103</sup> "Yemen Sees Fresh Displacement after Five Years of Conflict." The UN Refugee Agency. March 27, 2020. <https://www.unhcr.org/en-us/news/latest/2020/3/5e7dba1e4/yemen-sees-fresh-displacement-five-years-conflict.html>; "FAO Warns of Rapidly Deteriorating Food Security in Yemen." Food and Agriculture Organization of the United Nations. January 28, 2016. <http://www.fao.org/news/story/en/item/380653/icode/>.

<sup>104</sup> "Yemen: The Implications of Forced Immobility." Internal Displacement Monitoring Centre. June 2020. <https://www.internal-displacement.org/sites/default/files/publications/documents/202006-yemen-policy-paper.pdf>.

<sup>105</sup> "IOM Concerned about Impact of Yemen Famine Predictions on Displaced Persons, Migrants." IOM UN Migration. December 4, 2020.

<https://www.iom.int/news/iom-concerned-about-impact-yemen-famine-predictions-displaced-persons-migrants>.

<sup>106</sup> "Humanitarian Needs Overview Yemen." OCHA. February 2021.

[https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/yemen\\_hno\\_2021\\_final\\_version\\_1.pdf](https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/yemen_hno_2021_final_version_1.pdf).

<sup>107</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020.

[https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).

<sup>108</sup> "Yemen: The Implications of Forced Immobility." Internal Displacement Monitoring Centre. June 2020. <https://www.internal-displacement.org/sites/default/files/publications/documents/202006-yemen-policy-paper.pdf>.

- <sup>109</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020. [https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).
- <sup>110</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Reliefweb. December 2017. <https://reliefweb.int/sites/reliefweb.int/files/resources/bn-missiles-food-security-yemen-201217-en.pdf>.
- <sup>111</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020. [https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).
- <sup>112</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.
- <sup>113</sup> "Missiles and Food: Yemen's Man-made Food Security Crisis." Oxfam. December 2017. [https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file\\_attachments/bn-missiles-food-security-yemen-201217-en.pdf](https://d1tn3vj7xz9fdh.cloudfront.net/s3fs-public/file_attachments/bn-missiles-food-security-yemen-201217-en.pdf).
- <sup>114</sup> "IOM Concerned about Impact of Yemen Famine Predictions on Displaced Persons, Migrants." IOM UN Migration. December 4, 2020. <https://www.iom.int/news/iom-concerned-about-impact-yemen-famine-predictions-displaced-persons-migrants>.
- <sup>115</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020. [https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).
- <sup>116</sup> Sowers, Jeannie L., and Erika Weinthal. "Humanitarian Challenges and the Targeting of Civilian Infrastructure in the Yemen War." Researchgate. January 2021. [https://www.researchgate.net/publication/348455746\\_Humanitarian\\_challenges\\_and\\_the\\_targeting\\_of\\_civilian\\_infrastructure\\_in\\_the\\_Yemen\\_war](https://www.researchgate.net/publication/348455746_Humanitarian_challenges_and_the_targeting_of_civilian_infrastructure_in_the_Yemen_war).
- <sup>117</sup> "Yemen Plan of Action 2018–2020." Food and Agriculture Organization of the United Nations. 2018. <http://www.fao.org/3/i9054en/i9054en.pdf>.
- <sup>118</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020. [https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).
- <sup>119</sup> "Yemen | Food Security and Price Monitoring." World Food Programme. August 14, 2020. <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000119039.pdf>. Pg. 1; "Yemen: 900 Airstrike and Shelling Hits on Farms in Three Years." Norwegian Refugee Council. September 24, 2020. <https://www.nrc.no/news/2020/september/yemen-900-airstrike-and-shelling-hits-on-farms-in-three-years/>.
- <sup>120</sup> "Yemen Food Supply Chain." ACAPS. December 16, 2020. [https://www.acaps.org/sites/acaps/files/products/files/20201216\\_acaps\\_yemen\\_analysis\\_hub\\_food\\_supply\\_chain.pdf](https://www.acaps.org/sites/acaps/files/products/files/20201216_acaps_yemen_analysis_hub_food_supply_chain.pdf).
- <sup>121</sup> "Country Briefs: Yemen." Food and Agriculture Organization of the United Nations. March 10, 2021. <http://www.fao.org/giews/countrybrief/country.jsp?code=YEM>.
- <sup>122</sup> "World Leaders Can Still Avert Famine in Yemen. Here's How...." The New Humanitarian. January 6, 2021. [https://www.thenewhumanitarian.org/opinion/2021/01/06/yemen-famine-aid-funding-conflict?utm\\_source=The New Humanitarian&utm\\_campaign=f0a8dceca6-EMAIL\\_CAMPAIGN\\_2020\\_12\\_11\\_Weekly\\_COPY\\_01&utm\\_medium=email&utm\\_term=0\\_d842d98289-f0a8dceca6-75659826](https://www.thenewhumanitarian.org/opinion/2021/01/06/yemen-famine-aid-funding-conflict?utm_source=The%20New%20Humanitarian&utm_campaign=f0a8dceca6-EMAIL_CAMPAIGN_2020_12_11_Weekly_COPY_01&utm_medium=email&utm_term=0_d842d98289-f0a8dceca6-75659826).
- <sup>123</sup> "Situation of Human Rights in Yemen, including Violations and Abuses since September 2014." Human Rights Council. September 28, 2020. <https://www.ohchr.org/Documents/HRBodies/HRCouncil/HRCouncil/GEE-Yemen/2020-09-09-report.pdf>. Pg. 8
- <sup>124</sup> "Yemen | Food Security and Price Monitoring." World Food Programme. August 14, 2020. <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000119039.pdf>. Pg. 1 and Pg. 6
- <sup>125</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.
- <sup>126</sup> "Yemen: Civil War and Regional Intervention." Congressional Research Service. December 8, 2020. <https://fas.org/sgp/crs/mideast/R43960.pdf>. Pg. 1
- <sup>127</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.
- <sup>128</sup> "Country Briefs: Yemen." Global Information and Early Warning System. June 10, 2020. <http://www.fao.org/giews/countrybrief/country.jsp?code=YEM>.
- <sup>129</sup> "Yemen: Agricultural Livelihoods and Food Security in the Context of COVID-19." Reliefweb. January 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/cb3247en.pdf>.
- <sup>130</sup> "Yemen | Food Security and Price Monitoring." World Food Programme. August 14, 2020. <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000119039.pdf>. Pg. 6
- <sup>131</sup> "Country Briefs: Yemen." Global Information and Early Warning System. June 10, 2020. <http://www.fao.org/giews/countrybrief/country.jsp?code=YEM>.

## Prepared in Collaboration with:



*\*EC contribution is provided by the Joint Research Centre of the European Commission.*



Prepared by members of the GEOGLAM Community of Practice Coordinated by the University of Maryland with funding from NASA Harvest. The Crop Monitor is a part of GEOGLAM, a GEO global initiative.

<https://cropmonitor.org/>

[@GEOCropMonitor](#)

**Disclaimer**

Disclaimer: The Crop Monitor conflict report is produced by GEOGLAM with inputs from the following partners (in alphabetical order): EC JRC, FAO GIEWS, FEWS NET, WFP, and UMD. The findings and conclusions in this joint multiagency report are consensual statements from the GEOGLAM experts and do not necessarily reflect those of the individual agencies represented by these experts. GEOGLAM accepts no responsibility for any application, use or interpretation of the information contained in this report and disclaims all liability for direct, indirect or consequential damages resulting from the use of this report.