Working paper | Paper 2

Food security in Yemen: the role of the private sector in promoting domestic food production

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Key messages

Yemen is a food-insecure country. For several decades, domestic food production has declined and food imports have increased. Conflict and economic crisis have made it much more difficult for Yemen to finance these imports.

This report asks whether domestic production in a predominantly rural and agrarian country can be expanded – and whether the private sector could support that expansion.

Yemen's formal private sector, dominated by a few conglomerates, is allied with state elites and focused on the import trade. The consumption economy which the large importers have conjured into existence is tied up with the decline of agricultural production: the formal private sector invests almost nothing in agriculture.

Rural capital investment comes from remittances and rents, and is allocated to the most profitable crops: psychoactive stimulants, meat, dairy and poultry. Commercial agriculture often makes unsustainable demands on water supplies, and reshapes gendered orders of production in favour of men.

Commercialisation has not contributed to food security or even to productivity increases: yields in the most commercialised sectors are low.

These disconnects between commercialisation, productivity, ecological sustainability, equity and food security present policy-makers with difficult choices. This report argues that promoting domestic production requires an understanding of these choices, because domestic production is central to both the development and humanitarian agendas.

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I am sorry that the security situation in Yemen does not permit mention of so many thoughtful and brilliant Yemeni scholars and researchers who, along with named research participants, made this report possible.

About the author

Edward Thomas has been researching hunger, agrarian change and markets in Sudan and South Sudan for the past eight years, publishing his research with the Rift Valley Institute, the London School of Economics, Zed Books and other outlets.

This publication is part of a series of papers produced by ODI for UN OCHA and UNDP, which aim to generate evidence for action which can contribute to reducing food insecurity in Yemen.

Contents

Executive summary

Yemen's domestic food production has witnessed several decades of decline: imports now account for about two-thirds of available food by volume, and about four-fifths by calorific value. The current conflict has made import financing difficult to sustain, and this paper examines whether domestic production can be increased to supply Yemen's food requirements – and whether the private sector, which organises much of the country's food supply, can play a role in increasing production. The challenges are daunting: Yemeni food producers are grappling with a long, traumatic agrarian transition, while the formal private sector – led by a few big conglomerates – is focused on the import trade. The key question is whether the private sector can be engaged in agriculture in a way that might – in the midst of a conflict – redirect Yemen's agrarian transition towards, and not away from, increased production and productivity.

Yemen has very diverse agro-ecological zones, which have shaped diverse social formations and labour relations. In the 1960s, Yemeni food producers from all these zones were able to supply its overwhelmingly rural population. But a series of dizzying changes over the next few decades – wars, urbanisation, the reorganisation of labour and gender relations across the agricultural sector, policy responses to debt crises and structural imbalances and the rise and fall of remittance and petroleum economies – have undermined production across the country. These same processes helped to entrench the position of Yemen's formal private sector and deepen its alliances with state elites. The formal private sector is focused on the import trade: over the past decade, food has made up between a quarter and two-fifths of all imports.

Commercialisation of agriculture is not driven by the formal private sector. Rural capital investment comes from remittances from migrating farm workers and landlord profits – patterns of investment differ from one agro-ecological zone to another. Key drivers of commercialisation are the psychoactive stimulant *qat*, which in 2019 accounted for nearly two-fifths of all agricultural value. *Qat* has allowed rural producers from some of the hungriest parts of Yemen to access markets and influence urban consumption culture – at huge ecological, social and cultural cost.

In the past decade, domestic production has declined overall, and at the same time has reoriented towards commercial crops – such as *qat* and fodder, which allows farmers to benefit from the overall expansion in meat, dairy and poultry products. Cereal production has

contracted sharply. The need to maximise monetary income has probably driven the shift away from cereals. But this shift has deep ecological and social consequences: rainfed cereals are being replaced by commercial crops using unsustainable pump irrigation, and those commercial crops favour men's control over farm production and profits.

Private actors and profit motives are reshaping agriculture. But the profit motive has not contributed to productivity increases: for decades, yields measured in tons per cropped hectare have stagnated or declined. Yields in the most commercialised sectors and agroecological zones are as disappointing as those in more traditional sectors. And the handful of conglomerates and companies that make up the formal private sector are barely engaged in these processes of commercialisation. Their dominance over the imported food trade has given them a captive market which provides steadier and easier profits.

Disconnects between commercialisation, productivity, ecological sustainability, equity and food security present policy-makers with difficult choices. These disconnects need to be understood in the context of Yemen's agrarian transition, uneven and unequal patterns of landholding and the presence of millions of rural own-use producers, most of them women, many of them classed as 'subsistence producers'. These private actors, who are not regarded as part of the private sector because they operate at the margins of markets, are likely to be among the most food-insecure groups in the country. Any strategy aimed at working with the private sector to improve food security needs to put the interests of these market-marginal household producers front and centre.

Increasing Yemen's domestic food production presents formidable challenges, and decades of chaotic transition have led to the loss of many opportunities. But increasing domestic production is imperative if the country is to escape the structural food insecurity which arises in an import-dependent food system prone to shocks, with deepening social conflict over land, water and labour. There are several possible ways forward. The de facto authorities in Sana'a have developed regulatory mechanisms intended to compel major food importers to procure some supplies from domestic producers, as well as agricultural extension services. The Social Fund for Development, a non-profit organisation established by the government in 1997, has mobilised modest agricultural investments from commercial banks.

The formal private sector is not the only entry point for a private sector food security strategy. Smaller wholesale and retail traders are another entry point. They bring most domestic production to market, although they are only able to mobilise credit for their commercial operations in areas under the control of the Sana'a authorities, where the currency is more stable. Above all, food security strategies need to consider the interests and experiences of two groups: market-

oriented farmers and market-marginal farmers, whose efforts are key to any increase in domestic food production.

A food security strategy which uses markets to stimulate domestic production needs to respond to Yemen's complicated agrarian transition in an integrated way. Understanding the complex relationship between conflict and agrarian transition requires new approaches to research. These new approaches could help policy-makers understand changes to rural life; the disconnects between commercialisation, productivity, ecological sustainability and equity; the reluctance of formal private sector actors to invest in agriculture; and current policy initiatives led by Yemeni authorities. New research approaches are also needed, including investment in national statistical systems and national social science research institutions. Promoting domestic food production is central to development, humanitarian and protection policy agendas, and it needs informed approaches.

Introduction

This paper explores whether private producers in Yemen can increase food production in the current environment, thereby reducing the country's import dependence. It looks at the historical reasons for Yemen's declining domestic food production through a series of agrarian transitions beginning in the 1960s. It examines how the current conflict, which began in 2015, has intensified this decline, while also identifying ways in which production is being reorganised in response to the conflict. It assesses the prospects for promoting domestic production across a range of different producers, and concludes by suggesting a future research agenda.

The paper is based on a review of scholarly and policy literature relating to agriculture, rural livelihoods and the private sector in Yemen. It draws heavily on publicly available agricultural statistics which, although imprecise, give helpful indications of overall trends. The paper also draws on 40 phone interviews and re-interviews with key informants, and a survey of 50 food traders and nine chambers of commerce in eight governorates and in the administrative district of the capital (Sana'a governorate, Sana'a city, Aden, Ta'izz, Hadhramawt, al-Hudaydah, Ma'rib, Hajjah and Abyan) representing most of Yemen's ecological zones and militiadoms and polities.

Yemen's declining domestic food production

The conflict which began in 2015 has aggravated a broad decline in food production which has lasted several decades. Over the past decade, official production statistics suggest that the volume (or tonnage) of crop production fell by almost a third, and fisheries (devastated by blockades) by more than two-thirds. Production of a few, highly marketable products – meat, dairy, poultry, fodder and the psychoactive stimulant *qat* – has stayed level despite the conflict (see Figures 1 and 2). If the national accounts are to be believed, the real returns to agriculture have all but collapsed: in 2017, the contribution of agriculture to gross domestic product (GDP) was a third of what it was five years earlier (Figure 5).

These production declines have caused a huge food deficit, managed through imports of basic foods, along with some humanitarian food supplies. Imports used to be financed primarily by a combination of remittances and oil revenues. However, oil revenues have collapsed as a result of the conflict. Imports are therefore now mostly financed by remittances, which circulate through the country's formal and informal financial service providers, and international assistance. Import conglomerates also on occasion acquire external loan financing to fund their import activities.

There are reasons for pessimism about the sustainability of these arrangements, which have already been placed under severe stress by the decline in Yemen's oil revenues. International food and shipping prices are forecast to rise. Remittances are forecast to decrease, as Saudi Arabia – the main destination for Yemeni labour migrants – reorganises employment policy. Humanitarian aid commitments are decreasing. For these and other reasons, expanding domestic agricultural production is becoming an increasingly important policy objective. The objective could either be to increase exports from agricultural sectors such as coffee and honey, to generate financial resources to pay for more food, or it could aim at supplying local consumers with more domestically produced food.

Efforts to increase domestic agricultural production face daunting challenges, which are a product of a decades-long agrarian transition. In Yemen's national accounts, food production and distribution are presented as exclusively private sector activities. The

formal private sector – dominated by conglomerates focused on the import trade – is largely disengaged from domestic food production. The economic transitions of the past six decades turned Yemen from a self-sufficient, rural agrarian society which fed itself to a society based on remittances, oil rents and services. Yemen used foreign exchange from remittances and oil revenues to finance a new consumption culture, and food imports for its rapidly growing cities. These transitions made foreign trade much more rewarding than agricultural investment – and contributed to a situation where rural hunger was broader and deeper than urban hunger. One major survey undertaken just before the start of the past decade of instability found that 38.2% of rural Yemen was food insecure, against 14.5% of urban Yemen (WFP, 2010: 37).

For decades, the big conglomerates that sit atop Yemen's private sector have left the risks of farming to farmers grappling with a complex and multi-dimensional agrarian transition. Can the private sector be engaged in agriculture in a way that might – in the midst of a conflict – redirect Yemen's agrarian transition towards, and not away from, increased production and productivity? This paper tries to answer that question. It begins with an overview of the agrarian transition, then looks at some of the choices open to Yemeni authorities and international policy-makers when planning to increase domestic production – and whether the private sector can play a role.

Yemen's agrarian transition

In the 1960s, Yemen was overwhelmingly rural and agrarian. Its diverse landscape and climate – highlands, coastal plains and deserts, with significantly higher rainfall to the south – were mostly able to feed a population that was less than a fifth of today's. Since then, the country has undergone a dizzying succession of changes to rural life and agriculture, many of which have been traumatic. Livelihoods and settlement have been oriented away from rural worlds and agrarian patterns of life. Labour systems and gendered labour burdens within households have changed. Imported food has changed diets, increasing food availability, but leaving food systems vulnerable to shocks.

The wars and revolutions of the 1960s set off an agrarian transition that is still under way. Agrarian transitions do not follow a single template: agrarian societies have unique ecological and social orders that respond differently to the different political and environmental forces that set these transitions in train. Yemen's agro-ecological zones have different elevations, climates and water resources. These ecological differences have shaped labour relationships and access to land and water, and in turn shape food insecurity.

Yemen's ecological, hydrological and social diversity

Yemen's highlands are mainly watered by spring channels and systems for rainfall catchment and ancient terracing. The southern (lower) highlands are the most densely populated area in the country, and receive more rainfall than the northern (upper) highlands. The western Red Sea coastal plain, part of a fertile zone extending north into Saudi Arabia called the Tihama, is watered by seven major seasonal watercourses or *wadis*, channelled artificially by barrages and dams. It is more populous and much more agriculturally productive than the southern Arabian Sea coastal plain. The eastern internal plateau and the eastern desert are the least populous areas of Yemen, and depend more than other areas on flood irrigation. Historically, cereals, legumes, oilseeds and fruits dominated the highlands and coasts, with mobile pastoralism dominating the eastern plateau (Mundy, 1995; Donaldson, 2000; Adra, 2013; Varisco, 2018).

Historically, these different ecologies shaped different social formations of land and labour. The northern highlands had very small landholdings, with production and society organised around kinship and tribes. The more fertile southern highlands, and the *wadis* of the eastern Red Sea plain, had larger landholdings and landlords and sharecroppers with starkly different social status. Grazing lands in pastoralist zones to the east gradually became the property of tribal chiefs. Labour was mostly organised around households, and women's share of labour inputs varied significantly between different ecological zones (Adra, 2013).

'Subsistence'

Self-sufficient household production systems are often described as 'subsistence agriculture'. Before the 1960s, much of this rural world was organised around landowners and taxmen, alongside collectively managed lands more commonly associated with subsistence systems. Yemen had many features that are unusual in subsistence systems. Land was mostly held privately, producers generated and sold surplus, relationships between landowners and producers were sometimes denominated in money, and in many areas farmers participated in local markets (Halliday, 1970). During the course of Yemen's agrarian transitions, these farmers were drawn more deeply into dependence on markets and their demand for money grew. But millions of people maintained household production and consumption systems at the margins of the market. These 'market-marginal' farms are a key element of Yemen's food security crises. Before the conflict, many were farmed by food-insecure people, who depended on crops, wages, remittances and *qat* or livestock sales for food – 'market-marginal' is used in this paper to describe these busy, complicated rural lives (WFP, 2010: 53). Understanding the tenacity of these agricultural producers, their sacrifices and aspirations, is

necessary for developing the kind of food security strategy that would actually feed them. The following account of Yemen's agrarian transition and its land and labour systems sets out some key elements for further analysis.

The 1970s: remittances

In the 1960s, Yemen's largely self-sufficient rural world was unsettled by drought, by civil war in the north and by a violent colonial counter-insurgency in the south, both linked to regional and global rivalries over control of the Red Sea. Regional powers paid tribal leaders to destabilise central power, setting the stage for decades of political fragmentation and patronage.

The war ended in 1967, and by the mid-1970s up to a million Yemeni men had migrated from their farms to the booming labour markets in neighbouring Gulf countries. This shift from household farming to wage labour marked the start of a huge transition – made even more complex by the fact that it happened across international borders. Remittances poured into and funded a huge expansion in rural capital: tube-wells, pumps, generators, mills, roads, mills, tractors, roads and bridewealth. Wives of migrant workers had more work, and sometimes their control of remittances from an absent husband gave them more decision-making power. Milling machines and imported wheat meant that they stopped growing laboriously-produced Yemeni cereals like millet or sorghum, which were often more flavoursome and nutritious than imported substitutes, and mothers-in-law, who held the keys to family granaries, lost authority to young wives with cash. Tube-wells increased yields and diversified crops, but they also brought unsustainable changes to the water table, and made ancient, ingenious water-harvesting and terracing technologies obsolete. Men who left Yemen as farmers returned to take up trade: traders were at the centre of a new economy of increased consumption and decreased production (Mundy, 1995: 79; Adra, 2013: 34; Varisco, 2018).

The 1980s and 1990s: growth of the service and security sectors

In the 1980s Yemen underwent a programme of industrialisation aimed at integrating it into the economy of the Gulf and turning it into an oil exporter. In 1990, north and south Yemen reunified, but strains in the unification process led to a civil war in 1994. Tensions were exacerbated by the 1991 expulsion and dispossession of almost all Yemeni migrants from Saudi Arabia at a time when remittances were estimated to account for 39% of average farm family incomes (Elie, 2015: 41). This simultaneously led to an influx of returning labour to

Yemen, a downturn in foreign exchange inflows from remittances and negative shocks to household incomes.

Facing budget deficits, sharp declines to oil revenues and aid receipts, a debt crisis and the return of millions of immiserated workers from Saudi Arabia, the government adopted – with the support of international financial institutions – macroeconomic reforms which liberalised exchange rates, privatised state enterprises and deregulated non-food imports (IMF, 2002: 20, 29). Until the late 1990s, however, the government maintained subsidies on wheat and flour, part of a policy for managing urban dissent and consumption needs familiar across the region, and which accelerated the transition away from domestic cereals, whose production stagnated over the course of the 1990s (IMF, 2002: 93).

Reforms also entrenched the position of food importing conglomerates, whose interests were now configured around a semi-privatised patronage state (Hill et al., 2013: 71). At the same time, Yemen's oil revenues were increasing: in peak price years, oil accounted for 70% of government revenue (IMF, 2002: 18). Oil revenues made the state largely autonomous of the productive efforts of the population (such a divergence of state and farming interests often accelerates agrarian transitions). The oil-backed patronage system at once necessitated and facilitated the expansion of the security services, extractive industries, commercial services and the import sector. Many returning migrants clustered around these growth sectors, rather than agriculture. Agricultural policy increasingly became the preserve of foreign donors, who directed investment away from basic foodstuffs and sustainable water management practices towards thirsty crops demanded by domestic and Saudi markets (Mundy et al., 2014).

The 2000s: *qat*-led commercialisation

Patterns of agricultural growth and decline which were set in the 1990s – an increase in the production of fruit, fodder, oil seeds, meat and dairy, and a gradual decline in the production of cereals – shaped the next few decades. In 1994, the agriculture ministry reported that the cereals area was 734,000 hectares, and production was 749,000 tons (IMF, 2002: 93). Fifteen years later, in 2008, the cereal area was 756,132 hectares and production stood at 705,892 tons (FAO/WFP, 2009: 15, 16). In contrast, the area planted to *qat* was increasing steadily (ibid.: 10).

The government imposed import restrictions on key agricultural commodities in the 1980s, and maintained the import ban on *qat* imports from East Africa to protect Yemeni producers (Elie, 2015: 39). The government also incentivised pump irrigation, fertilizers and pesticides, all to the benefit of domestic *qat* production, which uses all these inputs. By 2000, production had expanded significantly, employing a quarter of the agricultural labour force and generating a

third of agricultural GDP and 7% of national GDP (ibid.: 41). *Qat* became a vehicle for small rural producers in highland areas to transition towards market production, profit from new urban consumer cultures and orient rural governance systems towards urban resources and politics. It shifted the gender balance of highland agricultural labour towards men, who largely control harvesting and marketing (Mundy, 1995: 78; interviews). *Qat* imposes enormous cultural, ecological and political costs, but for many farmers – particularly those working on small parcels of highland land that cannot otherwise supply markets – it has become the engine of Yemen's complicated agrarian transition.

The agrarian transition in Saada, in Yemen's northern-most highlands, has been described recently in some detail (Gatter, 2012), because its transition is implicated in the rebellions and wars of the past few decades. Before the 1962 revolution, Saada farmers mostly produced cereals for their own consumption. Tube well technology, adopted in the 1970s, enabled farmers to intensify and diversify production away from cereals and towards fruit and *qat*. Improved transport networks helped bring products to markets, and diesel subsidies helped make irrigated fruit and *qat* highly profitable – in 2003, 30.9% of Saada landholders owned irrigation pumps, three times the national average, and some districts of the governorate were the most *qat*-intensive in the country. Most Saada famers were smallholders – 43.9% held less than half a hectare of land. Almost 40% of farmers grew *qat*. During the Saada wars – a phase of the Houthi rebellion that began in 2004, aimed at challenging socio-economic marginalisation and reviving the Zaydi religious movement associated with Yemen's royalist past – *qat* helped finance the insurgents. In response, the government imposed a diesel blockade, aimed at undermining *qat* production and cutting off a rebel revenue source. Dealers managed to get Saada *qat* through checkpoints using part of the produce as bribes, but when the security forces intensified repression of the trade some redirected *qat* to illicit Saudi markets instead (Gatter, 2012: 466–68).

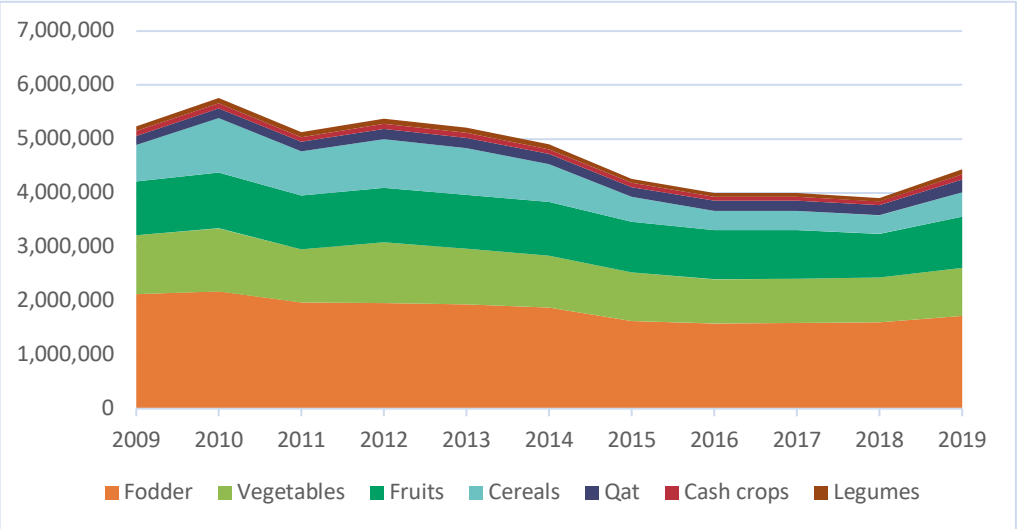
Gatter's work connects a specific agrarian transition with markets, Yemen's political conflicts and borders. Other literature has studied how Yemen's transition has decayed communal water management systems and allowed powerful landholders and rural leaders to capture water resources and control production, with some farmers selling land to water owners (Mundy et al., 2014: 152). The consolidation of control over water resources is implicated in Yemen's water crisis (which is not addressed in this paper), and to rural social change and rural food insecurity. Consolidation of land ownership may increase the value or volume of production and thereby increase the availability of food, potentially reducing hunger. But it can also force poor farmers into land sales and push them towards agricultural day labour, reducing their household income and undermining their access to food.

The current crises: production declines overall, and is reoriented towards commercial crops

Production of crop foods and most crop non-foods has declined over the past decade, with the pace of decline increasing during the course of the conflict. The biggest single crop by volume is animal fodder – most of it sorghum stalks. The biggest food crops by volume are vegetables and fruit, which are relatively high in water content and low in calories.

All food production is in decline as a result of the conflict, but cereals are declining the sharpest. Until 2014, cereal area and cereal production volumes remained around the post-unification average of around 750,000 hectares/750,000 tons a year (IMF, 2002: 93; FAO/WFP, 2009: 15; MAI, 2009–2019).[1] Sorghum grains accounted for well over half of all cereals produced, by volume. Sorghum is well-adapted to dryland farming, stores well and is one of the oldest grains cultivated in Yemen (Mehra, 2003). But many observers believe that this climate-appropriate crop is mainly surviving because of the value of its ratoon stalks as a commercial fodder crop – in average years, sorghum stalks make up about 80% of total fodder production (MAI, 2019).

Figure 1 Food and non-food crop production in metric tons, 2009–2019



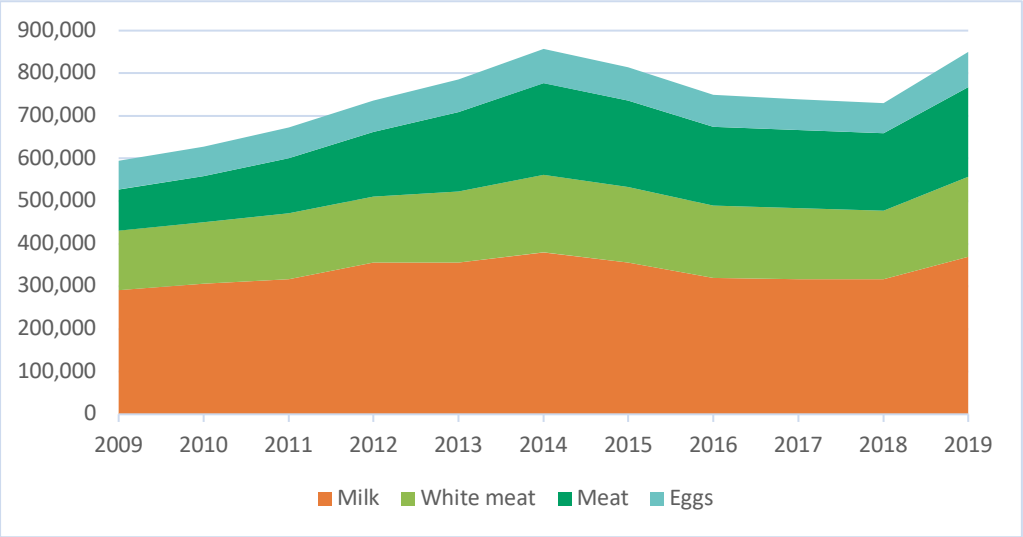
Source: MAI

Figure 1 shows changes to gross production between 2009 and 2019. These figures show both food crops (3.3 million tons in 2019) and non-food crops such as fodder, cotton and *qat*. Production is expressed in tonnage. The resilience of sorghum as a fodder crop is linked to the growth of meat, dairy and poultry production. MAI data suggests that animal food production increased significantly in the

[1] Average of years from 1994–1999 and 2004–2014. Data for 2000–2003 was not available.

run-up to the conflict, declined less sharply when the conflict began and peaked in 2019. Fish production is not included in the ministry's statistical yearbook, but UNDP estimates that Yemen's fisheries produced about 50,000 tons in 2017, down more than 80% from its 2004 peak. Fishing is badly affected by conflict (MAI, 2020, UNDP, 2020: 2).

Figure 2 Production of animal food products in metric tons, 2009–2019

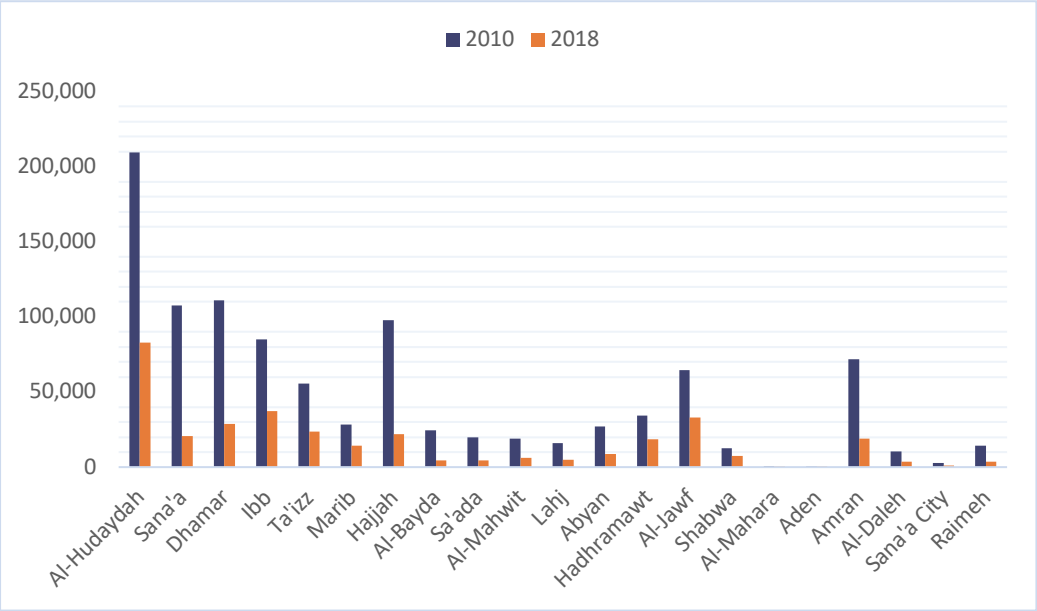


Source: MAI

There are many questions about the reliability of this data; according to one professor of agriculture, MAI data 'is 60–70% accurate – but it's all we've got' (interview). But overall trends suggest that crop farmers are moving towards marketable crops, and to the supply of relatively complex animal-protein value chains, which require fast processing and refrigeration. This in turn suggests that access to these value chains – and the money circulating through them – may be more important to farmers than production for own-consumption in a period of severe food insecurity – although such conclusions can only be posed tentatively, in the absence of social research among different farming communities. However, the conflict seems to have depressed agricultural production, while also reorganising it towards markets.

This reorganisation is happening in spatially uneven ways. Cereal production has seen the sharpest declines of any crop over the past decade. But those declines took place at a different pace in different governorates. The peak year for cereal production in the past 12 years was 2010, and the worst year was 2018. Figure 3 shows where the biggest shifts away from cereals took place by geographical location. Some of the sharpest and most significant declines were in highland governorates where *qat* predominates: Sana'a, Dhamar, Hajjah and Amran – whose combined *qat* area amounted to 55% of the national total in 2018.

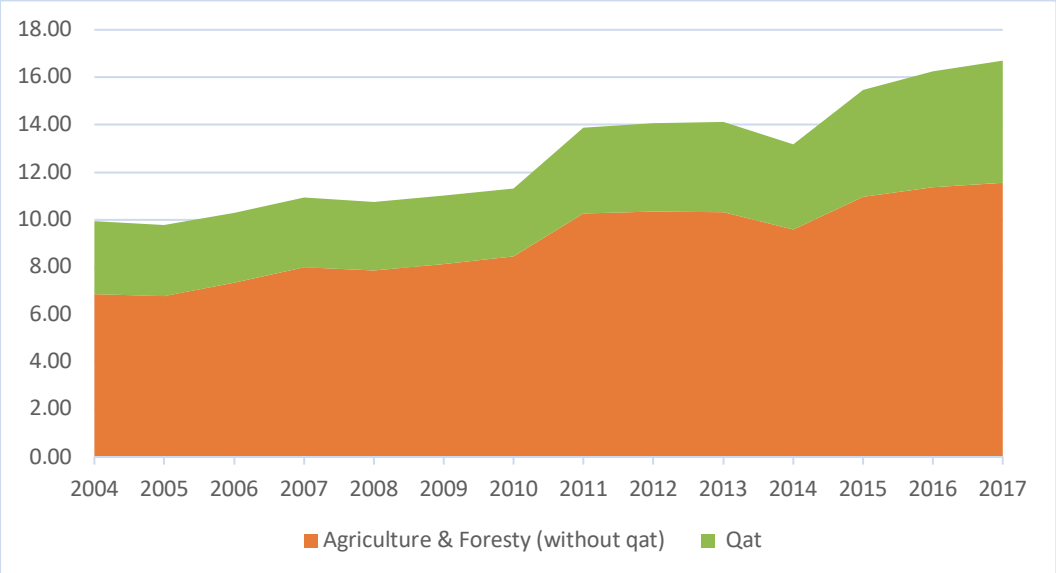
Figure 3 Cereal production by governorate in 2010 and 2018



Source: MAI

Cereal area – 528,078 hectares – made up 47% of the total in 2019 – by far the largest crop area. *Qat* was the second largest: 166,891 hectares, making up 15% of the total in 2019 (MAI, 2019: 2). The need to maximise income probably drove the shift away from cereals. Cereals made a negligible contribution to crop production by value: by far the most valuable crop was *qat*. Yemen's national accounts (latest figures date to 2017) divide the agrarian sector into *qat* and non-*qat*.

Figure 4 *Qat* and other agricultural production as a percentage of total GDP, 2004–2017

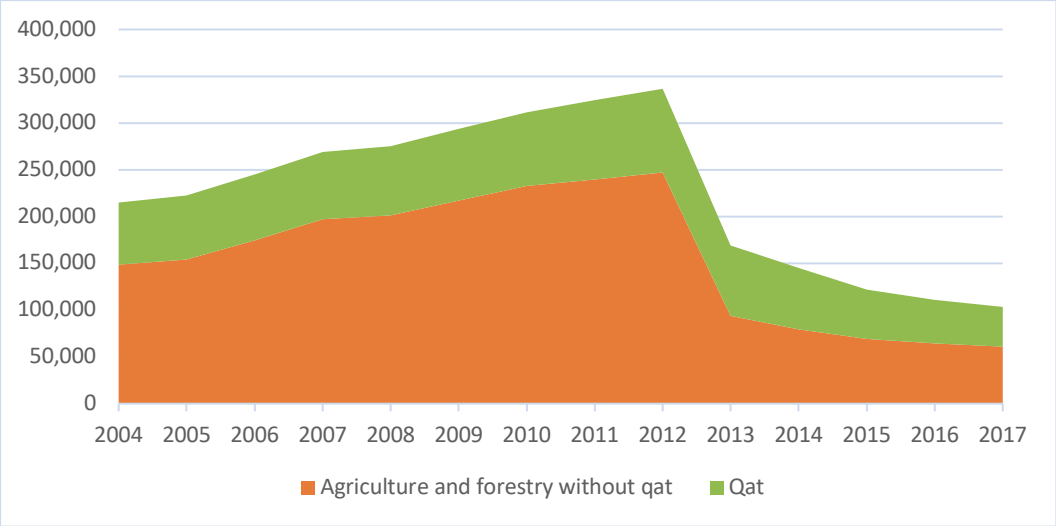


Source: CSO, 2018

Note: Figures after 2012 are provisional/projected

The increased share of *qat* in total GDP comes in the context of a massive contraction of GDP and agricultural GDP. Figure 5 shows the huge contraction in the real value of agriculture since the start of the crisis a decade ago. It also shows how safe an investment *qat* has become. *Qat* cultivation uses enormous and unsustainable quantities of groundwater, but it gives quick and reliable market access. It allows very small farmers access to markets – but it may favour richer farmers. One study based on a 2005 household budget survey found that *qat* made up about half of agricultural monetary income, favouring richer households with better access to land and irrigation (World Bank, 2010: 40).

Figure 5 Contribution of *qat* and other agricultural production to total GDP in millions of Yemeni Rials at constant prices (2000=100)



Source: CSO, 2018

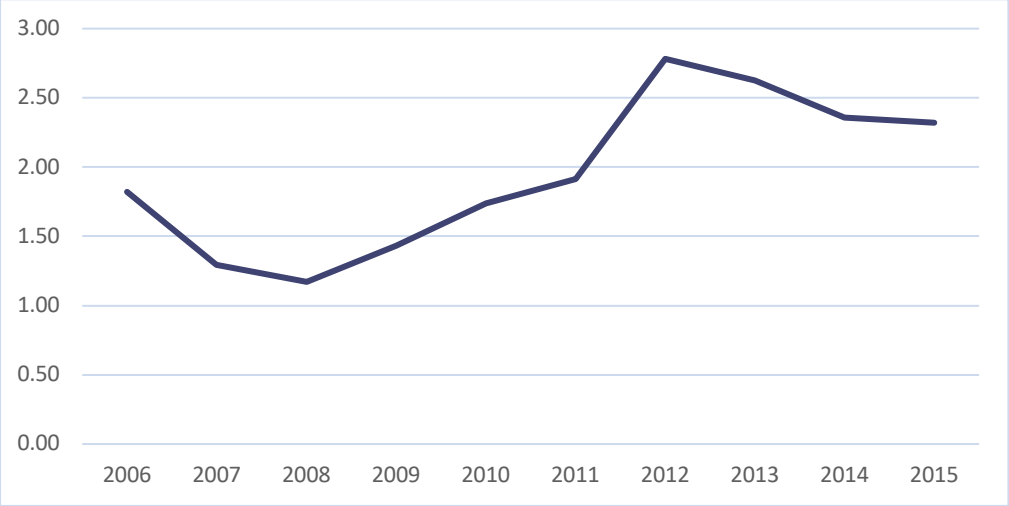
The overall trend suggests that, in the highland zones where most *qat* is grown, markets are probably exerting extreme pressures on farmers to switch to *qat* – and perhaps, too, that farmers are using *qat* sales to finance food purchases.

Figure 5 raises other important questions. How does the low monetary value of non-*qat* agricultural commodities affect farmers' decisions about the production, consumption and sale of non-*qat* crops? Is the market reshaping or eliminating market-marginal production? What are the political implications of *qat* geography, with over 80% of production taking place in governorates under the control of the de facto authorities in Sana'a? Is humanitarian food assistance – which is targeted more at displaced people than farmers, and is less important in the biggest *qat*-producing governorate of Sana'a – a sufficient encouragement to get farmers to transition to *qat*? Or is the transition taking place more slowly and chaotically? These questions are beyond the scope of this paper, but any food security survey must address them.

The private sector's reluctance to engage with agriculture

Taken as a whole, agriculture ministry data and national accounts suggest that private actors and profit motives are reshaping agricultural production. But this shift is being led by family remittance income rather than established private actors. Yemen's large commercial conglomerates, and the commercial banks to which they are linked, have very little engagement with agriculture. The biggest food conglomerate does not grow or trade in Yemeni crops, nor does it own livestock or procure milk from Yemeni production (interview). When Yemen's private banks were solvent – before 2015 – agriculture made up a negligible component of total loans and investments made by private sector commercial and Islamic banks – under 3% (Figure 6). This situation has remained unchanged after 2015: from 2014 to 2017, the share of total bank loans extended to the agriculture and fisheries sector hovered around 2.5% (MOPIC, 2018).

Figure 6 Percentage of loans and Islamic investment in agriculture, as percentage of total, 2006–2015



Source: CBY, 2015

Large commercial companies are reluctant to invest in agricultural production because of the risks associated with farming and the complexities of land ownership, labour and markets. These structural constraints appear to outweigh any new price incentives – incentives which appear to be most salient in fodder and *qat* production. The economic transitions of the past three decades made incentives for foreign trade much more rewarding than those for agricultural investment. This is both a cause and consequence of stagnant yields.

Stagnant yields

Over the past 30 years, agricultural yield on many Yemeni crops has declined. According to FAO's global database, between 1989 and 2019 yields on lentils declined from 1.5 metric tons per hectare to 0.7 tons per hectare. Sorghum yields declined from 1 ton per hectare to 0.7 tons per hectare, and tomato yields from 15.9 tons per hectare to 13.5 tons per hectare. This decline is similar to Sudan's, but Syria and Egypt, for example, have seen yields increase significantly over the same period (FAOSTAT, 2021). These stagnant or declining yields are an indicator of low investment in agriculture, and possibly the low use of fertilizers.[2]

Yields vary across Yemen's different agroecological zones and systems of agricultural production (see Figures 7–9). For example, al-Hudaydah, which produced about a third of the country's cereals in 2019, has seen cereal yields decline over the past decade. The decline recorded in the data began in 2015, before al-Hudaydah became a major battleground, possibly also linked to the maintenance of irrigation infrastructure.

Land and labour

The agricultural census conducted in 2002 identified unequal patterns of landholding. Yemen had 1,609,486 hectares of agricultural land, and 1,180,105 landholders. Fifty-six per cent of this land belonged to 83,150 landholders, about 7% of the total. Seven per cent of the land was held by 689,697 landholders – 58% of the total (CSO, 2003). The World Bank later estimated that Yemen had one of the most unequal land distributions in the world (World Bank, 2010: 31). Holdings are documented by local tribal authorities, but there is no national cadastral register, and apart from scattered local studies, control over land is not easy to quantify.

Inequality in landholdings was unevenly spread across the country. Owner-cultivation is the predominant land tenure system in Yemen, but there are significant areas where private land is lent out for sharecropping or fixed rent. Irrigation systems, crop type and land type all affect sharecropping and fixed-rent arrangements (Aw-Hassan et al., 2000: 7–8). The highest concentration of land ownership is in al-Hudaydah, which contains a quarter of Yemen's cultivable land and produces about a third of the country's cereals, fruits and fodder, and half its cash crops and legumes. About 4% of households own 96% of the fertile land in al-Hudaydah, with most of the rest working as agricultural labourers – many of them migrants from other areas (MOPIC, 2011: 23).

[2] Before the conflict, only about 3% of farmers used chemical fertilizers, most of them in the commercialised landlord zone along the coastal plain (WFP, 2010: 23).

Other areas – such as the terraced highlands – are not so easy for big landlords to acquire and control. The 2013–2014 labour force survey found 1.2 million in agricultural employment out of 4.2 million (29.2%) total employed. In addition, it found 3.3 million 'own-use producers', 82% of whom were women. Only a handful of these own-use producers, nearly all of them men, were looking for agricultural jobs for pay or profit at the same time as they worked on their farms. The survey classed most of them as 'subsistence foodstuff producers' (ILO, 2015: 6, 7, 47). Own-use producers are difficult for statisticians to define. Labour statisticians exclude people not working for pay or profit from the labour force (ILO, 2015: 19). Yemen's large market-marginal workforce nonetheless participates in markets – a 2010 study of al-Hudaydah farming households found that they spent almost half their household income on wheat (MOPIC, 2011: 24, 46).

The conflict has also dramatically altered relationships with land and is likely to have reshaped agricultural labour markets too. Parties to the conflict have bombarded and mined land, displacing farmers in the process. In Hajjah, the Saudi-led coalition's airstrikes have targeted agricultural land and infrastructure. In some cases, Houthi militia occupied farms abandoned by their owners during bombardment and refused to allow them to return, citing safety concerns (Mwatena, 2021: 125–173, 274–280).

Millions of Yemenis have endured displacement since the beginning of the war, and displacement is likely to create landless workers and complicate land tenure arrangements. Landless farmers were less likely to have access to favourable water sources or livestock assets, and needed to improvise very diverse livelihood strategies to survive (World Bank, 2010: 35).

Prospects for promoting domestic production

Yemeni markets are drawing in agricultural producers, but they are reorganising rather than increasing production. Long before the current conflict, production of key foods was in sharp decline, although marketable commodities – *qat* and fodder – were on the increase. The conflict has seen a continuation of this trend, coupled with a gradual increase in production of higher-value meat and dairy products. Despite the deep complexity of investing in a sometimes-violent agrarian transition, many policy-makers argue in favour of increasing domestic production, for the reasons set out in the introduction to this paper – global food and shipping prices are likely to go up, and remittances, aid flows and oil revenues are likely to go down – all potentially creating a new hunger crisis for an already stressed population. This section looks at what can be learned from Yemeni experiences of high production and high growth areas and sectors – not all of it salutary.

High production areas and high growth sectors – learning from Yemeni experience

About a third of Yemen's crop production by volume comes from al-Hudaydah, and half its cash crops. If the national accounts are to be believed, about half of Yemen's crop production by real value comes from *qat*. This section looks at what these success stories can teach us.

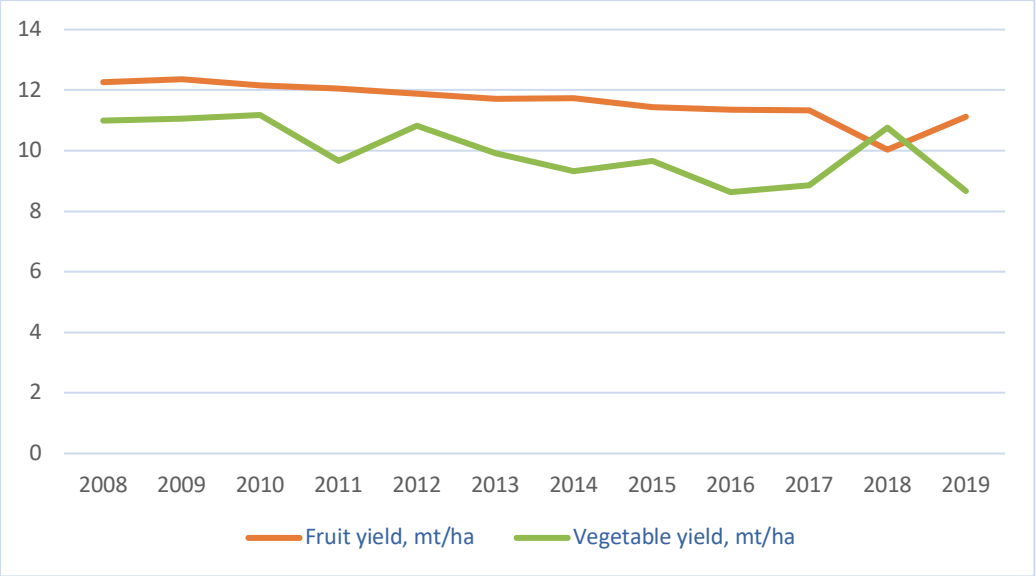
Al-Hudaydah occupies much of the Red Sea coastal plain. Its ecology and social system lend themselves to a commercial model of development: it was a landlord zone before Yemen's agricultural transition began. Its production system is based on local and migrant agricultural waged workers, sharecroppers and tenants. Many have very low incomes, and before the conflict just over a quarter of the population – 0.9 million people – were food insecure. Although these figures are dismal, the people of al-Hudaydah and the Red Sea plain were better-fed than people in most other agro-ecological zones (Ecker et al., 2010: 16). But after al-Hudaydah became a frontline in 2018, it became one of the hungriest areas in the country.

Qat has risen to dominate agricultural production in the highlands, particularly the northern highlands: about 90% of 2019 *qat* production

came from nine highland governorates. Their ecologies and social systems are less suited to commercialisation. The northern highlands, in particular, are dominated by smallholdings parcelled out across mountain slopes – there is some landlordism in the southern highlands. The dominant mode of agricultural development has involved families using remittances to invest in agricultural capital, without changing land or labour relationships: paying for water to grow and sell *qat* on family farms. These areas are now deeply food insecure. Before the conflict, more than a third of the population of the northern highlands and a fifth of the population of the southern highlands were food insecure (Ecker et al., 2010: 16).

These two trajectories of commercial development share three characteristics: low yields, unsustainable water use and changing patterns of social inequality. Yields of many crops in al-Hudaydah have been declining over the past decade: the 2018 conflict brought new shocks. For example, al-Hudaydah produces about a quarter of national fruit output and a tenth of national vegetable output: declining productivity in al-Hudaydah has major implications for food security (Figure 7).

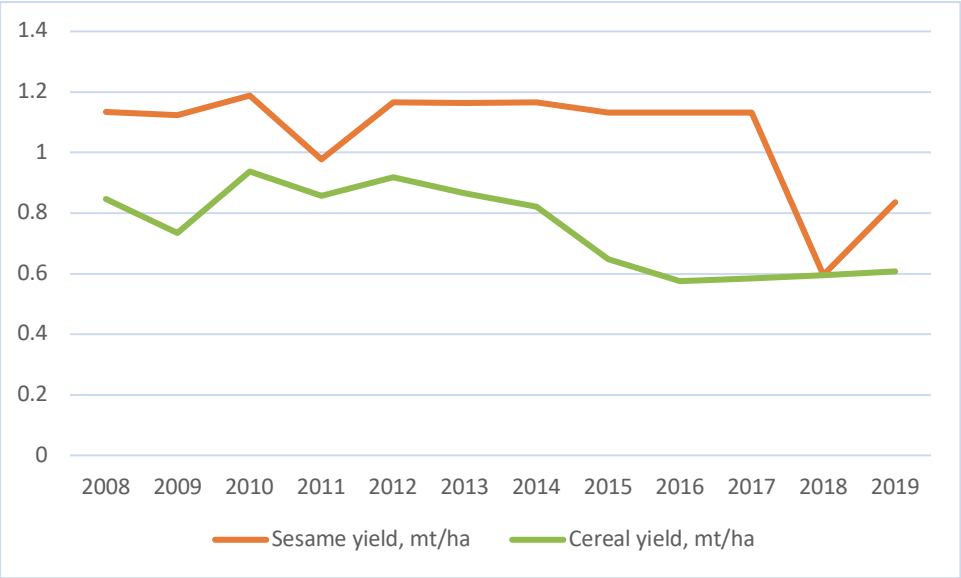
Figure 7 Fruit and vegetable yields in al-Hudaydah, 2008–2019, metric tons per hectare



Source: MAI

Al-Hudaydah also produces about a fifth of national cereal output and a quarter of national sesame output: yields of these crops have also been in decline (Figure 8: more data visualisations are available at CEOBS, 2020).

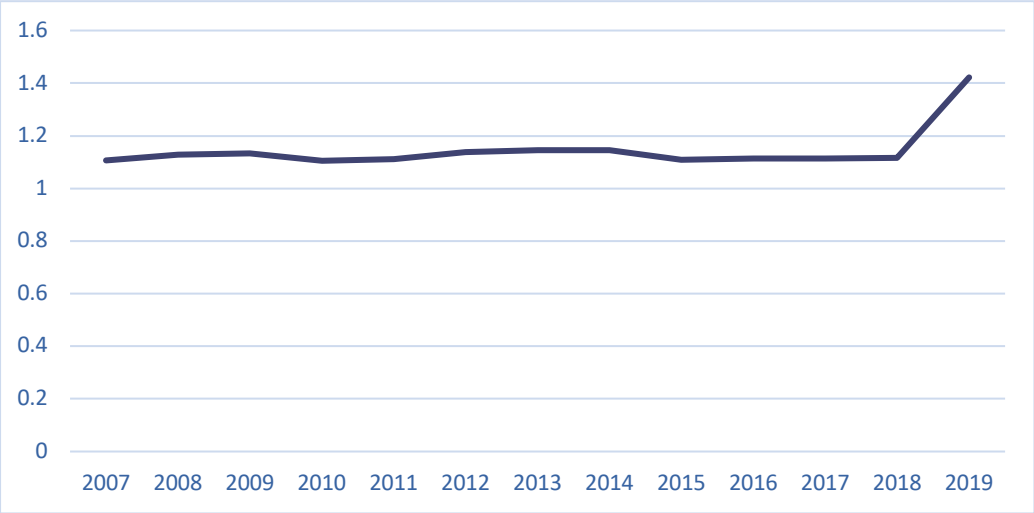
Figure 8 Sesame and cereal yields in al-Hudaydah, 2008–2019, metric tons per hectare



Source: MAI

Qat, which probably attracted most 'informal' investment over the past decade, has seen yields stagnating at just around 1.1 tons per hectare, with an enigmatic spike in 2019, which may repay further investigation (Figure 9).

Figure 9 *Qat* yields from 2007–2018, metric tons per hectare



Source: MAI

Both models of development use water unsustainably. *Qat* is informally estimated to account for 40% of all water use in the country (CEOBS, 2021). Al-Hudaydah has ancient and sustainable spate irrigation systems (dams, ponds and canals that capture seasonal rains for controlled release). But when international donors took over much of the direction of agricultural policy in the 1970s and 1980s, they built new diversion structures which allocated water primarily to upstream areas, upending traditional water usage rights, increasing inequality and reducing farmer incomes. This led to much

more intensive groundwater usage in the area before the current conflict: the water situation appears to have worsened since then (CEOBS, 2020).

Finally, both models of development change gender relations, sometimes fostering inequality. Changes to water allocations in al-Hudaydah have affected women farmers. *Qat* is picked in the early morning and late evening, making it a man's job. It also needs to get to market quickly, and men dominate transport and sales.

Both al-Hudaydah and the *qat* systems are models of private sector engagement in agriculture, and both present unexpected disconnects between commercialisation/investment in agricultural capital, productivity, ecological sustainability, equity and food security. These disconnects present policy-makers with unpromising choices.

Choices for policy-makers

What choices do Yemeni authorities and international policy-makers have when planning to increase domestic production in order to move Yemen away from its costly and complex dependence on remittance-financed imported basic foods? This section is organised around different elements of the private sector: the established, formal private sector; new entrants to the private sector; wholesale and retail food traders; and market-oriented farmers.

Mobilising the established formal private sector

The established formal private sector is made up of a few hundred companies, many of them organised into a handful of conglomerates networked with political authorities. But the established private sector – commercial companies and the illiquid commercial banks to which they are closely linked – have to date shown little interest in investing in agricultural production, preferring to supply their dairy factories and mills with imported milk and wheat.

Non-private sector actors – the Social Fund for Development and the de facto authorities in Sana'a – have developed initiatives to mobilise agricultural investment:

- The Social Fund for Development has a relatively small Economy programme which extends loans and loan guarantees to farmers, including small farmers. In one initiative, the Fund loaned $100,000 to 80 farmers for drip irrigation. Al-Kuraimi Islamic Bank provided an additional $600,000 in loans (as a recently established bank providing remittance services, Al-Kuraimi has greater liquidity than commercial banks which, pre-conflict, invested much of their capital in now non-performing Treasury bills). The project was most replicable in areas with good transport and data connections to markets. These projects are focused on the input end of the value chain. The Fund is also investing in value-added manufacturing (interviews).
- The de facto authorities in Sana'a have adopted regulatory measures which penalise the formal private sector if it fails to invest in local production – part of a suite of policies aimed at developing the kind of self-sufficiency needed to weather a long period of exclusion from international legitimacy. A government decree issued early in 2021 requires food import companies to procure 20% of their total stock from domestic producers. In

> response, importers have set up a company, al-Talal, with capital of about $1.6 million. When they import food, they deposit 20% of the monetary value of the import contract with the company. Part of that deposit is invested with individual farmers, who agree to a forward contract to produce a particular crop. These arrangements apply to crops such as spices, legumes and garlic, but not to cereals (interviews).

The value chain approach of the Social Fund for Development and the contract farming approach of the de facto authorities face constraints. The dramatic decline in the value of non-*qat* agricultural production over the course of the conflict shown in Figure 4 suggests that it will be hard to extract more value from farmers not producing the most commercial crops. This decline in value no doubt acts as a disincentive to agricultural investment. It also shows some of the limitations of a value chain approach. Both value chain and contract farming approaches allow for capital investment in agriculture, but both have also been criticised for shifting risk on to farmers (McMichael, 2013). Complementary approaches would be needed for very poor farmers and market-marginal farmers, who cannot bear risk.

Mobilising new entrants to the private sector

The conflict has brought many new entrants to the private sector: checkpoint commanders who have set up trading companies; regime loyalists who have won supply contracts for barracks, or set up new fuel or foreign exchange enterprises. These groups may have capital to invest, and some of them reportedly seek to invest in the established formal private sector, perhaps seeing it as a safer haven for their money. More research could help understand whether these groups might respond to regulatory pressure to encourage them to invest in domestic agriculture.

Mobilising small traders

Wholesale and retail traders dealing in domestically produced foods are part of agricultural markets which may predate the agrarian changes of the past 60 years, but which now serve a much larger number of consumers. In the survey conducted for this paper, 19 respondents said that they traded in domestically produced food. Most traders said that farms producing for market were ‘small’ or ‘medium’. These farms had fairly traditional labour practices – family labour, or a mix of family and hired labour, with male labour mentioned more frequently than female labour. They used a mix of irrigation systems, as might be expected in a study covering so many agro-ecological zones – but flood and well irrigation systems were much more likely than rainfed, and many traders reported that

farmers producing for markets had pumps – suggesting that market-oriented farmers are likely to have some agricultural capital.

Most traders dealing in domestic foods financed their commercial operations with cash, but some were able to take out secured loans from wholesalers, or even from banks. Credit arrangements were mostly reported in areas under the control of the de facto authorities, where the currency is more stable (in Sana'a, traders reported that they financed their operations in cash). While the survey covered most of Yemen's ecological zones and militiadoms and polities, it was far from comprehensive, but the suggestion that credit markets for domestic food may exist in areas under the control of the de facto authorities may repay further investigation.

Mobilising market-oriented farmers

Market-oriented farmers are a heterogenous group: large established families from landlord zones, *qat*-lords and smaller farmers selling livestock, *qat* and other commodities for profit. They may be able to mobilise resources for investment from remittances or from the sale of their products. Both the Social Fund for Development and the de facto authorities have developed interventions aimed at some of these groups.

- The de facto authorities established the General Organization for the Development and Production of Cereals by a 2016 decree, tasked with increasing grain production and establishing grain producing unions and cooperatives. The organisation has set up a Community Ploughing Unit which provides tractors to local farmer groups (Hatem, 2021; interviews). In 2020, the Cooperative Union of Grain Producers announced a programme to form and organise grain-producing cooperatives in nine highland and Red Sea plain governorates (Yemen Press Agency, 2020, *al-ittiḥād al-taʾāwunī al-yamani li-jamʾīyāt muntijī al-ḥubūb*; interviews).
- The Social Fund for Development supports agricultural markets, irrigation and seeds schemes, but most of its resources go towards its safety net programme aimed at vulnerable farmers.

Market-marginal farmers and agricultural wage labourers

Yemen has millions of small-scale producers operating at the margins of the market, many of them women. Some may rely on their own production to smooth household consumption. Many small-scale farmers have significant skills in arid zone cultivation, which will become more important if Yemen's water availability is compromised. More understanding of rural agrarian societies is needed to understand how different approaches to agricultural investment might impact different groups of farmers, and what kind of incentives might increase production. Along with agricultural day labourers, these two

groups make up the majority of farmers in the country, and many are likely to be hungry too. Private sector-led food security strategies are unlikely to take them into account, and for that reason the agricultural future of market-marginal farmers and wage labourers needs to be at the centre of research concerns.

Conclusion

Promoting domestic food production in Yemen is essential to food security and rural livelihoods: it should be central to the development, humanitarian and protection policy agendas.

Markets have a role in developing domestic production. But policy-makers need to approach that role with care. Yemen is undergoing a complex and often traumatic agricultural transition. Many things that can go wrong have already gone wrong: unsustainable water usage has become widespread; yields are stagnant; *qat* represents much of the market value of agriculture and plays a complex and sometimes counter-productive role in developing and commercialising agriculture; commercialisation has sometimes undermined productivity and equity; existing inequalities in landholding systems have been aggravated by displacement; agricultural knowledge and capital have been eroded by migration and conflict. Policy-making needs to take account of these inter-connected and multi-dimensional risks.

The complex role of markets in domestic food production means that it is important to understand distinctions between different private sector actors and their different levels of engagement with domestic food production. The formal private sector – a relatively small number of conglomerates, companies and linked commercial banks – is focused on food import trading, and has relatively little engagement with domestic production. New entrants to the private sector – who may have political and military connections – may share the reluctance of the established formal private sector to take on the risks of agricultural investment. That means that smaller players are probably more important. Smaller wholesalers and retailers play an important role in getting domestically produced food from market-oriented farmers to markets. Market-marginal farmers – focused on producing for household consumption – are less likely to produce marketable surplus, but they are highly exposed to food insecurity.

Before designing interventions aimed at using markets to stimulate agricultural production, policy-makers need to develop a better understanding of the different interests and incentives of these different actors.

The reluctance of the formal private sector to engage in agriculture is linked to the complex risks of investing in a sector which for over 60 years has been undergoing a traumatic transition. Key factors affecting risk include:

- Highly diverse agro-ecological zones, which shape crop choices and patterns of production.
- Different land tenure systems – from micro-holdings to landlord zones, which shape possibilities for investment, and which may be implicated in conflict and may have been reconfigured by displacement.
- Different systems of labour relations – from landless wage workers to sharecroppers, tenants, smallholders and landlords – which in many areas may have been reconfigured by displacement.
- The position of women farmers in a fast-changing, inequitable system.
- Water management systems, with different levels of sustainability and equity, which may be implicated in rural conflicts.
- The huge population of market-marginal farmers, whose interests may be oriented towards household food security rather than marketable surpluses: policy-makers need to avoid setting the food needs of markets and the needs of households in opposition.
- The role of the conflict in reshaping agricultural risks – direct attacks on agricultural infrastructure, mines and land expropriation.

A food security strategy which uses markets to stimulate domestic production needs to respond to all these risk factors in an integrated way. Understanding these risks calls for new subjects of research, and new research approaches.

New subjects of research could include:

- How rural life and gender relations have changed as a result of markets, new agricultural technologies, conflict, displacement and changes to land ownership – and how these changes have promoted or undermined food security.
- Areas, crops and sectors where markets support productivity gains, ecological sustainability and equity. This study has looked at some of the negative consequences of commercial approaches to agricultural development – the preference for thirsty crops, stagnant yields, the impacts on women farmers.
- The reluctance of the formal private sector to invest in agriculture and the challenges faced by private sector enterprises that are sourcing food locally.
- Current agricultural policy initiatives, such as the market and non-market agricultural policy interventions led by the de facto authorities in Sana'a.

New research approaches are also vital. Since the 1990s, international donors have exercised a considerable, and not always helpful, influence over agricultural policy in Yemen – in part as a result of the retreat of the state from the sector. Conventional donor research strategies need to be reassessed. First, a dialogue with different Yemeni authorities on developing national statistical systems, and restarting demographic surveys, is vital. Second, donors need to invest in national research institutions, rather than relying on consultants – international or Yemeni – who are more attuned to international policy trends than to local complexity. Key indicators here are the extent to which research questions and strategies are generated by local experts working in local institutions, and the quality of dialogue between local experts and international donors.

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