



WHOLE OF SYRIA (WoS)
FOOD SECURITY SECTOR
Strengthening Humanitarian Response



Wheat-to-Bread Processing Facility Mapping and Need Assessment Study

Northwest Syria
December 2019



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1. Introduction

Bread is a staple in the Syrian diet and plays a key role in meals throughout the days¹. During the pre-conflict era in Syria, most of the wheat-flour to bread facilities (silos, mills and bakeries), whether public, private or the joint sector, received support from the Government of Syria (GoS), as the flour and yeast used to make the bread, and fuel used to power the bakeries, were provided by the government at subsidized prices². In return, bread was distributed under subsidized prices. Each sub-district town was allocated a specific amount of flour, distributed to the functional bakeries according to their production capacity and population density in the community neighborhoods where the bakeries were located³. However, with onset of the conflict in 2011, the wheat-flour to bread value chain systems is perceived severely disrupted in some communities with the absence of subsidies from the government of Syria (GoS). In that regard, iMMAP was collaborated with the Food Security Sector (FSS) Cluster of northwest Syria, to carry out a wheat-flour to bread processing facility mapping and need assessment study across northwest Syria. The report highlighted the Syrian peoples' overall requirements for the wheat-flour to bread value chain and the need for rehabilitation of silos, mills and bakeries which aims to assist humanitarian relief organizations in planning and project formulations related to the wheat-flour to bread support programs in northwest Syria.

Study Objectives

Since 2012, some international humanitarian donors have supported bread programs across Syria, in areas outside of GoS control. These areas are controlled by various actors and with varying market contexts. Implementing partners rely on multiple modalities to support food needs in Syria, including providing in-kind assistance procured in the region and inside Syria, cash and voucher assistance. Given that bread is a key staple in the Syrian diet, humanitarian organizations also assist bakeries across Syria to increase the supply of bread, as well as to improve household access to bread at a stabilized price. Some humanitarian agencies have expansion plans for replicating and upscaling the wheat-flour to bread program activities in northwest Syria. Accordingly, iMMAP coordinated with FSS Cluster of northwest Syria to better understand the market dynamics and map the processing facilities in the wheat-flour to bread value chain. The study aims to provide recommendations to the wheat-flour to bread program implementing partners as per the following analytical questions:

1. How effective support to local silos, mills and bakeries can be designed in meeting program objectives;
2. Influences on markets and prices of inputs for bread making, bread and complementary and substitute commodities.

Geographical Coverage of the Study

The study prioritized presenting findings from Idleb, Hama and Aleppo governorates of northwest of Syria (north Aleppo/Euphrates Shield, west Aleppo, and northern Idlib). The wheat-flour to bread facility mapping and need assessment exercise was conducted for different silos, mills and bakeries as per the following table 1.

¹ WFP in Syria, 2017 Year in Review. <https://docs.wfp.org/api/documents/WFP-0000068650/download>

² FAO/WFP Crop and Food Security Assessment Mission to the Syrian Arab Republic, October 2018

³ Jose Ciro Martinez and Brent Eng. 2017. Struggling to Perform the State: The Politics of Bread in the Syrian Civil War. *International Political Sociology*, 11(2), pp. 130-147

Table 1: Sample Distribution

	Governorate	Silos	Mills	Bakeries
Aleppo	Jebel Saman	2	7	75
	Al Bab	2	3	31
	A'zaz	3	5	47
	Jarablus	2	0	16
Hama	As-Suqaylabiyah	1	0	9
Idleb	Idleb	2	3	50
	Al Ma'ra	2	8	66
	Harim	0	0	65
	Jisr-Ash Shuqur	0	0	29
	Ariha	0	4	22
Total		15	30	471

2. Methodology

The study area covered sub-districts of Aleppo, Hama and Idleb governorates of northwest Syria. The assessments were carried out by enumerators, who completed three different questionnaires. These questionnaires were developed by iMMAP.

Data collection tools development- iMMAP designed three different facility mapping tools for silos, mills and bakeries, respectively. These data collection tools were designed to identify and assess the highest number possible of;

3. Public and private wheat-flour to bread processing facilities, providing a general profile overview of ownership
4. Functional wheat-flour to bread processing facilities and whether they are being supported by subsidized programs
5. Damaged wheat-flour to bread processing facilities and related malfunctioning equipment/machines

Enumerators met with facility owners to carry out the mapping of silos, mills and bakeries. Moreover, the surveys aimed at exploring the operational capacity of the functional wheat-flour to bread processing facilities. Due to the high number of bakeries compared to silos and mills, two data collection tool versions (short and long versions) were developed for mapping the bakeries. A sample of 10% at sub-district level was taken for conducting the long version of the bakery mapping and need assessment data collection, whereas, the shorter version of the data collection tool was administered across all accessible remaining bakeries

Data collection- Upon finalizing the data collection tools, iMMAP hosted a training for the enumerators and took into consideration the enumerator's feedback to amend the tools accordingly. The next step was field testing, before kicking off the data collection activity.

Sampling- A pre-defined list of wheat-flour to bread facilities was used to kick off the data collection exercise, which was provided by active market actors in the wheat-flour to bread value chain. Accordingly, the snowball sampling technique was adopted to cover as many facilities as possible across the defined study area. The completed questionnaires were transferred from Syria to iMMAP office in Amman, Jordan through the Kobo Collect program, whereby iMMAP used the data to build a Microsoft Excel database which was used to create relevant tables, charts and graphs for reporting. iMMAP Geographical Information System team developed maps for the report using Arc GIS software. Finally, the narrative report was drafted by iMMAP analysts and researcher and the iMMAP production unit worked on the graphic designing component of the report and its layout.

3. Bakery Mapping

Sample

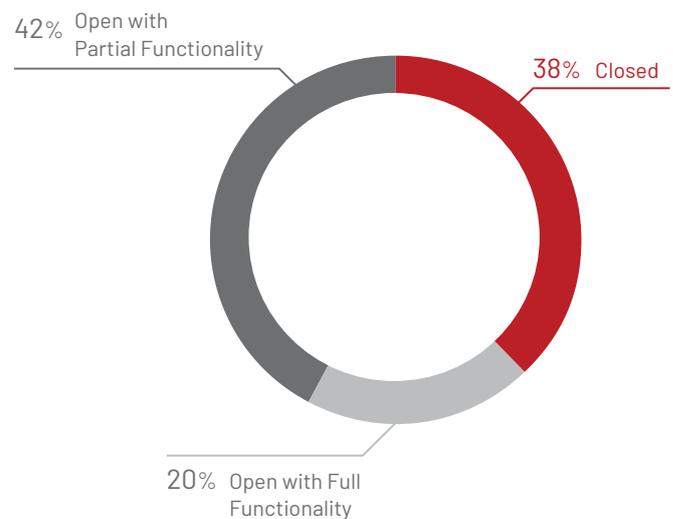
This study conducted 470 bakery mapping surveys, at the governorates of Aleppo, Idlib, and Hama, in 11 districts, 45 sub-districts, with the aim to cover all existing bakeries. For the purpose of getting more in depth and contextualized qualitative information, 47 (represent 45 communities from Aleppo and Idlib governorates) out of the 470 bakeries were surveyed using the longer version of the data collection tool for bakery facility assessment to assess the bakeries functionality, capacity, equipment/machines, inputs and needs.

Bakery operational status

The first objective of the survey is to map out the open and closed facilities, hence explore the reasons behind the closure. As for the open facilities the survey aimed at exploring the level of functionality. Collectively, this information helps in pin-pointing and prioritizing the bakeries that require rehabilitation support. The reported number of closed bakeries was 178 out of 470 surveyed, 199 bakeries were reported open with limited operational capacity due to partial-functionality, and 93 bakeries were reportedly open with the ability to work with full-functionality. Several reasons were reported to be behind the closing of the bakery facilities, that included; lack of machinery maintenance; destruction as result of bombing; limited access to funds; the deteriorating security situation; and need for building rehabilitation. Idlib governorate reported two sub-districts with the highest number of bakeries, Dana sub-district had 42 bakeries, followed by Ma'arrat An Nu'man with 34 bakeries. Whereas, the sub-district with the lowest number of bakeries was reported in Aleppo, particularly in Hadher sub-district.

In terms of closed bakeries, Kafr Nobol sub-district in Idlib governorate reported 96% of its bakeries closed (23 out of 24), the highest number of closed bakeries across the 45 sub-districts assessed. This was followed by Ma'arrat An Nu'man sub-district with 18 closed bakeries (out of 32 bakeries) then Atareb sub-district with 12 bakery facilities closed.

Figure 1: Status of Bakeries in NW Syria



Bakery Ownership

As a result of the conflict and the collapse of GoS centralized wheat-flour to bread system, a number of privately-owned bakeries opened after the escalation of the conflict. The primary difference between the private and public bakeries, was that public bakeries had access to cheaper flour compared to the market price and produced public bread at a lower price. The reason was that public bakeries were managed and owned by the Syrian Public Establishment of Grains (SPEG) under the umbrella body of the local councils (LC). Whereas, the ownership of private bakeries was in different forms ranging from, the individually owned bakeries, tenants renting out the bakery facility or partnership between two private owners. The data showed across the assessed locations, collectively indicated that 81% of the bakeries were privately owned and 19% of the bakeries were considered public bakeries. Figure 3 disaggregates the percentages based on the different forms of ownership. The 19% of public bakeries can be attributed to the weak position of SPEG and LCs in the influence of market dynamics, and their inability to absorb the local wheat production. Since 2018, as a result of the weak purchasing power, the LC had been receiving free flour supply from the Turkish Ministry of Interior Disaster and Emergency Management Market Environment (AFAD), to supplement their flour to bread production gaps.

On a sub-district level, Atareb in Aleppo governorate and Maaret Tamsrin in Idlib governorate reported the highest number of public bakeries with 7 public bakeries each. One essential finding that can be highlighted here was that the eight sub-districts reported having 100% of their bakeries privately owned, six of those sub-districts are in Aleppo governorates (Suran, Zarbah, Jandaris, Raju, Sheikh El-Hadis and Hadher), and two located in Idlib governorates (Salqin and Abul Thohur). This can indicate that people living in those sub-districts had limited access to public bread at lower prices supported by LC. Map 1 illustrates the geographical distribution of public and private bakeries across the study areas of Aleppo, Hama and Idlib governorates of northwest Syria.

Figure 2: Bakery status at subdistrict level in NW Syria

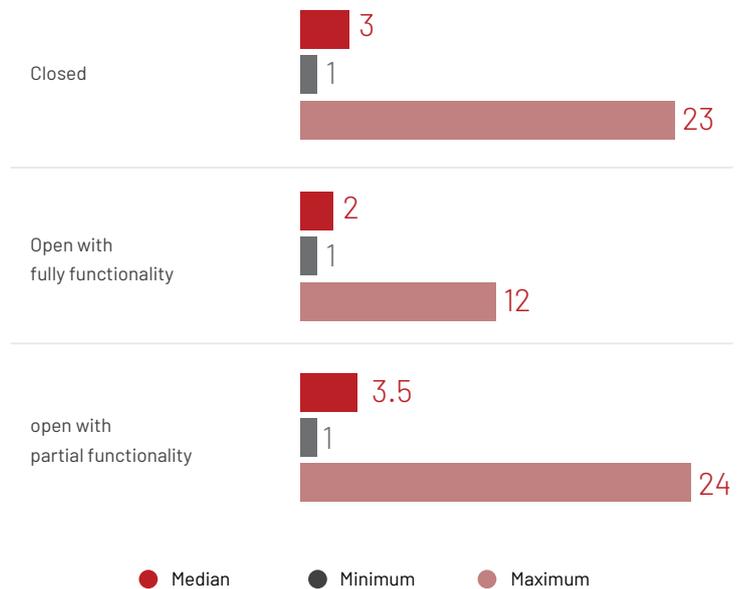
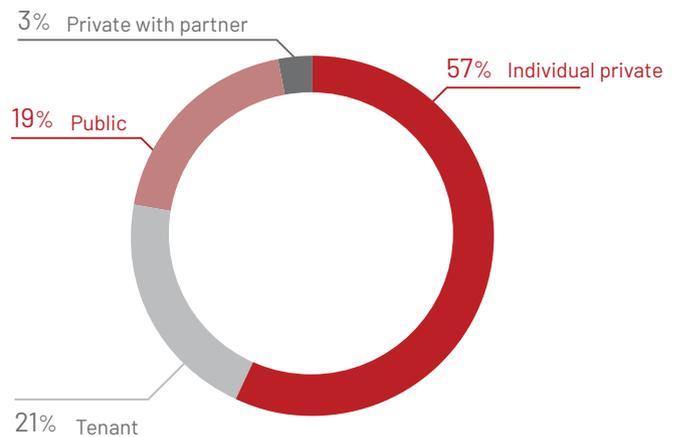
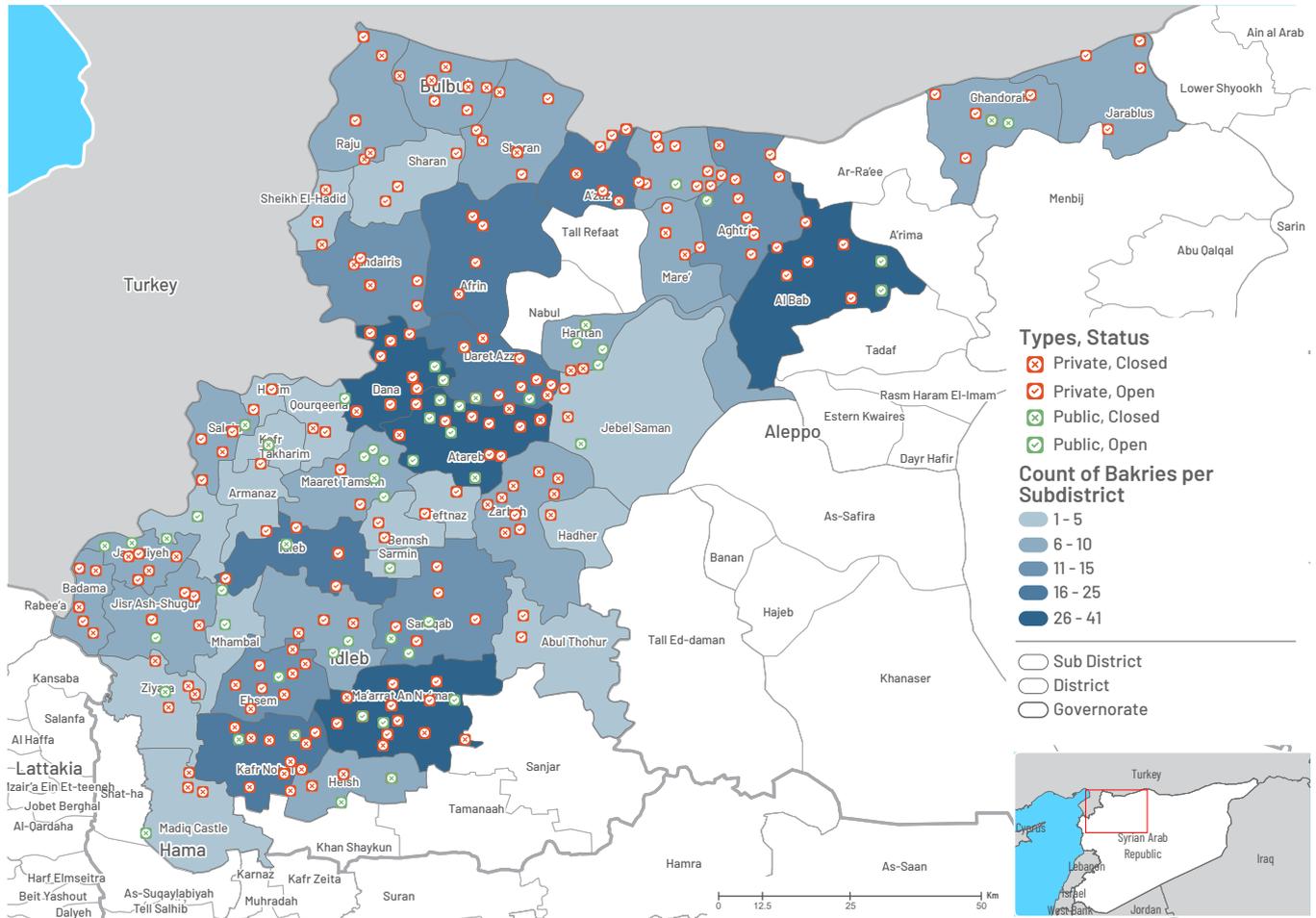


Figure 3: Bakery ownership styles in NW Syria



Map 1: Bakeries operational and ownership status



Bakery Management The survey collected information regarding the management authority of bakeries, to further validate whether the bakery system is influenced by the local council or working independently as a private bakery. The wheat-flour to bread value chain assessment and interviews with key actors revealed that some privately-owned bakeries were receiving free flour from humanitarian organizations in order to produce bread at subsidized prices. Moreover, interviews with SPEG officials reported that several public bakeries were lost to the management and control of the Free Army or other armed force groups. Accordingly, out of the 291 open bakeries, the main reported management authority was independent management system by the individual owner with 50% (145 bakeries). This was followed by tenant management of bakeries with 30% (87 bakeries) entities, then LC managed bakeries had a record of 15% (43 bakeries) and NGOs came next with 3% (8 bakeries). On the other hand, data showed that there is one bakery in Raju subdistrict in Afrin district (Aleppo) is being managed by the Free Army. In addition, there are four bakeries that were reported to be managed by Salvation Government-bakery institution, three in Idlib (Ma’arrat An Nu’man, Ehsem, and Qourqeena), and one in Aleppo (Daret Azza).

The 3% of bakeries managed by NGOs present 8 bakeries in six different subdistricts, with the majority being in Idlib. Three bakeries at Dana subdistrict in Idlib and one bakery at each of the following subdistricts Ariha, Badama, Janudiyeh, and Ma’arrat An Nu’man idlib.

Bakery Machinery and Building Status

The second layer of the survey focused on the operational and processing capacity of the bakeries. The collected data from the 470 bakeries using the mapping data collection tool showed that the assessed open bakeries (291) are well equipped with the basic needed machines and equipment. The mapping tool looked at the availability of the following basic machine/equipment types regardless of the number of machines/equipment at each facility: 1) All open Bakeries had Dough mixing machine, except 3 bakeries in Afrin (Aleppo); 2) All open bakeries had cutting machine, except to one bakery in Dana (Idleb). 3) All open bakeries had primary fermentation equipment except 4 bakeries at the following sub-districts (one at each) (Abul Thohur, Daret Azza, Haritan, Zarbah). 4) All open bakeries had Cooling path equipment except for two bakeries at Idleb and Aghtrin sub-districts (one at each). 5) All open bakeries had Dough Compressor, except one bakery in Aghtrin (out of the 11 open bakeries in Aghtrin). 6) All open bakeries had Fermentation tanks except 3 bakeries at Abul Thohur, A'zaz, Aghtrin subdistricts (one at each). However, only 42 bakeries out of the 291 open bakeries had packaging machines, which meant that at a sub-district level only 22 out of the 45 assessed sub-districts did not have packaging machines at all. Furthermore, 32 out of 45 sub-districts reportedly had a need for Yeast fridge with only 129 bakeries out of the 291 open bakeries reported to have Yeast fridge.

For further in-depth operational analysis, the bakery machinery/equipment was assessed by the long facility assessment tool which covered 47 bakeries. This in-depth assessment revealed that the assessed bakeries were well-equipped with a semi-automated work environment, the bread making processes that starts with mixing to baking was reportedly done by several machines, all 47 bakeries reported having at least one dough mixers, 48% of the bakeries had 2-4 dough mixers, also all the 47 bakeries had a functional dough cutting machine, 23% had more than one. Concerning the fermentation process, the 47 bakeries had at least one fermentation tank, (39) 83% of them have more than one in a range of 2-16, 45 out of the 47 bakeries had a fermentation room, a little more than half of them had more than one, only 17 (36%) of the bakeries had a yeast fridge. The bread dough compressor is a mechanical process as all the 47 bakeries had bread dough sheeters, 25% of them had more than one. The 47 bakeries had at least one oven, 6 bakeries had 2 ovens. The 47 bakeries had a motorized cooling path, 9 of them had more than 1. Only 3 bakeries reported owning a laminator, which means bread packaging was mostly a manual process, the following graph shows more details: -

Figure 4: Management authority in NW Syria

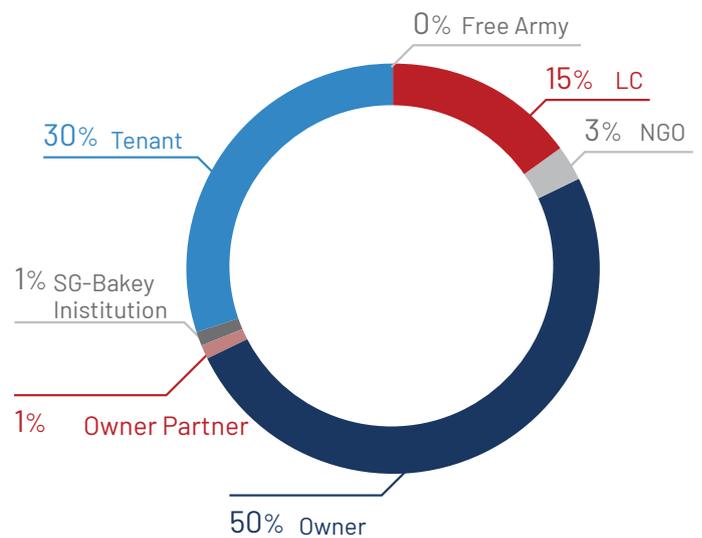
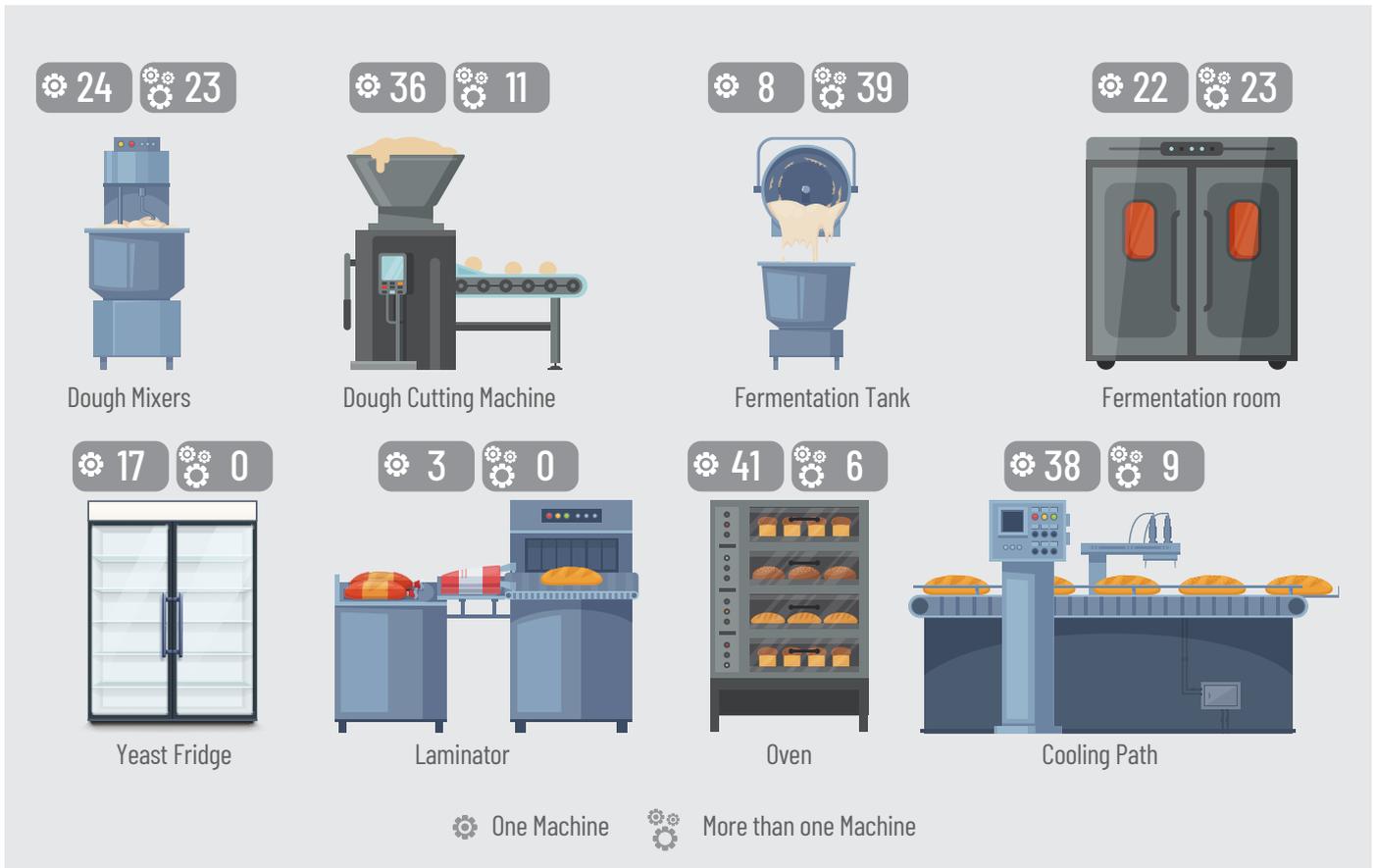


Figure 5: Machines availability

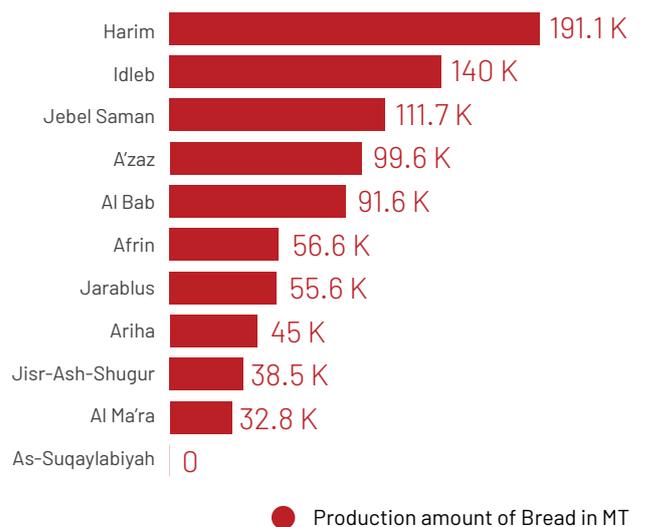


Bakeries Functionality

The functionality of bakery facilities was reported to be 33% across the 291 assessed bakeries in northwest region of Syria. This indicated that 291 open bakeries at northwest Syria region was producing 33% out of their full production capacity. Hence, as the total current daily production of the assessed 291 bakeries was 862.44 MT, the 291 bakeries had the capacity to produce 2610.5 MT on daily basis if input support is secured.

Figure 5 shows that Harim district came first in terms of the amount of daily production of bread with 191.14 MT, this was followed by Idleb district with 140.01 MT, then Jebel Saman district with 111.71 MT. Al Ma’ra district came last with 32.79 MT as daily production amount of bread. **However, one major data finding showed that As-Suqaylabiyah district had no bread production at all.**

Figure 6: Daily Production of Bread per District in NW Syria



● Production amount of Bread in MT

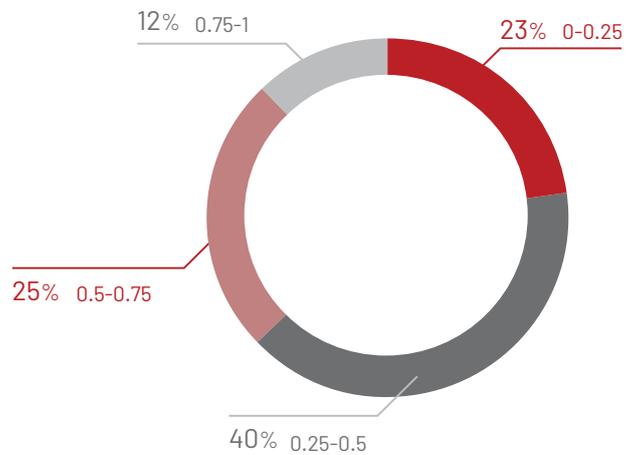
As illustrated in figure 6, the functionality rate of the assessed open bakeries was as followed; 23% (68 bakeries) of the open bakeries worked at 0–0.25 functionality rate, 40 % (117 bakeries) of the open bakeries worked at 0.25–0.5 functionality rate, 25% (71 bakeries) of the open bakeries worked at 0.5–0.75 functionality rate, 12% (35 bakeries) of the open bakery worked at 0.75–1 functionality rate.

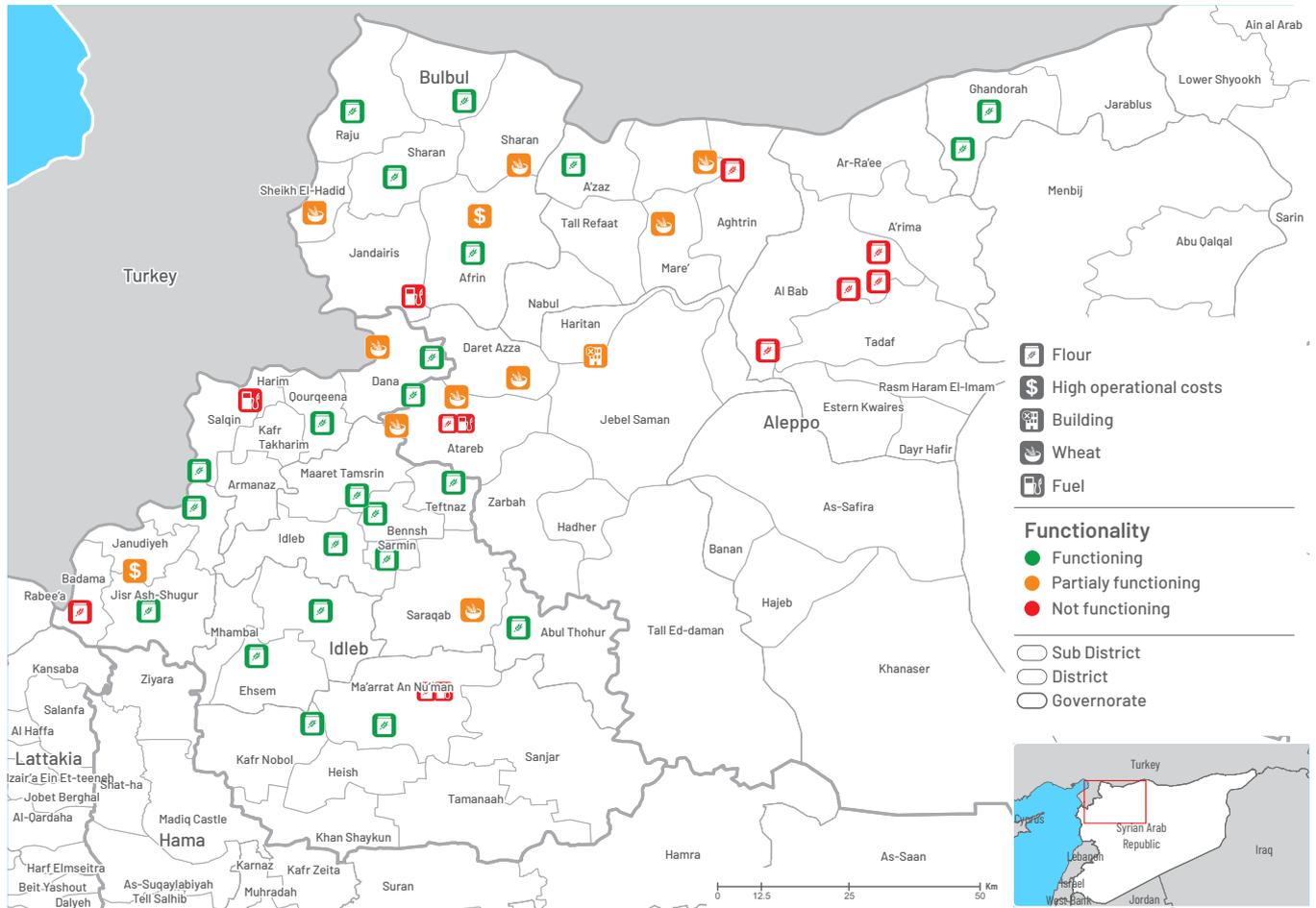
Qourqeena sub-district came first with 100 % functionality (12 MT daily production = 12 MT full daily production capacity). Ariha sub-district came next with 81% functionality rate (29.29 MT Daily production / 36 MT full daily production capacity). Then Jebal Saman sub-district with 71% functionality rate (4.29 MT Daily production / 6 MT full daily production capacity). Badama sub-district came last with 8% functionality rate (5.29 MT Daily production / 65 MT full daily production capacity).

Although Dana sub-district came first with highest full production capacity (633 MT daily), its functionality rate was considerably low (20 %, ranked 36th out of 41) with 134.71 MT as current daily production amount. Al Bab sub-district came second with 209 MT as full daily production capacity, ranked as 18th (out of 41) in terms of functionality rate (44%), with 91.64 MT as current daily production amount. Atareb sub-district came at third rank with 178 MT as full daily production capacity, still Atareb daily production is limited to 62 MT (35% functionality rate).

The long survey (at the 47 assessed bakeries) indicated several reasons behind the limited production capacity of almost half of the bakeries; inputs shortage was the main reason, specifically flour and fuel shortages. Other reasons included high operational costs, damaged building, enough bread production in the area by other bakeries also limited the capacity of some of the surveyed bakeries. In terms of the benefiting population, the surveyed bakeries served a population in a range of 1000 to 40,000 with an average of 12,485 person, per bakery. To overcome the current reduced productivity, the bakeries reported the following needed support, flour and fuel provision, building rehabilitation and machines maintenance. Map 2 below illustrates the bakery functionality and reason for limited functionality.

Figure 7: Bakeries Functionality



Map 2: Bakeries functionality and reasons for limited functionality

Rehabilitation needs

The first section of this report presented the general factors behind bakery closing, whereas in this section from an in-depth data analysis provide more detailed reason for bakery closures. The needs for building rehabilitation coupled with the needs for machine/equipment maintenance were the main reported reason for closing the bakeries. Eighteen per cent of the open bakeries reported a need for building rehabilitation, this was followed by the need for dough compressors maintenance with 12%, then cutting machine and cooling path equipment's maintenance with 11%. The maintenance of yeast fridge came last with 1%. It is worth mentioning that the needs for new machine was low at 4%.

Types of Produced Bread

The main types of bread that were being produced across the 45 assessed sub-districts in northwest Syria were the Public Regular bread, Private Regular Bread and other types of bread. Figure 8 illustrate the production of each type against the number of open bakeries.

1. Public Regular Bread;

bakeries receive flour from local council to produce regular bread at lower price (price of 900g was 150 SYP). The data shows that 102 bakeries reportedly produce Public Regular Bread, with a daily production amount of 289.76 MT across 23 sub-districts.

Moreover, there was difference between the sub-districts related to the common type of bread being produced at a sub-district level. For example, Qourqeena sub-district produced only one type of bread (Public Regular Bread at 3 bakeries with 12 MT daily production). In terms of sub-districts that produce the highest amount of public bread, Al Bab sub-district was leading the production with 70.86 MT with the highest number of 27 bakeries that were reported produce Public Regular Bread. This was followed by Dana sub-district with (30.44 MT) which also came at second rank along with Aghtrin sub-district in terms of number of bakeries that were reportedly produce Public Regular Bread with 10 bakeries.

Janudiyeh (0.91 MT), Badama (0.81 MT) and Daret Azza (0.63 MT) were reported to have the smallest amount of daily production of Public Regular Bread among the sub-districts that produce Public Regular Bread. However, collected data showed that there were 18 sub-districts (out of the 41 sub-districts that had open bakeries) that do not produce Public Regular Bread at their bakeries (70 bakeries). Furthermore, data showed that there were 9 sub-districts that had only one bakery (at each sub-district) that produces Public Regular Bread.

Figure 8: Bakery need in NW Syria

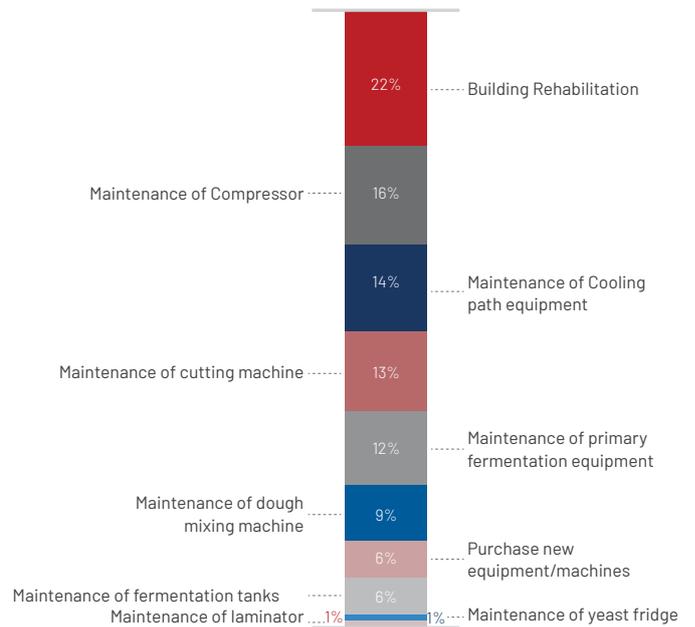
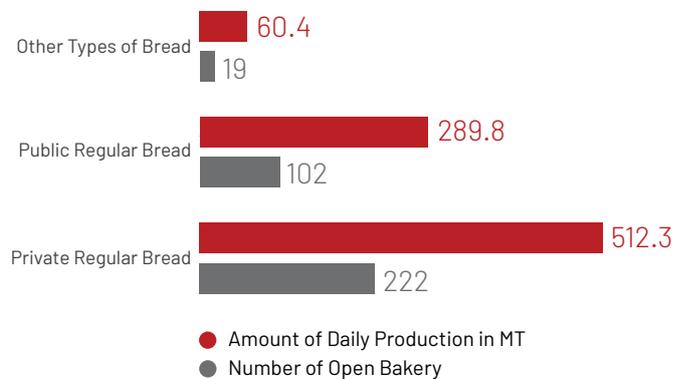


Figure 9: Production for each type of bread



2. Private Regular Bread;

The specifications of this type are like regular public, whereas bakery does not receive any support, and sells at higher price (price of 900g was 200 SYP). The data shows that 222 bakeries produced Private Regular Bread with a daily production amount of 512.33 MT across 39 sub-districts.

Fourteen, sub-districts (Sarmin, Zarbah, Teftnaz, Darkosh, Bulbul, Sheikh El-Hadid, Kafr Nobol, Kafr Takharim, Raju, Afrin, Jandairis, Sharan, Haritan and Ma'btali) reported that they produce only regular private bread at 51 bakeries with daily production of 105.36 MT.

Dana sub-district came first with largest amount of daily production of Private Regular Bread (104.28 MT) and highest number of bakeries that produced Private Regular Bread with 36 bakeries. This was followed by Atareb sub-district with (60.30 MT) and 20 bakeries. Saraqeb sub-district ranked thirdly at daily production of Private Regular Bread with (26.37 MT), while Ma'arrat An Nu'man and Afrin sub-districts took the third rank in terms of number of bakeries that produce the Private Regular Bread with 14 bakeries at each.

3. Other types of bread;

this type is referred to the various types of bread and prices that is being produced. The production of Other Types of Bread was reported at only seven sub-districts in 19 bakeries with total daily production of 60.35 MT. Abul Thohur produce just Other Types of Bread with 2 bakeries and daily production of 1.86 MT. Idleb sub-district came first with 8 bakeries and 27 MT as daily production, this was followed by Al Bab sub-district with 3 bakeries and 14.35 MT as daily production, then Badama, Abul Thohur, and Harim sub-districts with 2 bakeries. A'zaz and Bennsh sub-districts came last with 1 bakery each. Although Azaz came last with one bakery that produce Other Types of Bread, it took the third rank in terms of daily production of Other Types of Bread with 5 MT.

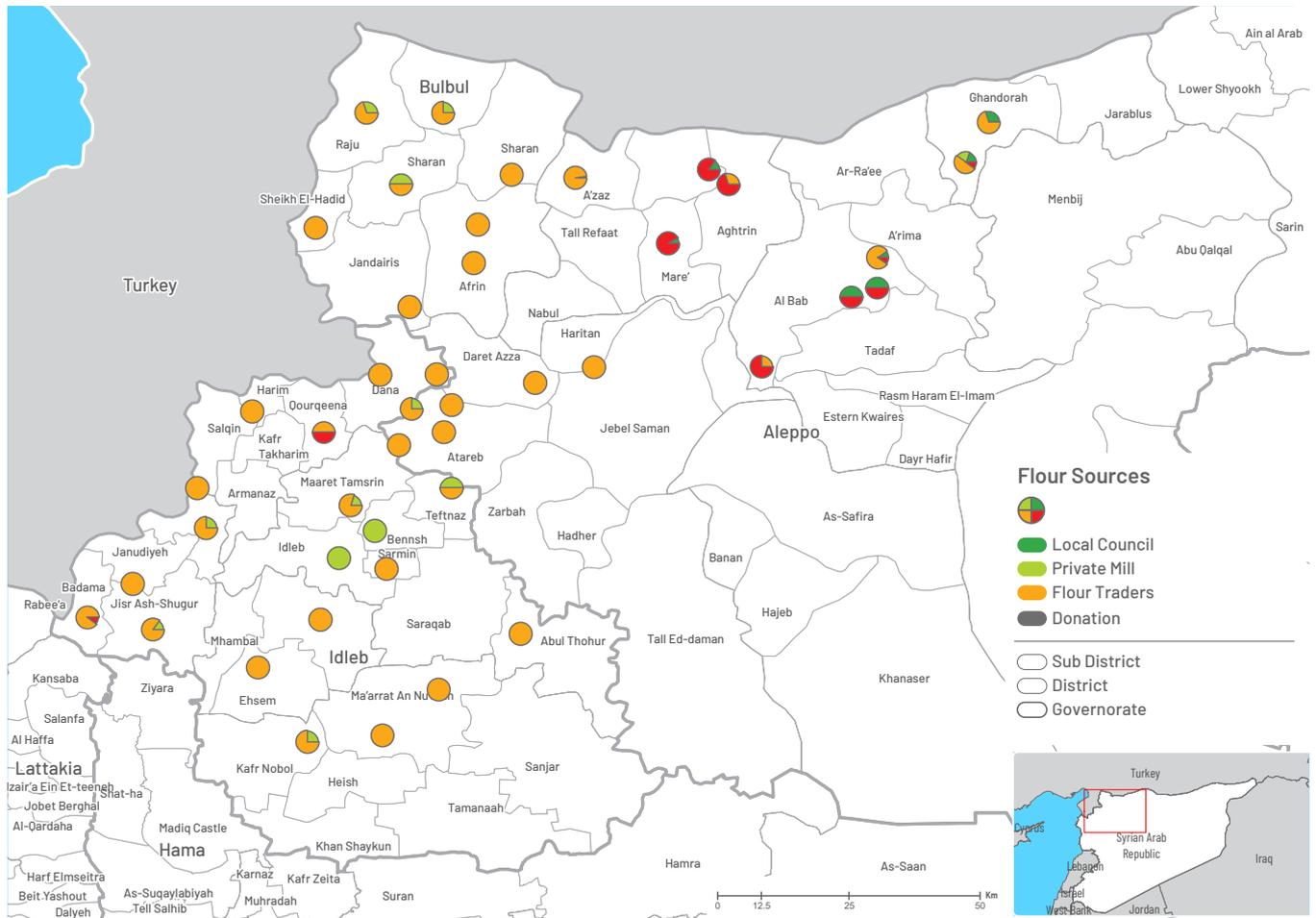
Bakeries Production Inputs

The in-depth analysis covered more detailed analysis related to the working hours and inputs used in production. In terms of working days, 33 (70%) of the bakeries reported working 7 days a week, 14 (30%) normally take a day off. Concerning the working hours, most of the bakeries reported a two-shifts 12-hours working day, which ranges in total from 10-20 hours. Over the month prior the data collection, 16 bakeries had to stop working due to machine malfunctioning, in a range of 1-6 days with an average of 3 days. Only 1 bakery in Sheikh El-Hadid community in Afrin had to stop working for one day over the last month due to fuel unavailability. Two bakeries in Aleppo had to stop working due to power cuts, one in Bhorta community in Azaz district and Anjara community in Jebel Saman district.

In terms of inputs, except for two bakeries in A'zaz and Daret Azza in Aleppo, none of the rest use the national grid electricity, they were fully dependent on private generators, 41 (91%) of the bakeries had one to two generators. The standard fuel for all bakeries was diesel which is stored in tanks with a size range of 1,000-10,000 litres. The diesel was reported to be locally refined as reported by 43 (91%) of the bakeries, four bakeries reported using imported diesel. The locally refined diesel was reported to have a low quality due to the limited capacity of the refineries, such poorly refined diesel was reported to cause machine/equipment malfunctioning, specifically mentioning generators and ovens, which encouraged the bakery owners to further refine the diesel using manual techniques.

Concerning water, all of bakeries reported having access to clean water, however from different sources; 20 (43%) reported wells, 8 (17%) reported water pipeline network and 27 (57%) reported water trucks as the sources of fresh water supply. The bakeries store water in tanks that range in capacity from 2,000 - 10,000 liters, the water tank material reported to be mainly metal, cement and plastic.

Regarding the flour sources, only 9 (19%) of the bakeries reported to receive flour from the local council, mainly from Al Bab and Jarablus, 21 (45%) of the bakeries buy 100% of their flour from the traders and 12 (25%) of the bakeries receive flour from humanitarian aid agencies. In terms of the flour country of origin, 45% of the bakeries bake imported Turkish wheat flour, the other 55% uses locally milled flour. More information in map 3 below;

Map 3: Wheat and Flour Sources

Regarding the baking yeast, except for two bakeries, the sample reported using dry yeast in a form of powder, the local council was the source of yeast in case of only two bakeries, one in Bazagha community in Al Bab district of Aleppo and one in Ghandorah community in Jarablus district of Aleppo. 44 (94%) of the bakeries buy the dry yeast from flour traders, only one bakery in Qourqeena community in Harim district of Idlib receive yeast from an aid agency. The yeast powder is imported from Turkey as per 44 bakeries out of the 47.

Concerning the bakery labor force, the bakeries employ full-timers who work for 8-12 hours daily, the average total full-timers reported as 16 employees, with a range of 4 to 67, all of them were men, IDP's represented an average of 35% of the bakery labor-force.

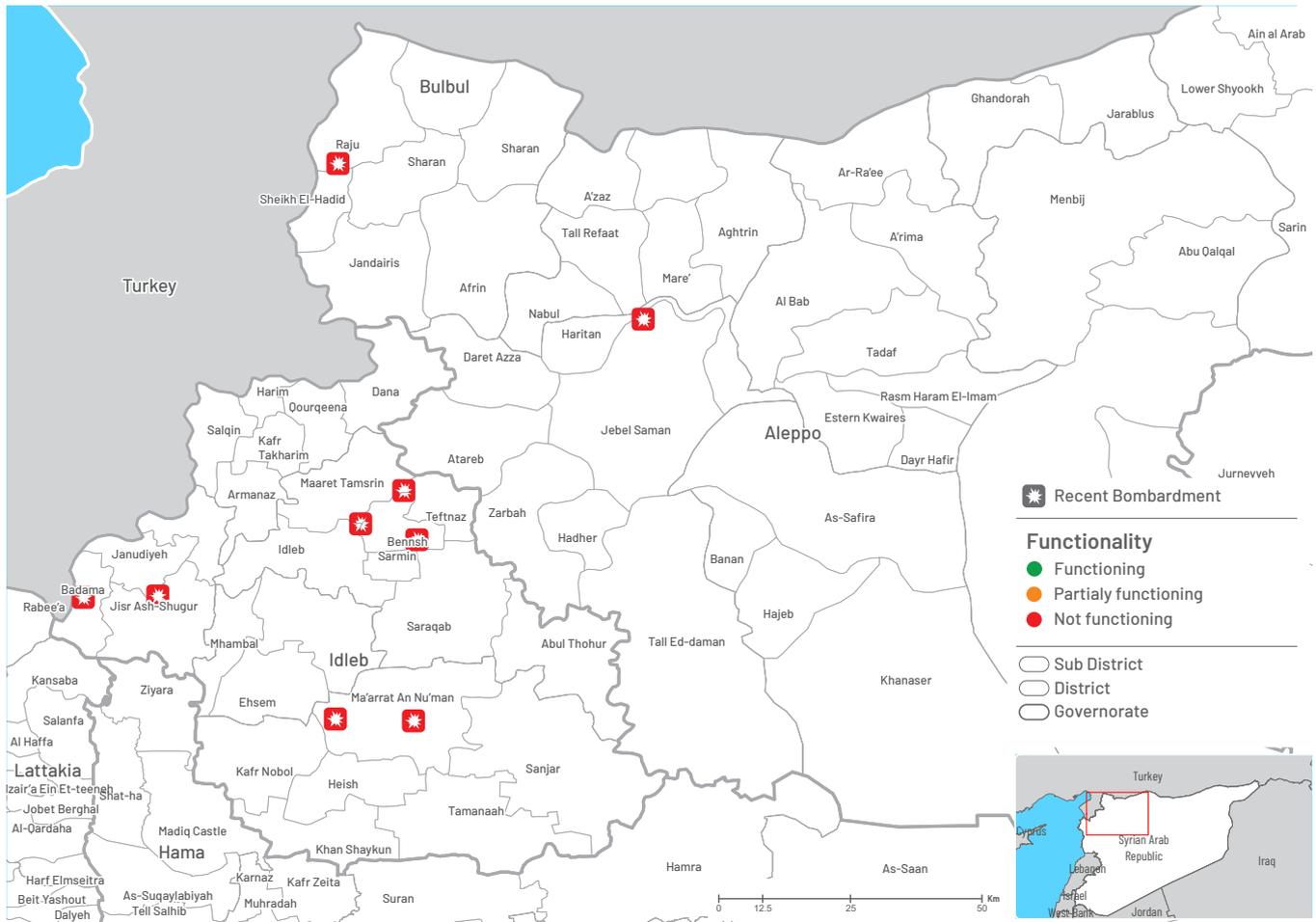
In terms of bread prices, the prices were variant according to the type and support in place, the public regular bread which is produced by the local council contracted and flour-supplied bakeries was priced at 150-160 SYP for the 800-1000g package, some bakeries produced the same bread, however, they buy the flour from the local traders to bake private regular bread which was priced at 200-250 SYP, some other bakeries were producing subsidized bread by baking flour that is freely distributed by aid agencies, which was priced at 80-90 SYP. Other types of bread were also produced by the private bakeries that were different in specifications and prices.

Bakeries Accessibility and security Situation

In terms of accessibility, all the bakeries reported accessible by beneficiaries, all bakeries also reported being accessible by trucks, up to 40 tons capacity trucks.

Concerning the security situation, 38 (81%) of the surveyed bakeries reported a stable security situation in the area of the bakery. Nevertheless, the other 9 reported nearby bombing risk, as indicated in map 4:

Map 4: Reported Recent Bombardment Near the Bakeries



Bakery production capacity against the subdistrict population

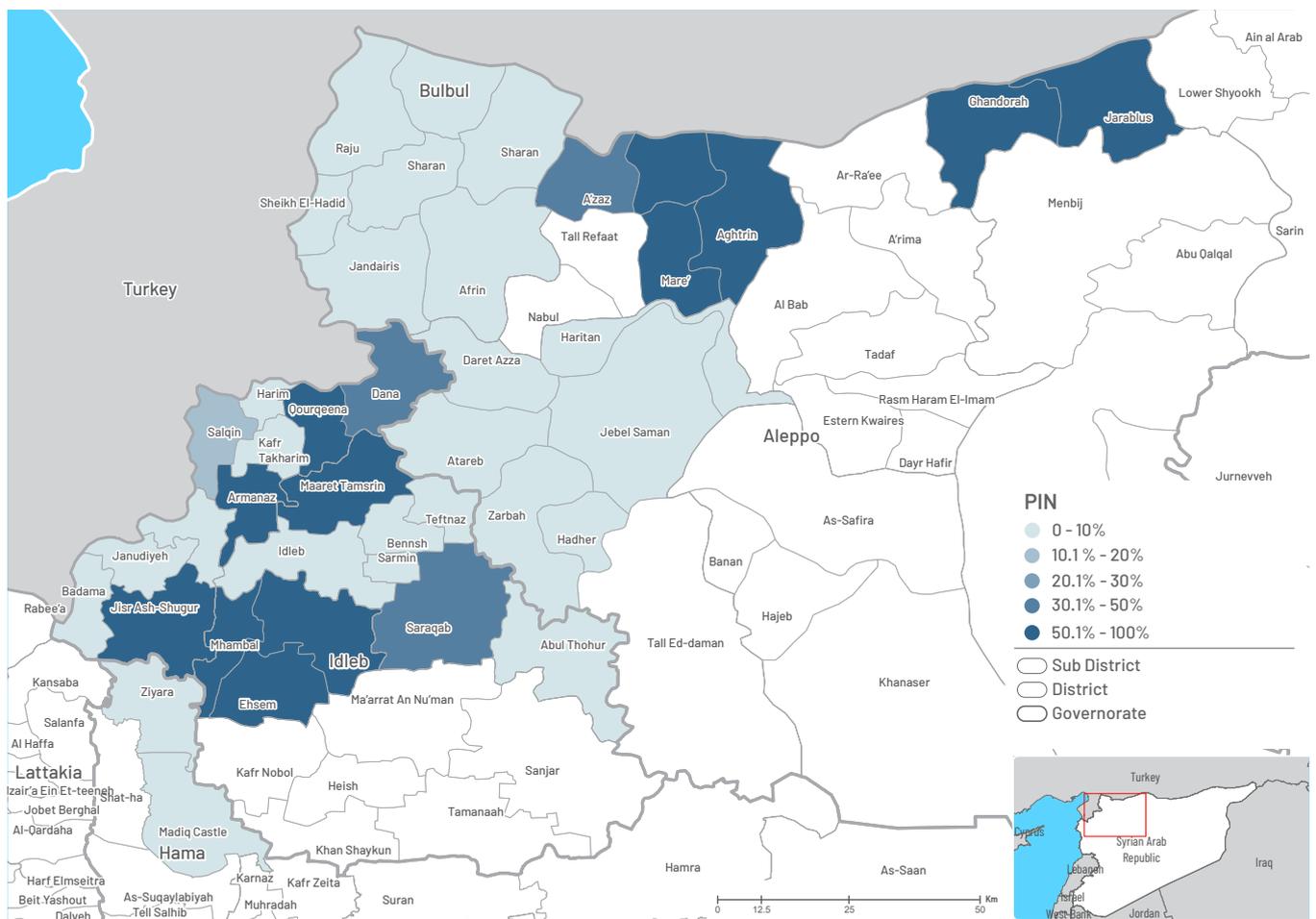
Using the Food Security cluster standard, the daily need of bread per person is 330g. Hence based on the below formula, collected data showed that across the 45 assessed sub-districts, the daily need of bread was 1869.07 MT, however the daily reported production of all types of bread at the 45 sub-districts was 862.44 MT. This indicated that 54% of the population in the assessed sub-districts have no access to bread from local bakery facilities. Furthermore, the daily production of regular public bread was 289.76 MT against 736.04 MT as daily needs of bread of People in Need (PIN). Therefore, 61% of PIN in northwest Syria had no access to regular public bread which brings negative impact on their economic status to meet their daily needs of bread

Daily needs of bread in an area = The number of population * 330g.

Thirty-Seven sub-districts reported shortage in the bread production. Hadher, Madiq Castle, Ziyara, and Heish sub-districts reported highest needs as there was no active bakery there with daily needs of 11.62 MT bread. This was followed by Jebel Saman sub-district which reported a daily production of 4.29 MT against 540.86 MT as daily needs. This indicated that 99% of the population in Jebel Saman sub-district does not have access to bread from local bakery facilities. Kafr Nobol came next with 1.71 MT daily production of bread against 10.74 MT daily needs which puts 84 % of the population in Kafr Nobol with no access to bread from local bakery facilities.

Twenty-two sub-districts reported that there is no production of regular public bread at their local bakery facilities. The number of PIN at these 22 sub-districts was 360,697 individuals which indicated the daily needs for 119.03 MT of regular public bread at these sub-districts. Map 5 illustrates PIN access to regular public bread on a sub-district level

Map 5: PIN access to regular public bread on subdistrict level



4. Mills Mapping

Sample

The second phase of the in-depth facility mapping was the mills surveys, 30 mills were surveyed across 21 communities in Aleppo and Idlib governorates. A mill facility assessment questionnaire was developed to assess the mills functionality, production capacity, machine/equipment status, and general needs to improve milling productivity.

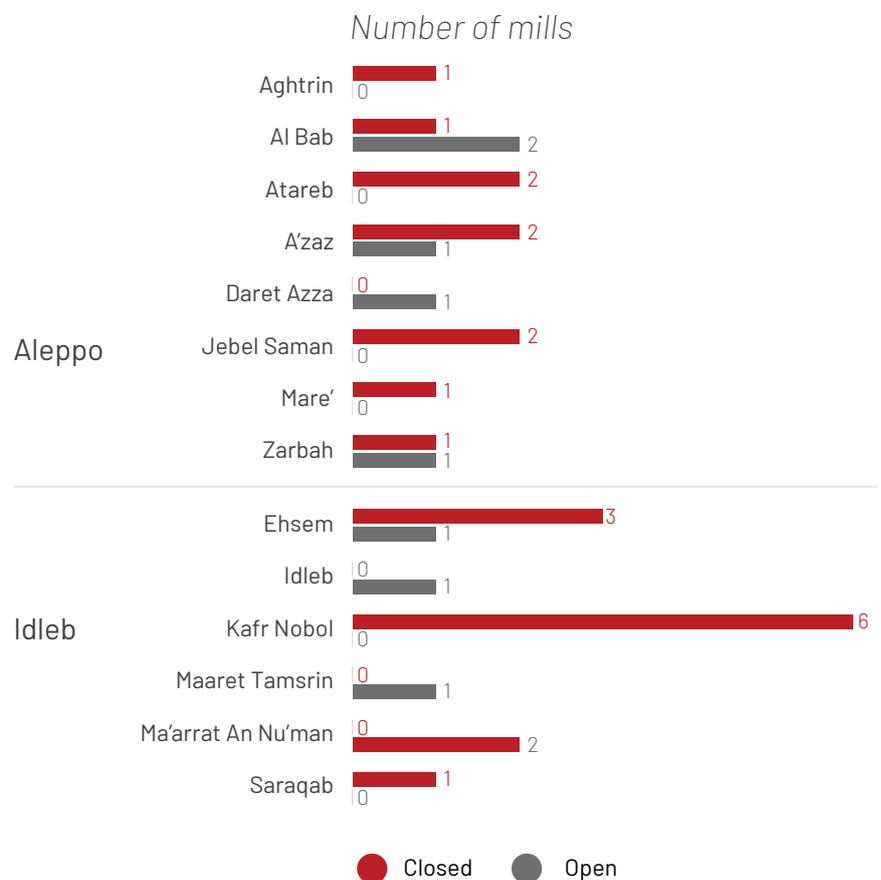
Mill facility location and operational status

Most mills (67%, n = 20) have been closed and inactive since 2015 due to diminishing returns of milling production, heavy conflict with targeted bombing of facilities by the warring parties and continuous shifting control lines of the local authorities. Of the thirty mills assessed, only ten were operational. Figure 9 shows that the number of mills and their operational status in each subdistrict of Aleppo and Idlib governorate. Similar to the bakeries, a number of private mills opened after the start of the conflict, where data shows that 70% of the open and active mills are individual privately owned (Al Bab and Ma'arrat An Nu'man subdistricts have 2 mills each and 1 mill in each of the subdistricts of Daret Azza, Zarbah and Ehsem),

whereas, 30% of the mills are publicly owned, one in each of the subdistricts of A'zaz, Idlib and Maaret.

Idlib governorate had the highest number of closed mills in a subdistrict, with 6 mills closed in Kafr Nobol and 3 mills closed Ehsem subdistricts (figure 9).

Figure 10: The number of mills and their operational status in Idlib and Aleppo



Sources of wheat grain for the surveyed mills

Figure 10 highlights the main sources of wheat grain reported by each of the mill facilities. The main supplier in all governorates were local farmers, followed by wheat traders in the same subdistrict. Non-governmental organizations were also reportedly supplying wheat to mills for flour production. It worth mentioning that the Local Council was surprisingly missing as a source of wheat grains for the mills, thus indicating the reduced control and absence of subsidies to the wheat to flour milling production.

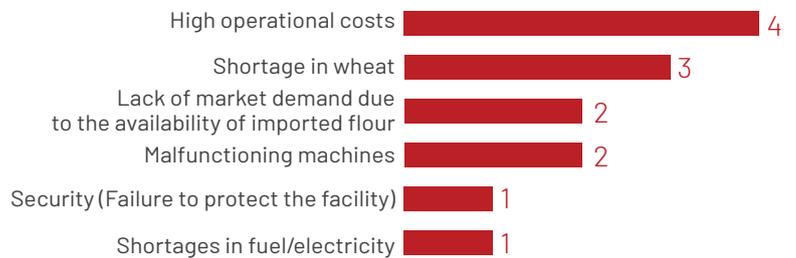
Figure 11: Main source of wheat grain for the mills



Constraints to increased mill production

Out of the ten operational mills assessed, only individual private owned mills reported that they were partially functioning, that is, one mill in each of the subdistricts of Ehsem, Ma' arrat An Nu'man, Zarbah and two mills in Al Bab subdistricts were reported partially functioning. The major barriers to production faced by mills are cited in figure 11. The high operational cost (raw materials, electricity/fuel, labour), shortage of wheat, reduced market demand due to the availability of imported flour and lack of and malfunctioning machines were the most common barriers to milling productivity. In addition, the mills also cited lack of electricity/fuel and insecurity as barriers to operations. As a result, 80% of mills use locally produced diesel as fuel to power the mills.

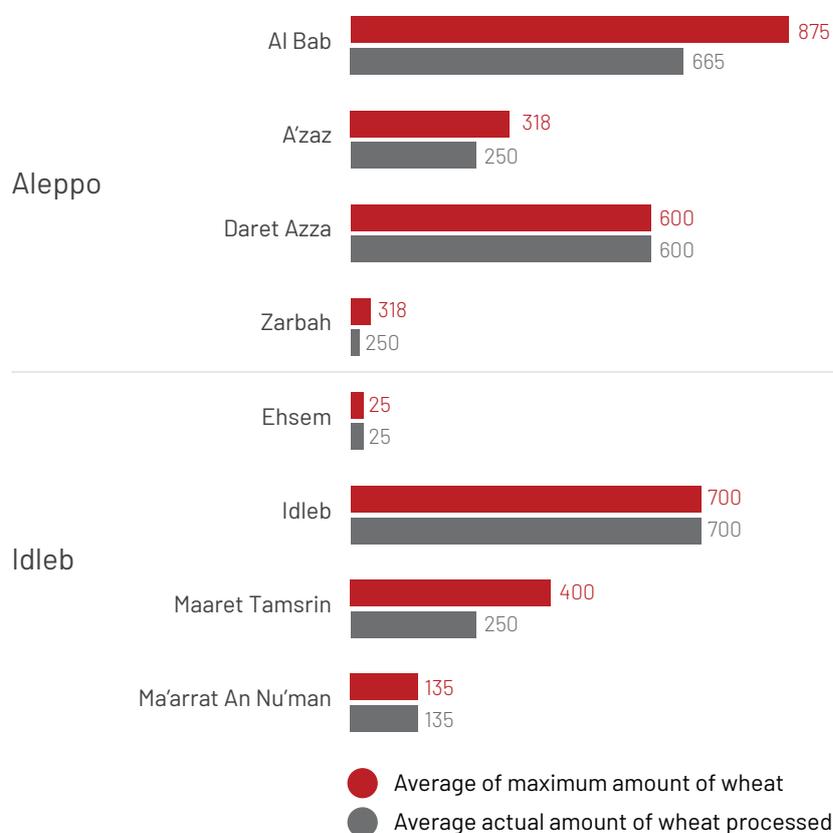
Figure 12: Major barriers to mill production



Current structure and operational capacity of mills

Figure 12 below shows the current capacity of the mill facilities in each governorate. It can be noted that the governorate with the largest milling capacity is in Aleppo Governorate, subdistrict of Al Bab, where there is an average maximum milling capacity of 875 MT as compared to the prevailing current actual milling production of 665MT. This was followed by the milling capacities for Maaret Tamsrin subdistrict in Idleb governorate, this subdistrict reported an average maximum milling capacity of 400 MT as compared to the prevailing actual milling production of 250 MT. The assessment noted that there is need for support to these mills to attain their maximum milling capacities including the following mills in Aleppo Governorates (subdistricts of A'zaz and Zarbah). It is worth reporting that average maximum milling capacity is attained by a mill in Daret Azza, where the mill owner even reported that they need no external support.

Figure 13: Operational capacity: Average Maximum and actual amount of wheat to flour (MT) processed by mills in each subdistrict



Mills flour production

Mills current flour production was reported at a range of 10 to 30MT per week for each mill. However, mills reportedly incur stoppages of operation due to various challenges. For instance, 0-15 days in a monthly cycle were recorded as a range of stoppages of mill operations due to breakdowns of machines/equipment and/or fuel unavailability of fuel. Despite the challenges, the operating mills are still able to supply flour to a quite large number of bakeries (Table 2). The mill in A'zaz supply the highest number of bakeries (55 bakeries) and followed by another mill in Idleb subdistrict which reportedly supply 30 bakeries. Distribution of flour is mainly direct from the mills to the bakeries (90%) and followed by direct from the mills to flour traders (10%).

The average cost of milling one ton of wheat was reported to be SYP 17 000 at an average profit of 15%. The more expensive milling service for beneficiaries were reported for the mills in Al Bab subdistrict (cost of milling one ton of wheat was SYP 25 000 at 10% profit level) and Azaz subdistrict (cost of milling one ton of wheat was SYP 25 000 at 25% profit level). The cheaper milling service for beneficiaries were reported in Idleb subdistrict (cost of milling one ton of wheat was SYP 9 000 at 3% profit level) and Maaret Tamasrin subdistrict (cost of milling one ton of wheat was SYP 12 000 at 10% profit level).

Table 2: Mills and bakeries in relation to populations serviced.

Subdistricts/number of mills in brackets	Number of bakeries-being supplied	Estimated number of people served
<i>Al Bab (2)</i>	33	133,073
<i>A'zaz (1)</i>	55	242,675
<i>Daret Azza (1)</i>	25	129,503
<i>Zarbah (1)</i>	0	92,905
<i>Ehsem (1)</i>	1	62,495
<i>Idleb (1)</i>	30	254,407
<i>Maaret Tamsrin (1)</i>	25	163,060
<i>Ma'arrat An Nu'man (2)</i>	6	243,484

Support required to improve mill production

Figure 13 highlight the most preferred form of support for mills to improve mill production. The most reported support required were the supply of energy in form of fuel or electricity, followed by the rehabilitation of machines and equipment for the mills. Structural rehabilitation of buildings was also cited as a requirement. However, there was a request for a policy paradigm shift to exempt importation of wheat-flour to reduce local competition of mill production as a business.

When asked about the estimated cost of rehabilitations of buildings the cost ranged from SYP1.5m to SYP 10m, whereas, the need for the cost of rehabilitating machines/equipment ranged from SYP 0.8m to SYP 50m. Some respondents (70%, n = 7) did not give responses regarding the cost of rehabilitation (Table 3) for they indicated no need for rehabilitation support despite confirming constraints to increased milling production due machine/equipment breakdowns and dilapidated buildings.

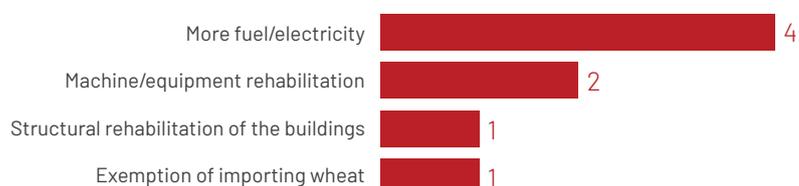
Figure 14: Kind of support required to improve mill production

Table 3: Estimated cost of rehabilitation

	Estimated-cost-of-building-rehabilitation (SYP)	Estimated-cost-of-machines-rehabilitation (SYP)
<i>Al Bab</i>	-	-
<i>A'zaz</i>	-	-
<i>Daret Azza</i>	-	-
<i>Zarbah</i>	10,000,000	50,000,000
<i>Ehsem</i>	-	-
<i>Idleb</i>	1,500,000	6,000,000
<i>Maaret Tamsrin</i>	10,000,000	6,000,000
<i>Ma'arrat An Nu'man (2)</i>	-	-

5. Silos Mapping

Sample

The final phase of the mapping assessment was surveying silo facilities, 15 silos were surveyed across 15 communities in Aleppo and Idleb governorates. A questionnaire was administered to personnel managing silos, to map the silo locations and assess its operational status functionality and general needs to improve wheat storage capacity.

Silos facility location and operational status

Majority of silos (87%, n = 13) assessed were closed and inactive since 2011 with the onset of the crisis which experienced targeted heavy bombing of silo facilities. Map 6: illustrates the location of the silos and the different reasons behind the closure of the facility. Of the fifteen silos assessed all were publicly owned, of which, only two silos were operational and fully functional, namely; a silo in Jarablus subdistrict, Aleppo governorate and another silo in Idleb subdistrict of Idleb governorate. The Jarablus silo was reportedly operated as a public entity. Map 7 geographically illustrates the capacities of the two open silos.

After the conflict the conflict wheat prices tremendously changed. The pre-conflict total cost of wheat per MT and current cost of wheat per MT from the silos are shown in figure 14, with the Jarablus silo reportedly had the highest current cost of SYP 220 000/MT whereas, the Idleb silo reportedly had the current cost of SYP 120 000/MT. In Idleb subdistrict the Silo management reported that the desired wheat price by people is SYP 50 000/MT. There was a report of increased cost of wheat as compared to pre-crisis level, this likely due to a few existing silos as majority of the silos closed operations.

The following subdistricts had their silos closed mainly due to the conflict (Ma'arrat An Nu'man – 2 silos, Ghandorah, Ma'arrat An Nu'man, Atareb, Aghtrin, Idleb, Atareb, Abul Thohur, Ziyara, Jarablus, Afrin, Al Bab, Ar-Ra'ee, Tall Refaat, Mare).

Map 6: Reported open and closed silos facilities

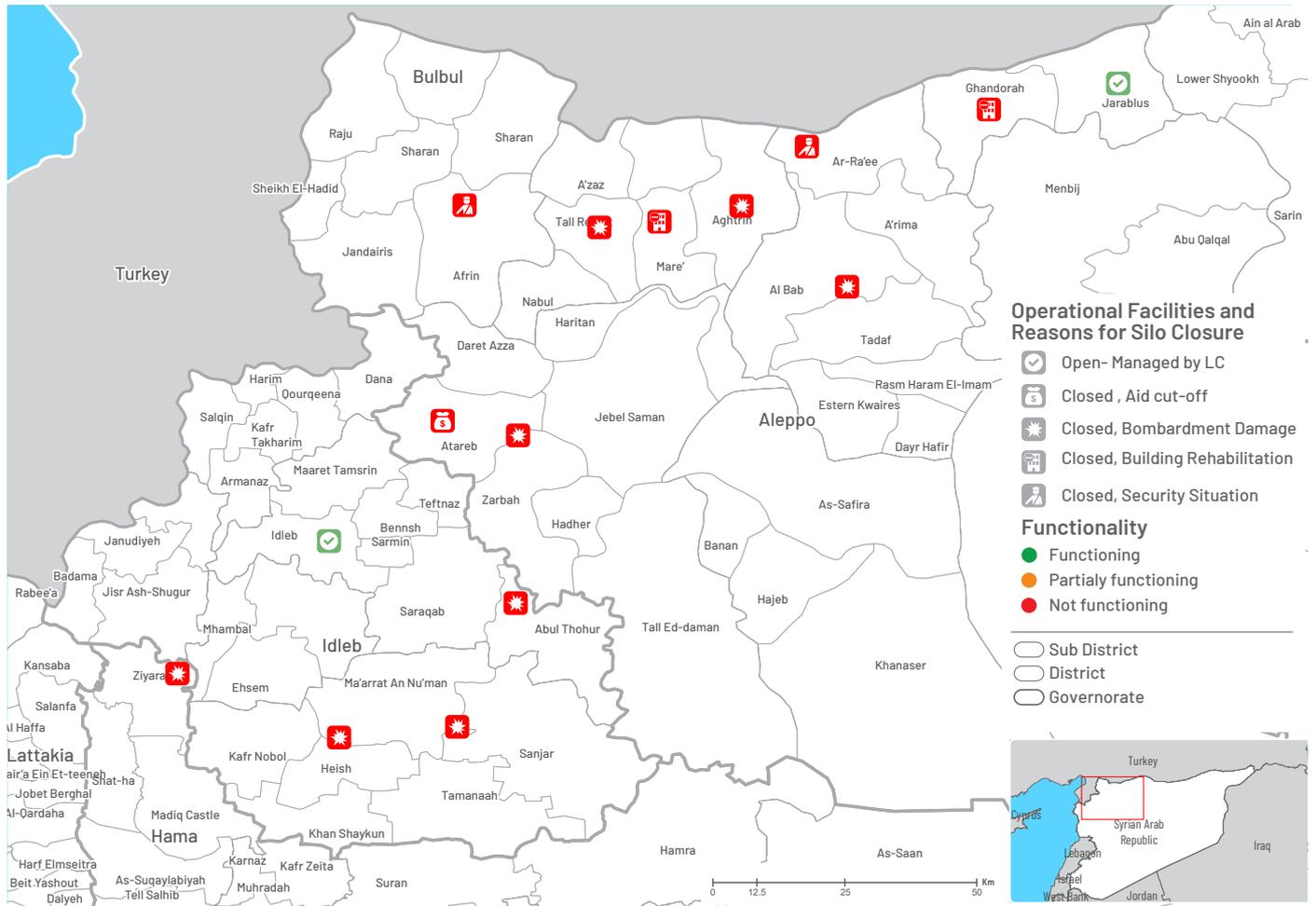
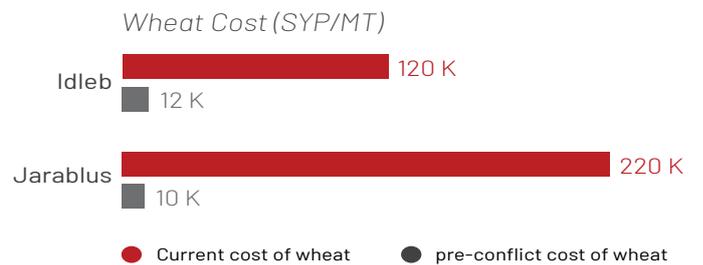
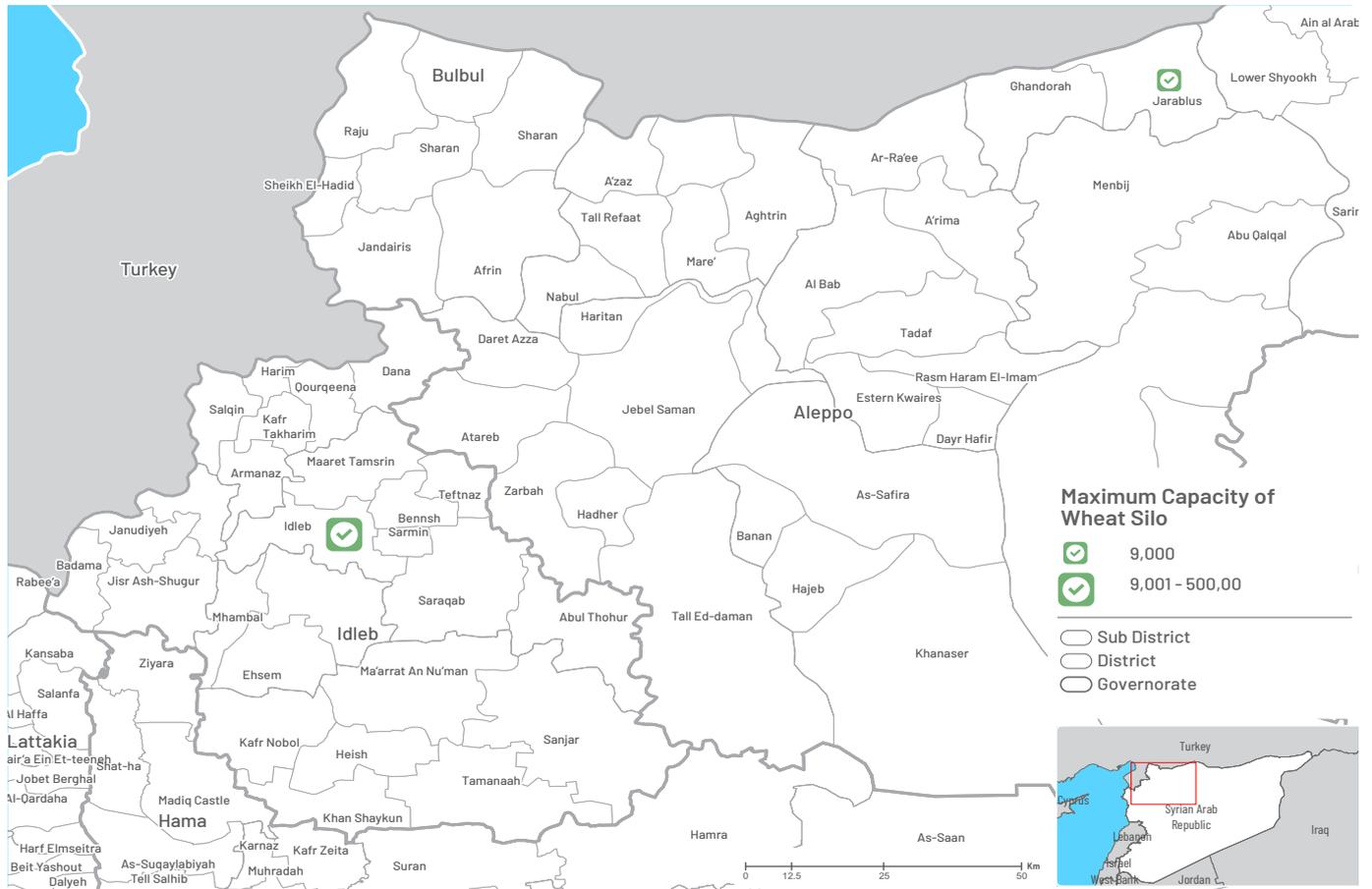


Figure 15: Cost of wheat at pre-conflict vs current



Map 7: Capacities of the open silos

Source of wheat and support required to improve wheat storage facilities

The main supplier of wheat to the two silos were local farmers (60%), followed by wheat traders (25%) in the same subdistrict. Non-governmental organizations were also reportedly supplying wheat to silos for storage (15%) for flour production. It was reported that the maximum capacity of the complex silo of Idleb subdistrict is 500 000 MT, whereas, the maximum capacity of the silo in Jarablus subdistrict is 9000MT. The Idleb silo reported the need for rehabilitation of the machines/equipment at an estimated cost of SYP 3.5m. The catchment area for the source of wheat for the complex silo of Idleb subdistrict covers three governorates, namely, Idleb, Hama and Aleppo. Whereas, the source of wheat for the Jarablus silo was reported to be 50% Aleppo Governorate and the other 50% imported from Turkey. It is important and good to note that the main source of energy for the silos is the renewable energy of solar.

6. Discussions

Bakeries

The assessed bakeries were operating in a reasonable equipped mechanical work environment. Except for packaging, all the bread production processes were machinal in all the surveyed bakeries. However, the efficient side of the mechanical capacity that the bakeries had, there was also an associated risk of having power and fuel-dependent bread production in bakeries in such an unstable security context, specifically the potential targeting of the wheat-flour to-bread facilities. The current main source of wheat flour to the surveyed bakeries were local traders, only 20% reported the local council as the main flour supplier. However, with the positive signal of market functionality and the feasibility of market-based food security and livelihood interventions, there was also a market power imbalance which was represented in price setting practices by reported oligopolists, especially at the trading phase of the wheat-flour to bread value chain. Such practices were not only impacting the retail cost of the final bread products that might deteriorate the consumer access but also might impact the profitability of the farmers, which might push many farmers to shift from wheat farming to other more profitable crops.

The number of privately-owned facilities was higher than the publicly owned facilities, and joint sector facilities. The ownership status of these facilities has seen more change towards privatization since the Syrian crisis began in 2011 with the absence of subsidies from the GoS. With the absence of subsidies and reduced public facilities, there is need for the humanitarian agencies to engage facilities owners to support the wheat-flour to bread chain actors by rehabilitating the equipment and machines which were highly reported as derailing production. Most of the assessed bakeries were well-equipped in a semiautomated work environment; thus, rehabilitation of bakery machines/equipment can be a quick turn-around of the productivity of many bakeries since there is less manual activity in bread production. There is also need to support bakeries with provision of good quality fuel/diesel which is the main source of energy or the provision of renewable solar energy, this is so given that 91% of the assessed bakeries were reportedly out of the national electricity grid. Moreover, the high number of bakeries in comparison with the limited number of active bread respondents coupled with limited funds have created a fund competition among the active bakeries. Furthermore, it has, in some cases, caused a negative impact by the current bread interventions that led to decrease demand in the non-supported areas due to enabling other bakeries to produce similar bread with a lower price in the nearby areas. Bread price was reportedly relatively cheaper from the subsidized public bakeries at 150-160 SYP for the 800-1000g bread package, thus, it is encouraged to channel more support towards the public bakeries or to subsidize other private bakeries to distribute bread at subsidized lower prices which can be easily afforded by most people.

The ownership and management profile of local bakeries played a role in utilizing the local resources towards having sufficient production of bread to meet the local needs. A significant number of the surveyed facilities (bakeries, mills, and silos) were owned and managed by private owners, not clear if these bakeries were established after the conflict as a response to the fallen public system or were always there. Although these facilities are directly linked with the basic needs of the population (bread), data reported that the majority of these facilities are privately owned and managed by individuals and are profit-oriented. This has a direct impact on increasing the price of bread at the households' side and limit the capacity of people in need (PIN) to have access to bread at an affordable price.

Local governance structure represented by the local council reported limited ability to supply the local processing facilities with inputs support which already had a direct impact on the functionality of the local processing facilities as well as the production cost of bread.

There was a wide variance in the bread production among the assessed subdistrict, additionally, there was a reported underproduction by some bakeries due to limited demand in some areas, these two facts support the conclusion of active and integrated bread market. The shortage in inputs supply reported being the main reason for the underproduction of many bakeries, which resulted in limiting the access to moderately-priced public bread by the needy population in many districts. Although 7 out of the 45 assessed subdistricts recorded a sufficient production of bread that is able to meet the basic needs there, it has been noticed that these 7 subdistricts supplied the nearby subdistricts with bread which resulted in having only one district out of the 11 assessed district that has sufficient production of bread. This district is Jarablus which has only two subdistrict and comparatively low numbers of human population (98,195).

Mills

Most of the surveyed mills and silos were targeted and destroyed during the conflict, since mills and silos are easy targets, specifically for airstrikes, rehabilitating them was not an option for the local administration and hence humanitarian actors as well. Thus, in terms of the impact of the on-going fighting and the chaining of controlling actors, the wheat-flour to bread management policy of the controlling actors has been witnessed as one of the reasons that contributed to diminishing the capacity of the local bakery. As an example, at the areas that are managed by HTS, some bakeries reported the closure of their bakery due to issues with HTS. As a result, any wheat-flour to bread program support need to be informed by in-depth context analysis to understand the power dynamics and its buy-in to the program. **Local farmers were reported to be the main supplier for both mills and silos in northwest Syria. From key informants' interviews**, it was reported that local councils lack the financial capacity to procure/absorb the local wheat production at the season time which resulted in having the bakeries being enforced to use the imported flour which is in low quality comparing with the local produced one from local mills. Thus, any external support of the wheat-flour to bread program support has to focus its support to the local chain actors and systems of the local wheat-flour to bread value chain.

Cost and lack of availability of key inputs, particularly electricity, fuel and possibly wheat, were the major barriers to the full operation of existing mills. Operational challenges were not just confined to the main wheat to bread inputs, **fuel is playing a big role in elevating the high production cost across the whole value chain**. The major driver for the high operation cost as reported by the three facilities was the high and fluctuating prices of fuel. Increasing availability, lowering the price of these inputs and rehabilitation of building infrastructure, mill machines/equipment could help close needs gaps. As assessed, local flour production falls very short of producing at maximum capacity for flour required to meet demands across Idlib, Hama and Aleppo governorates with specific gaps across the following mills in sub-districts of Maaret Tamsrin (capacity shortfall of 36%), Al Bab (capacity shortfall of 24%) and Azaz (capacity shortfall of 23%). Rehabilitation support of these mills is required to improve the production capacity to grind more wheat to flour to supply bakeries. For instance, the Azaz sub-district mill is the only existing functional mill in its market catchment area supplying the highest number of bakeries (55) serving the highest population of 242 675 people. Thus, it is important to note that, due to the low number of mills with high output capacity, it is possible that even at full capacity the existing mill infrastructure is not sufficient to close the vast gap between local flour need and local flour production. The absence of mills in most sub-districts of Aleppo and Idlib governorates in northwest Syria is a potential barrier to meeting flour demands, and this could put northwest Syria region at higher risk for flour and bread shortages and food insecurity. Continuing conflict, especially shifting dynamics in the coming year, are likely to continue to have a significant impact on the wheat-to-bread infrastructure and supply lines in northwest Syria. As such, it is important for the humanitarian community to maintain the capacity to monitor the situation in a collaborated and coordinated way in order to respond to immediate crises and local needs for the wheat-flour to bread value chain. In an attempt to support this staple value chain of wheat-flour to bread, a number of humanitarian aid organizations are supporting different market actors in a less synergistic approach which may out-compete other local chain actors and get them out of viable agribusiness. **As an example, some humanitarian aid organizations are importing flour for their flour distribution interventions program. As much as such efforts are stabilizing the supply of staple bread in the market, however, it has contributed to some level in marginalizing local wheat farmers and local flour production. The present study**

recorded the request by local millers that there is need for a policy shift to restrict importation of flour which was reported to a threat to local milling production (Figure 13).

Silos

The majority of silos (87%) were destroyed by targeted bombing across northwest Syria. There are only two functional silos, one in Idleb and another in Aleppo governorates of northwest Syria: the Idleb silo and the Jarablus silo in Aleppo. Before the conflict, the wheat market was largely controlled by GoS, which set prices and volumes of wheat purchasing and silo storage. Since the conflict began, this role has been disrupted with silo operators procure wheat from farmers, wheat traders and non-Governmental Organization (NGOs). Surprisingly, was the absence of local councils in coordinating wheat supply to silos thereby resulting in silos accessing wheat supplies at exorbitant prices of over 50% as compared to the pre-conflict price of wheat. It is suggested to engage the Idleb silo for support for rehabilitation of the machines/equipment at an estimated cost of SYP 3.5m for this complex silo to attain its maximum capacity of 500 000 MT. The rehabilitation support of the complex silo of Idleb sub-district could be crucial since this silo was reported to have a market catchment area that covers three governorates, namely, Idleb, Hamas and Aleppo in northwest Syria.

7. Recommendations

Findings from both the facility mapping and the value chain assessment provided a solid base for designing project activities. Partners should work with each market actor in the value chain simultaneously, to ensure an inclusive impact on the value chain. Targeting one segment in the value chain will create new bottlenecks and will disrupt the production flow. iMMAP's assessments provide a detailed overall idea of the needs and processing capacity in the targeted area. However, inclusive market system approach requires more in-depth market analysis to quantify the supply and demand needs in the market. Moreover, implementing partners must be constantly adaptive to the changes in the market dynamic, which requires continuous monitoring along with activity implementation. The following are the main recommendation that can be taken from this assessment: :

Further studies

- Refining and repeating data collection on silo, mill, and bakery operations to further understand local context to improve gap and output estimates and allow for trend analysis to continuously inform project designs for the wheat-flour to bread interventions.
- Gathering additional information to understand the opportunities for increasing the capacity of local mills to meet a greater percentage of community needs by producing affordable flour.

Implications for programming

- Because current local production is not sufficient to meet flour demands, and much of that production is centralized in few mills across the Idleb and Aleppo governorates of northwest Syria, humanitarian partners in Syria must maintain ability for crisis-response flour distributions and strong contingency planning while sourcing local wheat and support the local chain actors of the wheat-flour to bread value chain.
- Wheat-flour to bread infrastructure/facilities retains high political significance as proved by many facilities destroyed through targeted bombing. Thus, any significant programming change should be accompanied by a contextual risk assessment.
- Concerning the bakery Support Program Expansion; prioritize the subdistricts with low regular bread coverage to increase the amount of regular bread to meet at least the needs of bread of PIN at subdistrict level.
- Establish new bakery or rehabilitate the bakeries in the sub-district that does not have any bakery.
- Work with local farmers to get the best utilization of local resources of wheat to meet the local needs of bread.
- Investing in using alternative power solutions to be introduced to the three types of facilities is a critical resilience enabling intervention that will directly contribute to lowering the cost of flour and bread production, which will eventually reflect on the bread prices in the market. A good example is the use of solar energy as reported by the two existing and functional silos in Idleb and Jarablus sub-districts.

- The privately owned and managed bakeries open a room for cost-sharing rehabilitation and supporting the local production of bread production inputs (wheat, flour, and yeast) is a sustainable approach to help the local population meeting its bread needs.
- Rehabilitation of the closed and operating facilities will raise the processing capacity in the region. This will allow the market to absorb more supply of wheat and flour in the future. However, such intervention needs to be carefully approached and must be sensitive to the competition between the different actors in the market. For example, the facility mapping assessment revealed that several bakeries closed because their competitors in the area were receiving free flour support and were able to produce bread in subsidized prices. This has reduced their market share and led to losing their customers to the supported bakeries. This risk can be mitigated by efficiently mapping the facilities in the market and conducting in-depth market analysis to better understand the need in each targeted area.
- To avoid marginalizing of local wheat production, it is recommended for aid agencies, to support the local production of wheat from then process it into flour in local mills. Such interventions will empower the local market and encourage actors not to abandon producing wheat and flour, humanitarian partners in northwest Syria could consider including incentivizing demand for local durum wheat and flour (e.g. subsidies, distributions, awareness sessions, purchasing wheat, vouchers) and therefore encouraging local production of flour and supporting local production of wheat. Such interventions will empower the local market and encourage actors not to abandon producing wheat and flour.
- Consider programming that encourages increased local flour production from local wheat production to mitigate risk of border closure as well as to avoid out-competing the chain actors (wheat-flour to bread value chain) due to imports of wheat and flour. Such imports of wheat and flour are not sustainable in the long-run.
- Engage implementing partners to conduct feasibility studies of flour-based interventions such as new mill/bakery construction, mill/bakery rehabilitation, mill/bakery machine/equipment procurement, and mill/bakery renovations, especially in areas where these facilities are critically absent but with high population of people.
- The significant number of facilities that were targeted by the conflict counterparts highlights the need for more work by the humanitarian actors to advocating for avoiding such kind of facilities by warring parties.