Online Appendix: Facing Displacement and a Global Pandemic: Evidence from a Fragile State

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A Appendix: Table and Figures

A.1 Appendix Tables

Table A.1: Definition of the Variables

Variable name	Variable definition
Displaced	Dummy variable. It takes one if the respondent answered yes to the question "Has your household been displaced from your municipality?" and it answered no to the question "Have you returned to your community of origin?". It takes zero otherwise.
Displaced less than 5 years ago	Dummy variable. It takes one if the respondent answered yes to the question "Has your household been displaced from your municipality?", it answered no to the question "Have you returned to your community of origin?", and declared that displacement occurred less than 5 years before the interview took place. It takes zero otherwise.
Displaced more than 5 years ago	Dummy variable. It takes one if the respondent answered yes to the question "Has your household been displaced from your municipality?", it answered no to the question "Have you returned to your community of origin?", and declared that displacement occurred more than 5 years before the interview took place. It takes zero otherwise.
Individual controls	
Gender	Dummy variable. It takes one if the head of the respondent's household is female. It takes zero otherwise.
Age	Age of the head of the respondent's household.
Age squared	Squared age of the head of the respondent's household.
Respondent is the household head	Dummy variable. It takes one if the respondent is the head of the household It takes zero otherwise.
High education	Dummy variable. It takes one if the highest level of education completed by the head of the respondent's household is the University. It takes zero otherwise.
Household controls	
Number of members of household	Number of people living in the respondent's household (including him/her).
Share of children under 5 years	Share of children under 5 years old living in the respondent's household.
Share of adults over 60 years	Share of children under 5 years old living in the respondent's household.
Rented house	Dummy variable. It takes one if the respondent indicated the option "Rented Home" when answering to the question "Which of the following living arrangements best describes your housing situation currently?". It takes zero otherwise.
Socio-Economic Status	
(Log) income	(Log) monthly income from any source.
Lack of food	Dummy variable. It takes one if the respondent declared that "someone in the household is currently engaging in any following behaviors due to a lack of food or have engaged in any of these behaviors within the last 12 months before the interview, but he/she cannot continue to do it: Spent savings; Reduced non-food expenditures; Borrowed money; Sold productive assets; Took an additional job; Reduced Health Expenditure; Begged; Engaged in illegal work; Sold house or land". It takes zero otherwise.
New debt in last three months	Dummy variable. It takes one if the respondent answered yes to the question "Has your household incurred new debts in the last three months to cover your basic needs?". It takes zero otherwise.
Works in the public sector	Dummy variable. It takes one if the respondent indicated the option "Public Administration and Defence; Compulsory Social Security" when answering to the question "What is the sector you currenlty work in?". It takes zero otherwise.

Received social transfers	Dummy variable. It takes one if the respondent answered yes to the question "Has your household or any of your household members benefited from the assistance from the Government, NGOs or other UN agencies during the past 6 months?". It takes zero otherwise.

Household health outcomes

COVID 19	Dummy Variable. It takes one if the respondent answered yes to the question "Did you or anyone in your household experienced COVID 19 since March 2020?". It taks zero otherwise.
Chronic disease	Dummy Variable. It takes one if the respondent answered yes to the question "Did you or anyone in your household experienced a chronic disease since March 2020?". It takes zero otherwise.
Infectious disease other than COVID 19	Dummy Variable. It takes one if the respondent answered yes to the question "Did you or anyone in your household experienced an infectious disease other than COVID 19 since March 2020?". It takes zero otherwise.
Mental disease	Dummy Variable. It takes one if the respondent answered yes to the question "Did you or anyone in your household experienced a mental disease since March 2020?". It takes zero otherwise.

COVID-19 impact

COVID19 had a negative

Economic impact	Dummy Variable. It takes one if the respondent indicated the option "Economic and Financial impact" when reporting how COVID-19 negatively affected his/her well being. It takes zero otherwise.
Health impact	Dummy Variable. It takes one if the respondent indicated the option "Health impact" when reporting how COVID-19 negatively affected his/her well being. It takes zero otherwise.

Baladiya characteristics

Night lights per km^2

	Average (log) value of night lights observed in a distance radius of 20 km from the centroid of the respondent's Baladiya of residence in the 12 months before the interview took place. Data source: Visible Infrared Imaging Radiometer Suite (VIIRS).
Number of conflict events in Baladiya	Average (log) number of conflicts registered in a distance radius of 20 km from the centroid of the respondent's Baladiya of residence in the 12 months before the interview took place. Conflict events are defined as: Battles, Explosions/Remote violence, Riots, Violence against civilians, Looting/property destruction. Data source: the Armed Conflict Location & Event Data (ACLED) project.

Source: Libya 2021 High-Frequency Phone Survey Social Protection (HFS-SP)

Displacement status, economic activity, and COVID-19 Table A.2 and A.3 indicate that there is no evidence that the pandemic in Libya has a differential effect across types of occupation and sectors of employment. Together with the results reported in Table **??**, these findings suggest that it is unlikely that the reported higher negative economic effect of the pandemic for IDPs is related to their type of occupation or sector of employment.

Table A.2: Displacement Status, Type of Occupation, and COVID-19

Dependent Variable:	Someone in the household experienced COVID-19		
	(1)	(2)	(3)
Displaced	0.0014	0.0075	0.0085
	(0.0349)	(0.0369)	(0.0365)
Night lights per km^2			-0.0136
			(0.0085)
Number of conflict events in Baladiya			-0.0120
			(0.0184)
Agricultural, forestry and fishery laborer	0.0346	0.0313	0.0263
(1= Yes, 0 = No)	(0.0597)	(0.0603)	(0.0583)
Armed forces officer or other ranks	-0.0371	-0.0299	-0.0297
(1= Yes, 0 = No)	(0.0273)	(0.0276)	(0.0268)
Cleaner and helper	-0.0856**	-0.0427	-0.0257
(1= Yes, 0 = No)	(0.0305)	(0.0321)	(0.0311)
Clerical support worker	-0.0174	-0.0089	-0.0071
(1= Yes, 0 = No)	(0.0471)	(0.0424)	(0.0442)
Craft and related trade worker	-0.0260	-0.0294	-0.0287
(1= Yes, 0 = No)	(0.0279)	(0.0267)	(0.0265)
Food preparation assistant	0.0200	0.0245	0.0278
(1= Yes, 0 = No)	(0.1265)	(0.1263)	(0.1269)
Laborer in mining, construction, etc.	0.0033	0.0005	-0.0005
(1= Yes, 0 = No)	(0.0506)	(0.0519)	(0.0500)
Manager	0.0414	0.0279	0.0260
(1= Yes, 0 = No)	(0.0291)	(0.0266)	(0.0265)
Other	-0.0002	0.0007	-0.0006
(1= Yes, 0 = No)	(0.0177)	(0.0184)	(0.0173)
Plant and machine operator and assembler	-0.1003***	-0.0200	-0.0192
(1= Yes, 0 = No)	(0.0077)	(0.0115)	(0.0117)
Professional	0.0995	0.1017	0.1090
(1= Yes, 0 = No)	(0.1111)	(0.0988)	(0.0931)
Service and sale worker	-0.0728**	-0.0252	-0.0286
(1= Yes, 0 = No)	(0.0287)	(0.0181)	(0.0223)
Skilled agricultural, forestry, and fishery worker	-0.0350	-0.0335	-0.0321
(1= Yes, 0 = No)	(0.0430)	(0.0463)	(0.0457)
Street and related sale and service	-0.1116***	-0.0256	-0.0314
(1= Yes, 0 = No)	(0.0269)	(0.0319)	(0.0347)
Technician and associate professional	0.1889	0.1940	0.1983
(1= Yes, 0 = No)	(0.1533)	(0.1415)	(0.1441)
Individual and HH controls	No	Yes	Yes
Mantika of residence FE	Yes	Yes	Yes
Dependent Variable: Average Value	0.0946	0.0946	0.0946
R^2	0.1355	0.1541	0.1604
Number of observations	2257	2257	2257

Note: Estimated coefficients are reported along with robust standard errors (in parentheses). Standard errors are clustered by Mantika of residence using the wild cluster bootstrapt procedure proposed by Cameron et al. (2008), number of bootstraps: 1000. *, **, *** indicate statistical significance at the 10, 5 and 1 percent level.

Table A.3: Displacement Status, Sector of Employment, and COVID-19

Dependent Variable:	Someone in the household experienced COVID-19		
	(1)	(2)	(3)
Displaced	0.0034	0.0120	0.0128
	(0.0360)	(0.0387)	(0.0382)
Night lights per km^2			-0.0122
			(0.0085)
Number of conflict events in Baladiya			-0.0083
			(0.0201)
Agriculture and Hunting (1= Yes, 0 = No)	0.0166	0.0125	0.0082
	(0.0481)	(0.0489)	(0.0467)
Construction (1= Yes, 0 = No)	0.0040	0.0070	0.0066
	(0.0420)	(0.0400)	(0.0424)
Education (1= Yes, 0 = No)	0.0395	0.0310	0.0304
	(0.0256)	(0.0239)	(0.0237)
Electricity, Gas and Water supply (1= Yes, 0 = No)	0.0646	0.0692	0.0710
	(0.0497)	(0.0495)	(0.0485)
Extra-Territorial Organizations and Bodies (1= Yes, 0 = No)	-0.0382	-0.0269	-0.0273
	(0.0384)	(0.0434)	(0.0428)
Financial Intermediation (1= Yes, 0 = No)	-0.0169	-0.0268	-0.0267
	(0.0324)	(0.0375)	(0.0376)
Fishing (1= Yes, 0 = No)	-0.1027***	-0.0358	-0.0350
	(0.0145)	(0.0282)	(0.0291)
Health and Social Work (1= Yes, 0 = No)	0.0916	0.0818	0.0803
	(0.0632)	(0.0628)	(0.0639)
Hotels and Restaurants (1= Yes, 0 = No)	0.1336	0.1287	0.1231
	(0.1108)	(0.1154)	(0.1118)
Manufacturing (1= Yes, 0 = No)	-0.1134***	-0.0292	-0.0261
	(0.0141)	(0.0161)	(0.0169)
Mining and Quarrying (1= Yes, 0 = No)	0.1650	0.1483	0.1421
	(0.1618)	(0.1510)	(0.1550)
Other Community, Social and Personal Service Activities (1= Yes, 0 = No)	-0.0628**	-0.0672**	-0.0670**
	(0.0221)	(0.0243)	(0.0229)
Public Administration and Defence; Compulsory Social Security (1= Yes, 0 = No)	-0.0860***	-0.0584**	-0.0577**
	(0.0237)	(0.0244)	(0.0254)
Real Estate, Renting and Business Activities (1= Yes, 0 = No)	-0.0179	-0.0106	-0.0114
	(0.0246)	(0.0257)	(0.0245)
Transport, Storage and Communications (1= Yes, 0 = No)	-0.0119	-0.0094	-0.0101
	(0.0306)	(0.0300)	(0.0293)
Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods (1= Yes, 0 = No)	-0.0782***	-0.0247	-0.0244
	(0.0172)	(0.0165)	(0.0148)
Individual and HH controls	No	Yes	Yes
Mantika of residence FE	Yes	Yes	Yes
Dependent Variable: Average Value	0.0946	0.0946	0.0946
R^2	0.1510	0.1661	0.1706
Number of observations	666	666	666

Note: Estimated coefficients are reported along with robust standard errors (in parentheses). Standard errors are clustered by Mantika of residence using the wild cluster bootstrap-t procedure proposed by Cameron et al. (2008), number of bootstraps: 1000. *, **, *** indicate statistical significance at the 10, 5 and 1 percent level.

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Displacement Status and Type of Health Facility Used Table A.4 shows that the type of health facility where IDPs seek care does not explain our main result: IDPs are not different from the host population as for where they look for health care.

Table A.4: Displacement Status and Type of Health Facility Used

Dependent Variable	Seek care in							
	Public hospital		Private hospital		Health center		Pharmacy	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Displaced	0.0306	0.0100	-0.0190	-0.0022	-0.0181	-0.0071	-0.0178	-0.0226
	(0.0304)	(0.0285)	(0.0352)	(0.0364)	(0.0377)	(0.0378)	(0.0436)	(0.0464)
Night lights per km^2		0.0290		0.0628		0.0094		-0.1446**
		(0.0484)		(0.0495)		(0.0500)		(0.0655)
No. of conflict events in Baladiya		0.1180		-0.1557*		-0.0052		0.0367
		(0.1242)		(0.0920)		(0.1286)		(0.1025)
Individual and HH controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Diseases controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mantika of residence FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
0.0325	0.0325	0.0497	0.0497					
R^2	0.0633	0.1031	0.0918	0.1148	0.0550	0.0717	0.0387	0.0658
Number of observations	584	584	584	584	584	584	584	584

Note: Estimated coefficients are reported with robust standard errors. Standard errors are clustered by Mantika of residence using the wild cluster bootstrap-t procedure proposed by Cameron et al. (2008), number of bootstraps: 1000. All other variables are defined in Table **??**.

A.2 Appendix Figures

The time line of the COVID-Pandemic in Libya March 2020 - May 2021 Figure A.1 shows the most important moments in the evolution of the COVID-19 pandemic in Libya during our period of analysis, namely March 2020 - May 2021.

Figure A.1: Time line of the COVID-19 pandemic in Libya
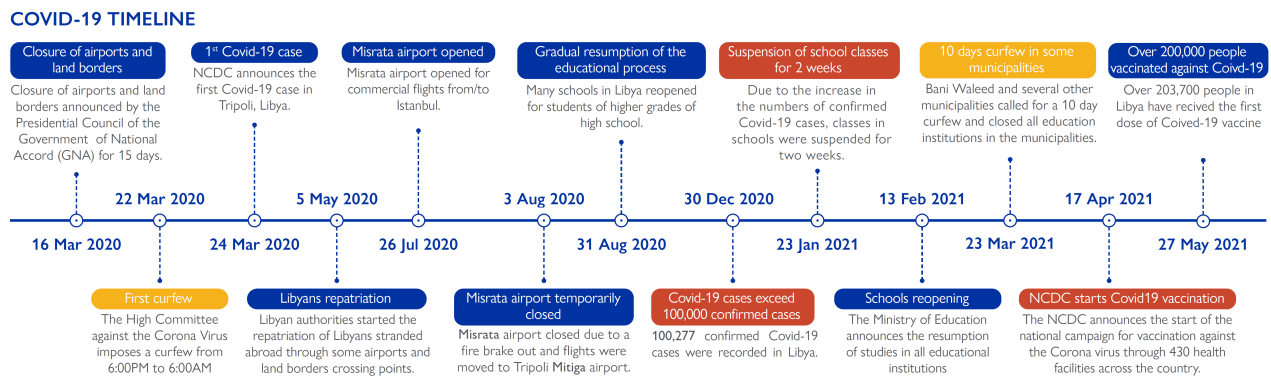
Note: (IOM, 2021a).

COVID-19 and vaccination in the North African region Figure A.2 shows data on COVID cases and vaccination in a sample of North African countries, including Libya. According to World Health Organization (WHO) records (WHO, 2021), Libya recorded a cumulative number of over 390 thousand confirmed cases and 5,750 deaths as per January 2022. These figures correspond to almost 5,700 cases per 100 thousand resident population and 830 deaths per 1 million population. As shown in Figure A.2 (left panel), WHO data indicate that Libya is the second hardest hit country in the North African region preceded only by Tunisia, which experienced a larger but still similar incidence of cases (almost 6,200 cases per 100 thousand population) and a substantially higher mortality rate (2,100 deaths per 1 million population). In contrast, Morocco recorded approximately 2,600 cases per 100 thousand population, and Algeria and Egypt were at 500 and 380, respectively. Figure A.2 (right panel) shows data on vaccination in Libya and in Norther Africa countries. Data show that Libya is lagging behind in terms of vaccination. In January 2022, Libya displays the lowest share of fully vaccinated citizens (12.6 per 100 population) in the region, a value which is close to the level of Algeria (12.8) but well below Egypt (23), Tunisia (51) and Morocco (62.4).

Figure A.2: COVID-19 in Libya and other Northern African countries
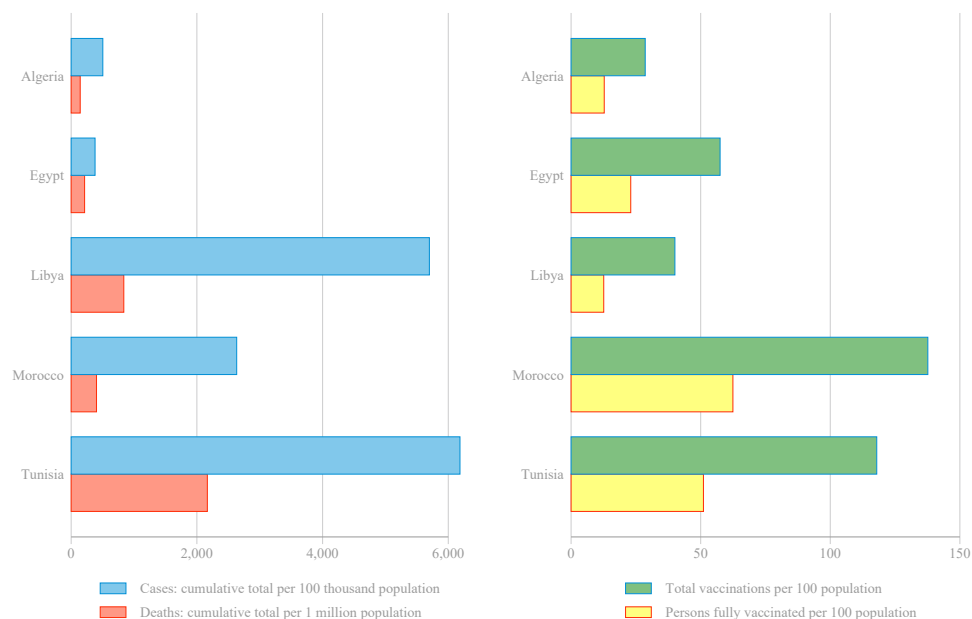
Note: Authors' elaborations on data from the WHO Coronavirus (COVID-19) Dashboard (data accessed on the 10th of January 2022).

B   Appendix: Survey methodology

The survey was conducted from April 6, 2021, to April 19, 2021 using phone-based data collection. For the implementation of the survey, the project relied on the infrastructure developed by the World Food Programme for its Mobile Vulnerability Analysis and Mapping (mVAM). The mVAM survey approach allows for a wide geographic coverage over a shorter period. However, the amount of information is limited by using short questionnaires administered by phone.

Despite limitations, phone surveys have demonstrated their ability to collect high-quality data. Their agility and ability to collect data rapidly without the need for personal presence by an enumerator makes phone surveys a valuable tool for specific situations, such as emergencies, dangerous situations, or situations in which the respondent is mobile (Hoogeveen and Lopez-Acevedo, 2021). While data are regularly reported by government agencies in high-income countries, a similar data infrastructure does not exist in most developing countries, even less in conflict-affected ones. This is why development economists resorted to phone surveys in developing countries as the primary method of collecting data during the pandemic (Miguel and Mobarak, 2021). Two main limitations inherent to conducting phone surveys need to be taken into account. First, groups with limited network coverage or no access to phones, mainly the poorest segment of the population, will be under-covered in the sample. Second, indicators that are measured at the individual level will be biased due to respondent selection Bundervoet et al. (2021). Smart phone ownership is common for Libyan populations, which reduces the likelihood of this being a barrier for the targeted groups (REACH, 2021).

The sample was drawn from a subscriber phone database from a Libyan telecom company based on respondents' location information (Mantikas). All respondents were randomly selected by stratified random sampling from the Mantikas of consideration based on their population shares. Within each stratum, respondents were selected using a simple random sample. Calls were made by the Libyan Bureau of Statistics and Census (LBSC) staff at the LBSC offices using phone lines provided by the telecom company.

The survey was administered with a median duration of 40 minutes. Due to the absence of a sampling frame of individuals, the high-frequency phone survey is not nationally representative. Instead, the survey reflects the results of respondents randomly selected from all 22 Mantikas, where spatial distributions of sampled respondents follow the same spatial distribution of individuals in the country.

Only Libyan nationals who are at least 18 years of age were eligible for selection. Calls made to respondents not meeting these requirements were terminated. A total of 2,297 call attempts were made, of which about 2 percent were made to ineligible respondents. These respondents include those who did not consent to the interview or non-Libyan citizens. After data cleaning, the final sample size is 2,257 respondents randomly selected from all the 22 administrative units (*Mantikas*). The *mantikas* with the highest number of respondents are Tripoli, Benghazi, and Misrata, which make up 42 percent of the total sample (see Figure B.1).

Figure B.1: Distribution of interviewed individuals in Libya
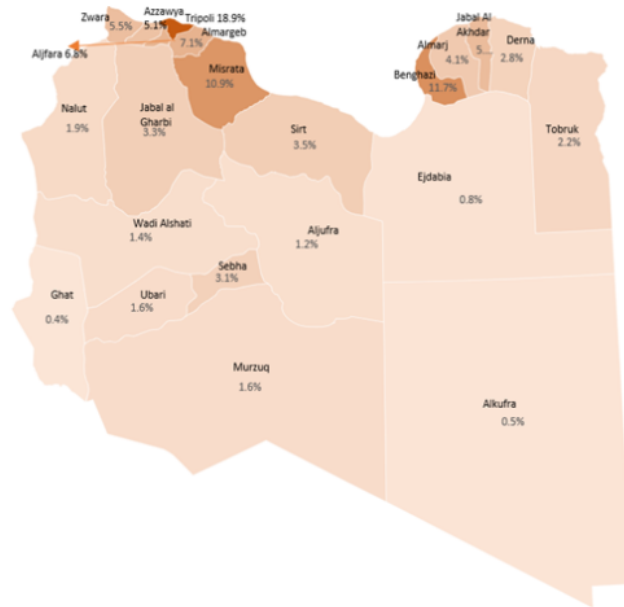
Note: Authors' calculation using HFS-SP 2021

To validate our sample, we conducted different checks against the few other existing sources of data on the size and geographical distribution of the Libyan population and on the number and location of IDPs in the country.

To begin, Table B.1 shows that the distribution of respondents at the Mantika level in our sample closely resembles that of the Libyan population as provided by the Libyan Bureau of Statistics.

In terms of the distribution of IDPs in the Libyan territory, our sample is also comparable to those from the only two other surveys conducted in the country after the beginning of the pandemic. The first one is IOM (IOM, 2021b). The top 3 Mantikas for the number of IDPs in our survey are the same as in this survey. Moreover, the correlation between the Mantika-level distribution of IDPs in our sample and in the IOM data for the same period is 0.88.

The only other source of data on displaced individuals in Libya in 2020 is provided by REACH (2021). The correlation between the Mantika-level sample composition in terms of host, displaced, and returnee individuals between our sample and the REACH one is 0.66.[1]

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[1]In August 2020, REACH conducted a quantitative phone-based data collection including non displaced, internally displaced persons (IDPs), returnees. The sample includes 6061 individuals (REACH, 2021).

Table B.1: Survey stratification by Mantika

	Mantika	Population	Population proportion	Proportion phone numbers (sampling)	Sampled data	Proportion sampled data
1	Tobruk	202,064	3%	3%	50	2%
2	Derna	206,809	3%	3%	63	3%
3	Al Jabal Al Gharbi	367,461	5%	4%	75	3%
4	Al Marj	162,266	2%	4%	92	4%
5	Benghazi	849,66	12%	12%	263	12%
6	Ejdabia	212,363	3%	3%	18	1%
7	Alkufra	56,727	1%	1%	11	0%
8	Sirt	151,33	2%	2%	78	3%
9	Aljufra	59,875	1%	1%	28	1%
10	Misrata	676,706	10%	10%	247	11%
11	Almargeb	536,255	8%	8%	160	7%
12	Tripoli	1,220,712	18%	19%	426	19%
13	Aljfara	551,111	8%	8%	154	7%
14	Azzawya	365,11	5%	5%	114	5%
15	Zwara	360,769	5%	5%	125	6%
16	Al Jabal Al Akhdhar	242,804	4%	5%	132	6%
17	Nalut	109,484	2%	2%	42	2%
18	Sebha	168,249	2%	2%	69	3%
19	Wadi Al Shatii	95,563	1%	1%	31	1%
20	Ubari	92,444	1%	1%	35	2%
21	Maszak	94,609	0%	1%	35	2%
22	Ghat	28,346	0%	0%	9	0%
	Total	6,810,717	100%	100%	2,257	100%

Source: Libyan Bureau of Statistics (LBSC) and 2021 Libya High-Frequency Phone Survey Social Protection (HFS-SP)

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