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# BMJ Open

## A rapid assessment of health system impact of COVID-19 on selected urban slum population of Bangladesh: from the perspective of health service providers and users

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## 24 ABSTRACT

25 **Objective** We aimed to rapidly assess the health systems impact of COVID-19 in the urban  
26 slums of Bangladesh.

27 **Design, Setting, and Participants** A cross-sectional survey with 476 households was conducted  
28 during October-December 2020 in five selected urban slums of Dhaka North, Dhaka South, and  
29 Gazipur city. In-depth interviews with purposively selected 22 slum dwellers and key informant  
30 interviews with 16 local healthcare providers and 4 policymakers and technical experts were also  
31 conducted.

32 **Outcome measures** The impact of the pandemic on the health systems was explored considering  
33 the WHO defined six building blocks. Descriptive and systematic framework approaches were  
34 applied to analyse the quantitative and qualitative data, respectively.

35 **Results** About 12% of members suffered from general illness and 25% reported chronic illness.  
36 Over 80% sought healthcare and majority sought care from informal healthcare providers. 39%  
37 of the recently delivered women sought healthcare in three months period. An overall reduction  
38 in healthcare use was reported during lockdown period compared to pre-pandemic time.  
39 Mismanagement and inefficient use of resources were reported as challenges of health financing  
40 during the pandemic. Health information sharing was inadequate at the urban slums resulting  
41 from the lack of community and stakeholder engagement (51% received COVID-19 related  
42 information, 49% of respondents knew about the national hotline number for COVID-19  
43 treatment). Shortage of human resources for health was reported to be acute during the pandemic  
44 resulting from the shortage of specialist doctors and uneven distribution of health workforce.  
45 COVID-19 test was inadequate due to the lack of adequate test facilities and stigma associated  
46 with COVID-19. Lack of strong leadership and stakeholder engagement was seen as the barriers  
47 to effective pandemic management.

48 **Conclusion** The findings of the current study are expected to support the government in tailoring  
49 interventions and allocating resources more efficiently and timely.

### 50 **Strengths and limitations of this study**

- 51 • This study will be the first study that explored the impact of COVID-19 and the resulting  
52 country-wide lockdown on the urban health system of Bangladesh through the WHO  
53

54 defined six building blocks (i.e., service delivery, health workforce, health information  
55 system, essential medicine, health financing, leadership/governance).

- 56 • The greatest strength of the study is that it took a holistic approach in exploring the health  
57 system impact of COVID-19 on urban slum dwellers taking into account data from  
58 community members, healthcare providers, and policymakers.
- 59 • This study was exploratory in nature, which did not allow us to make any causal inference.
- 60 • The study utilized the ongoing Urban Health and Demographic Surveillance System  
61 (UHDSS) of icddr,b for its sampling frame, which may be representative of Dhaka division  
62 but it would be more difficult to generalize the results to slums in other parts of the country.
- 63 • Response bias might exist in this study since data were collected over the phone, which is  
64 unable to capture insights related to sensitive issues like stigma.

## 66 INTRODUCTION

67 In March 2020, COVID-19 was declared as a pandemic by the World Health Organization  
68 (WHO) pointing to the sustained risk of further global spread [1]. To contain the spread of the  
69 virus, “stay-at-home” orders or lockdowns were deployed across the world including Bangladesh  
70 [2,3]. Being a developing country, the impact of this pandemic in Bangladesh was likely diverse  
71 and multisectoral. The impact on access to healthcare has been acute with challenges including  
72 fear of COVID-19 infection at health facilities [4,5]and economic hardship due to job loss or pay  
73 cut [6–9].

74 The health sector in Bangladesh is under-budgeted and the per-capita expenditure on health from  
75 the government have been low, around 27% of the total health expenses (THE), [10] where the  
76 out-of-pocket expenses (OOPE) have remained the major source of healthcare financing  
77 (constituting 74% of THE) [11]. The health service delivery in the country suffers chronically  
78 from a lack of adequate human resources, supplies, medicines, and governance. For acute  
79 illnesses, most people sought healthcare from unqualified, informal healthcare providers e.g.  
80 drug stores, chambers of village doctors [12–14]. The challenges are even greater in urban  
81 settings where access to healthcare is more complex in absence of strong public sector primary  
82 healthcare (PHC) provision. In contrast, in rural areas, there is a strong network of PHC centers  
83 run by the Ministry of Health and Family Welfare, in the urban areas PHC falls within the remit  
84 of the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC).

85 MLGRDC does not have the same kind of PHC network, and PHC in urban settings is fractured  
86 and uncoordinated, with the poor linkage between the various levels of health service delivery  
87 [15].

88 The impact of this weak urban health system mostly affects the low-income population, the  
89 majority of whom live in the urban informal settlements (slums). Additionally, there are public  
90 health concerns specific to the urban slums owing to overcrowding, unhygienic waste  
91 management, and pollution [16]. With the outbreak of COVID-19, an air-borne disease, the  
92 health systems impact was expected to be the greatest amongst the population of the urban slums  
93 [17]. In addition, the ongoing economic shutdown caused by COVID-19 threatened millions of  
94 livelihoods engaged in the informal sector with little or no financial protection for healthcare  
95 [18]. Unfortunately, almost 18 months into the pandemic, there remains a paucity of information  
96 about the nature and the extent of the impact, of the pandemic on health services in the urban  
97 slums. Given the nature of the spread of the disease, it is essential to understand whether and  
98 how COVID-19 affects the utilization of health services and OOPE during the pandemic.  
99 Understanding this is particularly important if the Universal Health Coverage lead, to leave no  
100 one behind, is to be taken seriously. Timely rapid assessments of the impact on the vulnerable  
101 groups can support the government and policymakers to design and implement efficient  
102 response plans. The current paper thus aims to assess the health systems impact of COVID-19  
103 urban slums dwellers in Dhaka city.

## 105 **METHODOLOGY**

### 106 **Conceptual framework**

107 We explored the impact of COVID-19 and the resulting country-wide lockdown on the urban  
108 health system of Bangladesh through the lens of WHO's six health systems' building blocks  
109 (i.e. service delivery, health workforce, health information system, essential medicine, health  
110 financing, leadership/governance)[19]. We explored how far health services were accessible  
111 and available to the urban slum population; challenges faced by the urban healthcare  
112 providers and the viewpoint of health policymakers towards healthcare provision in urban  
113 slums of Dhaka city during the pandemic. Figure 1 illustrates the impact pathway guiding the  
114 study.

115

(Figure 1 to be inserted here)

### Study design and setting

An exploratory study design applying both quantitative and qualitative approaches was used. The quantitative approach included a cross-sectional household survey. The survey was conducted among the adult male and female household members aged between 18 and 80 years of an existing Urban Health and Demographic Surveillance System (UHDSS) of icddr,b. The UHDSS covers about 31,577 households in five slums of Dhaka North, South, and Gazipur City-Corporations [20]. The qualitative approach included In-depth Interviews (IDI) with adult male and female slum dwellers, Key Informant Interviews (KII) with healthcare providers providing healthcare to slum dwellers, and with national-level health policymakers.

### Sample size

A recent study conducted in the urban slums of Dhaka, Bangladesh found that 41% of the respondents had an unwillingness to attend regular health services fearing COVID-19 infection and unavailability of doctors [21]. We assumed that 50% of the slum population will, for similar reasons, not utilize formal healthcare during the COVID-19 pandemic for general illnesses. Using this proportion ( $p=0.5$ ), with 95% confidence level and 5% precision level, an estimated 384 households were required for interview. Assuming a 10% non-response rate and 1.2 design effect for five slums, 512 households were selected from the database of UHDSS. However, 476 households were finally interviewed (response rate 93%). For qualitative data, a total of 22 IDIs with purposively selected male ( $n=10$ ) and female ( $n=12$ ) slum dwellers and 20 KIIs with purposively selected local healthcare providers ( $n=16$ ) and national level policymakers ( $n=4$ ) were conducted.

### Data collection

The household survey was conducted in five slums of UHDSS namely, Korail, Mirpur, Ershednagar, Shampur, and Dholpur from 31<sup>st</sup> October till 1<sup>st</sup> December 2020. We interviewed the respondents over the phone since the face-to-face interview was not feasible during the pandemic. During their routine data collection, the UHDSS surveillance workers took verbal consent over the phone from the households and health care providers regarding their participation in the current study. Only households agreeing to share their mobile numbers were



1  
2  
3 148 included in the sampling frame for the survey. Household survey data was collected using an  
4  
5 149 Android-based electronic questionnaire. Qualitative interviews with community members, health  
6  
7 150 care providers, and national level policy planners were conducted by phone till 15<sup>th</sup> January  
8  
9 151 2021.

10 152

### 11 12 153 **Study instrument**

13 154 Trained data collectors administered a pre-tested household survey in Bangla. Respondents were  
14  
15 155 provided BDT 200 [USD 2.37] using a mobile financial service compensating for their time  
16  
17 156 spent participating in the study. The survey collected information on household members' latest  
18  
19 157 episode of general illness, healthcare-seeking behaviour, and expenditure during the 14 days  
20  
21 158 preceding the survey and respondents' access to COVID-19 related information, 90 days  
22  
23 159 preceding the survey for Maternal, Newborn and Child Health (MNCH) services, and 12 months  
24  
25 160 preceding the survey for one major chronic illness e.g., Diabetes, Arthritis, Asthma,  
26  
27 161 Cardiovascular disease, and Hypertension. The IDIs with the slum dwellers explored their access  
28  
29 162 to healthcare during pandemic, information related to COVID-19, and challenges they faced in  
30  
31 163 accessing healthcare. The KIIs with the healthcare providers and the policymakers sought their  
32  
33 164 opinion and suggestions about the seven out of eight pillars of health system preparedness to  
34  
35 165 respond to the COVID-19 pandemic including (1) coordination, planning, and monitoring; (2)  
36  
37 166 risk communication and community engagement (3) surveillance, rapid response, and case  
38  
39 167 investigation; (4) Laboratories; (5) infection prevention and control; (6) case management; (7)  
40  
41 168 operational support and logistics [22].

### 41 170 **Statistical analysis**

42  
43 171 The characteristics of households and respondents are presented as categorical variables with  
44  
45 172 frequency (n) and percentage (%). The median OOPE is presented in BDT [USD 1=BDT 83].  
46  
47 173 Health service utilization, source of care, and OOPE have been compared with the findings from  
48  
49 174 previous urban health surveys and health surveillance data. Quantitative analyses were  
50  
51 175 performed using Stata, version 14 [23].

52 176 A systematic framework approach was used for analyzing the qualitative data. On completion of  
53  
54 177 an IDI or KII, verbatim transcriptions were made. The transcripts were then read carefully and  
55  
56 178 matched with the records to determine missing information and divided under different themes

179 and codes. We generated a matrix using the categories derived from different themes and  
180 subthemes. The findings under each main theme, subthemes, or category were presented for the  
181 identification of key areas of interest. Triangulation of information was done for validating the  
182 findings obtained from different sources.

183

## 184 **Patient and public involvement**

185 Patients or the public were not involved in the design, or conduct, or reporting, or dissemination  
186 plans of our research.

187

## 188 **RESULTS**

### 189 **Socio-demographic and economic information of study households and their members**

190 We surveyed 476 households with a total of 2,140 members. The proportion of male and female  
191 members was almost equal. About 32% of household members had no education. More than half  
192 of the members were married (53%). About 67% of members were currently unemployed. The  
193 highest proportion of the members belonged to the poorest-quintile (27%) and about 21%  
194 belonged to the richest asset quintile (Table 1).

195

196 **(Table 1 to be inserted here)**

197

### 198 **Impact of COVID-19 on Urban Health Systems**

#### 199 **Health service delivery**

##### 200 *Healthcare utilization*

201 About 12% of the members suffered from general illness in the last 14-days preceding the survey  
202 and 83% of them recovered from their illness by the day of the interview (Table 2). The majority  
203 suffered from cough (33%), followed by fever (32%), pain/chest pain (12%), and diarrhoea  
204 (4%). About 90% of those reporting illnesses, sought healthcare mostly from the local drug  
205 stores (64%) followed by private hospitals (16%), and public hospitals (14%).

206

207 **(Table 2 to be inserted here)**

208

209 About 25% of individuals aged 40 years and above reported suffering from a chronic illness  
210 (Table 3). Most of them suffered from Diabetes (24%) followed by Arthritis (20%), Asthma  
211 (16%), Cardiovascular (13%), and Hypertension (9%). About 80% regularly sought treatment for  
212 chronic illness. More than half of the members with chronic illness (56%) had received treatment  
213 in the 3 months preceding the interview. Local drug stores were again the major source of  
214 treatment (46%). About 37% of the members suffering from chronic illness did not seek care due  
215 to financial constraints and around 18% refrained from seeking care due to fear of COVID-19  
216 infection.

217  
218 **(Table 3 to be inserted here)**  
219

220 During the qualitative interviews, the respondents also spoke about more services utilization  
221 during the pandemic compared to other times. Patients with COVID-19 like symptoms feared  
222 being identified and stigmatized as COVID patients and referral to high-cost health facilities for  
223 treatment if they were seeking treatment at a formal health facility. The cost of formal healthcare  
224 was also an important deciding factor for using informal providers.

225  
226 *During the first two months, I received many patients with different health problems along with*  
227 *breathing difficulties. We usually suggest general drugs for breathing difficulty. (drug vendor,*  
228 *KII-2)*

229  
230 Among the mothers who utilized healthcare in the year preceding the survey, 39% of them  
231 sought healthcare in three months period (Table 4). Of the 27 mothers reporting MNCH care  
232 utilization about half reported using antenatal care (ANC), 30% used delivery care, and 21%  
233 reported utilizing postnatal care (PNC) services. The majority of the ANC services were sought  
234 from private facilities and NGO clinics. Eight out of total 10 deliveries reported were normal  
235 deliveries of which about 38% (n=3) took place at home. Whereas seven out of ten (70%)  
236 deliveries were institutional of which about 29% (n=2) were Caesarean section and the majority  
237 of them took place at private facilities (n=4). PNC services were availed only by those who had  
238 institutional deliveries.

239

240 (Table 4 to be inserted here)

241

### 242 *Healthcare provision*

243 An overall reduction in healthcare utilization was reported by urban healthcare providers during  
244 the pandemic compared to pre-pandemic period. From the healthcare providers, we found that  
245 the number of home deliveries in urban slums of Dhaka city increased and the number of normal  
246 deliveries also increased at the facilities. Many mothers tried to deliver their babies at home with  
247 assistance from traditional birth attendants but came to the facilities when TBAs could not help.

248

249 *Normal delivery at our hospital decreased during lockdown. We learned that they (pregnant*  
250 *women) tried to have normal delivery at home. They fell at risk. Traditional birth attendants are*  
251 *not trained to manage complications. We dealt with mothers who experienced complications*  
252 *after home delivery during lockdown. (Physician, KII-7)*

253

### 254 *Challenges in health service delivery during pandemic*

255 In the context of COVID-19, both service recipients and service providers faced challenges in  
256 accessing and providing services. Respondents from the community spoke about reduced hours  
257 of the formal health facilities, shortage of doctors as they were deployed to manage the  
258 pandemic, unavailability of specialists as they stopped attending, lack of physical examination  
259 and requirement of COVID tests were some of the major barriers to access healthcare during  
260 pandemic.

261 The health care providers talked about the lack of a triage system at the health facilities to  
262 identify patients with COVID-19 symptoms, an (initial) shortage of Personal Protective  
263 Equipment (PPE), challenges in maintaining proper safety measures, an increased workload, and  
264 stress among the major challenges they faced in providing healthcare during the pandemic.

265

### 266 *Healthcare financing*

267 In terms of budget allocated to manage the pandemic, the policymaker and the technical expert  
268 group members mentioned that the government with support from development partners were  
269 able to mobilize resources to manage the pandemic. However, there were challenges in ensuring

270 efficient use of the resources. The inefficiency was more visible in Dhaka city where the  
271 pandemic response strategy was rather rapid but unplanned. As mentioned by one respondent:

272  
273 *In Dhaka city, there was urgency and thus there was mismanagement. As we heard, people*  
274 *involved in the ministry of health and family welfare tried to release the fund which was in each*  
275 *of the operation plans of different departments, and they could do it. Later the government*  
276 *received funds from the donor agency. This was enough resource for the health sector..... It will*  
277 *not be correct to say resource shortage hindered the implementation of activities to manage the*  
278 *pandemic. (technical expert, KII-19)*

279  
280 During discussions about the reasons for inefficiency related to spending existing resources,  
281 respondents talked about existing government financial rules as an important barrier for rapid  
282 spending of money during the pandemic. As one respondent said:

283  
284 *A lot of money was misused ...you must have read in newspapers during pandemic.... I am not*  
285 *sure whether it was adequate or not but there was not any lack of funds. To some extent, they*  
286 *could not spend money due to the financial rules... There is tremendous political pressure.... The*  
287 *physicians do not understand finance. The administrative officers/clerks of DGHS prepare and*  
288 *manage those..... (technical expert, KII-17)*

### 289 290 *Out of pocket expense for healthcare during pandemic*

291 The median total OOPE per patient for treating general illness was BDT 315 in the 14-day  
292 preceding the survey. About 96% of the care seekers required medicine for which the median  
293 expenditure on medicine was BDT 300. In the three months preceding of survey, the median  
294 OOPE for chronic illness was BDT 1,750. For MNCH care-related expenditure in the 3 months  
295 preceding the survey, we found that 16 eligible mothers who took ANC incurred a median OOPE  
296 of BDT 1,220. Most of the expenditure was related to medical components e.g., medicine,  
297 diagnostic, etc. The median OOPE for delivery (n=10) was BDT 4,360. Total seven mothers who  
298 took PNC services had a median OOPE of BDT 760 (Figure 2).

299  
300 **(Figure 2 to be inserted here)**

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3 301  
4  
5 302 Health information on COVID-19 prevention, management and treatment  
6  
7 303 Around 51% of the respondents mentioned receiving COVID-19 related messages in the 30 days  
8  
9 304 preceding the survey. The rest reported not receiving any message. 51% of the respondents were  
10  
11 305 not aware of the national hotline number that provides COVID-19 related treatment through  
12 306 telemedicine (**Table 5**).

13 307  
14  
15 308 **(Table 5 to be inserted here)**  
16  
17 309

18 310  
19  
20 311 Television was the major source of COVID-19 related information for respondents (75%)  
21 312 followed by neighbors (6.5%) and social media (5.5%). (Figure 3).  
22  
23 313

24 314 **(Figure 3 to be inserted here)**  
25  
26 315

27 316 The lack of access to COVID-19 related information in the general population was also reported  
28  
29 317 by the members of national technical committee for COVID-19 (KII respondents). The  
30  
31 318 respondents mentioned that, although the government took several prevention initiatives, many  
32  
33 319 of them were not effectively implemented. The experts from the technical committee concluded  
34  
35 320 that engaging community in prevention, health education and awareness-raising, to contain the  
36  
37 321 spreading of the virus, was important; however, the government initiative to engage the  
38  
39 322 community was inadequate. This was in contrast to the government officials we interviewed.  
40  
41 323 One respondent said:

42 324  
43  
44 325 *“DG health is not so active in engaging community in preventive intervention but they are*  
45 326 *working. Bureau of health communication is also working with NGOs in this regard. However,*  
46 327 *this is not enough for effective engagement of community in pandemic management.”(technical*  
47  
48 328 *expert, KII-19)*  
49  
50 329



1  
2  
3 330 Health workforce

4  
5 331 Our findings indicate that the existing shortage of human resources in health in Bangladesh  
6  
7 332 became more acute in both public and private health facilities during the pandemic. This was due  
8  
9 333 to the unavailability of senior physicians to attend general patients during the lockdown period  
10  
11 334 and the re-assignment of physicians to attend COVID-19 patients. One respondent said:

12 335  
13  
14 336 “[The] Majority of the senior, experienced and specialized physicians did not attend patients.  
15  
16 337 Frontline health workers had to face the battle.” (technical expert, KII-18)

17 338  
18  
19 339 Deployment of human resources to tackle COVID-19 patients also resulted in a shortage of HR  
20  
21 340 in service delivery areas for general patients. The respondents also expressed their concern about  
22  
23 341 the concentration of doctors and nurses in Dhaka city to deal with the burden of the pandemic.  
24  
25 342 One respondent said:

26 343  
27  
28 344 Government has taken some good initiatives in response to Covid-19. You know the government  
29  
30 345 has recruited and deployed more than 2000 physicians and many other health staff on an urgent  
31  
32 346 basis. But there has been a problem in posting those physicians. The physicians have not been  
33  
34 347 posted at places where they are originally planned for. Due to political pressure or the influence  
35  
36 348 of Civil surgeons, many of them have been placed in urban areas or district level. (technical  
37  
38 349 expert, KII-17)

39 350  
40  
41 351 Safety of both patients and healthcare providers was another source of concern expressed. They  
42  
43 352 highlighted the absence of a triage system at the entry point of health facilities to be a major  
44  
45 353 obstacle in ensuring patient and provider safety from COVID-19 infection. One respondent said:

46 354  
47  
48 355 “In our facility, two staff members had been infected and we all had to go for isolation for 14  
49  
50 356 days. Therefore, there was no one to operate our facility. People have not received any treatment  
51  
52 357 from our facility at that time.” (Physicians, KII-1)

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60 358

359 Moreover, the respondents stated that there was a lack of a standard incentive package from the  
360 government to cover the health risks faced by frontline health workers, which led to discontent  
361 among the health workers.

362

### 363 Medical products and technologies

364 The respondents from the slums stated that access to existing COVID-19 test facilities was  
365 challenging for the urban slum dwellers due to the long waiting hours to get tested at public  
366 facilities which were affordable for them and the high cost of the testing at the private facilities.

367

368 *Many of our patients do not want to do the Corona test. The private diagnostic facilities have*  
369 *high charges for the test which the poor patients cannot afford. It is true that testing at public*  
370 *facilities is a hassle. Many of our patients shared their experience that they have to stand in a*  
371 *long queue and wait for a long time to get tested and then the reports take a long time. One*  
372 *patient told me that he received his report after 15 days of giving sample. (healthcare provider,*  
373 *KII-1)*

374

375 There was, moreover, a general lack of interest among slum dwellers to get tested because of the  
376 stigma associated with testing positive for COVID-19 and the accompanying fear of losing one's  
377 job.

378

379 *They do not want to go for doing Covid-19 test. If we refer them, they do not want to go because*  
380 *they fear that the hospital will admit him and will not allow him to meet with his family members.*  
381 *Community people would avoid him after knowing that he got infected. Thus, they do not want to*  
382 *do the test. (healthcare provider, KII-04)*

383

384 Moreover, according to the technical experts who were interviewed, the limited number of  
385 testing facilities resulted in limited availability of tests in the early stages of the pandemic. Not  
386 only there were fewer testing centers, but also the slum dwellers were not aware of the testing  
387 centers. One of the technical experts held the view that:

388



1  
2  
3 389 *“The lower-class people always experience discrimination. They are always deprived and in*  
4 *terms of getting Covid-19 related health services, they have been deprived.”* (technical expert,  
5 390  
6 KII-17)  
7 391

8 392

### 9 393 Leadership/ governance

10 394 A lack of strong leadership and strategic planning at the central level of the government was  
11 identified as one of the major health system challenges during the pandemic by the technical  
12 395  
13 experts. Centralization of decision-making was seen as a barrier to the timely allocation and use  
14 396  
15 of resources in managing local challenges posed by the pandemic. One respondent said:  
16 397

17 398

18 399 *“All decisions are made by one or two people. The WHO suggested involving all people in*  
19 *relevant sectors in order to fight with the pandemic. This is not possible for the ministry of health*  
20 400  
21 *independently. Not all divisions of the government were involved. Things could have been*  
22 401  
23 *different if all sectors worked together.”* (technical expert, KII-19)  
24 402  
25

26 403

## 27 404 DISCUSSION

28 405 The study findings highlight the effect of the COVID-19 pandemic and the resulting country-  
29 406  
30 wide lockdown on the health systems of Bangladesh from the perspective of health service users  
31 407  
32 and providers in urban slums, as well as policymakers and members of the national technical  
33 408  
34 committee on COVID-19. The impact on the six different building blocks of health systems is  
35 409  
36 presented in the study [19].  
37

38 410 Before pandemic, a study conducted in urban slums of Dhaka city in 2017 reported that 93% of  
39 411  
40 patients suffering from chronic illness [20]. Findings from our study showed that healthcare  
41 412  
42 seeking was adversely affected in the urban slums during the pandemic, particularly for patients  
43 413  
44 suffering from chronic illness (37% lower). The lower use of ANC, PNC, general outpatient  
45 414  
46 services, and immunization services was also reported in a study conducted by USAID [24].  
47

48 415 One important finding is the rise in the demand for informal healthcare providers during the  
49 416  
50 pandemic period by slum dwellers; consistent with the finding of other studies conducted in  
51 417  
52 similar settings[25,26]. The utilization of health services provided by formal health facilities was  
53 418  
54 limited during this time due to such issues as shortened service hours, lack of physicians,  
55 419  
56 COVID-19 test requirements at the hospitals, and financial constraints. Two other studies also  
57

1  
2  
3 420 reported that financial constraints and fear of COVID-19 infection acting as barriers to accessing  
4  
5 421 healthcare [27,28]. Unfortunately, the increased use of informal healthcare providers including  
6  
7 422 the traditional birth attendants puts patients at higher risk of malpractice. Healthcare providers  
8  
9 423 from the NGO-run clinics reported dealing with complicated maternity cases that had been  
10  
11 424 unsuccessfully managed by unskilled providers.

12 425 The health system also faced challenges from the limited supplies including PPE, shortage of  
13  
14 426 human resources, lack of screening mechanism to isolate COVID-19 patients from general  
15  
16 427 patients, and the workload and stress of healthcare providers. Due to the lack of a triage system  
17  
18 428 at the entry point of health facilities in urban areas, the healthcare providers and general patients  
19  
20 429 were always at risk of getting infected. The vulnerability of frontline healthcare providers during  
21  
22 430 the pandemic has also been reported elsewhere [25,29]. In an effort to protect both patients and  
23  
24 431 healthcare providers the system could benefit from establishing an easier triage system at the  
25  
26 432 entry point of all health facilities to separate patients presenting with COVID-19 like symptoms  
27  
28 433 from the rest. In addition, for certain health conditions, the use of remote healthcare through  
29  
30 434 telehealth services could prove to be crucial in ensuring that patients get healthcare without  
31  
32 435 compromising their own safety or that of the healthcare providers'. The national telehealth  
33  
34 436 service, Shastho Batayon (16263), was in operation during the pandemic; however, its reach was  
35  
36 437 found to be limited in the urban slums with only 49% of slum dwellers knowing about the  
37  
38 438 service.

39 439 Earlier studies have shown community engagement to be a crucial part of many health initiatives  
40  
41 440 [30,31] including initiatives for the management of communicable diseases [32] and maternal  
42  
43 441 and child health conditions [33]. More recently community engagement has been considered as a  
44  
45 442 fundamental component during outbreaks, such as the Ebola epidemic in 2014-2015 in West  
46  
47 443 Africa [34,35]. There was an overall lack of penetration of government initiatives for raising  
48  
49 444 awareness within the urban slum areas and 49% of the respondents mentioned not receiving any  
50  
51 445 COVID-19 related information in the three months preceding the survey. This could be  
52  
53 446 explained by the low level of community engagement activities of the government in managing  
54  
55 447 the pandemic. In managing the COVID-19 pandemic, the urban health system needed to have  
56  
57 448 expanded programs to engage community members effectively. In its absence, it is difficult to  
58  
59 449 ensure universal coverage of services. Studies published on COVID-19 have also highlighted the  
60  
61 450 importance of community engagement for COVID-19 prevention and control [30,36,37].

1  
2  
3 451 The health system of Bangladesh suffers chronically from a shortage of human resources for  
4 452 health [38]. This shortage became more acute during the pandemic when a higher number of  
5 453 doctors had to be placed at COVID-19 specialized hospitals to manage the sudden surge in cases.  
6  
7 454 As a consequence, there was a lack of adequate healthcare providers to treat general patients at  
8  
9 455 other health facilities. Furthermore, for their personal safety, and being among the high-risk  
10 456 group for COVID-19, senior and specialized doctors stopped providing services or switched to  
11 457 teleconsultation during the pandemic. In some places, service hours were shortened. In  
12 458 combination, these changes to the health system hindered access to routine care and in many  
13 459 cases delayed healthcare seeking for patients in urban Dhaka. The lack of physicians or general  
14 460 patients during pandemic has also been reported elsewhere [24,25].

15  
16 461 Delayed healthcare-seeking has far-reaching health implications which can lead to increased  
17 462 complications and required longer and more intensive treatment. This is expected to have both  
18 463 health and financial consequence on the population. The government of Bangladesh deployed an  
19 464 additional 2,500 doctors and 5,000 nurses on as an ad hoc, rapid response to the pandemic [39].  
20 465 It started in June 2020, which assisted the health system to gradually resume the other essential  
21 466 health services in the country.

22 467 According to the findings, healthcare financing for pandemic management in Bangladesh  
23 468 suffered more from inefficient planning and implementation rather than the lack of available  
24 469 funds. The urgent requirement for fund disbursement, the centralized financial management, the  
25 470 lack of efficient fund allocation mechanism during an emergency, and political influence all  
26 471 hindered the efficient use of available resources to manage the pandemic. From a user's  
27 472 perspective, the average OOPE for acute illness was found to be BDT 350 per patient which was  
28 473 higher than the average OOP for urban slum dwellers reported in a study conducted in the pre-  
29 474 pandemic period (BDT 280 per patient)[20]. This higher OOP may be attributable to the  
30 475 unavailability of formal healthcare providers during the COVID-19 period and increased  
31 476 referrals to the higher-cost formal providers. In order to ensure the financial protection of slum  
32 477 dwellers, the social safety net programs of the government should be extended to include the  
33 478 urban slum population. Health protection schemes need to be developed and implemented to  
34 479 ensure universal health coverage during and after the pandemic.

35  
36 480 According to the technical experts interviewed, the urban health system was not adequately  
37 481 equipped to deal with the pandemic. Initially, there were very few test centres for COVID-19,

1  
2  
3 482 although these increased over time. The public test centres were affordable and were  
4  
5 483 overwhelmed with patients, resulting in long waiting times. The private centres were easier to  
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7 484 access but unaffordable for the urban slum dwellers. In addition to the cost and time  
8  
9 485 considerations, the study identified stigma associated with COVID-19 to be a major reason for a  
10  
11 486 lack of interest in testing among the slum dwellers of Dhaka city. Earlier studies conducted on  
12  
13 487 the urban poor population of Bangladesh have reported lower test rates among lower  
14  
15 488 socioeconomic classes and the stigma associate with COVID-19 discouraging people from  
16  
17 489 getting tested [25,26].

18  
19 490 Finally, the study findings highlighted some challenges and loopholes in the national planning  
20  
21 491 that would require interventions from the various levels of the government and civil society. The  
22  
23 492 study identified a lack of coordination between the stakeholders from different sectors of the  
24  
25 493 health system (e.g., public, private, NGOs) as a major challenge in managing the pandemic [40].  
26  
27 494 Although NGOs with their extensive engagement at the grassroots level took up independent  
28  
29 495 initiatives to support the urban slum dwellers during the pandemic [26,41], their engagement in  
30  
31 496 the planning and implementation of government initiatives was negligible. Furthermore, the lack  
32  
33 497 of coordination between the different departments of urban health has been a long-standing  
34  
35 498 challenge for the urban health system [42].  
36  
37 499

## 38 500 **CONCLUSIONS**

39 501 The health system of Bangladesh is overburdened. Therefore, good governance and leadership  
40  
41 502 are needed in managing urban health during this pandemic. The adverse effect of the pandemic  
42  
43 503 has been acute on the health system which warrants the need for effective planning and sustained  
44  
45 504 investment in building a resilient health system for the country, particularly the urban health  
46  
47 505 system. The government of Bangladesh and other developing countries should take initiatives to  
48  
49 506 document all challenges of the health system faced during the pandemic and the best practices to  
50  
51 507 overcome the challenges. This will eventually help develop an effective pandemic preparedness  
52  
53 508 plan that is contextualized for the country settings and prepares the health system to tackle future  
54  
55 509 health emergencies.  
56  
57 510

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2  
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7  
8  
9

10 515  
11  
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15  
16  
17 519

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22  
23  
24 524

25  
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28  
29  
30 527

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32  
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34 529

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36  
37  
38 531

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42  
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44 535

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654 **List of tables**655 **Table 1** Background characteristics of household members (N=2140)

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Age in years</b>		
≤14	631	29.5
15-29	682	31.9
30-39	349	16.3
40-49	224	10.5
50-59	131	6.1
≥60	123	5.8
<b>Sex</b>		
Male	1,064	49.7
Female	1,076	50.3
<b>Education Level</b>		
No education	680	31.8
Primary	701	32.8
Secondary and above	759	35.5
<b>Occupation</b>		
Currently unemployed	1,442	67.38
Service holder	261	12.20
Businessman	115	5.37
Informal worker	299	13.97
Others	23	1.07
<b>Marital Status</b>		
Married	1,130	52.8
Unmarried	776	36.3
Others	234	10.9
<b>Regular earning person</b>		
Yes	499	23.3
No	1,641	76.7
<b>Household income group in last 30 days</b>		
No income	546	25.5
≤ 8000	352	16.5
8001-14000	557	26.0
14001-20000	362	16.9
>20000	323	15.1
<b>Asset quintiles</b>		
Poorest	572	26.7
2nd	279	13.0
3rd	405	18.9
4th	433	20.2
Richest	451	21.1

656

658 **Table 2** Healthcare utilization for general illness or symptoms in 14 days

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Suffered from general illness or symptoms</b>		
Yes	251	11.7
No	1,889	88.3
<b>Has the person recovered now?</b>		
Yes	207	82.5
No	44	17.5
<b>Self-reported illness/symptoms</b>		
Cough	83	33.1
Fever	81	32.3
Pain/chest pain	31	12.4
Diarrhoea	11	4.4
Skin disease	10	4.0
Weakness	6	2.4
Shortness of breath	5	2.0
Injury/fractured	5	2.0
Others (e.g., vomiting, worms)	19	7.6
<b>Did the person receive any treatment?</b>		
Yes	227	90.4
No	24	9.6
<b>Reason not to receive any treatment (multiple response)</b>		
The problem was not critical	14	51.9
Financial constraints	8	29.6
Didn't sure about receiving treatment due to COVID-19	3	11.1
Others	5	7.4
<b>How long after the onset of illness was treatment sought?</b>		
The day the person got sick	27	11.9
One day later	114	50.2
Two days later	52	22.9
Three or more days later	34	15.0
<b>Source of healthcare utilization.</b>		
Drug stores	145	63.9
Private hospitals	37	16.3
Public hospitals	31	13.7
NGO hospitals	5	2.2
Others (e.g., homeopathic)	9	4

659

660 **Table 3** Chronic illness and healthcare utilization among the households' members aged 40 and  
 661 above

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Suffered any chronic illness</b>		
Yes	120	25.1
No	358	74.9
<b>Type of chronic disease</b>		
Diabetes	29	24.2
Arthritis	24	20.0
Asthma	19	15.8
Cardiovascular disease	16	13.3
Hypertension	11	9.2
Psychological disorder	4	3.3
Chronic Ovarian disease	3	2.5
Liver disease	3	2.5
Others (e.g., Gastric, prolonged injury)	11	9.2
<b>Have to take regular treatment for this disease.</b>		
Yes	96	80.0
No	24	20.0
<b>Sought treatment for this disease in last 3 months</b>		
Yes	67	55.8
No	53	44.2
<b>Reasons to not take treatment (multiple response)</b>		
The problem was not critical	28	41.8
Financial constraint	25	37.3
Due to COVID-19	12	17.9
Others (e.g., no accompanying person)	3	3.0
<b>Source of healthcare utilization.</b>		
Public hospital	15	22.4
Private hospital	18	26.9
drug store	31	46.3
Others (e.g., homeopathic)	3	4.5

662

663 **Table 4** Utilization of maternity care (child delivery and pregnancy-related)

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Sought maternity healthcare last year (delivery and pregnancy-related)</b>		
Yes	69	13.4
No	445	86.6
<b>Sought maternity healthcare in last three months (delivery and pregnancy-related)</b>		
Yes	27	39.1
No	42	60.9
<b>Reasons to not take treatment (multiple response)</b>		
The problem was not critical	36	73.5
Financial constraint	7	14.3
Due to COVID-19 didn't take treatment	3	6.1
Others (e.g.,)	3	6.1
<b>Maternity care received in last 3 months (multiple services)</b>		
ANC	16	48.5
Delivery	10	30.3
PNC	7	21.2
<b>Number of ANC</b>		
Less or equal to 3 times	12	75.0
4 times plus	4	25.0
<b>Source of ANC care</b>		
Public hospital	1	6.3
Private hospital	7	43.8
NGO hospital	7	43.8
Others (e.g., trained birth attendant)	1	6.3
<b>Type of delivery</b>		
Normal delivery	8	80.0
Cesarean delivery	2	20.0
<b>Place of delivery</b>		
Home delivery	3	30.0
Institutional delivery	7	70.0
<b>Source of delivery care</b>		
Public hospital	2	28.5
Private hospital	4	57.1
NGO hospital	1	14.3
<b>Number of PNC</b>		
1 time	4	57.1
More than 1 times	3	42.9
<b>Source of PNC</b>		
Public hospital	2	28.6
Private hospital	3	42.9
NGO hospital	1	14.3
Others	1	14.3

664

665 **Table 5** Knowledge about access to COVID-19 related information

Variables	Yes; n (%)	No; n (%)
Do you have access to quarantine facility nearby your house/ workplace?	94 (19.8)	382 (80.25)
Did you receive any message on COVID-19 prevention and treatment?	244 (51.26)	232 (48.74)
Do you know any hotline number to contact in case of any symptoms of you or others?	234 (49.16)	242 (50.84)

666

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1  
2  
3 668 **List of figures**

4  
5 669 **Figure 1** Health system impact of COVID-19 on urban slum dwellers

6  
7 670 **Figure 2** Median out-of-pocket expenditure for healthcare

8  
9 671 **Figure 3** Source of information on COVID-19  
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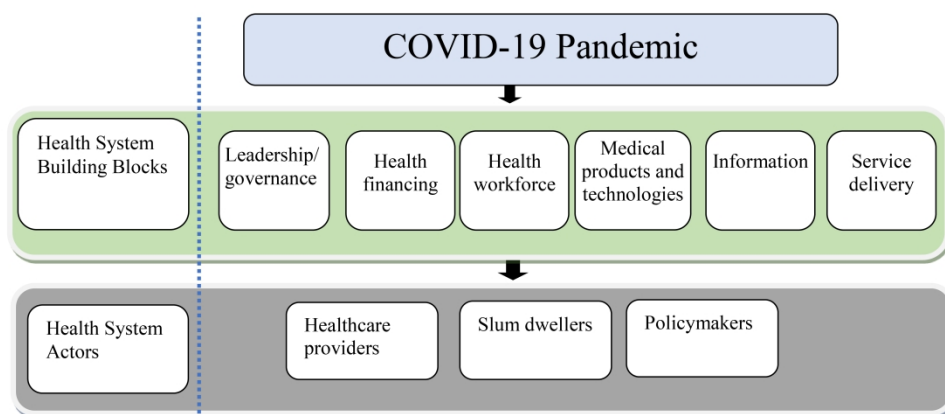


Figure 1 Health system impact of COVID-19 on urban slum dwellers

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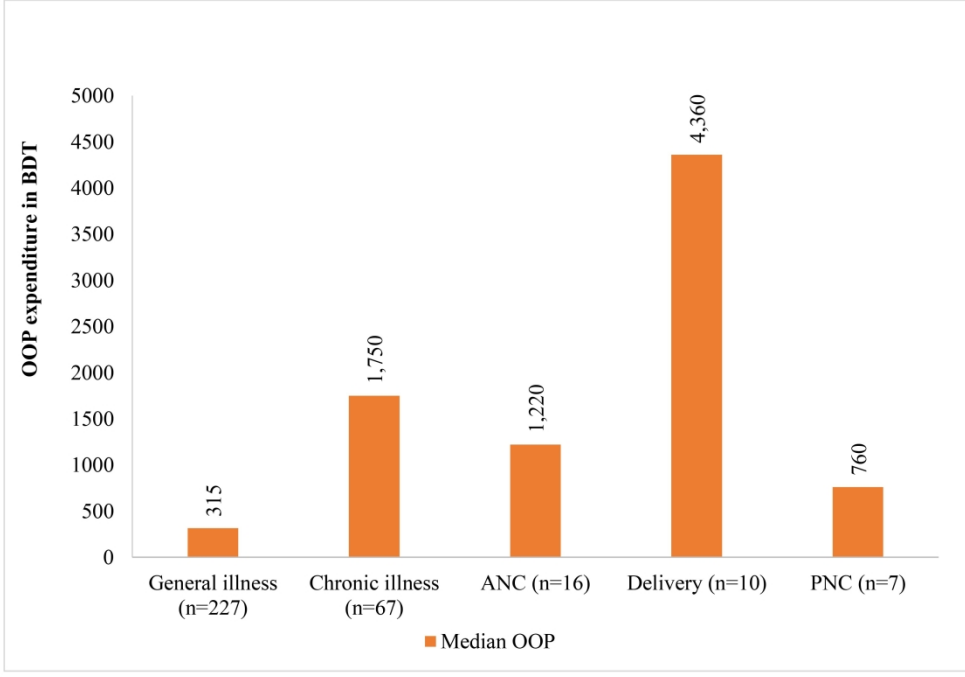


Figure 2 Median out-of-pocket expenditure for healthcare  
314x217mm (300 x 300 DPI)

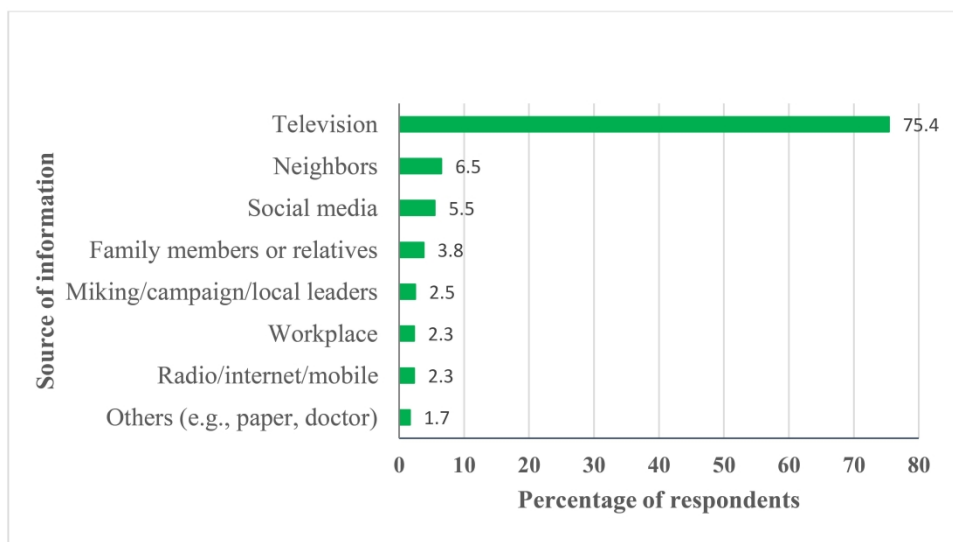


Figure 3 Source of information on COVID-19

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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-11
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	

		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14 - 17
Generalisability	21	Discuss the generalisability (external validity) of the study results	
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## Health system impact of COVID-19 on urban slum population of Bangladesh: a mixed-method rapid assessment study

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1 **Title.** Health system impact of COVID-19 on urban slum population of Bangladesh: a mixed-  
2 method rapid assessment study

3  
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## 24 ABSTRACT

25 **Objective** We aimed to rapidly assess the health system impact of COVID-19 in the urban slums  
26 of Bangladesh.

27 **Design, Setting, and Participants** A cross-sectional survey among 476 households was conducted  
28 during October-December 2020 in five selected urban slums of Dhaka North, Dhaka South, and  
29 Gazipur City Corporation. In-depth interviews with purposively selected 22 slum dwellers and key  
30 informant interviews with 16 local healthcare providers and 4 policymakers and technical experts  
31 were also conducted.

32 **Outcome measures** Percentage of people suffering from general illness, percentage of people  
33 suffering from chronic illness, percentage of people seeking healthcare, percentage of people  
34 seeking maternal care, health system challenges resulting from COVID-19.

35 **Results** About 12% of members suffered from general illness and 25% reported chronic illness.  
36 Over 80% sought healthcare and the majority sought care from informal healthcare providers. 39%  
37 of the recently delivered women sought healthcare in three months period. An overall reduction in  
38 healthcare use was reported during the lockdown period compared to pre-pandemic time.  
39 Mismanagement and inefficient use of resources were reported as challenges of health financing  
40 during the pandemic. Health information sharing was inadequate at the urban slums resulting from  
41 the lack of community and stakeholder engagement (51% received COVID-19 related information,  
42 49% of respondents knew about the national hotline number for COVID-19 treatment). Shortage  
43 of human resources for health was reported to be acute during the pandemic resulting from the  
44 shortage of specialist doctors and uneven distribution of the health workforce. COVID-19 test was  
45 inadequate due to the lack of adequate test facilities and stigma associated with COVID-19. Lack  
46 of strong leadership and stakeholder engagement was seen as the barriers to effective pandemic  
47 management.

48 **Conclusion** The findings of the current study are expected to support the government in tailoring  
49 interventions and allocating resources more efficiently and timely during a pandemic.

### 50 **Strengths and limitations of this study**

- 51 • The greatest strength of the study is that it took a holistic approach in exploring the health  
52 system impact of COVID-19 on urban slum dwellers taking into account data from  
53 community members, healthcare providers, and policymakers.  
54



- 55 • The study was a rapid assessment capturing insights on health system impact of COVID-19  
56 which allowed timely evidence generation during a pandemic.
- 57 • One of the limitations of the study is it was exploratory in nature, which did not allow making  
58 any causal inference.
- 59 • The study utilized the ongoing Urban Health and Demographic Surveillance System  
60 (UHDSS) of icddr,b for its sampling frame, which may be representative of Dhaka division  
61 but it would be more difficult to generalize the results to slums in other parts of the country.
- 62 • The study was conducted over phone which could introduce response bias in terms of  
63 capturing sensitive issues like stigma.

## 65 INTRODUCTION

66 In March 2020, COVID-19 was declared as a pandemic by the World Health Organization (WHO)  
67 pointing to the sustained risk of further global spread [1]. To contain the spread of the virus, “stay-  
68 at-home” orders or lockdowns were deployed across the world including Bangladesh [2,3]. Being  
69 a developing country, the impact of this pandemic in Bangladesh was likely diverse and  
70 multisectoral. The impact on access to healthcare has been acute with challenges including fear of  
71 COVID-19 infection at health facilities [4,5]and economic hardship due to job loss or pay cut [6–  
72 9].

73 The health sector in Bangladesh is under-budgeted and the per-capita expenditure on health from  
74 the government have been low, around 27% of the total health expenses (THE), [10] where the  
75 out-of-pocket expenses (OOPE) have remained the major source of healthcare financing  
76 (constituting 74% of THE) [11]. The health service delivery in the country suffers chronically from  
77 a lack of adequate human resources, supplies, medicines, and governance. For acute illnesses, most  
78 people sought healthcare from unqualified, informal healthcare providers e.g. drug stores,  
79 chambers of village doctors [12–14]. The challenges are even greater in urban settings where  
80 access to healthcare is more complex in absence of strong public sector primary healthcare (PHC)  
81 provision. In contrast, in rural areas, there is a strong network of PHC centers run by the Ministry  
82 of Health and Family Welfare, in the urban areas PHC falls within the remit of the Ministry of  
83 Local Government, Rural Development and Cooperatives (MLGRDC). MLGRDC does not have  
84 the same kind of PHC network, and PHC in urban settings is fractured and uncoordinated, with  
85 the poor linkage between the various levels of health service delivery [15].

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2  
3 86 The impact of this weak urban health system mostly affects the low-income population, the  
4 87 majority of whom live in the urban informal settlements (slums). Additionally, there are public  
5 88 health concerns specific to the urban slums owing to overcrowding, unhygienic waste  
6 89 management, and pollution [16]. With the outbreak of COVID-19, an air-borne disease, the health  
7 90 systems impact was expected to be the greatest amongst the population of the urban slums [17]. In  
8 91 addition, the ongoing economic shutdown caused by COVID-19 threatened millions of livelihoods  
9 92 engaged in the informal sector with little or no financial protection for healthcare [18].  
10 93 Unfortunately, almost 18 months into the pandemic, there remains a paucity of information about  
11 94 the nature and the extent of the impact, of the pandemic on health services in the urban slums.  
12 95 Given the nature of the spread of the disease, it is essential to understand whether and how  
13 96 COVID-19 affects the utilization of health services and OOPE during the pandemic.  
14 97 Understanding this is particularly important if the Universal Health Coverage lead, to leave no one  
15 98 behind, is to be taken seriously. Timely rapid assessments of the impact on the vulnerable groups  
16 99 can support the government and policymakers to design and implement efficient response plans.  
17 100 The current paper thus aims to assess the health systems impact of COVID-19 urban slums  
18 101 dwellers in Dhaka city.

## 102 **METHODOLOGY**

### 103 **Conceptual framework**

104  
105 We explored the impact of COVID-19 and the resulting country-wide lockdown on the urban  
106 106 health system of Bangladesh through the lens of WHO's six health systems' building blocks  
107 107 (i.e. service delivery, health workforce, health information system, essential medicine, health  
108 108 financing, leadership/governance)[19]. We explored how far health services were accessible  
109 109 and available to the urban slum population; challenges faced by the urban healthcare providers  
110 110 and the viewpoint of health policymakers towards healthcare provision in urban slums of Dhaka  
111 111 city during the pandemic. Figure 1 illustrates the impact pathway guiding the study.

112  
113 **(Figure 1 to be inserted here)**

### 114 115 **Study design and setting**

116 An exploratory study design applying both quantitative and qualitative approaches was used. The  
117 117 quantitative approach included a cross-sectional household survey. We used the sampling frame

1  
2  
3 118 of an existing Urban Health and Demographic Surveillance System (UHDSS) of icddr,b. The  
4  
5 119 UHDSS covers about 31,577 households in five slums of Dhaka North, South, and Gazipur City-  
6  
7 120 Corporations [20]. We conducted interviews with adult male and female members (aged between  
8  
9 121 18 and 80 years) of the randomly selected household of the UHDSS. The inclusion criteria were  
10  
11 122 “households that are covered under the UHDSS in the selected slums”, “households that have an  
12  
13 123 active mobile phone number”, and “households that were residing at the study slum during  
14  
15 124 COVID1-19 pandemic and were interested to participate to our study”. Whereas, the exclusion  
16  
17 125 criteria included “households that are not included in UHDSS”, “households that don’t have an  
18  
19 126 active mobile phone number”, “households that left the slums before or at the beginning of  
20  
21 127 pandemic and was not interested to participated in our study”.

22 128 The qualitative approach included In-depth Interviews (IDI) with adult male and female slum  
23  
24 129 dwellers, Key Informant Interviews (KII) with healthcare providers providing healthcare to slum  
25  
26 130 dwellers, and with national-level health policymakers.

### 131 132 **Sample size**

133 A recent study conducted in the urban slums of Dhaka, Bangladesh found that 41% of the  
134  
135 134 respondents had an unwillingness to attend regular health services fearing COVID-19 infection  
136  
137 135 and unavailability of doctors [21]. We assumed that 50% of the slum population will, for similar  
138  
139 136 reasons, not utilize formal healthcare during the COVID-19 pandemic for general illnesses. Using  
140  
141 137 this proportion ( $p=0.5$ ), with 95% confidence level and 5% precision level, an estimated 384  
142  
143 138 households were required for interview. Assuming a 10% non-response rate and 1.2 design effect  
144  
145 139 for five slums, 512 households matching the inclusion criteria were selected from the database of  
146  
147 140 UHDSS. However, 476 households were finally interviewed (response rate 93%). For qualitative  
148  
149 141 data, a total of 22 IDIs with purposively selected male ( $n=10$ ) and female ( $n=12$ ) slum dwellers  
150  
151 142 and 20 KIIs with purposively selected healthcare providers ( $n=16$ ) from local drug stores and  
152  
153 143 public healthcare facilities, and national level policymakers ( $n=4$ ) were conducted.

### 144 145 **Data collection**

146 The household survey was conducted in five slums of UHDSS namely, Korail, Mirpur, Shyampur,  
147  
148 147 Dholpur and Ershadnagar from 31<sup>st</sup> October till 1<sup>st</sup> December 2020. We interviewed the  
149  
150 148 respondents over the phone since the face-to-face interview was not feasible during the pandemic.

1  
2  
3 149 During their routine data collection, the UHDSS surveillance workers took verbal consent over the  
4  
5 150 phone from the households and health care providers regarding their participation in the current  
6  
7 151 study. Only households agreeing to share their mobile numbers were included in the sampling  
8  
9 152 frame for the survey. Household survey data was collected using an Android-based electronic  
10  
11 153 questionnaire. Qualitative interviews with community members, health care providers, and  
12  
13 154 national level policy planners were conducted by phone till 15<sup>th</sup> January 2021.  
14  
15 155

### 156 **Study instrument**

157 Trained data collectors administered a pre-tested household survey in Bangla. Respondents were  
158 provided BDT 200 [USD 2.37] using a mobile financial service compensating for their time spent  
159 participating in the study. The survey collected information on household members' latest episode  
160 of general illness, healthcare-seeking behaviour, and expenditure during the 14 days preceding the  
161 survey and respondents' access to COVID-19 related information, 90 days preceding the survey  
162 for Maternal, Newborn and Child Health (MNCH) services, and 12 months preceding the survey  
163 for one major chronic illness e.g., Diabetes, Arthritis, Asthma, Cardiovascular disease, and  
164 Hypertension. The IDIs with the slum dwellers explored their access to healthcare during  
165 pandemic, information related to COVID-19, and challenges they faced in accessing healthcare.  
166 The KIIs with the healthcare providers and the policymakers sought their opinion and suggestions  
167 about the seven out of eight pillars of health system preparedness to respond to the COVID-19  
168 pandemic including (1) coordination, planning, and monitoring; (2) risk communication and  
169 community engagement (3) surveillance, rapid response, and case investigation; (4) Laboratories;  
170 (5) infection prevention and control; (6) case management; (7) operational support and logistics  
171 [22]. During the data collection phase of the study the national COVID-19 vaccination programme  
172 was yet to initiate in the country which limited the scope of the current study to comment on all  
173 but one pillar (i.e. vaccination) of health system preparedness.

### 175 **Statistical analysis**

176 The characteristics of households and respondents are presented as categorical variables with  
177 frequency (n) and percentage (%). The median OOPE is presented in BDT [USD 1=BDT 83].  
178 Health service utilization, source of care, and OOPE have been compared with the findings from

179 previous urban health surveys and health surveillance data. Quantitative analyses were performed  
180 using Stata, version 14 [23].

181 A systematic framework approach was used for analyzing the qualitative data. On completion of  
182 an IDI or KII, verbatim transcriptions were made. The transcripts were then read carefully and  
183 matched with the records to determine missing information and divided under different themes  
184 and codes. We generated a matrix using the categories derived from different themes and  
185 subthemes. The findings under each main theme, subthemes, or category were presented for the  
186 identification of key areas of interest. Triangulation of information was done for validating the  
187 findings obtained from different sources.

188

### 189 **Patient and public involvement**

190 Patients or the public were not involved in the design, or conduct, or reporting, or dissemination  
191 plans of our research.

192

## 193 **RESULTS**

### 194 **Socio-demographic and economic information of study households and their members**

195 We surveyed 476 households with a total of 2,140 members. The proportion of male and female  
196 members was almost equal. About 32% of household members had no education. More than half  
197 of the members were married (53%). About 67% of members were currently unemployed. The  
198 highest proportion of the members belonged to the poorest-quintile (27%) and about 21% belonged  
199 to the richest asset quintile (Table 1).

200

201 **(Table 1 to be inserted here)**

202

### 203 **Impact of COVID-19 on Urban Health Systems**

#### 204 **Health service delivery**

##### 205 *Healthcare utilization*

206 About 12% of the members suffered from general illness in the last 14-days preceding the survey  
207 and 83% of them recovered from their illness by the day of the interview (Table 2). The majority  
208 suffered from cough (33%), followed by fever (32%), pain/chest pain (12%), and diarrhoea (4%).

209 About 90% of those reporting illnesses, sought healthcare mostly from the local drug stores (64%)  
210 followed by private hospitals (16%), and public hospitals (14%).

211  
212 **(Table 2 to be inserted here)**

213  
214 About 25% of individuals aged 40 years and above reported suffering from a chronic illness (Table  
215 3). Most of them suffered from Diabetes (24%) followed by Arthritis (20%), Asthma (16%),  
216 Cardiovascular (13%), and Hypertension (9%). About 80% regularly sought treatment for chronic  
217 illness. More than half of the members with chronic illness (56%) had received treatment in the 3  
218 months preceding the interview. Local drug stores were again the major source of treatment (46%).  
219 About 37% of the members suffering from chronic illness did not seek care due to financial  
220 constraints and around 18% refrained from seeking care due to fear of COVID-19 infection.

221  
222 **(Table 3 to be inserted here)**

223  
224 During the qualitative interviews, the respondents also spoke about more services utilization  
225 during the pandemic compared to other times. Patients with COVID-19 like symptoms feared  
226 being identified and stigmatized as COVID patients and referral to high-cost health facilities for  
227 treatment if they were seeking treatment at a formal health facility. The cost of formal healthcare  
228 was also an important deciding factor for using informal providers.

229  
230 *During the first two months, I received many patients with different health problems along with*  
231 *breathing difficulties. We usually suggest general drugs for breathing difficulty. (drug vendor, KII-*  
232 *2)*

233  
234 Among the mothers who utilized healthcare in the year preceding the survey, 39% of them sought  
235 healthcare in three months period (Table 4). Of the 27 mothers reporting MNCH care utilization  
236 about half reported using antenatal care (ANC), 30% used delivery care, and 21% reported utilizing  
237 postnatal care (PNC) services. The majority of the ANC services were sought from private  
238 facilities and NGO clinics. Eight out of total 10 deliveries reported were normal deliveries of which  
239 about 38% (n=3) took place at home. Whereas seven out of ten (70%) deliveries were institutional



240 of which about 29% (n=2) were Caesarean section and the majority of them took place at private  
241 facilities (n=4). PNC services were availed only by those who had institutional deliveries.

242

243 **(Table 4 to be inserted here)**

244

#### 245 *Healthcare provision*

246 An overall reduction in healthcare utilization was reported by urban healthcare providers during  
247 the pandemic compared to pre-pandemic period. From the healthcare providers, we found that the  
248 number of home deliveries in urban slums of Dhaka city increased and the number of normal  
249 deliveries also increased at the facilities. Many mothers tried to deliver their babies at home with  
250 assistance from traditional birth attendants but came to the facilities when TBAs could not help.

251

252 *Normal delivery at our hospital decreased during lockdown. We learned that they (pregnant*  
253 *women) tried to have normal delivery at home. They fell at risk. Traditional birth attendants are*  
254 *not trained to manage complications. We dealt with mothers who experienced complications after*  
255 *home delivery during lockdown. (Physician, KII-7)*

256

#### 257 *Challenges in health service delivery during pandemic*

258 In the context of COVID-19, both service recipients and service providers faced challenges in  
259 accessing and providing services. Respondents from the community spoke about reduced hours of  
260 the formal health facilities, shortage of doctors as they were deployed to manage the pandemic,  
261 unavailability of specialists as they stopped attending, lack of physical examination and  
262 requirement of COVID tests were some of the major barriers to access healthcare during pandemic.

263 The health care providers talked about the lack of a triage system at the health facilities to identify  
264 patients with COVID-19 symptoms, an (initial) shortage of Personal Protective Equipment (PPE),  
265 challenges in maintaining proper safety measures, an increased workload, and stress among the  
266 major challenges they faced in providing healthcare during the pandemic.

267

#### 268 *Healthcare financing*

269 In terms of budget allocated to manage the pandemic, the policymaker and the technical expert  
270 group members mentioned that the government with support from development partners were able



271 to mobilize resources to manage the pandemic. However, there were challenges in ensuring  
272 efficient use of the resources. The inefficiency was more visible in Dhaka city where the pandemic  
273 response strategy was rather rapid but unplanned. As mentioned by one respondent:

274  
275 *In Dhaka city, there was urgency and thus there was mismanagement. As we heard, people*  
276 *involved in the ministry of health and family welfare tried to release the fund which was in each*  
277 *of the operation plans of different departments, and they could do it. Later the government received*  
278 *funds from the donor agency. This was enough resource for the health sector..... It will not be*  
279 *correct to say resource shortage hindered the implementation of activities to manage the*  
280 *pandemic. (technical expert, KII-19)*

281  
282 During discussions about the reasons for inefficiency related to spending existing resources,  
283 respondents talked about existing government financial rules as an important barrier for rapid  
284 spending of money during the pandemic. As one respondent said:

285  
286 *A lot of money was misused ...you must have read in newspapers during pandemic.... I am not*  
287 *sure whether it was adequate or not but there was not any lack of funds. To some extent, they could*  
288 *not spend money due to the financial rules... There is tremendous political pressure.... The*  
289 *physicians do not understand finance. The administrative officers/clerks of DGHS prepare and*  
290 *manage those..... (technical expert, KII-17)*

291  
292 *Out of pocket expense for healthcare during pandemic*

293 The median total OOPE per patient for treating general illness was BDT 315 in the 14-day  
294 preceding the survey. About 96% of the care seekers required medicine for which the median  
295 expenditure on medicine was BDT 300. In the three months preceding of survey, the median OOPE  
296 for chronic illness was BDT 1,750. For MNCH care-related expenditure in the 3 months preceding  
297 the survey, we found that 16 eligible mothers who took ANC incurred a median OOPE of BDT  
298 1,220. Most of the expenditure was related to medical components e.g., medicine, diagnostic, etc.  
299 The median OOPE for delivery (n=10) was BDT 4,360. Total seven mothers who took PNC  
300 services had a median OOPE of BDT 760 (Figure 2).

301

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3 302 (Figure 2 to be inserted here)  
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5 303  
6  
7 304 Health information on COVID-19 prevention, management and treatment  
8  
9 305 Around 51% of the respondents mentioned receiving COVID-19 related messages in the 30 days  
10  
11 306 preceding the survey. The rest reported not receiving any message. 51% of the respondents were  
12  
13 307 not aware of the national hotline number that provides COVID-19 related treatment through  
14  
15 308 telemedicine (Table 5).

16 309  
17 310 (Table 5 to be inserted here)  
18

19 311  
20 312  
21  
22 313 Television was the major source of COVID-19 related information for respondents (75%) followed  
23  
24 314 by neighbors (6.5%) and social media (5.5%). (Figure 3).

25 315  
26  
27 316 (Figure 3 to be inserted here)  
28

29 317  
30  
31 318 The lack of access to COVID-19 related information in the general population was also reported  
32  
33 319 by the members of national technical committee for COVID-19 (KII respondents). The  
34  
35 320 respondents mentioned that, although the government took several prevention initiatives, many of  
36  
37 321 them were not effectively implemented. The experts from the technical committee concluded that  
38  
39 322 engaging community in prevention, health education and awareness-raising, to contain the  
40  
41 323 spreading of the virus, was important; however, the government initiative to engage the community  
42  
43 324 was inadequate. This was in contrast to the government officials we interviewed. One respondent  
44  
45 325 said:

46 326  
47 327 “DG [Directorate General] health is not so active in engaging community in preventive  
48  
49 328 intervention but they are working. Bureau of health communication is also working with NGOs in  
50  
51 329 this regard. However, this is not enough for effective engagement of community in pandemic  
52  
53 330 management.” (technical expert, KII-19)  
54  
55 331

1  
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3 332 Health workforce  
4

5 333 Our findings indicate that the existing shortage of human resources in health in Bangladesh became  
6  
7 334 more acute in both public and private health facilities during the pandemic. This was due to the  
8  
9 335 unavailability of senior physicians to attend general patients during the lockdown period and the  
10  
11 336 re-assignment of physicians to attend COVID-19 patients. One respondent said:

12 337  
13  
14 338 “[The] Majority of the senior, experienced and specialized physicians did not attend patients.  
15  
16 339 Frontline health workers had to face the battle.” (technical expert, KII-18)  
17

18  
19 341 Deployment of human resources to tackle COVID-19 patients also resulted in a shortage of HR in  
20  
21 342 service delivery areas for general patients. The respondents also expressed their concern about the  
22  
23 343 concentration of doctors and nurses in Dhaka city to deal with the burden of the pandemic. One  
24  
25 344 respondent said:

26 345  
27 346 Government has taken some good initiatives in response to Covid-19. You know the government  
28  
29 347 has recruited and deployed more than 2000 physicians and many other health staff on an urgent  
30  
31 348 basis. But there has been a problem in posting those physicians. The physicians have not been  
32  
33 349 posted at places where they are originally planned for. Due to political pressure or the influence  
34  
35 350 of Civil surgeons, many of them have been placed in urban areas or district level. (technical expert,  
36  
37 351 KII-17)  
38

39  
40 353 Safety of both patients and healthcare providers was another source of concern expressed. They  
41  
42 354 highlighted the absence of a triage system at the entry point of health facilities to be a major  
43  
44 355 obstacle in ensuring patient and provider safety from COVID-19 infection. One respondent said:

45 356  
46 357 “In our facility, two staff members had been infected and we all had to go for isolation for 14 days.  
47  
48 358 Therefore, there was no one to operate our facility. People have not received any treatment from  
49  
50 359 our facility at that time.” (Physicians, KII-1)  
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361 Moreover, the respondents stated that there was a lack of a standard incentive package from the  
362 government to cover the health risks faced by frontline health workers, which led to discontent  
363 among the health workers.

364

### 365 Medical products and technologies

366 The respondents from the slums stated that access to existing COVID-19 test facilities was  
367 challenging for the urban slum dwellers due to the long waiting hours to get tested at public  
368 facilities which were affordable for them and the high cost of the testing at the private facilities.

369

370 *Many of our patients do not want to do the Corona test. The private diagnostic facilities have high*  
371 *charges for the test which the poor patients cannot afford. It is true that testing at public facilities*  
372 *is a hassle. Many of our patients shared their experience that they have to stand in a long queue*  
373 *and wait for a long time to get tested and then the reports take a long time. One patient told me*  
374 *that he received his report after 15 days of giving sample. (healthcare provider, KII-1)*

375

376 There was, moreover, a general lack of interest among slum dwellers to get tested because of the  
377 stigma associated with testing positive for COVID-19 and the accompanying fear of losing one's  
378 job.

379

380 *They do not want to go for doing Covid-19 test. If we refer them, they do not want to go because*  
381 *they fear that the hospital will admit him and will not allow him to meet with his family members.*  
382 *Community people would avoid him after knowing that he got infected. Thus, they do not want to*  
383 *do the test. (healthcare provider, KII-04)*

384

385 Moreover, according to the technical experts who were interviewed, the limited number of testing  
386 facilities resulted in limited availability of tests in the early stages of the pandemic. Not only there  
387 were fewer testing centers, but also the slum dwellers were not aware of the testing centers. One  
388 of the technical experts held the view that:

389

390 *"The lower-class people always experience discrimination. They are always deprived and in terms*  
391 *of getting Covid-19 related health services, they have been deprived."* (technical expert, KII-17)

392

### 393 Leadership/ governance

394 A lack of strong leadership and strategic planning at the central level of the government was  
395 identified as one of the major health system challenges during the pandemic by the technical  
396 experts. Centralization of decision-making was seen as a barrier to the timely allocation and use  
397 of resources in managing local challenges posed by the pandemic. One respondent said:

398

399 *“All decisions are made by one or two people. The WHO suggested involving all people in relevant*  
400 *sectors in order to fight with the pandemic. This is not possible for the ministry of health*  
401 *independently. Not all divisions of the government were involved. Things could have been different*  
402 *if all sectors worked together.” (technical expert, KII-19)*

403 Supplementary table 1 presents an overview of the opinions of all the technical experts and the  
404 healthcare providers in relation to the health system impact of COVID-19 pandemic  
405 **(Supplementary table 1)**.

406

## 407 DISCUSSION

408 The study findings highlight the effect of the COVID-19 pandemic and the resulting country-wide  
409 lockdown on the health systems of Bangladesh from the perspective of health service users and  
410 providers in urban slums, as well as policymakers and members of the national technical  
411 committee on COVID-19. The impact on the six different building blocks of health systems is  
412 presented in the study [19] **(Supplementary table 1)**.

413 Before pandemic, a study conducted in urban slums of Dhaka city in 2017 reported that 93% of  
414 patients suffering from chronic illness [20]. Findings from our study showed that healthcare  
415 seeking was adversely affected in the urban slums during the pandemic, particularly for patients  
416 suffering from chronic illness (37% lower). The lower use of ANC, PNC, general outpatient  
417 services, and immunization services was also reported in a study conducted by USAID [24].

418 One important finding is the rise in the demand for informal healthcare providers during the  
419 pandemic period by slum dwellers; consistent with the finding of other studies conducted in similar  
420 settings[25,26]. The utilization of health services provided by formal health facilities was limited  
421 during this time due to such issues as shortened service hours, lack of physicians, COVID-19 test  
422 requirements at the hospitals, and financial constraints. Two other studies also reported that

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3 423 financial constraints and fear of COVID-19 infection acting as barriers to accessing healthcare  
4 [27,28]. Unfortunately, the increased use of informal healthcare providers including the traditional  
5 424 birth attendants puts patients at higher risk of malpractice. Healthcare providers from the NGO-  
6 425 run clinics reported dealing with complicated maternity cases that had been unsuccessfully  
7 426 managed by unskilled providers.  
8 427

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10  
11 428 The health system also faced challenges from the limited supplies including PPE, shortage of  
12 429 human resources, lack of screening mechanism to isolate COVID-19 patients from general  
13 430 patients, and the workload and stress of healthcare providers. Due to the lack of a triage system at  
14 431 the entry point of health facilities in urban areas, the healthcare providers and general patients were  
15 432 always at risk of getting infected. The vulnerability of frontline healthcare providers during the  
16 433 pandemic has also been reported elsewhere [25,29]. In an effort to protect both patients and  
17 434 healthcare providers the system could benefit from establishing an easier triage system at the entry  
18 435 point of all health facilities to separate patients presenting with COVID-19 like symptoms from  
19 436 the rest. In addition, for certain health conditions, the use of remote healthcare through telehealth  
20 437 services could prove to be crucial in ensuring that patients get healthcare without compromising  
21 438 their own safety or that of the healthcare providers'. The national telehealth service, Shastho  
22 439 Batayon (16263), was in operation during the pandemic; however, its reach was found to be limited  
23 440 in the urban slums with only 49% of slum dwellers knowing about the service.

24 441 Earlier studies have shown community engagement to be a crucial part of many health initiatives  
25 442 [30,31] including initiatives for the management of communicable diseases [32] and maternal and  
26 443 child health conditions [33]. More recently community engagement has been considered as a  
27 444 fundamental component during outbreaks, such as the Ebola epidemic in 2014-2015 in West  
28 445 Africa [34,35]. There was an overall lack of penetration of government initiatives for raising  
29 446 awareness within the urban slum areas and 49% of the respondents mentioned not receiving any  
30 447 COVID-19 related information in the three months preceding the survey. This could be explained  
31 448 by the low level of community engagement activities of the government in managing the  
32 449 pandemic. In managing the COVID-19 pandemic, the urban health system needed to have  
33 450 expanded programs to engage community members effectively. In its absence, it is difficult to  
34 451 ensure universal coverage of services. Studies published on COVID-19 have also highlighted the  
35 452 importance of community engagement for COVID-19 prevention and control [30,36,37].  
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3 453 The health system of Bangladesh suffers chronically from a shortage of human resources for health  
4 454 [38]. This shortage became more acute during the pandemic when a higher number of doctors had  
5 455 to be placed at COVID-19 specialized hospitals to manage the sudden surge in cases. As a  
6 456 consequence, there was a lack of adequate healthcare providers to treat general patients at other  
7 457 health facilities. Furthermore, for their personal safety, and being among the high-risk group for  
8 458 COVID-19, senior and specialized doctors stopped providing services or switched to  
9 459 teleconsultation during the pandemic. In some places, service hours were shortened. In  
10 460 combination, these changes to the health system hindered access to routine care and in many cases  
11 461 delayed healthcare seeking for patients in urban Dhaka. The lack of physicians or general patients  
12 462 during pandemic has also been reported elsewhere [24,25].

13 463 Delayed healthcare-seeking has far-reaching health implications which can lead to increased  
14 464 complications and required longer and more intensive treatment. This is expected to have both  
15 465 health and financial consequence on the population. The government of Bangladesh deployed an  
16 466 additional 2,500 doctors and 5,000 nurses on as an ad hoc, rapid response to the pandemic [39]. It  
17 467 started in June 2020, which assisted the health system to gradually resume the other essential health  
18 468 services in the country.

19 469 According to the findings, healthcare financing for pandemic management in Bangladesh suffered  
20 470 more from inefficient planning and implementation rather than the lack of available funds. The  
21 471 urgent requirement for fund disbursement, the centralized financial management, the lack of  
22 472 efficient fund allocation mechanism during an emergency, and political influence all hindered the  
23 473 efficient use of available resources to manage the pandemic. From a user's perspective, the average  
24 474 OOPE for acute illness was found to be BDT 350 per patient which was higher than the average  
25 475 OOP for urban slum dwellers reported in a study conducted in the pre-pandemic period (BDT 280  
26 476 per patient)[20]. This higher OOP may be attributable to the unavailability of formal healthcare  
27 477 providers during the COVID-19 period and increased referrals to the higher-cost formal providers.  
28 478 In order to ensure the financial protection of slum dwellers, the social safety net programs of the  
29 479 government should be extended to include the urban slum population. Health protection schemes  
30 480 need to be developed and implemented to ensure universal health coverage during and after the  
31 481 pandemic.

32 482 According to the technical experts interviewed, the urban health system was not adequately  
33 483 equipped to deal with the pandemic. Initially, there were very few test centres for COVID-19,



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3 484 although the number increased over time. The public test centres were affordable and were  
4  
5 485 overwhelmed with patients, resulting in long waiting times. The private centres were easier to  
6  
7 486 access but unaffordable for the urban slum dwellers. In addition to the cost and time considerations,  
8  
9 487 the study identified stigma associated with COVID-19 to be a major reason for a lack of interest  
10  
11 488 in testing among the slum dwellers of Dhaka city. Earlier studies conducted on the urban poor  
12  
13 489 population of Bangladesh have reported lower test rates among lower socioeconomic classes and  
14  
15 490 the stigma associate with COVID-19 discouraging people from getting tested [25,26].

16 491 Finally, the study findings highlighted some challenges and loopholes in the national planning that  
17  
18 492 would require interventions from the various levels of the government and civil society. The study  
19  
20 493 identified a lack of coordination between the stakeholders from different sectors of the health  
21  
22 494 system (e.g., public, private, NGOs) as a major challenge in managing the pandemic [40].  
23  
24 495 Although NGOs with their extensive engagement at the grassroots level took up independent  
25  
26 496 initiatives to support the urban slum dwellers during the pandemic [26,41], their engagement in  
27  
28 497 the planning and implementation of government initiatives was negligible. Furthermore, the lack  
29  
30 498 of coordination between the different departments of urban health has been a long-standing  
31  
32 499 challenge for the urban health system [42].

31 500

## 32 501 **CONCLUSIONS**

33  
34 502 The health system of Bangladesh is overburdened. Therefore, good governance and leadership are  
35  
36 503 needed in managing urban health during this pandemic. The adverse effect of the pandemic has  
37  
38 504 been acute on the health system which warrants the need for effective planning and sustained  
39  
40 505 investment in building a resilient health system for the country, particularly the urban health  
41  
42 506 system. The government of Bangladesh and other developing countries should take initiatives to  
43  
44 507 document all challenges of the health system faced during the pandemic and the best practices to  
45  
46 508 overcome the challenges. This will eventually help develop an effective pandemic preparedness  
47  
48 509 plan that is contextualized for the country settings and prepares the health system to tackle future  
49  
50 510 health emergencies.

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11  
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13 518 number: PR-200143). Research Assistants recorded audio consent from all the respondents, and  
14 519 confidentiality, and anonymity was ensured before enrolment in the study.  
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18 520  
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31 528  
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35 530  
36 531 **Participant consent for publication** Not required.  
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39 532  
40 533 **Data availability statement** The dataset generated and/or analyzed during the current study is not  
41 534 publicly available. However, it is available from the corresponding author on reasonable request.  
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653 **List of tables**654 **Table 1** Background characteristics of household members (N=2140)

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Age in years</b>		
≤14	631	29.5
15-29	682	31.9
30-39	349	16.3
40-49	224	10.5
50-59	131	6.1
≥60	123	5.8
<b>Sex</b>		
Male	1,064	49.7
Female	1,076	50.3
<b>Education Level</b>		
No education	680	31.8
Primary	701	32.8
Secondary and above	759	35.5
<b>Occupation</b>		
Currently unemployed	1,442	67.38
Service holder	261	12.20
Businessman	115	5.37
Informal worker	299	13.97
Others	23	1.07
<b>Marital Status</b>		
Married	1,130	52.8
Unmarried	776	36.3
Others	234	10.9
<b>Regular earning person</b>		
Yes	499	23.3
No	1,641	76.7
<b>Household income group in last 30 days</b>		
No income	546	25.5
≤ 8000	352	16.5
8001-14000	557	26.0
14001-20000	362	16.9
>20000	323	15.1
<b>Asset quintiles</b>		
Poorest	572	26.7
2nd	279	13.0
3rd	405	18.9
4th	433	20.2
Richest	451	21.1

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657 **Table 2** Healthcare utilization for general illness or symptoms in 14 days

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Suffered from general illness or symptoms</b>		
Yes	251	11.7
No	1,889	88.3
<b>Has the person recovered now?</b>		
Yes	207	82.5
No	44	17.5
<b>Self-reported illness/symptoms</b>		
Cough	83	33.1
Fever	81	32.3
Pain/chest pain	31	12.4
Diarrhoea	11	4.4
Skin disease	10	4.0
Weakness	6	2.4
Shortness of breath	5	2.0
Injury/fractured	5	2.0
Others (e.g., vomiting, worms)	19	7.6
<b>Did the person receive any treatment?</b>		
Yes	227	90.4
No	24	9.6
<b>Reason not to receive any treatment (multiple response)</b>		
The problem was not critical	14	51.9
Financial constraints	8	29.6
Didn't sure about receiving treatment due to COVID-19	3	11.1
Others	5	7.4
<b>How long after the onset of illness was treatment sought?</b>		
The day the person got sick	27	11.9
One day later	114	50.2
Two days later	52	22.9
Three or more days later	34	15.0
<b>Source of healthcare utilization.</b>		
Drug stores	145	63.9
Private hospitals	37	16.3
Public hospitals	31	13.7
NGO hospitals	5	2.2
Others (e.g., homeopathic)	9	4

658

659 **Table 3** Chronic illness and healthcare utilization among the households' members aged 40 and  
 660 above

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Suffered any chronic illness</b>		
Yes	120	25.1
No	358	74.9
<b>Type of chronic disease</b>		
Diabetes	29	24.2
Arthritis	24	20.0
Asthma	19	15.8
Cardiovascular disease	16	13.3
Hypertension	11	9.2
Psychological disorder	4	3.3
Chronic Ovarian disease	3	2.5
Liver disease	3	2.5
Others (e.g., Gastric, prolonged injury)	11	9.2
<b>Have to take regular treatment for this disease.</b>		
Yes	96	80.0
No	24	20.0
<b>Sought treatment for this disease in last 3 months</b>		
Yes	67	55.8
No	53	44.2
<b>Reasons to not take treatment (multiple response)</b>		
The problem was not critical	28	41.8
Financial constraint	25	37.3
Due to COVID-19	12	17.9
Others (e.g., no accompanying person)	3	3.0
<b>Source of healthcare utilization.</b>		
Public hospital	15	22.4
Private hospital	18	26.9
drug store	31	46.3
Others (e.g., homeopathic)	3	4.5

661

662 **Table 4** Utilization of maternity care (child delivery and pregnancy-related)

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Sought maternity healthcare last year (delivery and pregnancy-related)</b>		
Yes	69	13.4
No	445	86.6
<b>Sought maternity healthcare in last three months (delivery and pregnancy-related)</b>		
Yes	27	39.1
No	42	60.9
<b>Reasons to not take treatment (multiple response)</b>		
The problem was not critical	36	73.5
Financial constraint	7	14.3
Due to COVID-19 didn't take treatment	3	6.1
Others (e.g.,)	3	6.1
<b>Maternity care received in last 3 months (multiple services)</b>		
ANC	16	48.5
Delivery	10	30.3
PNC	7	21.2
<b>Number of ANC</b>		
Less or equal to 3 times	12	75.0
4 times plus	4	25.0
<b>Source of ANC care</b>		
Public hospital	1	6.3
Private hospital	7	43.8
NGO hospital	7	43.8
Others (e.g., trained birth attendant)	1	6.3
<b>Type of delivery</b>		
Normal delivery	8	80.0
Cesarean delivery	2	20.0
<b>Place of delivery</b>		
Home delivery	3	30.0
Institutional delivery	7	70.0
<b>Source of delivery care</b>		
Public hospital	2	28.5
Private hospital	4	57.1
NGO hospital	1	14.3
<b>Number of PNC</b>		
1 time	4	57.1
More than 1 times	3	42.9
<b>Source of PNC</b>		
Public hospital	2	28.6
Private hospital	3	42.9
NGO hospital	1	14.3
Others	1	14.3

663

664 **Table 5** Knowledge about access to COVID-19 related information

Variables	Yes; n (%)	No; n (%)
Do you have access to quarantine facility nearby your house/workplace?	94 (19.8)	382 (80.25)
Did you receive any message on COVID-19 prevention and treatment?	244 (51.26)	232 (48.74)
Do you know any hotline number to contact in case of any symptoms of you or others?	234 (49.16)	242 (50.84)

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For peer review only

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667 **List of figures**

668 **Figure 1** Health system impact of COVID-19 on urban slum dwellers

669 **Figure 2** Median out-of-pocket expenditure for healthcare

670 **Figure 3** Source of information on COVID-19

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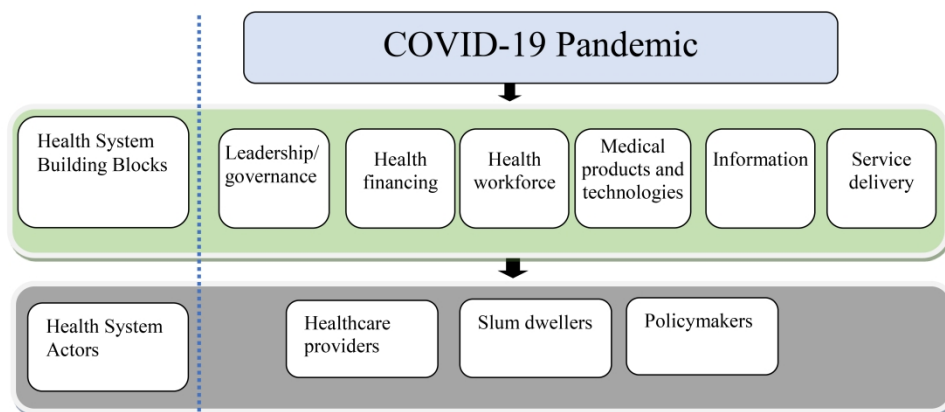


Figure 1 Health system impact of COVID-19 on urban slum dwellers

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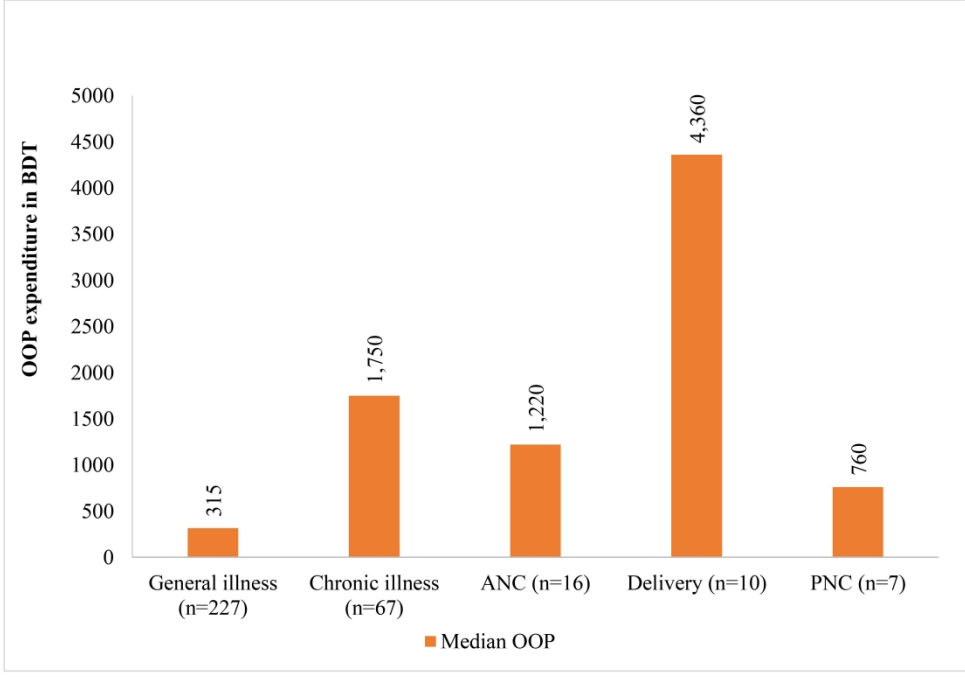


Figure 2 Median out-of-pocket expenditure for healthcare  
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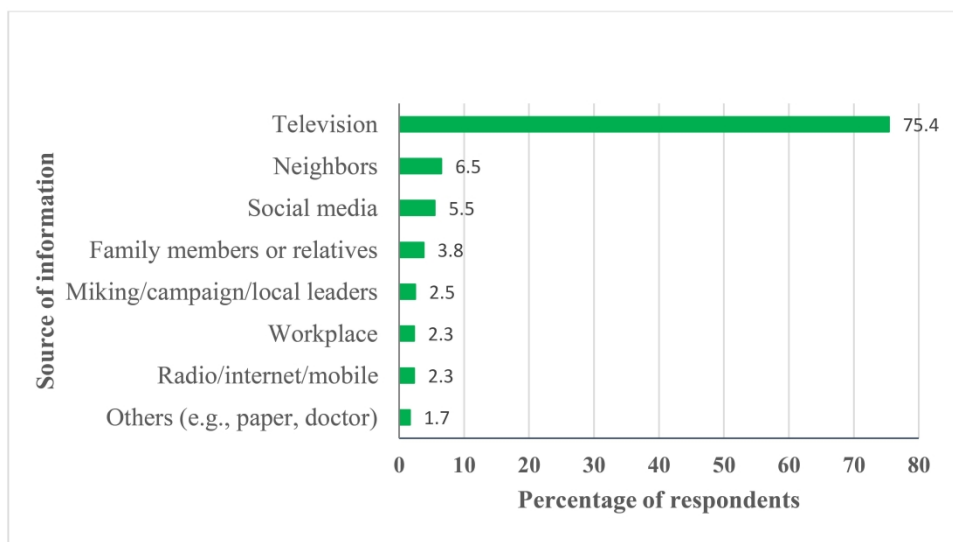


Figure 3 Source of information on COVID-19

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**Supplementary Table 1** Opinion of the key informants regarding the six building blocks of health system.

Theme (health system building blocks)	Respondent type	Quotation (opinion)
Health service delivery	Drug Vendor (informal healthcare provider) (KII-2)	<i>“During the first two months, I received many patients with different health problems along with breathing difficulties. We usually suggest general drugs for breathing difficulty.”</i>
	Formal healthcare provider (KII-7)	<i>“Normal delivery at our hospital decreased during lockdown. We learned that they (pregnant women) tried to have normal delivery at home. They fell at risk. Traditional birth attendants are not trained to manage complications. We dealt with mothers who experienced complications after home delivery during lockdown.”</i>
Healthcare financing	Technical Expert (KII-19)	<i>“In Dhaka city, there was urgency and thus there was mismanagement. As we heard, people involved in the ministry of health and family welfare tried to release the fund which was in each of the operation plans of different departments, and they could do it. Later the government received funds from the donor agency. This was enough resource for the health sector..... It will not be correct to say resource shortage hindered the implementation of activities to manage the pandemic.”</i>
	Technical Expert (KII-17)	<i>“A lot of money was misused ...you must have read in newspapers during pandemic.... I am not sure whether it was adequate or not but there was not any lack of funds. To some extent, they could not spend money due to the financial rules... There is tremendous political pressure.... The physicians do not understand finance. The administrative officers/clerks of DGHS prepare and manage those.....”</i>
Health information on COVID-19 prevention, management and treatment	Technical Expert (KII-19)	<i>“DG [Directorate General] health is not so active in engaging community in preventive intervention but they are working. Bureau of health communication is also working with NGOs in this regard. However, this is not enough for effective engagement of community in pandemic management.”</i>
Health workforce	Technical Expert (KII-18)	<i>“[The] Majority of the senior, experienced and specialized physicians did not attend patients. Frontline health workers had to face the battle.”</i>

	Technical Expert (KII-17)	<i>Government has taken some good initiatives in response to Covid-19. You know the government has recruited and deployed more than 2000 physicians and many other health staff on an urgent basis. But there has been a problem in posting those physicians. The physicians have not been posted at places where they are originally planned for. Due to political pressure or the influence of Civil surgeons, many of them have been placed in urban areas or district level.”</i>
	Formal healthcare provider (KII-1)	<i>“In our facility, two staff members had been infected and we all had to go for isolation for 14 days. Therefore, there was no one to operate our facility. People have not received any treatment from our facility at that time.”</i>
Medical products and technologies	Formal healthcare Provider (KII-1)	<i>“Many of our patients do not want to do the Corona test. The private diagnostic facilities have high charges for the test which the poor patients cannot afford. It is true that testing at public facilities is a hassle. Many of our patients shared their experience that they have to stand in a long queue and wait for a long time to get tested and then the reports take a long time. One patient told me that he received his report after 15 days of giving sample.”</i>
	Formal healthcare Provider (KII-04)	<i>“They do not want to go for doing Covid-19 test. If we refer them, they do not want to go because they fear that the hospital will admit him and will not allow him to meet with his family members. Community people would avoid him after knowing that he got infected. Thus, they do not want to do the test.”</i>
	Technical Expert (KII-17)	<i>“The lower-class people always experience discrimination. They are always deprived and in terms of getting Covid-19 related health services, they have been deprived.”</i>
Leadership/ governance	Technical Expert (KII-19)	<i>“All decisions are made by one or two people. The WHO suggested involving all people in relevant sectors in order to fight with the pandemic. This is not possible for the ministry of health independently. Not all divisions of the government were involved. Things could have been different if all sectors worked together.”</i>

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-11
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	

		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14 - 17
Generalisability	21	Discuss the generalisability (external validity) of the study results	
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).