Original Article

Community-Based Assessment of People with Chronic Diseases and Conditions Worsening the Severity of COVID-19 in Addis Ababa City Administration

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Abstract

Background: the COVID-19 pandemic stayed in a sporadic form for a long time after introducing the coronavirus in the country, later appearing in clusters within communities. During such sporadic and clustered spread of the disease, the government of Ethiopia started identifying suspects through active surveillance for COVID-19. This study aimed to describe people who have chronic illnesses that could be underlying conditions for increased severity of COVID-19.

Methods: A survey was conducted in May 2020 using active community-based case surveillance in 30 randomly selected woredas in Addis Ababa City. Data were collected from each household member by assessing for general conditions and diseases expected to increase their risk of suffering higher severity from COVID-19. Data were stored in M.S. Excel and analyzed using SPSS-version 26 for windows. Descriptive analysis was conducted to know the proportion of persons with chronic diseases, and thus the population with a higher risk of suffering more severity from COVID-19 by place, person, and time. The results are presented using tables and graphs as appropriate.

Results: The point prevalence of flu-like syndrome was 51.9 per 100,000 persons, and the prevalence was higher among older people. The study showed that 11,600 per 100,000 households have at least a member with chronic diseases that worsen the severity of COVID-19 morbidity. The survey also found 6,939 and 5,140 households per 100,000 households have diabetes mellitus and hypertension, respectively, and about 1950 per 100,000 households were with bronchial asthma. Nearly a quarter of the households have people with two or more chronic diseases that worsen their risk of facing a more severe course of COVID-19 than it would be for people without those underlying conditions.

Discussion: High proportion of households have people with chronic diseases that worsen their risk of suffering a more severe course of COVID-19 than it would be for people without those underlying conditions. The Ministry of Health should devise and implement mechanisms to safeguard people with chronic diseases from contracting the diseases. [*Ethiop. J. Health Dev.* 2021; 35(2):133-140]

Keywords: COVID-19, chronic diseases, severe course of COVID-19, Addis Ababa

Introduction

The outbreak of respiratory illness caused by the novel (new) coronavirus has gained attention globally. It is recognized as a severe public health threat by the World Health Organisation and many other health management organizations, including the U.S. Centre for Disease Control and Prevention (CDC) [1, 2]. The disease is a severe illness with high morbidity and mortality, mainly in the elderly, and chronic diseases like diabetic mellitus, cardiovascular disease, and chronic kidney diseases [3-5]. The condition also has an adverse social and economic impact, affecting developed and developing countries [6].

Transmission of coronavirus is through respiratory or nosocomial communication [7]. The disease has an incubation period ranging from 2 to7 days [8, 9].

Evidence from clusters reported in Europe and the United States indicates that the virus can be transmitted rapidly [10]. This rapid transmission within a short time, also called exponential growth, depicts continuous development in several cases with a doubling rate every three days, which may affect hundreds of thousands of people within few weeks, which has made people worry about the disease [11-13]. Scholars doubt such discrepancy, which they consider people in the tropics due to the warm environment, age distribution, and genetic makeup [14]. Others also think either the virus took a longer time to reach these countries because they are not well connected with the other world, or the disease may already be markedly distributed in such countries. Such countries may not be able to detect the epidemic [15].

In Ethiopia, like in many other African countries, the disease stayed in a sporadic form for a longer time than expected, and currently, it is for higher transmission within communities [16, 17]. A large number of health care providers are isolated as patients in designated hospitals for COVID-19 [18, 19]. After the first COVID-19 case in Addis Ababa on Mar 03, 2020, the pandemic spread slowly to create a sporadic occurrence in significant parts of the city. Within a couple of weeks, after people were gathering for the Easter Holiday followed by the Ramadan of the year, the transmission rate was increasing, and sporadic form of the COVID-19 was observed in Addis Ketema, Lideta, and Bole Sub-cities [20]. During such sporadic and clustered distribution of the disease, the government

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made lockdown of schools and government offices, allowing older people and those with chronic conditions to work from home [18]. The pandemic has continued spreading to a community level toward the end of the first web during the second web of spread [21].

Studies have shown that older age and chronic diseases like diabetic mellitus, cardiovascular diseases, and renal diseases relate with the worsening of covid-19 to its severe form [22-26]. Studies have shown that people aged 65 and above are at higher risk of suffering higher severity of the pandemic disease [27, 28]. Moreover, cardiovascular diseases and diabetes mellitus that predominate in older people are also conditions that increase the severity and mortality of COVID-19 [29-32], and so are chronic obstructive pulmonary diseases, of which bronchial asthma deserves special attention [33, 34]. Based on studies from a meta-analysis of early and preliminarily available data, chronic kidney disease appears to be associated with an enhanced risk of suffering increased severity of COVID-19 infection [35, 36].

Studies indicate that chronic diseases related to the severity and high mortality of COVID-19 are prevalent in big towns and cities of low and middle-income countries [37, 38]. Several studies show the epidemiological transition of disease morbidity of both infectious and chronic diseases to increase with the rise in life expectancy, resulting in the existence of a dual burden in big towns and cities in developing countries, including Addis Ababa [39, 40].

The project's whole purpose was to combat the spread of COVID-19 through early identification of suspects through active house-to-house surveillance for people with acute respiratory tract infections [ARI], mainly flu-like symptoms to be tested for COVID-19. Besides, the project has asked for diseases and conditions that may aggravate the severity of the pandemic in Addis Ababa and similar settings. Therefore, this paper aimed to identify the prevalence and pattern of persons with a higher risk of suffering increased severity of COVID-19.

Methods

The project assessed the study population through a cross-sectional (survey) design that included all dwellers of the selected community in Addis Ababa through a house-to-house survey. The study was undertaken mainly in Addis Ababa City, situated in the heart of the country, and has an average population density of 5,645.61 persons per km sq. The city administration is divided into ten sub-cities and 120 woredas[1], with an urban setting. Within woreda also are *ketenas* that small informal villages [41].

The city has a total population of 4.793 million persons as of May 2020, based on Worldometer elaboration of the latest United Nations data, of which 50.02% are female [42]. According to a study done by Adane et al. (2017), Addis Ababa has 33 Hospitals, 52 Health Centers, clinics of different levels [43]. The health facilities have health care staff, such as physicians with specialties and general practitioners, health officers, nurses, pharmacists, laboratory technologists, radiology experts, and environmental sanitarians. The three-weeks long (May 8–27, 2020) active community-based case surveillance targeted residents of 210 '*Ketenas'* in 30 COVID-19 hotspot woredas identified by the MoH, with support from Addis Ababa Regional Health Bureau, across all sub-cities of Addis Ababa City Administration.

The study population's source population was dwellers of Addis Ababa, while dwellers found in the woredas selected from each sub-city were the study population of the project. The sample size for the study was determined using the sample size determination formula for a single population based on maximal variability of 50% and higher precision of one percent and taking a design effect of 10. A minimum of 95,123 individuals is required. However, in this study, data was collected from 198,440 households.

The surveillance was conducted in the 30 identified hotspot woredas. Based on the number of hotspots the woreda had, the number of woredas within sub-cities was selected. The hotspots were localized places within a woreda and were considered by the presence of a relatively higher number (5 or more) of COVID-19 positive persons in the first two months after the first COVID-19 patient was identified. A multistage sampling strategy was applied. The first stage was selecting woredas from the sub-cities, and four woredas were chosen from each of three sub-cities: Bole, Yeka, and Kolfe Keranio. Three woredas were chosen from each of the other four sub-cities: Akaki Kaliti, Nefas Silk Lafto, Kirkose, and Addis Ketema; and two woredas were sampled from each of Gulele, Arada, and Lideta sub-cities. The second stage of sampling was the selection of *Ketenas*, where seven *"ketenas"* adjacent to the hotspot areas were sampled from each selected woreda, making a total of 210 *ketenas*. The third stage of sampling was selecting households, and all dwellers (members) of the households found in the *Ketenas* were visited and assessed for flu-like syndrome and chronic disease.

Data were collected electronically using tablets by two health professionals accompanied by local police. Data collectors were oriented on the roles of each member, the content of the questionnaire, on how to use a tablet for reporting, on understanding the linkage of the system with Rapid Response Team (RRT), laboratory, isolation/treatment center, and the community screening algorithm.

The following major/critical issues were ensured and addressed by the data collection team in due course. The data collectors practiced all the timely prerequisites for the prevention of covid-19. They informed the head of the household on the disease, its prevention and control measures, and the need for screening. Information was provided by taking the necessary Covid-19 prevention measures, such as

[1]A woreda is the basic administrative unit with an administrative council composed of elected members.

maintaining physical distancing (2-meter distancing), cleaning hands, and using masks during data collection.

The data collectors encouraged the head of the household to make all family members available for screening. Each household member was assessed using an infrared-thermal instrument for basal body temperature, presence of symptoms, signs of acute respiratory illness individually and at a household level for each known chronic disease or condition that may heighten the severity of COVID-19. The data was recorded in tablets and exported to and stored at the eCHIS of the Ministry of Health. The information contains the head's name, address within the district, age group, symptoms and signs of the ARI syndrome, and chronic diseases underlying the increased severity of COVID-19.

Data were retrieved in M.S. Excel and were analyzed after exporting to SPSS version 26 for windows, while aggregated data were analyzed using M.S. Excel. Descriptive analysis was conducted to assess proportions by place, person, and time. Findings were presented using tables and graphs as appropriate.

Results

The project assessed 198,440 households with 762,520 individuals in the 30 woredas found in the ten-sub-cities. A higher proportion of houses were from Yeka (18.0%), Bole (16.2%), Kolfe Keranio (14.0%), and Nifas Silk Lafto (13.5%) sub-cities, while few households were seen in Arada (3.1%) and Lideta sub-cities. The primary source of water was a pipe in 97.0%, while households use running river and unprotected-wells as a significant source of water. The survey found about two in three inhabitants using the traditional toilet, and about 18.2% and 8.8% use flush toilets or ventilated toilets. About 98% of the dwellers claimed to have electricity (Table 1).

Table 1. **Household-level characteristics of the houses in Addis Ababa, Aug. 2020**

Character	Number of households	Percent
Sub-city (households)		
Addis Ketema	13677	6.9
Akaki Kality	17276	8.7
Arada	6069	3.1
Bole	32125	16.2
Gulele	14110	7.1
Kirkos	14714	7.4
KolfeKeranio	27826	14.0
Lideta	9675	4.9
Nifas Silk Lafto	26764	13.5
Yeka	35818	18.0
Water source		
Pipe	192558	97.0
Protected well	2744	1.4
Spring	269	0.1
Unprotected well	657	0.3
Running river	48	0.0
Others	2164	1.1
Type of toilet		
Ventilated Toilet	17516	8.8
Flush toilet	56040	18.2
Traditional toilet	121769	61.4
Open field	1409	0.7
Other	1706	0.9
Presence of electricity	194,752	98.1
Presence of radio	140750	70.9
Presence of television	180,206	90.8
Presence of house phone	27,250	13.7
Presence of mobile phone	192,673	97.1
Total households	198,440	100

***Symptoms of the flu-like syndrome*:** The study found that 396 (51.9 per 100,000) inhabitants had an acute respiratory infection or flu-like syndrome; 57.6% are females, about 65.2% are in the age group between 15 and 59 years of age group. Cough was the primary symptom noted in about 78% of the cases, followed by sore throat, headache, and fever. About 3.3% of the patients had a history of travel to endemic places abroad or contact with a confirmed case of COVID-19 (Table 2).

Table 2. **Age, sex, and significant symptoms of cases of ARI in Addis Ababa, Aug. 2020**

	Frequency	Percent
Sex		
Male	168	42.4
Female	228	57.6
Age group (individuals)		
Under 5 yr	49	12.4
5-14 yrs	43	10.9
15-59 yrs	258	65.2
60 yr and above	46	11.6
Symptoms		
Musculoskeletal pain	29	7.3
Coughing	310	78.3
Fever	54	13.6
Headache	69	17.4
Sore throat	99	25.0
Severity of illness	7	1.8
Exposure status		
Travel (abroad) history	15	3.8
Contact with a case history	13	3.3

Magnitude of the flu-like syndrome: The study found that 52 per 100,000 inhabitants had acute respiratory illnesses or flu-like illnesses. This magnitude was about 111 per 100,000 inhabitants for the age group 60 years and above. The extent (that is 41 per 100,000) was lower for people in the age group between 5 and 14 years, and 49 per 100,000 participants were in the age category 15–59 years. Prevalence of the ARI or flu-like syndrome was high in Addis Ketema at 417 per 100,000 households, followed by Kirkos 245 per 100,000 households, Bole and Yeka sub-cities. (Table 3).

Table 3. **The proportion of the case of ARI pers each age group in Addis Ababa, Aug. 2020**

	Totals	Cases	Cases per 100,000
Age group (individuals)			
Under 5 yr	87254	49	56.2
5-14 yrs	105087	43	40.9
15-59 yrs	528678	258	48.8
60 yr and above	41501	46	110.8
Total	762520	396	51.9
Sub-city (households)			
Addis Ketema	13677	57	416.8
Akaki Kality	17276	23	133.1
Arada	6069	5	82.4
Bole	32125	75	233.5
Gulele	14110	11	78.0
Kirkos	14714	36	244.7
KolfeKeranio	27826	54	194.1
Lideta	9675	18	186.0
Nifas Silk Lafto	26764	43	160.7
Yeka	35818	73	203.8
Overall	198,440	396	199.6

Chronic disease in the population: About 70% of the assessment participants were in the productive age group of 15–59 years. About 25% were below 15 years, 5% were older, age 60, or more. The overall prevalence of any form of chronic disease within a house in the city was 11,500 per 100,000 households. The survey also found 6,939 and 5,140 per 100,000 households had at least a person with diabetes mellitus and hypertension, respectively. About 1950 per 100,000 households had at least a member with bronchial asthma. Finally, the survey found almost a quarter of the households had persons with two or more chronic diseases (Table 4).

Table 4. **Individual age and morbidity status of members of the household in Addis Ababa, Aug. 2020**

Characteristics	Frequency	Per cent
Age group (individuals)		
Under 5 yr	87254	11.4
5-14 yrs	105087	13.8
15-59 yrs	528678	69.3
60 yr and above	41501	5.4
Total	762520	100.0
Households' chronic disease		(Per 100,000 population)
Diabetes Mellitus	10200	5140
Hypertension	13770	6939
Bronchial asthma	3870	1950
Chronic heart disease	725	365
Any cancerous disease	204	103
Chronic Kidney disease	1332	671
Other chronic diseases	50	25
Presence of any comorbid	23,611	11,600
Number of chronic disease type		Percent (n=23,611)
Only one	17814	75.4
Two diseases	5130	21.7
Three diseases	602	2.5
Four or more	65	0.3
Total households	**198,440**	

Discussion

The study has found a relatively significant level of a flu-like syndrome in Addis Ababa, with a point prevalence reaching 52 per 100,000 population. It was higher (111 per 100,000 people) among older people aged 60 years or more. The study also depicted a higher proportion of households, 11,600 per 100,000 households with severe chronic disease or conditions that could worsen COVID-19 morbidity and mortality. The survey also found about a quarter of the households have people with two or more chronic disease types.

The magnitude of the flu-like syndrome in the study area is relatively low compared to the general seasonal influenza in Europe, affecting about 20% of the population [44]. A survey conducted in the United States in October 2010 using serum prevalence for flu revealed that 30 - 45% of the sample was positive [45]. The prevalence revealed by the present study is relatively lower than also the results of the survey made in South Africa [46]. The study from South Africa, which compared the excess mortality due to all causes and pneumonia and influenza with the situation in the United States using a serfling-regression model, found the mean percentage of winter deaths attributable to influenza was 16% in South Africa and 6% in the United States [47].

The seasonal variation may explain such a lower prevalence of flu-like syndrome in Ethiopia. This study was conducted during the warmer season in May to June compared to the influenza season survey for the U.S., South Africa, and Europe done in cold seasons [48]. As a stigmatizing condition earlier, at the onset of the COVID-19 pandemic, people may not have disclosed their status when it was stigmatizing. The consistent use of face masks during the study time may have also reduced respiratory illness transmission, including influenza [49]. Although underestimation was highly likely in our study, the finding showed an absolute majority for the season.

In this study, the flu-like syndrome was higher in households in the Addis Ketema sub-city, with a prevalence of 416.8 per 100,000 households. Although no research was found supporting this finding, it may be related to the high population density where the is relatively high environmental congestion and high non-hygienic biological wastes. During the data collection, the Addis Ketema sub-city was an epidemic spot for the COVID-19 pandemic [50]. The higher level of the flu-like syndrome may also be related to the epidemic.

Moreover, the study has depicted the magnitude of households with at least a person with a chronic disease that may worsen the course of COVID-10 pandemic morbidity and mortality. The study found a relatively significant proportion of households in Addis Ababa to have people with a chronic disease that could worsen the severity of COVID-19. However, the magnitude of people with chronic diseases and conditions in the city is relatively lower than a study from two systematic reviews and meta-analyses [51, 52]. The prevalence of chronic diseases in the meta-analysis study included seven studies, and the magnitude of hypertension was 21.1%, and diabetes 9.7%, followed by cardiovascular disease 8.4%, and respiratory system disease 1.5% [51]. Similarly, in another meta-analysis from eighteen studies with 14,558 individuals, a pooled prevalence of chronic illnesses in patients with COVID-19 disease was 22.9% for hypertension, 11.5% for diabetes, and 9.7% for cardiovascular diseases (CVD) [52].

The lower magnitude found by the present study may be because our research method to assess chronic disease related to the severity of COVID-19 was based on a previous assessment by a physician and does not include individuals who do not know their status.

Individuals who did not disclose their status to family members may not be counted, resulting in underestimating the syndrome. Moreover, our measurement counted for anyone with any chronic disease in the family. Thus, the presence of one or more individuals with a single similar chronic illness in the household was counted as a single household. Therefore, in this study, the proportion of people with chronic illness was assessed among all age groups at the household level rather than many studies computing chronic disease among adult or older populations, inflating the denominator and lower proportion in our study.

Although the study assessed a considerable number of households in Addis Ababa, it may have limitations taking the measurement made at the household rather than at the individual level. Since the project's primary aim was to collect data for active surveillance, data related to sociodemographic characteristics and other individual-level information was not assessed, making the study challenging to evaluate analytically. The project has failed to determine household members' significant socioeconomic status, resulting in difficulty describing persons with the flu-like syndrome and chronic disease correctly. As an active surveillance survey for signs and symptoms of the flu-like syndrome during the COVID-19 pandemic, stigmatizing and discriminating the nature of the disease may have made study subjects abstain from disclosing the syndrome properly.

Conclusion/Recommendation

The study found a relatively significant level of the flu-like syndrome in Addis Ababa, and it was higher among older people age 60 years or more. The study revealed a high proportion of households with severe chronic diseases conditions that may worsen the severity of COVID-19 morbidity and mortality. The Ministry of Health should consider the magnitude of people with chronic diseases and conditions that may exacerbate the severity of COVID-19 and plan for the vaccination and preparation of therapeutic measures.

Conflict of interest

Packard and Lucy Foundation funded this study. The authors declare no potential conflict of interest.

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Contribution of authors

B.C., AM, T.D., and N.D. drafted and supplemented the manuscript and read and approved the final manuscript. B.C., Y.A., F.B., A.A., and N.D. augmented the document and approved the final manuscript. All authors read and approved the final manuscript.

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