



Epidemiological Characteristics of Coronavirus disease 2019 (COVID-19) in Afghanistan

Khawaja Mir Islam SAEED

¹Afghanistan Field Epidemiology Training Program (AFETP), Afghanistan National Public Health Institute (ANPHI), Ministry of Public Health, Kabul, Afghanistan.

*Corresponding Author

Khawaja Mir Islam SAEED

Email: kmislamsaeed@gmail.com

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Abstract: Background: On 31 December 2019, the Coronavirus Disease 2019 (COVID-19) emerged in China, and soon declared a pandemic by the World Health Organization. Afghanistan reported its first imported case in late February 2020. The aim of this study was to review and describe the epidemiological pattern of cases of COVID-19 during the first three months period of its spread in Afghanistan. **Methodology:** We conducted a descriptive epidemiological study to describe the cases and deaths due to COVID-19 in terms of time, place and person. Data were extracted from District Health Information Software 2 (DHIS2) databases developed and used by Ministry of Public Health between February 24 to June 04, 2020. The frequency of cases of COVID-19 infection and percentage of resulting mortality and case fatality rate were calculated and categorized by sex, age group, and provinces. Measures taken in response to pandemic were reported as well. **Results:** The first suspected case of COVID-19 was imported from Iran to Hirat province in Western Afghanistan, and confirmed by lab on 24 February in Afghanistan. On 22 March, the first official death due to COVID-19 was announced in Balkh, a Northern province and the two new cases in Kabul Province were announced both foreign diplomats. After more than three months on 04 June totally 18,969 cases including 309 deaths were reported officially by Ministry of Public Health. Totally 45,139 samples have been tested by PCR and 42% were positive. Kabul, Hirat, Kandahar, Balkh and Paktia are the top high infected among 34 provinces. Average age of infected are 37 years with minimum of one year and maximum 100 years. Of total cases, 74% of new cases and 81% of deaths were males. Majority of cases (53%) were young in age group of 20 to 40 years. Majority of deaths occurred in age group of 50 years and older while there was just one case of death (2%) in age group of less than 30 years. Out of all cases, 1903 (13.7%) were hospitalized of whom 74% were males. Until now, 872 healthcare workers are infected of whom 13 are dead. Recovery rate is 9% and case fatality ratio is 1.63%. **Conclusion:** Like many developing countries with existing challenges of insecurity, poverty, and political uncertainty, Afghanistan has been burdened with epidemic of COVID-19 since February 2020. Higher morbidity was recorded in young population while increased rates of mortality were recorded in older groups. Further epidemiological studies are required to determine the various aspects of the disease burden in the country including risk factors for infection and short and long-term health outcomes of COVID-19 in Afghanistan.

Keywords: Afghanistan; COVID-19; Pandemic; Epidemiology; Descriptive.

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Research Article

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first detected in Wuhan, China on December 31, 2019 (Li, Q. *et al.*,

2020; & WHO a 2019). The isolation of coronavirus goes back to 1937, when it caused bronchitis in birds, however specifically human coronaviruses were first characterized in the 1960s which were associated with respiratory diseases (Wang, W. *et al.*, 2015; & Gaunt,

E. R. *et al.*, 2010). The virus is called coronavirus due to spikes on its surface resembling crown (Lin, S. *et al.*, 2005). Coronaviruses (CoVs) belong to the family *Coronaviridae*. The family *Coronaviridae* has two subfamilies including *Orthocoronaviridae* and *Torovirinae*. The subfamily *Orthocoronaviridae* has four genera: alphacoronavirus, betacoronavirus, gammacoronavirus and deltacoronavirus (Ashour, H. M. *et al.*, 2020). Until now, seven types of coronaviruses have the ability to infect human. The human coronaviruses are 229E, NL63, OC43 and HKU1, and the rarer strains are Severe Acute Respiratory Syndrome (SARS-CoV) (Matoba, Y. *et al.*, 2015) and Middle Eastern respiratory syndrome coronavirus (MERS-CoV) which first appeared in 2012 in Saudi Arabia (Chen, X. *et al.*, 2017) and recent SARS-CoV-2 (WHO b). Usually, the CoVs are commonly harbored in mammals and birds as well as in camels, cattle, cats, bats, and other animals (Ashour, H. M. *et al.*, 2020). However, the intermediate hosts of SARS-CoV-2 are unknown (Jiang, S. *et al.*, 2020).

Due to the severe outbreak across the globe, the World Health Organization (WHO) declared the outbreak of COVID-19 as pandemic on 11 March, 2020 (WHO c). As of June 04, 2020, the total number of confirmed cases were 6,737,606 and total number of deaths were 393,832 globally. USA, Brazil, Russia, Spain, UK, Italy, India, Germany, Peru and Turkey are the top countries with the highest number of cases while USA, UK, Brazil, Italy, France, Spain, Mexico, Belgium, Germany and Iran are top ten countries with the highest total number of deaths (World Meter. 2020). The global case fatality ratio for COVID-19 is changing between 3 to 7% (WHO c). However, it is still lower as compared to previous coronavirus outbreaks such as SARS (9.6%) and MERS (35.2%). Despite of low mortality rate it has killed a greater number of people than those two later coronaviruses (Mahase, E. 2020).

Afghanistan is a south Asian country with a population of 31.6 million people, 71.5% of whom live in rural areas (WHO. Afghanistan. 2020). The health system of the country has been steadily progressing over the last 17 years, with increasing coverage of health services throughout the country. In 2018, a total of 3,135 health facilities were functional, which ensured access to almost 87% of the population within two hours distance (WHO. Afghanistan Health System. www.emro.who). There are only 9.4 skilled health professionals, and 1.9 physicians per 10,000 individuals in Afghanistan; physicians are disproportionately distributed across the country, with 7.2 physicians per 10000 people in urban areas and as few as 0.6 physicians per 10000 in rural areas (WHO. 2013). Overall low literacy rate of 31.74% has affected community awareness of public health, sanitation, and hygiene practices (UNESCO <https://data.uis.unesco.org>). Afghanistan is likely to be significantly affected with major disease outbreaks due

to its weak health system and limited capacity to cope with these outbreaks. Due to years of war and conflict as well as harsh economic situation, millions of Afghans have left the country. Afghanistan's close proximity to the Iran, which was initially a global hotspot for the corona virus, has positioned the country at heightened risk, with tens of thousands of people and commercial movements across the border from Iran each day. High internal displacement, low coverage of vaccination required for stronger immune systems in combination with weak health, water and sanitation infrastructure has worsen the situation (<https://reliefweb.int>). Afghanistan is still endemic for emerging infectious diseases such as poliomyelitis and measles. From January 01 to March 14, 2020, a total of 138,013 returnees have come back to Afghanistan through Iran and Pakistan borders. The first COVID-19 case in Afghanistan was confirmed on February 24, 2020 in one of the returnees from Iran in Herat province (COVID-19 Update: Ministry of Public Health - Afghanistan). Since then, many cases and clusters have been confirmed in various provinces. Afghanistan is particularly vulnerable due to limited availability of properly equipped medical facilities, inadequate numbers of trained medical staff, a large influx of returnees neighbouring countries during recent weeks, and lack of technical and financial resources to support local government in tackling the pandemic. Insecurity is the other challenge for the health system, and it would make it hard for MoPH to implement preventive, curative, and virus containment measures in areas under control of Anti-Government Elements (AGE). The main objective of this study was to describe the key epidemiological pattern of COVID-19 pandemic in Afghanistan and the specific aims were comparing afghan cases with other countries, recording challenges, proposed associated measures, and present recommendations for improving the fight against COVID-19 in Afghanistan and in similar contexts around the world.

METHODS

In order to illustrate the epidemiological characteristics of COVID-19 cases and deaths reported and recorded in Afghanistan, a descriptive epidemiological study was designed and conducted on June 5, 2020. It describes data from February 24 to June 04, 2020. Daily data regarding COVID-19 were entered by data officer in provinces as well as in Kabul using DHIS2 which is available for use in public domain. MoPH through its website, publishes dashboards showing the COVID-19 infections and reflect the geographical as well as demographical burden of the disease in Afghanistan. Currently, there are limited data in the website, however it contains the number of cases tested and confirmed, the number of deaths confirmed, the sex of the patients, the and provinces inhabited by the infected person.

Data were analyzed using Microsoft Excel Version 16.0 and IBM SPSS for Windows, Version 20.0 (IBM Corp, Armonk, NY, USA). In this study we compared number of cases and deaths of the country with few other relevant nations. Furthermore, more focus was concentrated on descriptive epidemiology of COVID-19 in Afghanistan including person, place and time. The frequency of cases of SARS-CoV2 infection and percentage of resulting deaths were calculated and categorized by sex, age group, and provinces. In addition, the case fatality rate as a measure of the severity was calculated according to sex, age group, and province.

RESULTS

As of 04 June, in Afghanistan, total number of confirmed official cases and deaths were 18,969 and 309, respectively; while total active cases were 16,898 and total recovered cases were 1762 all over the country (Worldmeters. Coronavirus Pandemics. 2020). The first case of COVID-19, which was imported from Iran to Hirat province of Afghanistan and confirmed in central public health laboratory (CPHL) on 23rd and announced on 24th February by Ministry of Public Health (Afghanistan confirms 1st case of coronavirus". 2020). On 22 March, the first official death due to COVID-19 was announced who was a 40-year-old man who had died in Chimtal district of Balkh Province, three days before confirmation; on same date two new cases in Kabul Province were announced both foreign diplomats

(First Coronavirus Death Confirmed in Afghanistan". 2020). As of writing this report, 45139 samples have been tested in all central and regional public health laboratories since last week of February, of which 18969 were declared positive by Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) in Afghanistan. The sample positivity rate was 42% which was twice as high as six weeks (19.5%) before on 24 February (Paiman, W. 2020). The frequency of cases and deaths have been slow in the beginning of the outbreak while started to increase in late March and continues to grow.

On 4th June, 2020, Afghanistan ranked 41st as compared to six weeks back (72nd) based on total number of 18,969 confirmed cases and 49th compared to six weeks back (66th) based on total number of 309 deaths out of 215 countries and territories in the world (Worldmeters. Coronavirus Pandemics. 2020). Comparison of the rate of confirmed cases per million population, the country ranked 90th as compared to six weeks back (149th). The country announced its first case on late February when on same day some other countries such as Croatia, Lebanon, Belgium, Egypt, Nepal and Sri Lanka only (same) had one confirmed case. Figure 1 shows the comparison of number of COVID-19 cases in Afghanistan on with few countries that had one case on 24, February, 2020. Despite of having identified one case on 24th February, the countries now show drastic differences in terms of confirmed cases.

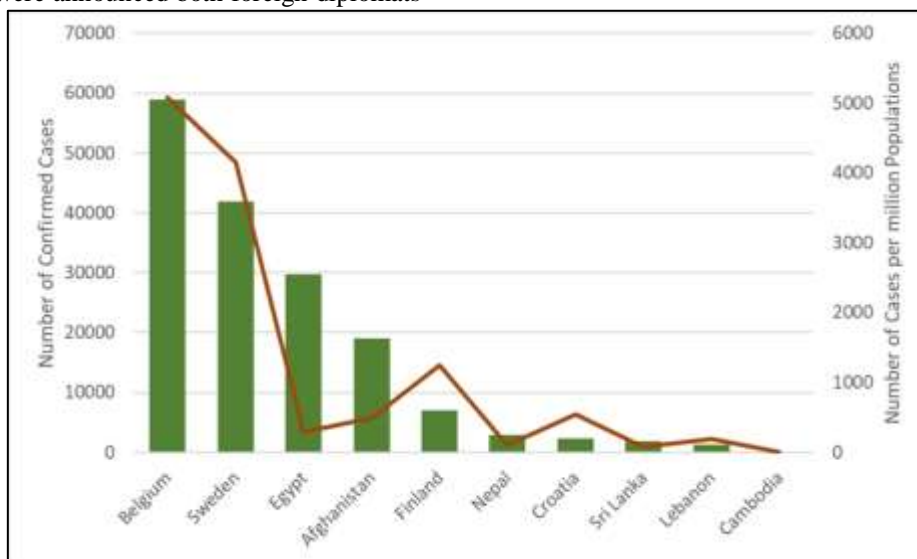


Figure 1. Compassion of number of COVID-19 cases in Afghanistan with countries that had one case on 24, February, 2020

Iran by recording 167,156 number of cases and 8,134 deaths on 4th June, 2020 is at the top of table while Syria by recording 124 cases and 6 death on same date is at the bottom of the table. Afghanistan in ranked 8th based on number of cases and 6th based on number of deaths. It would be, also, reasonable to compare the number of confirmed cases, case identification per million and number of deaths in neighboring countries (Figure 2). Afghanistan is ranked fifth from the top of

the list as compared with its close neighbors in terms of number of confirmed cases, death and recovered. In addition, we have compared the rates of identification, recovery and fatality with neighboring as well as EMRO countries. The analysis shows that Afghanistan with 9.3% recovery rate is 2nd from the bottom of the table as compare to other countries. For instance, Morocco has highest recovery rate (88.8%) and Somalia

with 19% and Yemen with 3.7% recovery rate are at both side of Afghanistan.

Furthermore, in EMRO countries Yemen with 22.7% case fatality ratio (CFR) is in the top and Qatar

with 0.07% CFR is at the bottom of the table. Afghanistan with 1.6% CFR is ranked 13th of EMRO countries.

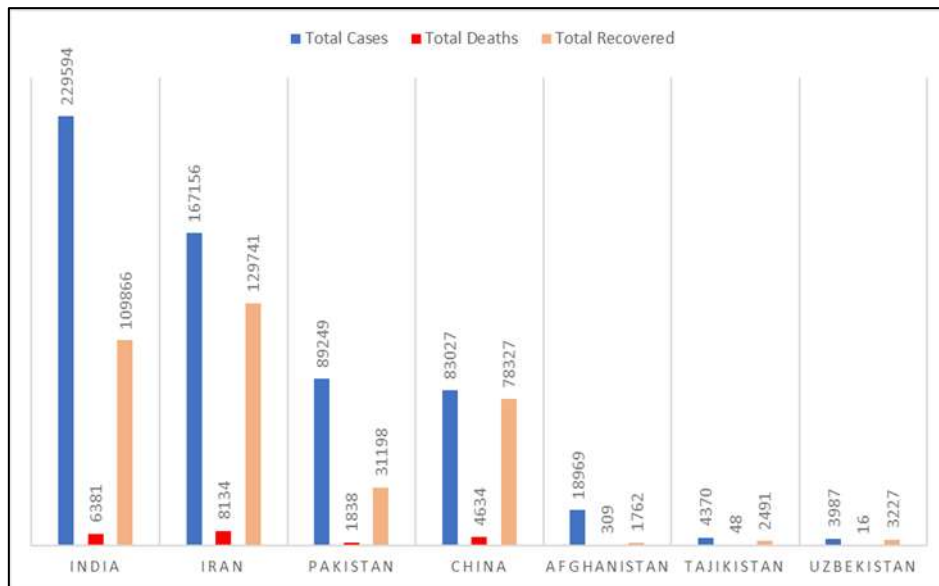


Figure 2: Comparison of cases, deaths and cases per million population in seven neighboring countries

Description by Geography

Lockdown measures in neighboring countries forced many Afghan refugees returning home, mostly through Hirat, Nimroz and Farah provinces (western borders of Afghanistan) while they spread over all over the country. Through this way, before community spread, the people with disease is dispersed in majority of provinces (UNHCR. www.unhcr.org). The epicenter of the outbreak was Hirat province in west of the country having shared border with Iran in which the

first case was imported and reported. Progressively, the cases were detected and reported from all other provinces. After more than three months now Kabul province with a total of 7,556 cases of whom 505 are recovered and 39 are death is on the top of the table and Urozgan by having five total case of whom one is recovered and no death is at the bottom. As of June 04, all 34 provinces are infected with COVID-19 (Figure 3).

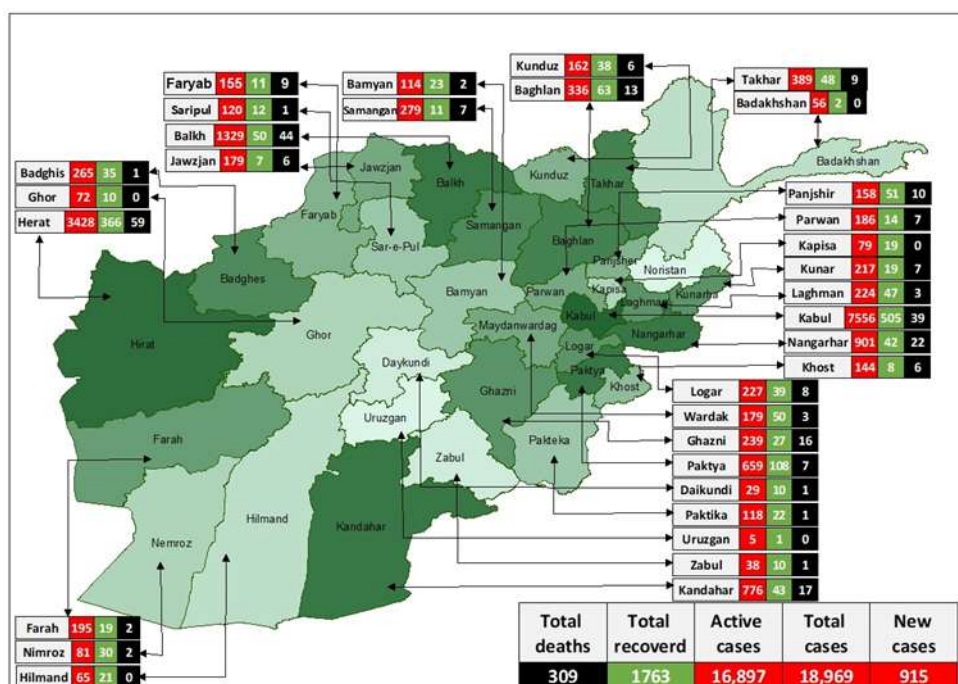


Figure 3: Geographical distribution of COVID-19 cases, recovered and death in Afghanistan

After Kabul at the top of the table, Hirat, Balkh, Nangarhar, Kandahar, Paktia, Takhar, Baghlan, Samangan and Badghis provinces were ranked at top ten provinces with number of cases.

Top ten provinces can be seen in Figure 4.

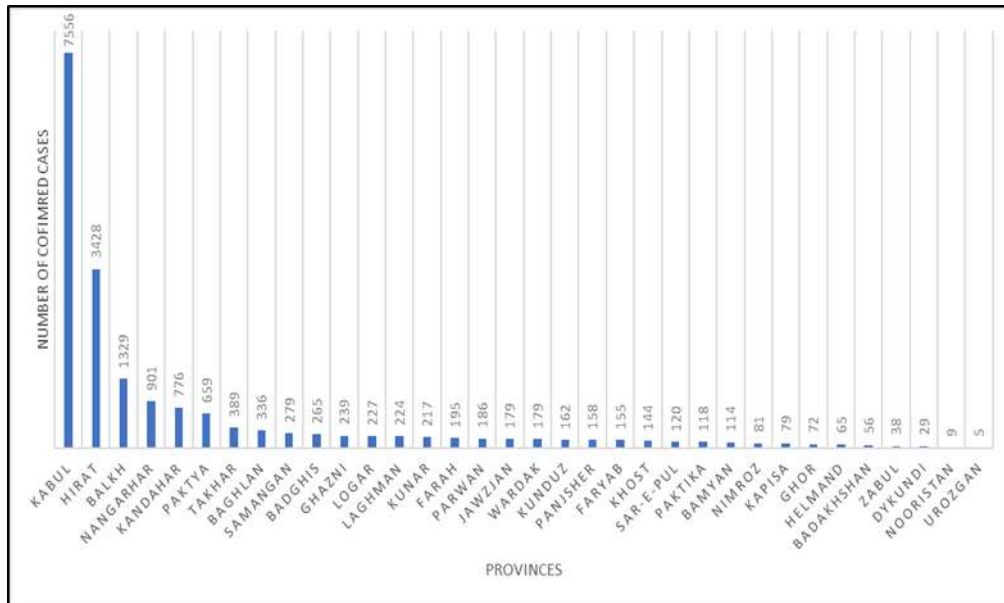


Figure 4: Top ten provinces with total number of COVID-19 cases in Afghanistan

However, Hirat (59), Balkh (44), Kabul (39), Kandahar (22), Ghazni (16), Baghlan (13) and Panjshir (10) are the provinces with highest number of deaths. Provinces such as Helmand, Ghor, Kapisa, Badakhshan, Urozgan and Nooristan have not reported any deaths yet. However, it should be noted that few provinces have good reporting mechanism while in some other provinces the deaths are not properly reported and recorded at provincial level.

In addition, the positivity rate of samples is also increasing day-to-day. For instance, the positivity rate was around 20% nationally on 24 February but now it has raised to 42%. It seems that 38% of provinces has more positivity rate as compare to national average (42%). The highest positivity rate was recorded in Nangarhar (65.4%) and lowest in Nooristan (16%). Figure 5 shows samples positivity using PCR testing

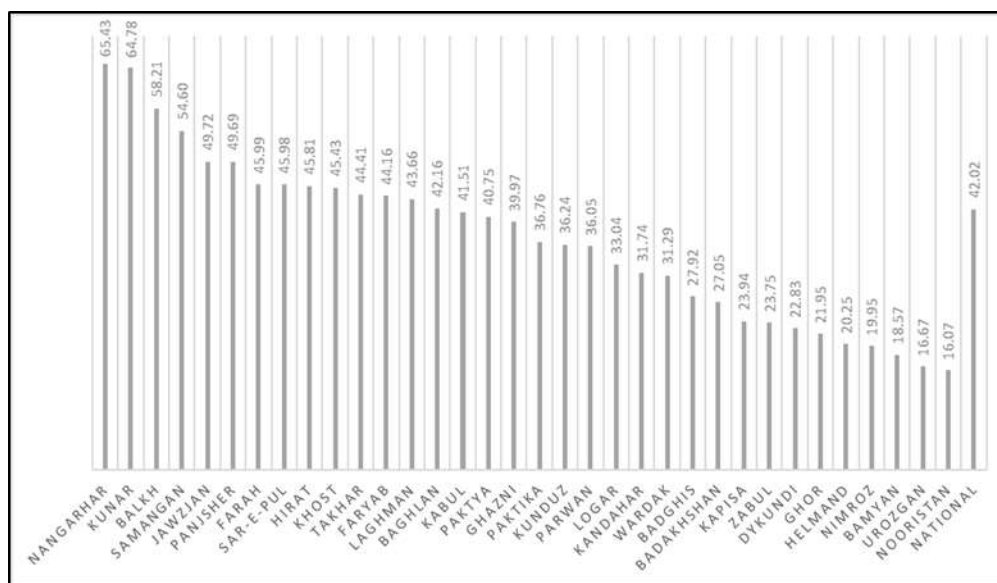


Figure 5: Proportion of positivity rates by provinces of COVID-19 in Afghanistan

The highest recovery rate is reported in Nimroz province (37%) and lowest in Badakhshan province (3.6%) while the national recovery is 9.3%. In Ghazni and Panjshir provinces each reported 16 and 10 cases of death which shows almost 6% case fatality ratios. Following that Faryab (5.8%), Khost (4.2%), Baghlan (3.8%), Parwan (3.7%), Kunduz (3.7%), Logar (3.5%), Dykundi (3.5%), Jawzjan (3.3%) are the top ten provinces with highest case fatality ratio including Ghazni and Panjshir. The national CFR recorded on June, 04 is 1.6%.

Description by Age Group and Sex

Of total cases, 73.9% were male and 26.1% were female with a wide range of age limits. The average age of affected subjects was 37.3 years with minimum of one year and maximum of 100 years. Table 1 shows the distribution of the number cases according to gender and age. About half of cases (53%) were in young age group of 20 to 40 years.

Table 1: Frequency distribution of COVID-19 cases by sex in Afghanistan

| Categories | Male | % | Female | % | Total | % |
|------------------|------|-------|--------|-------|-------|-------|
| Age Group | | | | | | |
| 0-9 | 64 | 0.62 | 49 | 1.35 | 113 | 0.81 |
| 10-19 | 467 | 4.55 | 359 | 9.88 | 826 | 5.94 |
| 20-29 | 2733 | 26.62 | 1129 | 31.08 | 3862 | 27.79 |
| 30-39 | 2870 | 27.96 | 700 | 19.27 | 3570 | 25.69 |
| 40-49 | 1924 | 18.74 | 568 | 15.63 | 2492 | 17.93 |
| 50-59 | 1208 | 11.77 | 455 | 12.52 | 1663 | 11.97 |
| 60-69 | 689 | 6.71 | 254 | 6.99 | 943 | 6.79 |
| 70-79 | 211 | 2.06 | 94 | 2.59 | 305 | 2.19 |
| 80+ | 99 | 0.96 | 25 | 0.69 | 124 | 0.89 |

Approximately 81% of deaths occurred in males and 19% in females. Figure 6 depicts the proportion of cases and case fatality ratio with respect to age group. Despite of low infection in higher age groups the case fatality ratios are getting increased. Almost 22% of deaths is recorded in age group of >70 years.

Of all cases in this study period, 13.1% were hospitalized while the rest is either isolated in their home or unknown. Among hospitalized patients 75% were males. As of June 04, 872 healthcare workers were infected with COVID-19 in the country which accounts to 4.6% of total infections and 13 deaths which accounts to 4.2% of total deaths due to COVID-19.

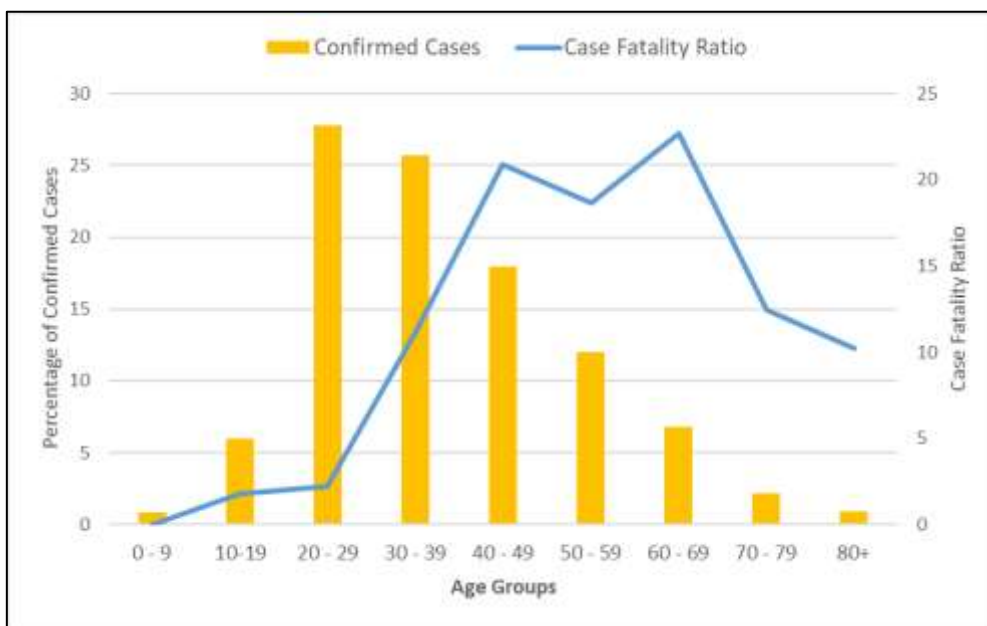


Figure 6: Proportion of cases and deaths due to COVID-19 by age groups in Afghanistan

Top ten provinces in which healthcare workers are infected includes Hirat (204), Wardak (78), Kabul (88), Nangarhar (71), Balkh (65), Kandahar (58), Kunduz (31), Badghis (26), Sarepul (25) and Takhar (24) provinces.

Description by Time

Figure 7 depicts the trend of cumulative cases as well as deaths and recoveries due to COVID-19 in the country. Of total cases recovery rate is 9.28% and case fatality ratio is 1.63%; however, it differs on daily bases. For instance, on 24 February the recovery rate was 12.7% while the case fatality ratio was more than 3%

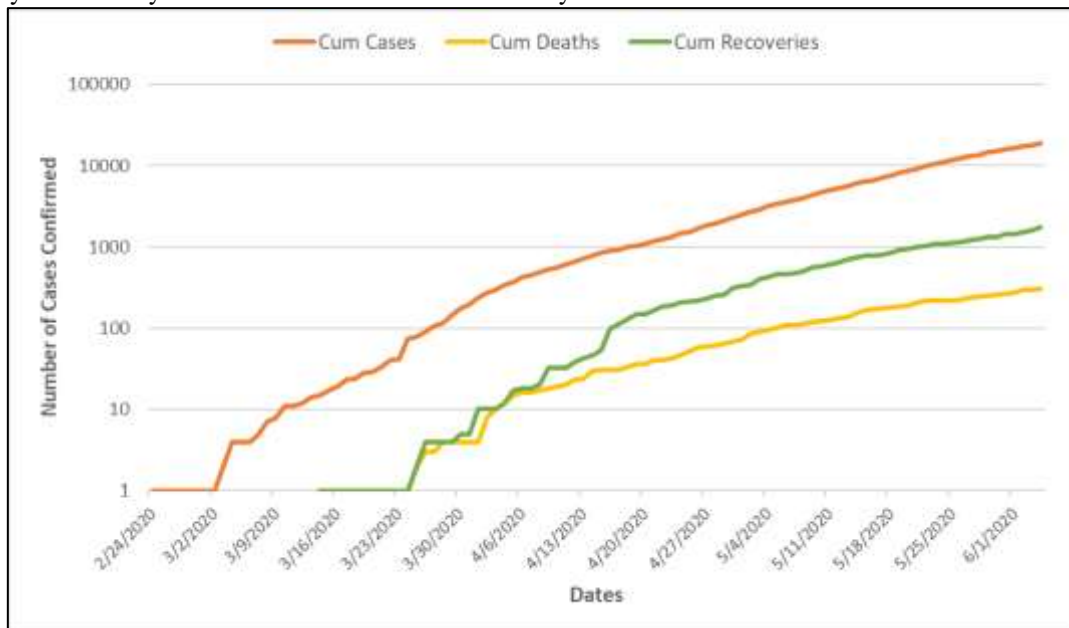


Figure 7: Trend of cumulative cases and deaths due to COVID-19 in Afghanistan

The first recovery reported on 14 and first death on 22 March and afterwards the number of cases and deaths are rising. The rate of increasing of confirmed cases was different on daily bases, however on average, in last three months, there was 1.40 time increase in number of confirmed cases. Figure 8 shows the epidemic curve based on number of daily cases confirmed and case fatality ratio calculated on cumulative cases and deaths.

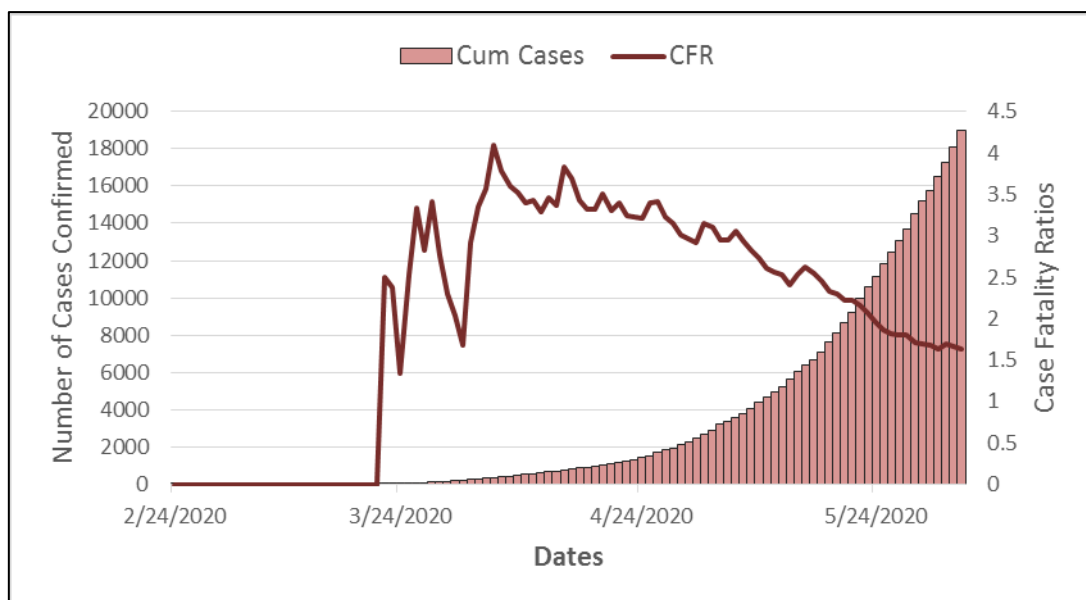


Figure 8: Epidemic curve of daily COVID-19 confirmed cases and case fatality ratio (CFR)

As a whole, on average CFR is 2% because in first month there was no death which led to zero fatality. However, since record of first case of death on 22nd March the average CFR is 1.63%. The histogram of cases shows that number of cases are rising and

probably, after three months, still it has reached to peak of the outbreak. Furthermore, CFR is varying on first couple of weeks due to varying number of cases, however at the end of graph it is consistently declining very slowly.

Challenges and Responses

After WHO declaration of COVID-19 as a PHEIC, the MoPH in Afghanistan get preparation and start taking actions. The key measures were activating and updating the national emergency plan, establishment of entry fever screening in key airports and land crossings, allocation of certain hospitals in Hirat, Kabul and few hospitals in other provinces for isolation of confirmed cases. In addition, other efforts were procurement of PCR kits to CPHL for testing the samples, enhancing surveillance by development of case definitions and sample collection, expanding the PCR testing to five regional provinces, raising public awareness and focusing on mobilizing fund to support the programs. In order to manage the emergency a group of committees at country level were established and dedicated to fight COVID-19. At higher level, the President chairs COVID-19 related response meetings with provincial governors through video conferences and virtual meetings. The Second Vice President is chairing Emergency and Disaster Response High Level Committee, which is the highest decision-making body for COVID-19 response. The key committees functionalized at MoPH level were high coordination committee headed by minister of public health while a series of subcommittee such as case management, surveillance and laboratory, risk communication, infection prevention and control, logistic and operation were functional occasionally. Although the committees were not fully coordinated, however the emergency is being well managed until now. Government of Afghanistan, World Bank, Asian Development Bank and US government committed to support Afghanistan financially to fight against COVID-19. The last key measure taken by the government is announcement and implementation of partial lockdown in key provinces such as Kabul and Hirat which is replicated to other provinces spontaneously. In an effort to manage the outbreak appropriately all three deputy ministers and following the minister himself were replaced recently.

DISCUSSION

Afghanistan as a conflict affected country has experienced enormous challenges including political unrest, complex emergencies, socio-economic hardships, humanitarian crises and high burden of infectious and non-infectious diseases. Moreover, it is constrained by limited institutional and workforce resources and capacities. These challenges along with COVID-19 have put the country at risk of spread of the diseases with high mortality and morbidity rates. COVID-19 was an epidemic in China in the beginning of 2020 which spread all over the world and now it changed to a global pandemic. This descriptive epidemiological study focuses on pattern of COVID-19 in Afghanistan between February 24 and June 04, 2020. It should be mentioned that many dimensions of the COVID-19 are still unknown and at the same time due to emergency situation the amount and quality of data is

lacking (World Health Organization. 2020). However, incidence of confirmed cases and deaths are rising, until writing this report there is no peak which is against the prediction of Singapore University (Luo, J. 2020). We assume a smaller number of cases are detected and the true cases would more than official confirmed ones. Anecdotal reports expects that the incidence would continue to increase until the end of June and will be died by end of August, 2020. No doubt, the preventive or adverse measures will linger or shorten the curve. Furthermore, due to low capacity of PCR testing, low access to healthcare services and misconception about COVID-19 management few numbers of suspected cases are coming to health centers for testing as well receiving care. Therefore, comparison of Afghanistan to other countries including EMRO and neighboring will be challenging. Low number of confirmed case due to COVID-19 probably is linked to early preparation of the government, low number of testing, population low confidence and adverse behaviors of the community. Low number of deaths could be attributed to under reporting, age structure of country (young population), widespread vaccination against childhood infection diseases, natural resistance and immunity of third world and underreporting of deaths in the country (Paiman, W. 2020). High number of cases and deaths in all 34 provinces is an indication of community spread in the country. More number of cases and deaths in few provinces are due to their high population density, being network of few zonal provinces, establishment of regional lab in each one and high access to health facilities. In these zonal provinces hundreds of thousands of people frequently travel to and from other provinces.

In this study, we observed a higher rate (two-third) of COVID-19 incidence and deaths in men than in women which is not unexpected because the country is conservative society and more males are involved in social and economic affairs. It means that men are likely to spend more time outdoors and thus have a higher risk of exposure to a source of infection. Young and male laborers have left the country due to economic hardship and now returning back with COVID-19. However, a series of studies suggests that there is also a higher incidence of MERS-CoV and influenza in men than in women, which is probably due to a higher level of testosterone and a corresponding suppression of their immune response (Furman, D. *et al.*, 2014; & Alghamdi, I. G. *et al.*, 2014). The findings of this study indicate that those in the age groups of 20-30 and 30 - 40 years are at higher risk of infection while the age group of 60 years and more had the highest rate related deaths. It is obviously manifest that young population is economical group and more exposed, therefore more infected but due to high level of resistance and immunity has low rate of death. It has been documented that people over 65 years of age and younger people with chronic diseases are at a greater risk of complications resulting from viral infections than

healthy adults. This indicates that older and unhealthy younger people are more likely to become infected with COVID-19 owing to a weak immune system, and infection is more likely to be fatal in these groups (Alghamdi, I. G. *et al.*, 2014; & Seasonal influenza (flu).2013).

The key limitation of this study was unavailability of true data, using of secondary dataset and not performing a real survey. Although government of Afghanistan has announced and implemented restriction of movements of people in cities and closed educational and government institutions, however it is difficult to continue and sustains quarantine/lockdown for longer time because close to 54% (tolonews.com) of Afghan citizens live under poverty line and on daily wages. Therefore, the impact on the social determinants of health would be huge requiring multi-dimensional intervention.

CONCLUSION

Epidemiological analysis of the daily reports of COVID-19 incidence recorded by the MoPH in DHIS2, in three months period disclosed that the recent epidemic of SARS-CoV2 has a high fatality rates in the country and has already spread from person to person. The numbers and rates of cases and deaths are higher in men than in women. Higher morbidity is recorded in young population while higher rates of mortality is noted in older groups. Number of cases and deaths are reported from five zonal provinces due to high population density and frequent travels. However, further epidemiological studies are required to determine the various aspects including risk factors for infection and outcome of COVID-19 in Afghanistan. Management of the pandemic in current situation pose a series of lessons to be recorded and learnt for future situations.

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