Evolution of COVID-19 in the Karisimbi Health Zone City of Goma, DRC 2020

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ABSTRACT

Introduction: The Karisimbi health zone reported its first case of Covid-19 in the twentieth epidemiological week of 2020, and up to the thirty-third epidemiological week, it had reported 223 confirmed cases and 22 deaths. There was widespread fear of Covid-19 among the population and healthcare providers. The Karisimbi health zone implemented a number of strategies to combat the pandemic, including epidemiological surveillance of Covid-19, follow-up of contact cases, isolation of confirmed cases and medical management. Nevertheless, the health zone was not analyzing Covid-19-related data on a regular basis, and was not communicating sufficiently on its evolution due to the non-payment of service providers. This justified the present study, the aim of which was to analyze Covid-19-related data and inform decision-makers and health providers about its evolution in order to contribute to the improvement of Covid-19 control strategies. **Methods:** This cross-sectional descriptive study that used secondary data was carried out in the Karisimbi health zone from the 20th to the 33rd epidemiological week of the year 2020 with a sample of 109 Covid-19 patient files. Descriptive analyses were carried out (proportion and mean) for the study variables derived from Covid-19 patient records. **Results:** Of the 109 patient files examined, 40.4% (45/109) were asymptomatic for Covid-19, while 59.6% (56/109) were symptomatic. The average turnaround time for results from the Institut National de Recherche Biomédicale was 7 days. The average age of patients with confirmed Covid-19 was 38, and the overall case-fatality rate was 10%. Only 61.5% of cases were followed up in Covid-19 treatment centers, and diabetes mellitus was the only comorbidity encountered, with a diabetes-specific mortality of 100%. From the twentieth epidemiological week to the thirty-third week of 2020, Covid-19 evolved in a fluctuating manner, with a peak in week 28 and numerous deaths in week. **Conclusion:** From the twentieth epidemiological week to the thirty-third week of the year 2020, Covid-19 evolved in a fluctuating manner, with a peak in week 28 and numerous deaths in week 31. Thus, the delay in reporting laboratory results (7 days turnaround time) did not enable the surveillance team to halt the spread of the disease at an early stage.

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Introduction

The Covid-19 pandemic, the first case of which was recorded in Wuhan, China, since December 2019, is marking human history by the thousands of deaths it causes through its ferocity [1]. However, the Coronavirus (Covid-19) disease had spread worldwide. Preserved for a short time, Africa has been affected since March 2020, with around 85% of countries affected. Covid-19 has gone beyond the threat stage to become a sad reality on the continent [2].

Prior to the arrival of this epidemic in Africa, the World Health Organization (WHO) and health experts all predicted a rapid spread of Covid-19 in Africa, with unprecedented mortality [2-5]. This apocalyptic prediction of the impact of the Covid-19 epidemic in sub-Saharan Africa was based on the combination of several factors of vulnerability, including the fragility of the health system, the economy, the promiscuity of individuals and the extreme poverty of populations living from day to day without provisions, the endemic nature of certain chronic pathologies that predispose to Covid-19, such as HIV/AIDS infection, malaria, sickle-cell anemia and malnutrition [6-9].

Limited access to drinking water and essential medicines, denial of the disease due to high illiteracy rates, and intense trade with Asian and European countries such as China, France, Belgium and Italy all contribute to the spread of pandemic [9]. However, the spread of the Covid-19 epidemic in Africa countries appears to be slower and less deadly, with notable differences between countries [10].

According to the Africa Center for Disease Control and Prevention, the number of confirmed cases of Covid-19 in Africa stood at 1,148,849, while the number of deaths due to the pandemic had reached 26,664, representing a case-fatality rate of 2.3%. At that time, South Africa had the highest number of Covid-19 cases on the continent, with 596,060 cases and the highest recorded number of Covid-19-related deaths at 12,423 deaths [11].

The Democratic Republic of Congo has not been spared by this pandemic. The country´s first Covid-19 index case was declared on March 10, 2020 in the provincial city of Kinshasa, the country's capital and considered the epicenter in the country. This led President Félix Tshisekedi to declare a state of emergency and national containment to deal with the Covid-19 epidemic on March 24, 2020. The lockdown lasted six months and was lifted on July 23, 2020 [12,13].

Covid-19 was confirmed in Goma in April 2020. While this province had just emerged from the Ebola epidemic that claimed thousands of lives, the population and healthcare providers were gripped by fear of a new disease. According to the epidemiological bulletin of August 31, 2020, 17 provinces out of 26, or 65% of the country's provinces were affected, with a total of 1,0104 confirmed cases, of which 9,322 were declared cured and 259 deaths. The cure rate was 92.3% and the case fatality rate was 2.6% [14].

North Kivu had a total of 762 confirmed cases and 99 deaths, representing a case-fatality rate of 13%; and it is the province with the highest case-fatality rate due to Covid-19 compared with other affected provinces in the country [15]. This situation is explained by intense mobility of people in the province, because of its international airport, two main terrestrial points of entry to Rwanda, maritime ports and other roads linking the city to other parts of the country. During the period of confinement, the city of Goma recorded a migratory flow of 30,148 between April and July 2020 [16].

The Karisimbi health zone is one of the three health zones in the city of Goma affected by this pandemic, with a cumulative total of 223 confirmed cases and 22 deaths, representing a case-fatality rate of 9.87%. This health zone had the highest Covid-19 case-fatality rate in the whole province [12]. With a surface area of 48.27 km2 and 581501 inhabitants, it also has a spatial density of 12046.8407 inhabitants per square kilometer. It has a total of 262 health structures, 67 of which are integrated into the system, spread over 19 health areas, the Goma international airport and a border post between the town of Goma and the Republic of Rwanda are located in the Karisimbi health zone.

The Karisimbi health zone reported its first case of Covid-19 in the twentieth epidemiological week of 2020, and by the thirty-third epidemiological week, had reported 223 confirmed cases and 22 deaths. The Karisimbi health zone put in place a number of strategies to combat the pandemic, including epidemiological surveillance of Covid-19, follow-up of contact cases, isolation of confirmed cases and medical management. Nevertheless, the health zone was not analyzing Covid-19-related data on a regular basis, and was not communicating sufficiently on its evolution due to the non-payment of service providers. This justified the present study, the aim of which was to analyze Covid-19-related data and inform decision-makers and providers about its evolution in order to contribute to the improvement of Covid-19 control strategies.

Research objectives

To carry out this study, we set three specific objectives: to determine the evolution of Covid-19 in the health zone by epidemiological week, to describe the characteristics of people with Covid-19 and to determine the average time taken for laboratory results to be returned.

Methods

Study setting

This study was conducted in the Karisimbi health zone of the North Kivu Provincial Health Division in the Democratic Republic of Congo.

Type of study

This is a descriptive cross-sectional study using secondary data extracted from records of Covid-19 patients notified from the 20th to the 33rd epidemiological week of the year 2020 in the Karisimbi health zone.

Sampling

A total of 223 confirmed cases of Covid-19 were recorded in the Karisimbi health zone between the 20th and 33rd epidemiological weeks of the year 2020. Thus, of the 223 confirmed cases, only 107 Covid-19 case files were found at the health zone central office and were considered the sample size for this study.

Study population

The study population was any record of a patient with Covid-19 notified between the 20th and 33rd epidemiological week of the year 2020 in the Karisimbi health zone and whose medical record was kept at the Karisimbi health zone central office. Patient files were examined to extract data for this study.

Data analysis

We used EPI DATA 2013 to code and categorize the data, which was then exported to SPSS version 23 for analysis. Descriptive analyses were carried out (proportion and mean) for the study variables derived from Covid-19 patient records.

Ethical approval

We obtained ethical approval after presentation and discussion of the study protocol with the ethics committee of the Karisimbi health zone. We obtained ethical approval after presentation and discussion of the study protocol with the ethics committee of the Karisimbi health zone.

Results

The Karisimbi health zone investigated and sampled 1,590 suspected Covid-19 cases and sent them to the laboratory for confirmation. Only 223 cases tested positive for Covid-19, i.e. 223/1590*100=14%, which was taken as the frequency of confirmed Covid-19 cases in the health zone.

Evolution of Covid-19 by epidemiological week

From epidemiological week 20 to week 33 of 2020, reported cases of Covid-19 fluctuated, peaking in week 28. Most deaths occurred in epidemiological weeks 28 and 29, accounting for 50% of all deaths during this period (Figure 1).

Of the 107 patient files examined, 40.4% were asymptomatic for Covid-19, while 59.6% were symptomatic. Of the cases presenting clinical signs of Covid-19, 70% had cough, 60% had a temperature above 37°C and 50% had severe weakness and pain (Table 1).

Characteristics of Covid-19 cases

Among confirmed cases of Covid-19 in the Karisimbi Health Zone, 63.3% (69/109) were men and 36.6% (41/109) women. The average age of patients with Covid-19 was 38 years (range 3 to 90), and the overall case-fatality rate due to Covid-19 was 10% (11/109). In terms of medical management, 61.5% (67/109) of Covid-19 patients were treated at the treatment center and 38.5% (42/109) at home.

Of the 109 patient files examined, 40.4% (45/109) were asymptomatic for Covid-19, while 59.6% (65/109) were symptomatic. The distribution of the different clinical signs of Covid-19 among the symptom cases is shown below: 72.3% (47/65) had a cough, 63.1% (41/65) had a temperature above 37°C, 55.4% (36/65) had headache, 53.8% (35/65) had pain, 49.2% (32/65) had intense fatigue, 30.8% (20/65) had a nasal discharge, 29. 2% (19/65) had shortness of breath, 18.5% (12/65) had nausea, 18.5% (12/65) had sore throat, 13.8% (9/65) had vomiting and 7.8% (5/65) had diarrhea (Table 1).

Of the confirmed cases, 66.1% (72/109) were contacts of known confirmed or probable cases, and 22% (24/109) were healthcare workers, 8.3% (9/109) had been hospitalized or visited a health facility within 14 days prior to the date of symptoms onset and 0.9% (1/109) were known to have travelled within 14 days of the onset of symptoms (Table 2).

Complications identified among COVID-19 cases

Of the 109 cases, only 10/109 (9.2%) cases experienced complications. Among these cases, 90% (9/10) had acute respiratory distress, 70% (7/10) were admitted to the intensive care unit, 60% (6/10) received oxygen therapy and 40% (4/10) were in a comatose state (Table 3). Our study showed that diabetes mellitus was the only

comorbidity encountered, with a diabetes-specific mortality of 100%.

Average time taken for receiving results

The average turnaround time for Covid-19 sample results from the Institut National de Recherche Biomédicale in Kinshasa to the Karisimbi Health Zone response team was 7 days, ranging from 3 to 25 days.

Discussion

The present study was initiated to analyze the records of patients with Covid-19, and to inform decision-makers about the evolution of the disease in the Karisimbi Health Zone of North Kivu Province in the Democratic Republic of Congo in order to contribute to improving the fight against the pandemic. The frequency of Covid-19 infection in the Karisimbi Health Zone was 14%.

The study involved a sample of 109 Covid-19 patients, 63.3% of whom were men and 36.7% women. The high frequency of Covid-19 cases among men could be explained by the fact that, in the Karisimbi Health Zone, it is mostly men whose occupations and family survival require them to go out a lot and be in contact with the outside world, exposing them to the circulating virus, rather than the women who commonly stay at home to look after their children.

The results of this study are similar to those of a study carried out in Iceland by D.F Gudbjartsson et al who showed that children under 10 and women were less affected by corona virus infection than men [17]. While 40% of cases were asymptomic and the response strategy consisted of screening only contact cases showing signs linked to Covid-19, this strategy run counter to the conclusions of a meta-analysis study by Diana Buitrago-Garcia et al who estimated that 17-25% of people infected with Covid-19 would remain asymptomatic throughout the course of their infection [18].

The finding that 40% of the cases were asymptomatic is consistent with the Diamond Princess publication which revealed that 48% of cases confirmed by respiratory sampling were totally asymptomatic [19]. Melissa M. et al on the other hand showed a higher frequency with more than half the residents with positive results being asymptomatic at the time of testing [20].

The most frequent symptoms and clinical signs found in the files of patients suffering from Covid-19 were: cough, temperature above 370C, and pain representing 70%, 60% and 50% respectively. The presence of these symptoms which are linked to Covid-19 infection, confirms that the patients in this study had the disease. A study by Haiyan Qiu et al showed that the most common symptoms on admission were fever (36%) and dry cough (19%) in all patients confirmed positive for Covid-19 [21]. And a study by Fang Zheng et al found that cough and fever were the main symptoms, with 44% and 52% respectively [22].

The Covid-19 case-fatality rate of 10% in Karisimbi health zone was higher than the rate in other health zones in the country, which was around 1%. This may be explained by the lack of early case reporting, which would also justify the lack of adjustment of control strategies by decision-makers. However, the Karisimbi zone case fatality rate are in line with studies carried out by Richardson S et al and Groenewegen K. A et al, who found 9.6% Covid-19 case-fatality [23].

The average turnaround time for laboratory results was 7 days. This is due to the fact that the Karisimbi Health Zone does not have the necessary capacity for the biological analysis of Covid-19 samples and samples had to be sent to the National Laboratory, which prevented the response team from stopping the circulation of the virus in the Karisimbi Health Zone at an early stage.

Our study revealed certain complications among ten COVID-19 cases, including 90% of patients presenting with acute respiratory distress, 70% admitted to the intensive care unit, 60% receiving oxygen therapy, 40% in a comatose state, whereas a study by William Murk et al showed that pneumonia, acute respiratory distress syndrome, acute lower respiratory tract infection and respiratory failure were complications identified [24].

In terms of comorbidity, only diabetes mellitus was identified, with a diabetes-specific mortality of 100%. This agrees with the various daily epidemiological reports of the Multisectoral Committee for the Fight against Covid-19 indicating that mortality is very high among patients with comorbidities [13].

Conclusion

In conclusion, the results of this study carried out in the Karisimbi Health Zone highlight a fluctuating evolution of Covid-19 over the epidemiological weeks studied, with a peak observed in week 28 and most deaths in weeks 28 and 29. Characteristics of Covid-19 cases showed that the majority of patients were symptomatic, presenting mainly with symptoms of cough, fever, weakness, severe pain, runny nose, shortness of breath, nausea, sore throat, diarrhea, vomiting, and headache. Men were more affected than women, with an average age of affected patients of 38. The overall case-fatality rate was 10%, with diabetes mellitus as the only comorbidity associated with a specific mortality of 100%. Complications were rare but serious, notably acute respiratory distress and admission

to intensive care. Finally, the average time taken to receive results from the Institut National de Recherche Biomédicale in Kinshasa to the Karisimbi health zone intervention team was 7 days, with a variability ranging from 3 to 25 days. These results underline the importance of continuous monitoring and appropriate management to combat Covid-19 in the study area.

We recommend that the Karisimbi Health Zone (should) integrate Covid-19 data analysis into routine activities, and present evolving trends in the Covid-19 situation at the weekly Health Zone epidemiological surveillance unit meeting. And the government of Congo should train health professionals in matters of Covid-19 management, and then equip the Health Zone with Lab equipment for biological analysis of Covid-19 samples to facilitate timely diagnosis and institution of public health measures to control spread of the disease.

What is known about this topic

- Cough and fever are the main symptoms (rarely serious).
- Mortality is very high in patients with comorbidities.
- A smaller percentage of individuals infected with Covid-19 remain asymptomatic throughout the course of their infection.

What this study adds

- The average time taken by the Institut National de Recherche Biomédicale de Kinshasa to return Covid-19 sample results to the Karisimbi Health Zone response team was 7 days.
- The mean age of Covid-19 patients was 38 years.
- Diabetes mellitus was the only comorbidity encountered, with a diabetes-specific mortality of 100%.

Competing interests

The authors declare no competing interests.

Authors´ contributions

Conception, literature compilation, interpretation and editing: Djamba Okitokonda Fidèle, Correction and interpretation: Éric Panzi Kalunda, Data collection and entry: Ernest Ombha Loshima, Guy Bilulu Suama, Union Sacrée Mwanza Tsonga, Database design: Freddy Kambale Kavoga, Supervision: André Kalabela Misombo All authors have read and approved the corrected version of the article.

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References

1. Liu YC, Kuo RL, Shih SR.COVID-19: The first documented coronavirus pandemic in history. Biomed J [Internet]. 2020 May 5 [cited 2024 Jun 17];43(4):328-33. https://doi.org/10.1016/j.bj.2020.04.007 Google Scholar

2. Gountieni D, Lankoandé.[Thesis on the COVID-19 Disaster in Africa: African Resentment or Reality?] [Internet]. Ouagadougou (Burkina Faso):Applied Research and Analysis Group for Development (GRAAD); 2020 Apr 6 [cited 2024 Jun 9]. 31 p. French.

3. Lai CC, Wang CY, Wang YH, Hsueh SC, Ko WC, Hsueh PR.Global epidemiology of coronavirus disease 2019 (COVID-19): disease incidence, daily cumulative index, mortality, and their association with country healthcare resources and economic status . International Journal of Antimicrobial Agents [Internet]. 2020 Mar 19[cited 2024 Jun 9];55(4):105946. https://doi.org/10.1016/j.ijantimicag.2020.105946 PubMed | Google Scholar

4. Kinross P, Suetens C, Dias JG, Alexakis L, Wijermans A, Colzani E, Monnet DL, European Centre for Disease Prevention and Control (ECDC) Public Health Emergency Team.Rapidly increasing cumulative incidence of coronavirus disease (COVID-19) in the European Union/European Economic Area and the United Kingdom, 1 January to 15 March 2020. Eurosurveillance [Internet]. 2020 Mar 19 [cited 2024 Jun 9];25(11): pii=2000285. https://doi.org/10.2807/1560-7917.es.2020.25.11.2000285 Google Scholar

5. Centre d´étude stratégiques de 1´Afrique.[Mapping risk factors for the spread of COVID-19 in Africa] [Internet]. Washington (DC):Centre d´études stratégiques de 1´Afrique [Africa Center for Strategic Studies];. 2020 Apr 13 [cited 2024 Jun 10]; [about 20 screens]. French.

6. Napoli PE, Nioi M.Global Spread of Coronavirus Disease 2019 and Malaria: An Epidemiological Paradox in the Early Stage of A Pandemic. JCM [Internet]. 2020 Apr 16 [cited 2024 Jun 10];9(4):1138. https://doi.org/10.3390/jcm9041138 PubMed | Google Scholar

7. Hussain FA, Njoku FU, Saraf SL, Molokie RE, Gordeuk VR, Han J.COVID–19 infection in patients with sickle cell disease . Br J Haematol [Internet]. 2020 Apr 21 [cited 2024 Jun 10];189(5):851-2. https://doi.org/10.1111/bjh.16734 PubMed | Google Scholar

8. Dexter D, Simons D, Kiyaga C, Kapata N, Ntoumi F, Kock R, Zumla A.Mitigating the effect of the COVID-19 pandemic on sickle cell disease services in African countries . The Lancet Haematology [Internet]. 2020 Apr 23[cited 2024 Jun 10];7(6):e430-2. https://doi.org/10.1016/s2352-3026(20)30122-8 PubMed | Google Scholar

9. François L, Yannick M, Jean R, Rosette K, Lepira, Daniel K, Jacques LM.[Low progression of COVID-19 pandemic in sub-Saharan Africa: reality or iceberg´s tip?] . Ann Afr Med [Internet]. 2020 Jun [cited 2024 Jun 10];13(3) e3759-64. French. Abstract available in English. Download pdf to view full article.

10. Nachega J, Seydi M, Zumla A.The Late Arrival of Coronavirus Disease 2019 (COVID-19) in Africa: Mitigating Pan-continental Spread. Clin Infect Dis [Internet]. 2020 Mar 30 [cited 2024 Jun 10];71(15):875-8. https://doi.org/10.1093/cid/ciaa353 PubMed | Google Scholar

11. Xinhua Net.Africa's confirmed COVID-19 cases surpass 1.91 mln: Africa CDC. Xinhua Net [Internet]. 2020 Nov 13 [cited 2024 Jun 10]: [about 2 screens].

12. Lassaad Ben Ahmed, Mulegwa P.[DRC: state of health emergency lifted] . Anadolu Agency [Internet] 2020 Jul 22 [updated 2020 Jul 23;cited 2024 Jun 10]: [about 5 screens]. French.

13. France24. [End of the state of health emergency: the people of Kinshasa return to café terraces] . France24 [Internet]. 2020 Jul 22 [cited 2024 Jun 10]: [about 5 screens]. French.

14. Ministère de la santé [Ministry of Health] (DRC). Stop Coronavirus Covid-19 [Internet]. Kinshasa (DRC): Ministère de la santé [Ministry of Health];2022 Aug 31[cited 2024 Jun 10]. French.

15. Kubuya B J.[2020 Annual Report of the Provincial Health Directorate of North Kivu] [Internet]. Goma (Democratic Republic of Congo): Division Provinciale de la Santé du Nord Kivu [North Kivu Provincial Health Division]; 2021 Mar 20 [cited 2024 Jun 8]. 59 p. French. Download pdf to view full document.

16. Direction Provinciale de Migration du Nord Kivu [North Kivu Provincial Migration Directorate]. [Report of the 2nd quarter of migratory flows from the city of Goma]. Goma (DRC): Direction Provinciale de Migration du Nord Kivu [North Kivu Provincial Migration Directorate; 2020 Jul. French.

17. Gudbjartsson DF, Helgason A, Jonsson H, Magnusson OT, Melsted P, Norddahl GL, Saemundsdottir J, Sigurdsson A, Sulem P, Agustsdottir AB, Eiriksdottir B, Fridriksdottir R, Gardarsdottir EE, Georgsson G, Gretarsdottir OS, Gudmundsson KR, Gunnarsdottir TR, Gylfason A, Holm H, Jensson BO, Jonasdottir A, Jonsson F, Josefsdottir KS, Kristjansson T, Magnusdottir DN, Le Roux L, Sigmundsdottir G, Sveinbjornsson G, Sveinsdottir KE, Sveinsdottir M, Thorarensen EA, Thorbjornsson B, Löve A, Masson G, Jonsdottir I, Möller AD, Gudnason T, Kristinsson KG, Thorsteinsdottir U, Stefansson K.Spread of SARS-CoV-2 in the Icelandic Population. N Engl J Med [Internet]. 2020 Apr 14 [cited 2024 Jun 10];382(24):2302-15. https://doi.org/10.1056/nejmoa2006100 Google Scholar

18. Qiu H, Wu J, Hong L, Luo Y, Song Q, Chen D.Clinical and epidemiological features of 36 children with coronavirus disease 2019 (COVID-19) in Zhejiang, China: an observational cohort study . Lancet Infect Dis [Internet]. 2020 Mar 25 [cited 2024 Jun 10];20(6):689-96. https://doi.org/10.1016/s1473-3099(20)30198-5 Google Scholar

19. National Institute of Infectious Diseases (Japan). Field Briefing: Diamond Princess Covid-19 cases [Internet]. Tokyo (Japan): National Institute of Infectious Diseases; 2020 Feb 19 [cited 2024 Jun 10]; [about 10 screens].

20. Kimball A, Hatfield KM, Arons M, James A, Taylor J, Spicer K, Bardossy AC, Oakley LP, Tanwar S, Chisty Z, Bell JM, Methner M, Harney J, Jacobs JR, Carlson CM, McLaughlin HP, Stone N, Clark S, Brostrom-Smith C, Page LC, Kay M, Lewis J, Russell D, Hiatt B, Gant J, Duchin JS, Clark TA, Honein MA, Reddy SC, Jernigan JA, Public Health - Seattle & King County, CDC COVID-19 Investigation Team, Public Health - Seattle & King County, Baer A, Barnard LM, Benoliel E, Fagalde MS, Ferro J, Smith HG, Gonzales E, Hatley N, Hatt G, Hope M, Huntington-Frazier M, Kawakami V, Lenahan JL, Lukoff MD, Maier EB, McKeirnan S, Montgomery P, Morgan JL, Mummert LA, Pogosjans S, Riedo FX, Schwarcz L, Smith D, Stearns S, Sykes KJ, Whitney H, CDC COVID-19 Investigation Team, Ali H, Banks M, Balajee A, Chow EJ, Cooper B, Currie DW, Dyal J, Healy J, Hughes M, McMichael TM, Nolen L, Olson C, Rao AK, Schmit K, Schwartz NG, Tobolowsky F, Zacks R, Zane S.Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility - King County, Washington, March 20. MMWR Morb Mortal Wkly Rep [Internet]. 2020 Apr 3 [cited 2024 Jun 10];69(13):377-81. https://doi.org/10.15585/mmwr.mm6913e1 PubMed | Google Scholar

21. Buitrago-Garcia D, Ipekci AM, Heron L, Imeri H, Araujo-Chaveron L, Arevalo-Rodriguez I, Ciapponi A, Cevik M, Hauser A, Alam MI, Meili K, Meyerowitz EA, Prajapati N, Qiu X, Richterman A, Robles-Rodriguez WG, Thapa S, Zhelyazkov I, Salanti G, Low N.Occurrence and transmission potential of asymptomatic and presymptomatic SARS-CoV-2 infections: Update of a living systematic review and meta-analysis . Ford N, editor. PLoS Med [Internet]. 2022 May 26 [cited 2024 Jun 10];19(5):e1003987. https://doi.org/10.1371/journal.pmed.1003987 PubMed | Google Scholar

22. Zheng J.SARS-CoV-2: an Emerging Coronavirus that Causes a Global Threat . Int J Biol Sci [Internet]. 2020 Mar 15 [cited 2024 Jun 10];16(10):1678-85. https://doi.org/10.7150/ijbs.45053 PubMed | Google Scholar

23. Groenewegen K, Den Ruijter H, Pasterkamp G, Polak J, Bots M, Peters SA.Vascular age to determine cardiovascular disease risk: A systematic review of its concepts, definitions, and clinical applications . Eur J Prev Cardiol [Internet]. 2020 Aug 29 [cited 2024 Jun 10];23(3):264-74. https://doi.org/10.1177/2047487314566999 Google Scholar

24. Murk W, Gierada M, Fralick M, Weckstein A, Klesh R, Rassen JA.[Comprehensive analysis of COVID-19 complications: a pre- and post-exposure self-matching study] . CMAJ [Internet]. 2021 Mar 15 [cited 2024 Jun 10];193(11): E389-98. https://doi.org/10.1503/cmaj.201686-f French.

Table 1: Clinical characteristics of Covid-19 patients notified from epidemiological week 20 to 33 of 2020 in the Karisimbi health zone

Signs	Signs (n=65)	Percentage
Fever at 38^0C		
No	24	36,9
Yes	41	63,1
Nasal discharge		
No	45	69.2
Yes	20	30.8
Shortness of breath/Dyspnea		
No	46	70.8
Yes	19	29.2
General Weakness/Intense Fatigue		
No	33	50,8
Yes	32	49,2
Nausea		
No	53	81.5
Yes	12	18.5
Sore Throat		
No	53	81.5
Yes	12	18.5
Diarrhoea		
No	60	92.2
Yes	5	7.8
Cough		
No	18	27.7
Yes	47	72.3
Vomiting		
No	56	86.2
Yes	9	13.8
Headache		
No	29	44.6
Yes	36	55.4
Pain		
No	30	46.2
Yes	35	53.8

65 patients who showed clinical signs of Covid-19, 7/10 had cough, 6/10 had a temperature over 370C 5/10 had severe weakness and pain

Table 2: Sources of exposure of Covid-19 patients from epidemiological week 20 to week 33 of 2020 in the Karisimbi health zone		
Signs	**Signs (n=109)**	**Percentage**
Notion of hospitalization/consultation/visit to a health facility within 14 days prior to the date of onset of symptoms		
No	100	91,7
Yes	9	8,3
Health Care Provider		
No	85	78,0
Yes	24	22,0
Travel in the 14 days **prior to the appearance of the sign**		
No	108	99,1
Yes	1	,9
Close contact with a probable or confirmed case in the 14 days preceding the case.		
No	37	33,9
Yes	72	66,1
Of the cases,7/10 where contacts of confirmed or probable cases, 2/10 were health personnel		

Table 3: Complications identified in Covid-19 patients from epidemiological week 20 to week 33 of 2020 in the Karisimbi health zone		
Signs	**Signs(n=10)**	**Percentage**
Patients admitted to an intensive care unit		
No	3	30
Yes	7	70
Patients who have been ventilated		
No	5	50
Yes	5	50
Patients who have received oxygen therapy		
No	4	40
Yes	6	60
Coma		
No	6	60
Yes	4	40
Patients with acute respiratory distress syndrome		
No	1	10
Yes	9	90
Of the cases that experienced complications, 9/10 had acute respiratory distress, 7/10 were admitted to an intensive care unit, 6/10 received oxygen therapy, 4/10 were in a comatose state		

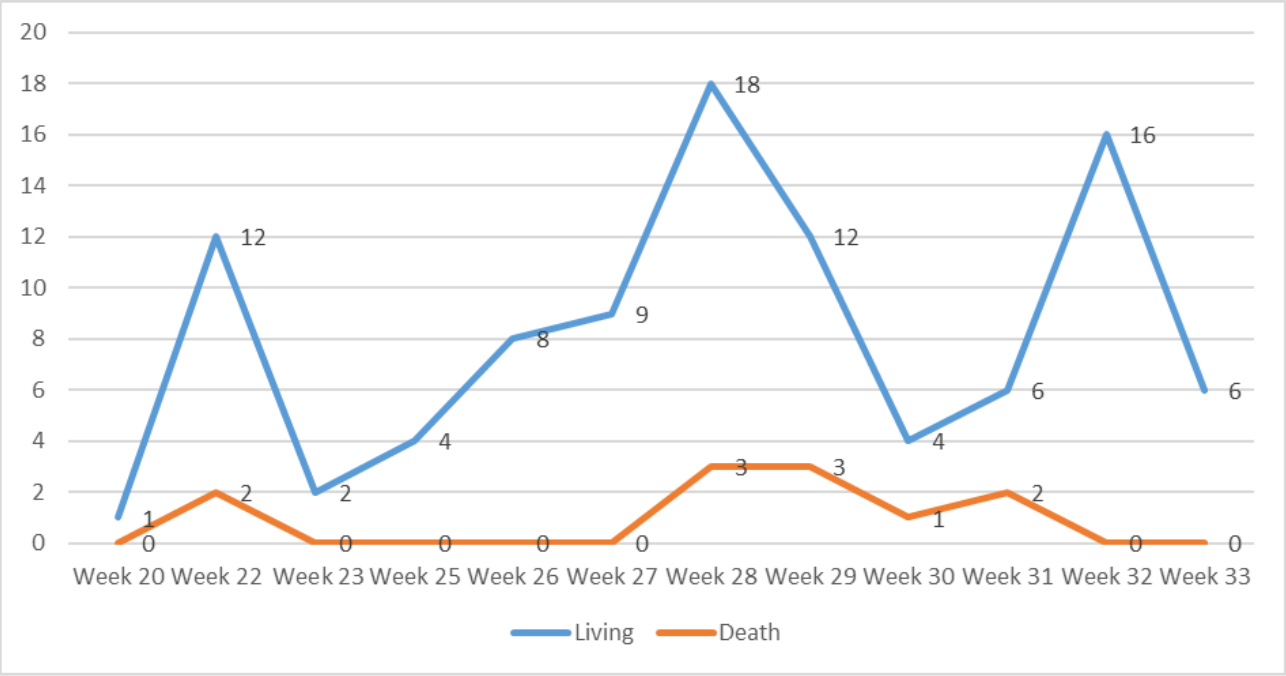

Figure 1: Covid-19 trends from epidemiological week 20 to week 33 of 2020 in the Karisimbi health zone