

**Epidemiological Study of Maturity Diabetes in the Karsimbi Health Zone Case of the CBCA Virunga General Reference Hospital for 2020 and 2021**

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**Abstract**

*Introduction.* Mature diabetes is one of the world's leading killers, along with high blood pressure and smoking, according to the World Health Organization (WHO). This disease is a major public health problem and despite prevention efforts, the pandemic continues. This study seeks to determine the prevalence of mature diabetes in the health zone of Karisimbi case of the CBCA Virunga Reference General Hospital.

*Method.* This is a retrospective study that took place in the internal medicine department of the CBCA Virunga Reference General Hospital in Goma City for 2020 and 2021. The data collected was mainly analysed with a view to collect descriptive and entered statistics using Ms Word 2013 and Excel Software. This is how we ended up with the frequency and percentage tables.

*Results.* The sample covered 102 diabetics for the year 2020 and 123 for the year 2021. After analysis and interpretation of the data, it emerged that the male sex is more affected by diabetes, the group of age of 45 and over is more concerned, and that the majority of diabetics are from the health zone (urban environment).

*Conclusions.* Imposing prevention as the first means of control, raising public awareness of the harmful effects of a sedentary lifestyle and obesity, important diabetogenic factors and respecting hygienic (dietary) measures to delay the onset of complications, thus improving the medical surveillance of diabetes, to be screened early in the event of a history of diabetes in the family or the existence of a risk factor.

**Keywords:** Epidemiology, Diabetes, Elderly, Sex, Maturity

**Introduction**

Diabetes mellitus is a public health problem worldwide and particularly in sub-Saharan Africa, where the constant increase in its prevalence is a major concern (Jaffiol, 2011). In these countries, this expansion is part of a true epidemiological transition from communicable diseases to non-communicable diseases due not only to the aging of the population, physical inactivity and obesity (Gning et al., 2007), but also to endocrine disruptors (Nalbone, Cicolella, & Laot-Cabon, 2013).

Type 2 diabetes is also called fatty diabetes or middle age diabetes. This is the most common form of diabetes: it mainly affects people over 50 who have an unbalanced diet. Type 2 diabetes requires regular monitoring and appropriate treatment to avoid complications.

Diabetes mellitus is one of the chronic diseases where therapeutic compliance is an essential component of the management process (Polonsky & Henry, 2016). An estimate from the International Diabetes Federation (IDF) pointed out that 463 million people worldwide have diabetes (International Diabetes Federation, 2019). Once rare in North Africa, type 2 diabetes is now progressing rapidly (International Diabetes Federation, 2019). In 2017, North Africa and the Middle East had 39 million diabetes patients, reaching a prevalence of 11% according to FDI estimates, and projections for 2045 will reach 82 million, representing an increase of 110% (International Diabetes Federation, 2019). In North Africa, type 2 diabetes has been the subject of several national studies, according to the methodological guidelines of the World Health Organization (WHO) (National Institute of

Public Health, 2007; Ben Romdhane et al., 2014). Type 2 diabetes is a silent, life-threatening disease (Lamri, Gripiotis, & Ferrario, 2014).

Diabetes is "one of the world's leading killers", along with high blood pressure and smoking, according to the World Health Organization (WHO). This disease is a major public health problem and despite prevention efforts, the pandemic continues.

In 2014, diabetes affected 422 million people worldwide, while it affected only 108 million patients worldwide in 1980 and the first forecasts of the World Health Organization (WHO) and the International Diabetes Federation (IDF) worried in 1990 about the risk of seeing diabetes affect 240 million people in 2025.

In 2019, diabetes affects more than 463 million people worldwide, including 59 million in Europe (International Diabetes Federation, 2019).

In 2021, diabetes affects more than 537 million people worldwide (i.e. 1 in 10 people), including 61 million in Europe (International Diabetes Federation, 2019) and 463 million people in 2019, an increase of 74 million in 2 years. In addition, 6.7 million people died in 2021 due to their diabetes, an increase of 2.5 million compared to 2019 (4.2 million deaths). In 2021, 81% of adults with diabetes live in low- and middle-income countries (compared to 79% in 2019). The current forecasts of these two organizations are very worrying: they announce 643 million diabetic patients for 2030 and 784 million for 2045.

In 2019, more than 4.5 million people in France have diabetes, but around 1 million of them are unaware of it! This represents a cost of €4,500/person with diabetes per year (International Diabetes Federation, 2019). In 2019, 1 in 11 people suffer from diabetes worldwide. The figure made public by the International Diabetes Federation (IDF) in the 9th edition of its Diabetes Atlas (2019) represents exactly 463 million people worldwide.

Over the period 2010-2015, the prevalence of diabetes increased by an average of 2.1% per year. At an identical age structure, it was higher in men (6.1%) than in women (4.2%), increased with age to reach a peak between 80 and 84 years in women and between 70 and 79 years for men. In 2015, more than 1 in 5 men aged 70 to 84 had diabetes in France. And yet these figures are not inevitable. We can all help reduce the risk of type 2 diabetes.

The mean age was  $49.06 \pm 16.97$  years. The age group from 40 to 65 years old represented 48.5% and subjects under 40 years old 33.7% (Séré et al., 2021).

The average age varied between  $44.9 \pm 4.1$  in Egypt and  $60.05 \pm 12.35$  years in the city of Sidi Bel-Abbés in Algeria (24.28) (Achouri et al., 2021).

In NIDDM, there is poor regulation of this system, most often with a state of insulin resistance: to maintain a constant sugar level, the body needs more insulin, because it becomes less efficient. Eventually, even large amounts of insulin are no longer enough to use the circulating glucose that accumulates in the blood: this is hyperglycemia. Eventually, the pancreas gets tired of this permanent stimulation and can then no longer produce enough insulin: this is insulin-requiring. These mechanisms of insulin resistance particularly concern people who are overweight. In this section, it is a question of taking up the factors which condition the prevalence of fatty diabetes.

### Age Parameter

The occurrence of type 2 diabetes is essentially linked to lifestyle: overweight, physical inactivity, high blood pressure, etc.

The analysis was done according to the cultural factors of the Sunrise model (Leininger & McFarland, 2002; 2006). The risk factors for type 2 diabetes associated with an increased risk of diabetes with a demonstrated causal link are:

- Age > 45 years;
- Geographical origin (person of non-Caucasian origin and/or migrant who has adopted a Western way of life);

- Overweight (body mass index  $> 28 \text{ kg/m}^2$ ).

Socio-cultural factors include all the elements that affect the values, norms and social perceptions of parents and communities with regard to school and the education of children.

### **The Gender Parameter**

Men are more often affected by T2DM (6.7% vs 4.9% of women), the prevalence of which increases with age (0.5% among 18-24 year olds vs 14.2% among older 65) with a peak increase among 45-54 year olds.

According to the data collected as part of the Ob Epi study, 2012 edition, while subjects suffering from type 2 diabetes are more frequently men (55% of subjects), women are more often obese (severe or very severe), hypertension or dyslipidemia.

Men are more often affected by T2DM (6.7% vs 4.9% of women), the prevalence of which increases with age (0.5% among 18-24 year olds vs 14.2% among older 65 years old) with a peak increase among 45-54 year olds.

### **Methods**

#### **Type of Study**

This is a retrospective study that took place in the Internal Medicine Department of the CBCA VIRUNGA Reference General Hospital in Goma.

#### **Study Period**

It extended over a period of two years from January 1, 2020 to December 31, 2021.

#### **Variables**

The parameters of the study were: epidemiological data (age, sex, type of diabetes), and place of origin. This study seeks to determine the prevalence of diabetes of maturity in the health zone of Karisimbi case of the General Hospital of Reference CBCA Virunga.

#### **Study Population and Sampling**

##### ***Target population***

The target population of the study consists of all patients admitted to the Virunga general reference hospital in the Karisimbi health zone during the period of our study, i.e. 21,415 patients for the year 2020 and 25,412 for the year 2021.

##### ***Setting***

##### ***Inclusion criteria:***

- Any diabetic subject registered in internal medicine from 2020 to 2021;
- Any subject aged at least 18 years old;
- The subject with a duly completed hospitalization file;
- Any subject followed at the Virunga General Reference Hospital during the study period.

##### ***Exclusion criteria***

- Any case of diabetes not recorded in the consultation register;
- Any subject under the age of 18;
- All other cases other than diabetes.

##### ***Study sampling***

##### ***a) Choice of sampling***

The choice of our sample was made using reasoned choice non-probability convenience sampling based on the selection criteria. Our sample is composed of 102 diabetics for the

year 2020 and 123 diabetics for the year 2021, which makes a total of 225 diabetics, all meeting the selection criteria.

*b) Type of sampling*

Our sampling is of the exhaustive type, i.e. we took all cases of adult diabetes in adults registered at the Virunga General Reference Hospital from 2020 and 2021.

**Data Sources**

*Data collection techniques and tools*

The data collection tool was essentially the face-to-face interview of the nurse in charge and the attending nurses of the internal medicine department. With the verification of the completeness of patient records. The protocol consisted of a data collection sheet (check list) containing the socio-demographic (age, sex, type of diabetes and place of origin), clinical and biological parameters of the patients who consulted the Virunga General Reference Hospital. for Diabetes.

The free observation allowed us to have an idea about the completeness.

The documentary technique allowed us to exploit the documents, works, articles, archives both official and private, published in order to easily understand the validity of the data provided.

*Data entry, processing and analysis*

The data collected was mainly analysed in order to identify descriptive statistics and entered using Ms Word 2013 and Excel software. This is how we ended up with the frequency and percentage tables.

**Results**

This survey which intervenes aims to collect, from the nursing staff, registers and files of the patients, the data which will make it possible to determine the prevalence of the diabetes of the maturity in the health zone of Karisimbi case of the General Hospital of Reference Virunga. Here it is a kind of report of all that was collected on the ground during the investigations. The data analysed are grouped by socio-demographic parameters.

**Data Analysis**

*Prevalence of Diabetes*

**Table 1: Hospital prevalence of diabetes in 2020**

	Effective	%
Cases of diabetes	102	0,48
Other pathologies	21313	99,52
TOTAL	21415	

Source: Our survey

From this table, we realize that out of a total of 21,415 patients admitted to the internal medicine department during our study period, 102 were diabetic, i.e. a hospital prevalence of 0.48%.

**Table 2: Hospital prevalence of diabetes in 2021**

	Effective	%
Cases of diabetes	123	0,48
Other pathologies	25289	99,52
TOTAL	25412	

Source: Our survey

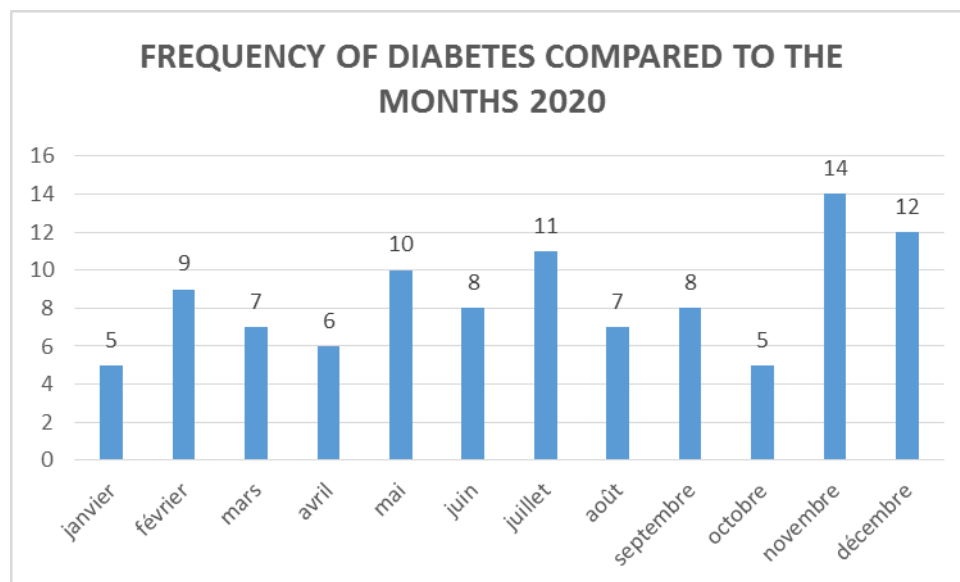
This table shows that out of a total of 25,412 patients admitted to the CBCA VIRUNGA General Reference Hospital during our study period, 123 were diabetic, i.e. 0.48%.

**Table 3: Distribution of diabetes cases by month for the year 2020**

Month	Number of diabetics	Number of deaths	<5 years	>5 years	Total
January	5	2	112	1240	1352
February	9	2	46	1442	1488
March	7	1	108	1526	1634
April	6	1	103	1382	1485
May	10	1	130	1452	1582
June	8	1	96	1520	1616
July	11	2	119	1769	1888
August	7	0	123	1911	2034
September	8	0	128	1814	1942
October	5	0	114	1673	1787
November	14	1	290	2183	2473
December	12	3	299	1835	2134
<b>TOTAL</b>	<b>102</b>	<b>14</b>	<b>1668</b>	<b>19747</b>	<b>21415</b>

Source: Our survey

This table presents the data for the number of diabetics, the number of deaths and the total number of patients admitted to the CBCA Virunga Reference General Hospital by month for the year 2020.



**Figure 1**

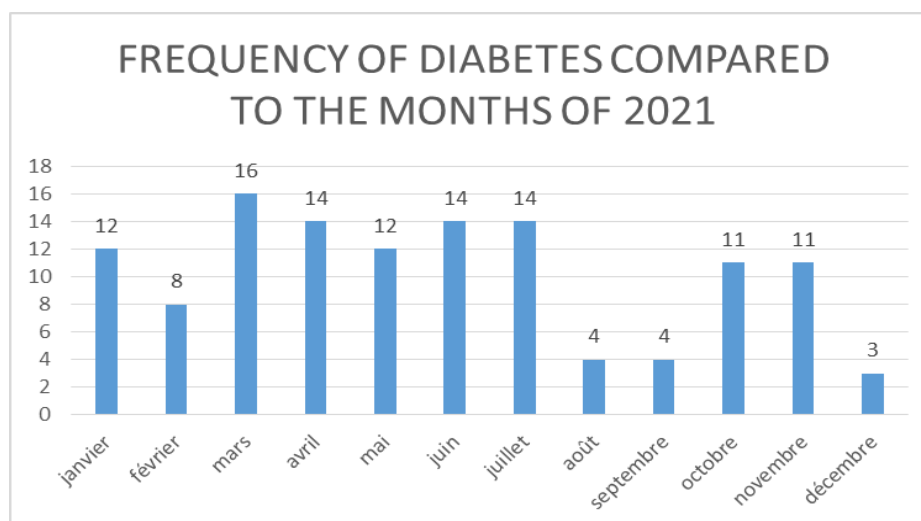
The figure above shows us the distribution of diabetes cases by month for the year 2020 and that the month of November occupies the first place followed by the months of December, July, May... and that the months of January and October in Last Position.

**Table 4: Distribution of diabetes cases by month for the year 2021**

Month	Number of diabetics	Number of deaths	<5 years	>5 years	Total
January	12	1	240	2019	2259
February	8	1	258	2024	2282
March	16	2	319	2470	2789
April	14	1	312	1785	2097
May	12	1	144	1702	1846
June	14	0	334	2020	2354
July	14	4	242	1686	1928
August	4	1	152	1354	1506
September	4	1	176	1354	1530
October	11	1	238	1839	2077
November	11	1	297	2057	2354
December	3	1	232	2158	2390
<b>TOTAL</b>	<b>123</b>	<b>15</b>	<b>2944</b>	<b>22468</b>	<b>25412</b>

Source: Our survey

This table presents the data for the number of diabetics, the number of deaths and the total number of patients admitted to the CBCA Virunga Reference General Hospital by month for the year 2021.



**Figure 2**

The figure above shows us the distribution of diabetes cases by month for the year 2021 and that the month of March occupies the first place followed by the month of April, June, July... and that the months of December in last position.

### Sociodemographic Data

**Table 4: Distribution of diabetes cases by sex for the year 2020**

Sex	Effective	%
Female	27	26,5
Male	75	73,5
Total	102	

Source: Our survey

From this table we see that out of a total of 102 diabetics, the male sex is more affected with 75 cases or 73.5%.

**Table 5: Distribution of cases of diabetes by sex for the year 2021**

Sex	Effective	%
Female	37	30,1
Male	86	69,9
Total	123	

Source: Our survey

From this table we realized that out of a total of 123 diabetics, the male gender prevails with 86 cases or 68.9%.

**Table 6: Distribution of cases of diabetes by origin for 2020**

Origin	Effective	%
Out of the Zone	36	35,3
From the Zone	66	64,7
Total	102	

Source: Our survey

From this table we realize that 66 cases of diabetics or 64.7% are from the Karisimbi Health Zone.

**Table 7: Distribution of cases of diabetes by origin for the year 2021**

Origin	Effective	%
Out of the Zone	47	38,2
From the Zone	76	61,8
Total	123	

Source: Our survey

It appears from this table that 76 cases of diabetics or 61.8% are from the health zone.

**Table 8: Distribution of cases of diabetes by age for the year 2020**

Age range	Effective	%
Between 18-45	24	23,5
45 and over	78	76,5
Total	102	

Source: Our survey

From this table, we realize that 76.5% of diabetics are aged between 45 and over.

**Table 9: Distribution of cases of diabetes by age for the year 2021**

Age range	Effective	%
Between 18-45	26	21,1
45 and over	97	78,9
Total	123	

Source: Our survey

From this table, we realize that 78.9% of diabetics are aged between 45 and over.

**Table 10: Mortality due to diabetes for the year 2020**

Mortality	Cases	%
14	102	13,7

Source: Our survey

This table shows that mortality due to diabetes was around 13.7% in 2022.

**Table 11: Mortality due to diabetes for the year 2021**

Mortality	Cases	%
15	123	12,2

Source: Our survey

From this table, we find that the lethality due to diabetes is 12.2%.

### Discussion

Under this point, we compare the results of the surveys with existing previous and theoretical studies in order to see what corresponds and what contradicts the other studies to which the research has alluded, especially consistent with our theme.

### Related to the Prevalence

According to Tables 1 and 2, the results of our study reveal that the prevalence of diabetes at the General Reference Hospital CBCA VIRUNGA is 0.48% for the year 2020 and 0.48% for the year 2021. Our results are almost similar to those of the World Health Organization which stipulates that diabetes is presented at the level of the entire terrestrial globe and an abusive and progressive increase has been observed over the last twenty years, reporting a prevalence of 7% in 2009.

Similarly, according to Judith TEKE, the Democratic Republic of Congo DRC like other African countries on the one hand, and those of the whole world on the other hand is not spared by this pandemic.

The prevalence of diabetes in the DRC was almost zero 40 years ago; it suddenly rose to 5.8% for the entire country and 7% for the city of Kinshasa alone (Judith TEKE, 2003).

### Related to Age Character

The age group most affected by diabetes is that between 36 years and over with 69.8% and the least affected is that between 5 and 15 years with 4.7%.

According to Seniors (2012), as a general rule, diabetes appears at middle age, generally from the age of 40 and during old age. Similarly, according to Inserm (2015) diabetes is generally in adulthood in individuals aged 40 and over.

This is witness to our results in Table 8 and 9 which states that the age group most affected by diabetes is that between 45 years and over for with 76.5% for the year 2020 and 78.9% for the year 2021 and the least affected is those between 18 and 45 years old with 23.5% for the year 2020 and 21.1% for the year 2021. Similar results were also found by the Swiss Medical Review, which states that the elderly person has the most high prevalence of diabetes, compared to other age groups.

According to estimates by the World Health Organization (WHO), there are approximately 350 million diabetics worldwide, with a prevalence of 67.1% in subjects over 35 years old.



### Character Related Sex

Of 102 registered diabetics, there were 75 (73.5%) men and 27 (26.5%) women for the year 2020 and 86 (69.9%) men and 37 (30.1%) women for the year 2021 see Tables 4 and 5. Our results meet the results according to the data collected as part of the Ob Epi study 2012 edition, on subjects suffering from type 2 diabetes are more frequently men (55% of subjects), women are more often obesity (severe or very severe), hypertension or dyslipidemia.

Men are more often affected by T2DM (6.7% vs 4.9% of women), the prevalence of which increases with age (0.5% among 18-24 year olds vs 14.2% among older 65 years old) with a peak increase among 45-54 year olds.

### Related to the Source

According to Table 6 and 7, most cases of diabetes, i.e. 64.7% for the year 2020 and 76.5% for the year 2021, come from the health zone (urban center), followed by outside the zone with 35.3 % for the year 2020 and 23.5% for the year 2021. Our results would be explained by the fact that, in urban areas, a large part of the population lives in the Mercia of sweet foods, in particular cookies, chocolates, sweets etc.

This prevalence is at the same level as that observed by Georges Rosario (2014) in Burkina Faso where most cases of diabetes, i.e. 19.2%, were recorded in the urban center.

### Closing

This study focused on the epidemiological aspect of mature diabetes in the Karisimbi health zone, specifically in the CBCA Virunga reference general hospital. The overall objective was to want to determine the prevalence of diabetes at the CBCA Virunga general referral hospital. Specifically, it was a question of determining the sex most affected, the age group most affected and identifying the place of origin of diabetic patients.

The sample covered 102 diabetics for the year 2020 and 123 diabetics for the year 2021. After analysis and interpretation of the data, it emerged that the male sex is more affected by diabetes, the age group 45 years and over is more concerned and that the majority of diabetics are from the health zone (urban environment).

That said, we recommend:

- To the politico-administrative and health authorities of the DRC: to strengthen the very expensive and complex care program for the diabetes and its complications in developing countries, impose prevention as the first means of control.

- To nursing staff: to raise public awareness of the harmful effects of a sedentary lifestyle and obesity, major diabetogenic factors.

- To diabetics and their families: to respect the hygiene and dietary measures to delay the onset of complications, thus improving the medical monitoring of diabetes, to be screened early in the event of a history of diabetes in the family or the existence of a risk factor.

At this price we can hope for a regression, if not delay the onset of diabetes and / or its complications which make it a disease whose morbidity and mortality are increased in the population.

### Conflicts of Interest

No conflicts of interest reported.

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