



Stroke among the adult population of Burkina Faso: magnitude and trend

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Background: Strokes are the second leading cause of death and the third leading cause of disability-adjusted life-years lost in the world. Most of incident and prevalent cases of strokes occur in low-income and middle-income countries. The purpose of this study was to describe the overall trend of stroke prevalence and mortality among adults in Burkina Faso.

Methods: This was an exhaustive document review of strokes using the Ministry of Health's statistical yearbooks over an 11 years period. Patients aged 15 years or over were taken into consideration. The process of compiling statistical yearbooks takes place from the periphery to central level. The assessment of temporal trends was performed using linear equations.

Results: From 2002 to 2012, the number of adult stroke consultations increased from 15,976 to 134,049. We noticed a clear increase in the number of hospitalized patients of both genders, from 523 in 2002 to 9,047 in 2012. Furthermore, we observed a regression of in-hospital mortality rates from 2004 onwards.

Conclusions: In our study, we noted a substantial increase in the number of stroke cases requiring consultation and hospitalisation. In contrast, the mortality rate was decreasing.

Keywords: Adult; Burkina Faso; stroke

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Introduction

Strokes are the second leading cause of death (1) and the third leading cause of disability-adjusted life-years lost in the world (2). In 2010, there were 16.9 million new stroke cases and 5.9 million deaths related to strokes in the world (3). Most of the incident cases (68.6%), prevalent cases (52.2%), deaths related to strokes (70.9%) and disability-adjusted life-years lost due to a stroke (77.7%) occur in low-income and middle-income countries (3). Between 1990 and 2010, the aged-standardised stroke incidence decreased by 12%

in high-income countries, whereas it increased by 12% in low-income and middle-income countries (3). Like other low-income and middle-income countries, Sub-Saharan Africa is facing an ever-increasing cardiovascular morbidity and mortality rate largely associated with strokes. This increase in the number of strokes in Africa was exacerbated by the demographic and epidemiological transitions (4). Besides high blood pressure (HBP), which remains the main cause of strokes in Sub-Saharan Africa, recent studies have identified other risk factors such as atrial fibrillation, diabetes, abdominal obesity and a westernised way of life

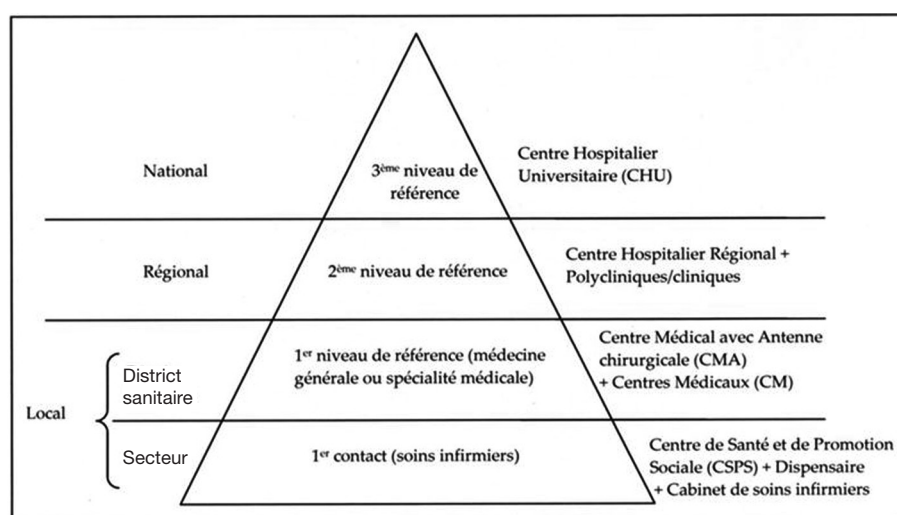


Figure 1 Burkina Faso's healthcare pyramid-1.

among the population. This is characterised by a sedentary lifestyle, growing addiction to tobacco, alcohol abuse and an excessively salty, carbohydrate and lipid-rich diet (5). All these factors are becoming increasingly common in African countries because of globalization, which comes with a rapid and uncontrolled urbanization, leading to exposure to stress and a change in the population's lifestyle (5,6).

Human, social and economic consequences of strokes are particularly devastating in African countries particularly because of the health care system's weakness regarding early detection and adequate care (7,8). There is little information on the scale of the stroke problem in Burkina Faso and the existing data were mainly gathered through hospital studies. Indeed, Napon *et al.* (9) showed in the teaching hospital Yalgado Ouédraogo in 2011 that HBP, smoking and alcohol are the main risk factors for ischemic strokes among young people. In addition, Zabsonré *et al.* (10) reported in 1997 that 15.1% of cardiovascular admissions to the teaching hospital Sourô Sanou were strokes, with a mortality rate of 31.6%. In the Yalgado Ouedraogo teaching hospital in Ouagadougou, Napon *et al.* (11) noted an in-hospital mortality rate of 29% due to strokes in their study of functional impairment forecast in 2013. Notwithstanding previous works, data on the scale of strokes in Burkina Faso remains embryonic and fragmented, which justifies the interest of our study. Its objective was to describe the overall trend of stroke prevalence and mortality among adults in Burkina Faso using the Ministry of Health's statistical yearbooks.

Methods

We undertook an exhaustive document review of strokes by using the Burkina Faso Ministry of Health's statistical yearbooks, which covered a period of 11 years from 2002 to 2012. The statistical yearbook is prepared as follows: there are three levels in the administrative structure of this country's healthcare system, the central, the intermediate and the peripheral levels. The first one contains all basic health facilities of the so-called Health and Social Promotion Centres as well as the Medical Center with Surgical units. These Medical centers with Surgical units are managed by the Regional Public Health Department. The second level is represented by all Regional Hospital Centers. It serves as reference for the first level. The third level comprises all teaching hospitals and provides the highest standard of healthcare within the system. It also serves as reference for the second level (*Figure 1*).

In terms of human resources, nurses are found in all three levels of the healthcare system, whereas specialist doctors and general practitioners are only found in the second and third levels. Nurses specialising in epidemiology and biostatistics are found at every healthcare level and are in charge of compiling, processing and approving all health-related information relevant to their healthcare level. Furthermore, they are responsible for transmitting these data to the upper healthcare level. The continuing training of health workers not only in the peripherals level but also in the different hospitals on the management of strokes aims to harmonize diagnosis. In addition, the weekly meetings

of neurologists and cardiologists help to ensure consistency in diagnoses. With regard to technical support facilities, medical scanners are only found at the third level of some public facilities and in a limited number of private facilities. When there is a suspicion of stroke in the peripheral health units these cases are referred to the MCS Medical center with Surgical units or Regional hospital center where medical doctors are present who will confirm the clinical diagnosis and initiate treatment. Data for the statistical yearbook are collected from information provided in the records of every health facility in the country. These data are summarised in the form of a monthly report by the chief nurse of each disability-adjusted life-years, and are then sent to every nurse specialising in epidemiology and biostatistics. They are responsible for the Center for Health Information and Epidemiological Surveillance (CHIES) of the health district. They then compile and approve these data before sending it to the CHIES level of the Regional public health department, which is still in the first level. Reports from these regional CHIES and the ones from the second level (regional hospital center) are then sent to the CHIES in the General Directorate of Health Information and Statistics, in the central level for compilation. In addition, CHIES of Teaching hospital send their reports directly to the General Directorate of Health Information and Statistics. The reports are sent on the 5th of each month at the latest for the first level, on the 15th for the second level and on the 25th to the General Directorate of Health Information and Statistics. The statistical yearbook is created according to the national development programme and the national health policy. As a result, an annual national workshop was organised, including participants from every healthcare level as well as financial partners. Its purpose is to reach a consensus regarding the presentation of yearbook data. During this workshop, CHIES from each healthcare level and a representative from the National Institute of Statistics and Demography (NISD) are present. After checking the comprehensiveness and reliability of data, explaining the differences and correcting any errors, they approve the yearbook data. The statistical yearbook data can thereafter be distributed as a hard-copy or in digital form on the various websites: Ministry of Health's website (), NISD website (www.insd.bf) and the national institute of statistics website (www.cns.bf). In 2018 the Burkina Faso population was 20,244,080 inhabitants, of whom 48.30% were male and 51.70% female. The age range of 0–14 years was 46.81% of the population and 50 years and over 8.88% according to

the report of the NISD.

Ethical considerations

Having used the Burkina Faso Ministry of Health statistical yearbooks and as data were collected anonymously, we did not need the approval of any Ethics Committee for this study.

Statistical analysis

Each yearbook contained variables on consultations and on hospitalisations. The variable regarding death was only found in the hospitalisation section. In our study, we only took patients aged 15 or over into consideration. Therefore, based on each statistical yearbook, the main variables that we selected were the following: number of consultations regardless of the pathology, the number of hospitalisations regardless of the pathology, the number of consultations as a result of a stroke, the number of hospitalisations as a result of a stroke and the number of in-hospital deaths related to strokes. We also collected some secondary variables on the number of consultations as a result of a stroke for male and female patients. The variable “population” is the overall population of Burkina Faso (source NISD) in the current year, while the other variables include the number of consultations for HBP and the number of hospitalisations for HBP. The definitions of some variables differ according to the healthcare level and depending on the health workers' qualifications. For our study, we only focused on the differences between the definitions of a stroke. As a matter of fact, the first level refers to a handbook called “Manual of Diagnosis and Therapy”, according to which a stroke is a more or less long-term pathological loss of awareness, with a blood pressure higher than 160/90 mmHg and paralysis. By contrast, the other healthcare levels use the WHO definition: “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin” (12,13) and HBP, headaches and a blood pressure higher than 140/90 mmHg.

The absolute numbers and the proportion of strokes and HBP among the total number of consultations and hospitalisations were calculated per year. Our data were collected and analysed using Microsoft Office Excel 2007 and STATA/IC 12.0 software. The graphic equation ($b = x\%/years$) was used to evaluate the trends.

Table 1 Centralised data on consultations and hospitalisations in Burkina Faso from 2002 to 2012

Year	Population	Any consultations	Consultations for stroke	Any hospitalization	Hospitalization for stroke	Deaths for stroke
2002	12,124,719	3,643,418	15,976	88,858	523	41
2003	12,419,677	4,308,197	17,008	136,888	2,046	146
2004	12,722,570	4,311,636	9,480	122,151	624	82
2005	12,880,980	5,184,224	38,792	149,757	1,247	130
2006	13,944,664	5,763,294	49,679	211,729	2,279	190
2007	14,330,584	7,051,201	65,715	261,632	2,890	217
2008	14,731,167	8,454,632	70,792	478,602	3,286	245
2009	15,224,780	9,234,464	79,304	404,232	3,885	288
2010	15,730,977	11,725,007	87,774	481,120	3,699	115
2011	16,248,558	10,956,781	33,959	486,272	6,538	365
2012	16,779,208	14,776,209	134,019	576,460	9,047	432
Total	–	85,409,063	602,498	3,397,701	36,064	2,251

Results

Table 1 comprises centralised data on consultations and hospitalisations in Burkina Faso from 2002 to 2012. During this period, the total number of consultations for stroke increased from 15,976 in 2002 to 134,019 in 2012. The total number of stroke cases which required hospitalisation increased from 523 in 2002 to 9,047 in 2012. The trend in the proportion of consultations for stroke in comparison to the total number of consultations was on the rise (*Figure 2*) but is still below 10 ‰. The trend in the proportion of stroke hospitalizations in comparison to the total number of hospitalizations showed also an upward trend (*Figure 3*). The number of hospitalized patients for a stroke increased among men as well as among women (*Figure 4*). In-hospital deaths resulting from a stroke showed a downward trend since 2004 (*Figure 5*).

Discussion

This study is the first to show the national trend of stroke frequency among the population of Burkina Faso. During the study period, we noted that the number of consultations for stroke significantly increased by 8.4 times from 2002 to 2012. The number of stroke hospitalisations increased by 17.5 times over the same period. However, the overall population of the country only increased by 40% within the same period. As a proportion of the total number of

consultations, strokes represented 4.38‰ in 2002 and 9.07‰ in 2012. The same upward trend was observed for hospitalizations, increasing from 5.89‰ in 2002 to 15.69‰ in 2012. However, over the same period, deaths resulting from strokes in hospital facilities decreased from 78.39‰ in 2002 to 47.75‰ in 2012. We also focused on HBP as it is recognised as the main risk factor for strokes (5). In our study, we observed an increase in the proportion of HBP cases in consultations as well as in hospitalizations. The main strength of our study is that we managed to compile the total number of recorded stroke cases in the country using the national register. In addition, there was no modification of the data collection methods for the statistical yearbook during the study period which could have influenced the results. Nevertheless, as the study is a secondary analysis of collected data from registers of routine healthcare facilities, we had no control over the primary data collection. On the other hand, some of the cases may remain unrecorded for the following reasons.

Health workers forgetting to fill in registers at the different healthcare levels. Some mistakes may also have crept in during data transmission from the peripheral to the central level. The dips in the graph in 2004 and 2011 can be due in part by a reporting problem, some of the stroke data were not recorded in some health facilities. In 2011, data on consultations for stroke and HBP was considerably lower than the previous years and did not

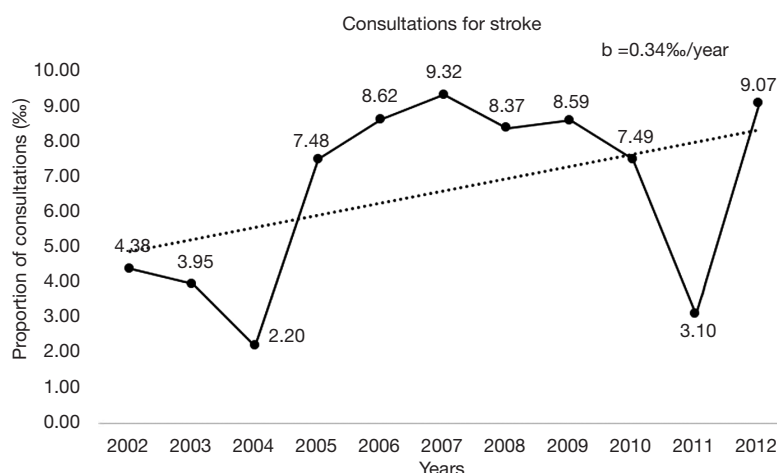


Figure 2 Proportion of consultations for stroke in all health facilities in Burkina Faso from 2002 to 2012.

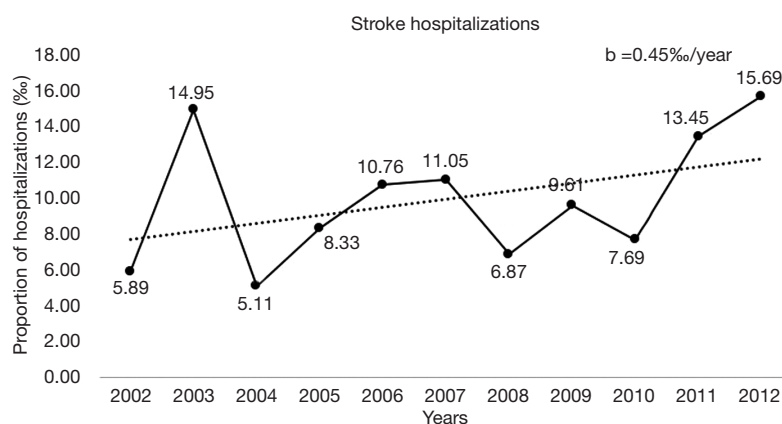


Figure 3 Proportion of stroke hospitalizations cases in all health facilities in Burkina Faso from 2002 to 2012.

follow the steady increase which we had observed. This may be as a result of the socio-political context of Burkina Faso at the time. A military mutiny created a climate of insecurity which prevented the city services and enterprises from functioning effectively. It was difficult for citizens to access the different healthcare facilities. In addition to the mutiny, other social movements and union strikes occurred during the same period. Diagnosing a stroke is also a major problem. Most adult patients do not have access to a medical scanner. The diagnosis of a stroke is therefore made on the basis of a clinical diagnosis, and the definition of a stroke varies from one healthcare level to another. As a large proportion of the staff is poorly trained, there is a chance of misdiagnosis. Moreover, a significant proportion of the population never visits healthcare facilities for a wide range of reasons (geographical accessibility, financial

reasons, cultural reasons) and some of the stroke cases were therefore not recorded. The factors previously mentioned probably resulted in an underestimation of strokes cases. Our results confirm the theory that there is an increase in stroke frequency in Burkina Faso. Our observations match the data collected in other low-income and middle-income countries, according to which, the aged-standardized incidence of strokes increased by 12% between 1990 and 2010. However, this incidence decreased by 12% in high-income countries during the same period (3). Nonetheless, incidence data from population registers is not available in Sub-Saharan countries. Our data therefore come from health-care facilities (www.cns.bf). The economic growth of those regions could result in a substantial increase of this incidence in the coming years (14). The increase of the number of hospitalizations in 2003 for stroke compared

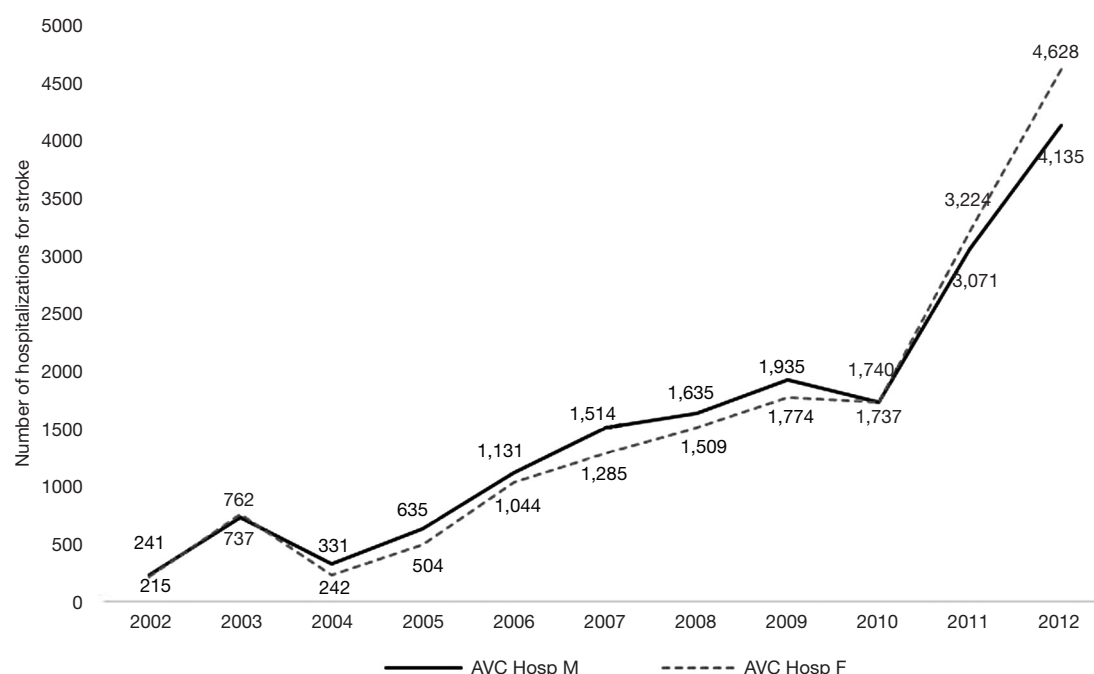


Figure 4 Number of strokes hospitalizations by gender in Burkina Faso from 2002 to 2012.

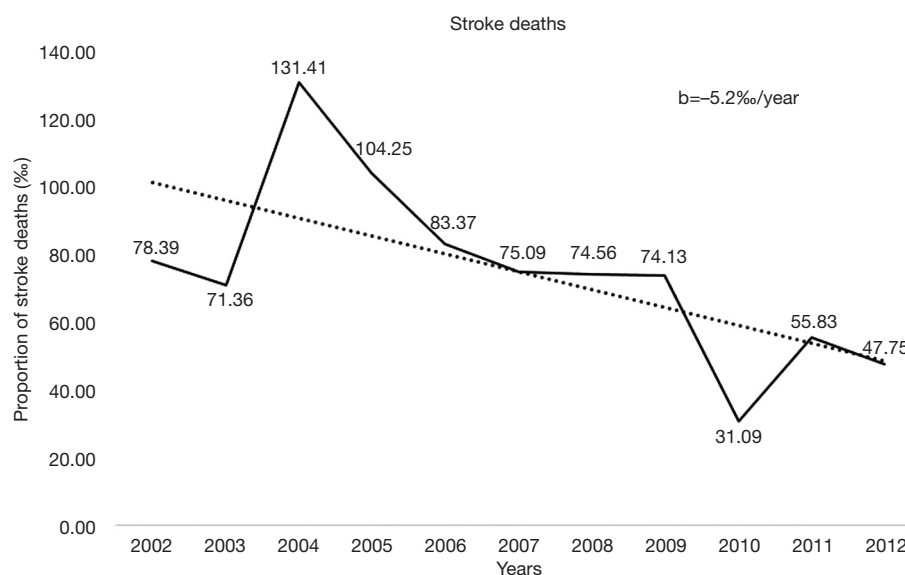


Figure 5 Proportion of deaths resulting from stroke in the health facilities from 2002 to 2012.

to others years is linked to the fact that during that same year the number of hospitalizations for HBP which is the first risk factor for stroke also increased roughly in the same proportion. As was the case with the other studies, we did not notice any significant difference in the number of

hospitalized stroke cases based on gender (15).

The increase of the number of deaths in 2004 compared to other years may be related to the fact that this year has seen many more hemorrhagic stroke cases. Our results regarding the decrease in mortality rates for strokes in

Burkina Faso are also in line with international data. While the absolute number of deaths related to a stroke increased by 20% between 1990 and 2010 in the world, the mortality rate decreased by 23% in low-income and middle-income countries and by 38% in high-income countries (3). Our study also highlighted an upward trend in HBP frequency which is the main cause of strokes in Africa and the world as a whole (5). This increase in consultations and hospitalizations for HBP corresponds to the data found in studies of other populations, which report a significant increase in HBP prevalence in most of Sub-Saharan countries, both in rural and urban areas (16,17). Like other low-income and middle-income countries, the change in the HBP trend in the population we studied could partly be explained by globalisation and the rapid urbanisation that Burkina Faso is currently facing. This has caused a change to the population's way of life, resulting in a "westernised" lifestyle with an excessively salty, carbohydrate and lipid-rich diet, a sedentary lifestyle, insufficient intake of fruit and vegetables and alcohol abuse (18). Improvements to the health-care services, such as the development of technical support facilities in health-care facilities in Burkina Faso, training of medical and paramedical staff, and the provision of improved diagnostic resources such as blood pressure monitors, probably contributed to a greater number of patients suffering from hypertension being diagnosed. The results of our study show a clear need for comprehensive and reliable data. This requires completeness and effective monitoring of the data collected from peripheral to central levels. In addition, research into the healthcare system in order to make it function better and be more efficient is also needed. The fact that the methods of providing information, methods of surveillance and methods of signalling an epidemic are insufficient leads to a decline in the surveillance in low-income and middle-income countries. In order to control the determinants and the costs related to chronic diseases, epidemiological research is required. Finally, due to the fact that access to body scanners is limited for the majority of the population, health workers should be retrained more often and more comprehensively in order to diagnose strokes. They should also be made aware of the importance of the data report for consultations and they should implement information, education and communication (IEC) activities on cardiovascular risks into their weekly program. The current progression and magnitude of strokes requires additional research to be initiated in order to explore the determinants of strokes in low-income and middle-income countries like Burkina

Faso. The results of our research based on the methodology applied ought to guide our policies concerning the fight against cardiovascular diseases. In terms of public health, everybody should have at least one medical check-up per year in order to prevent and/or control common risk factors for cardiovascular diseases.

Conclusions

Our study revealed an important increase number of strokes in the healthcare facilities. We showed a clearly upward of stroke trend during the study period. This must be taken into consideration by all the health workers regardless the stroke burden. The fight against non-communicable diseases must be identified as priority of health policies.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jxym.2019.03.01>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Having used the Burkina Faso Ministry of Health statistical yearbooks and as data were collected anonymously, we did not need the approval of any Ethics Committee for this study.

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