IMPLICATIONS OF MEDICAL BASED RECORDS ON HEALTHCARE DELIVERY IN BAMENDA HEALTH DISTRICT, CAMEROON

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DOI: 10.51558/2303-680X.2024.22.2.3

Abstract

This study has as objectives: to examine the effect of well-preserved medical based records on healthcare service delivery, to verify the heterogeneity effect of medical based records on healthcare service delivery by the type of medical record, and to determine the challenges associated with the keeping of medical records in Bamenda Health District, Cameroon. The marginal effect estimate of the probit model is used to estimate the result, while primary data was collected among 267 health personnel. The result shows that well-preserved medical based records strongly correlate with quality healthcare service delivery, and it is a paper-electronic based phenomenon. The challenges faced in the process of keeping medical records are: shortage of filing space, misfiling and missing files, damage to records, incompetent/unskilled staff, shortage of staff, lack of support for resources, and insufficient budget. The study suggests that: (1) decision makers should valorize the keeping of medical records as it enhances quality healthcare service delivery; (2) the health sector should include record keeping in the training curriculum of personnel and (3) more awareness should be made regarding record keeping by the actors. All these are good steps toward better health service.

Keywords: medical based records, quality service delivery, health centers, Bamenda

Jel: T12, D34, M56

1. Introduction

Records play a crucial role in most human endeavors, and they are essential to many of our business and social interactions. Many professions such as accounting, auditing, health, finance, human resources, and law rely on the strength of records management to perform their duties. Records are created and managed with the intention of supporting the accurate and efficient delivery of services in many areas. Records are especially important in hospitals as they are needed for confirming background information. Despite the importance of medical records, they are often not well preserved and managed correctly, which results in medical practitioners being unable to access information about previous diagnoses, treatments, and prescriptions. If medical records are not well preserved and managed properly, they can be lost forever. Missing or incomplete files can have a negative impact on the lives of patients (Njiemanted *et al*., 2017).

Among other sectors of the economy, health service delivery continues to receive attention. Numerous complaints have been made regarding the poor service delivery at public and private health facilities. At the core of the service delivery has been the need for well-preserved medical records and information management delivery systems of reliable and authentic information so that patients are able to receive quality medical services. Issues of negligence, poor diagnosis and treatment have been linked several times to ineffective and poor medical record keeping. Drawing on good records management principles and standards, this write up sought to establish the role of well-preserved paper based medical records in the delivery of public health services. This research is mainly focused on well-preserved paper based medical records in support of quality service delivery in the health sector of Bamenda I, II and III municipalities.

The importance of medical records to the provision of quality healthcare service

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delivery must be emphasized. Medical practitioners need information about previous diagnoses, treatments, and prescriptions in order to note the progress made with previous treatments and how to move forward. If medical records are not preserved, it becomes difficult to retrieve such records, which results in hospitals not being able to render quality healthcare services or these services being rendered incorrectly, especially for chronic patients. These records are used for various purposes, for example, for nursing and clinical audits in the peer review meetings, which are conducted regularly in hospitals or for screening the business transactions conducted by doctors and nurses. They confirm the procedures followed when doctors and nurses conducted certain critical patients' treatment activities such as child delivery and operations, as well as investigating maternal death (Bodzewan & Abimnui, 2019; Carvalho, 2011).

The hospitals also regularly use medical records in response to legal actions/litigations or complaints from the patients or citizens about hospital services rendered. In addition, the patients' records are also used daily to further record information about the patients' personal details, prescriptions, and diagnosis for future reference and for patients' follow-ups. The information recorded is eventually used to confirm the patients' health history during current and future consultations. This emphasizes that the pace at which the records are retrieved and served for this purpose determines the patient's waiting time for the services. This has an impact on the quality of the service rendered by the health institution (Njiemanted *et al*., 2017).

Records in hospitals are used to collect and validate statistical information daily. The statistics collected is used to regularly review hospital's monthly performance in all activities. It is through proper and well-preserved records management that the data collected can be complete and accurate.

Also, in order for records management to contribute meaningfully to health care provision, health care institutions need to implement a digital records system (Asinor & Leung, 2016). This is a legitimate option which is cheaper in terms of money, time, and energy to ensure speedy retrieval of records. Electronic medical record (ERM) systems in hospitals have significant benefits. Not only do they reduce the provisions for errors evident in typical manual operations, they also promote an environmentally friendly paperless environment which improves communication of information amongst medical professionals (WHO, 2018).

This allows timely access to patient records for easier decision making in critical situations where the expertise and consultation of distant specialists may be required. Other benefits include significant reduction of errors, elimination of legibility issues, easier billing methods, and having a data repository for future research and quality improvement. Essentially, an EMR system has the ability to facilitate the continuity of care. EMR systems subsequently assist the organization and the society as a whole. EMR systems provide many benefits to hospitals and health centers in managing their daily operations.

However, just like many other information systems, EMR adaptation and implementation prove to be more successful when users participate in the discussion about its design and implementation. Developing countries such as India, Kenya and Haiti have benefited greatly with the intervention of EMR systems which provides accuracy, efficiency and has overall cost benefits (Bodzewan & Abimnui, 2019).

Patients choose healthcare based on the satisfaction they receive from different health facilities. Adams *et al*. (2009) carried out a study in the emergency department of a hospital and determined the level of client satisfaction in relation to waiting time. It was concluded that the overall patient satisfaction was linked positively with two indicators of clients' recommendation and the extent to which service is satisfactory.

The problem that led to this study is that health workers in both the public and private health institutions, such as medical doctors and nurses, are usually not able or struggle to render timely and effective health services to citizens due to the lack of effective and well

preserved record management systems. Ineffective medical record management systems usually lead to long patient waiting times before patients receive quality healthcare service. Information is power in the health sector as patients usually rush to hospitals in an emergency situation and doctors need to have patients' medical records in other to stabilize their conditions before diagnoses are made and treatment actually starts. This information can be obtained if the patient or the health facility keeps their medical history (Asinor & Leung, 2016).

Health workers usually end up not rendering certain services because the health history of the patient is not contained in medical files. This is due to the fact that, if the health worker proceeds treating patients without enough information about the patients' health background, s/he may end up rendering poor health service that might be risky to patients' health.

There is a need for an effective records management program to upgrade the records keeping system for easy and timely retrieval of information, improved office efficiency and productivity. It is against this background that this study is instituted to investigate the contributions of well-preserved paper based medical records on quality service delivery among health centers in Bamenda I, II and III municipalities.

The objectives targeted in this study are: (1) to examine the effect of medical based records on healthcare service delivery, (2) to verify the heterogeneity effect of medical based records on healthcare service delivery by the type of medical records, and (3) to determine the challenges associated with keeping medical records in Bamenda I, II and III municipalities.

2. Literature Review

Healthcare in Cameroon is similar to most setups in developing countries. Cameroonian hospitals form the main pillars of the healthcare sector.

Most major hospitals are concentrated in the urban centers. The Central Hospital at the University of Yaoundé is the referral teaching hospital. The Gynecology, Obstetrics and Pediatrics Hospital of Yaoundé and the Central Hospital of Yaoundé are the main hospitals in the capital. Ten provincial hospitals are located at the headquarters of each province serving as the main reference hospitals in that province. There are many district hospitals at the divisional and sub divisional levels.

Alongside the district hospitals, there are health centers and clinics in the rural areas and the health posts. The latter are managed by outreach programs through primary health care coordinators, which are present in the villages for the treatment of minor injuries and for reference purposes.

In 2018, the doctor to patient ratio stood at 1:10,500 (WHO, 2018). The uneven distribution of resources including human capital investment, constitute a big issue to the population in Cameroon, especially in the rural communities. Although hundreds of medics graduate annually, because of poor distribution, their presence in the field remains almost unnoticed. Many doctors do not like being posted to the rural areas because they believe that working in the villages is like a punishment.

Rural posts also do not allow doctors the opportunity for a private practice, where they can earn more money (Laohakangvalvit *et al*., 2015). Alongside government facilities, there are private hospitals and clinics. These are operated by some well-known missionaries offering healthcare services at a low cost.

Medical records are a vital asset in ensuring that hospitals run effectively and efficiently. They support clinical decision-making, provide evidence of policies, and support hospitals in cases of litigation. Hospitals deal with the life and health of their patients. Good medical care relies on well-trained doctors and nurses and on high-quality facilities and equipment.

Without accurate, comprehensive, up-to-date, and accessible medical records, medical personnel may not offer the best treatment or may in fact misdiagnose a condition, which can have serious consequences. Associated records, such as X-rays, specimens, drug records, and patient registers, must also be

well managed if the patient is to be protected. Similarly, good medical records management ensures that the hospital's administration runs smoothly: unneeded records to be transferred or destroyed regularly by keeping storage areas clear and accessible; and key records to be found quickly by saving time and resources (WHO, 2018).

The medical record is the who, what, why, where, when, and how of the patient care during hospitalization (Laohakangvalvit *et al*., 2015). Medical record is the only history of achievement, the only measurement of work being done by the medical and nursing staff, the only record of progress of the patient, and it is the source of information for many purposes. Taking into consideration the benefits of medical records, this research work systematically discusses the concept, significance, and challenges of medical records as a whole.

It is widely known that the quantities of data and information generated increase every day, especially in the healthcare sector. The population growth, the increasing number of patients, and the emergence of new diseases and symptoms require healthcare organizations to capture and manage enormous amounts of data and information (WHO, 2018).

Records form an integral part of any medical practice because they help to ensure good care for patients and also become critical in any future dispute or investigation. Kuteesa and Kyotalimye (2019) defined record keeping as a confidential record that is kept for each patient by a healthcare professional or organization. It contains the patient's personal details (such as name, address, date of birth), a summary of the patient's medical history, and documentation of each event, including symptoms, diagnosis, treatment, and outcome.

Relevant documents and correspondence are also included. Information from medical records provides the essential data for monitoring patient care, clinical audits, and assessing patterns of care and service delivery. In the current environment, the medical record also forms the first link in the information chain producing the depersonalized, aggregated, and coded data for statistical purposes (Laohakangvalvit *et al*., 2015). A considerable effort is invested in writing, filing, sorting, searching, retrieving, issuing, and recovering the medical record, in whole or in part.

There is no doubt that the ready availability of well organized, legible, accurate, and comprehensive clinical notes can play a very significant role in the clinical decision-making process and assist in the provision of quality healthcare. A medical record enables health professionals to review previous care events, to reach timely and appropriate clinical decisions, and to develop treatment plans that minimize the risks and maximize the potential benefits to the patient.

Kuteesa and Kyotalimye (2019) traced the development of medical records, going back to the seventeenth century, when he narrated that in 1752, Benjamin Franklin set up an incorporated Hospital in Philadelphia in the United States of America. This hospital is presently known as Pennsylvania Hospital. She introduced medical records by preparing the files of special cases on which patients' name, admission date, discharge date, etc. were written.

3. Methodology

Bamenda Health District (BHD) is one of the 19 Health Districts in the North-West Region. Bamenda is found in the North-West Region of Cameroon and is the head quarter of the Mezam division with an estimated population of about 500,840 people (Njingun *et al*., 2023).

The BHD is comprised of 18 Health Areas, 14 public and 4 conventional. However, there are many other private health facilities operating in anonymity (not cooperating with the District Health Service). Furthermore, there is also the practice of modern traditional medicine; this is in line with the national health policy of Cameroon which recognizes the role of traditional medicine in the health domain of the country.

The topography of the BHD greatly influences the climate. The temperatures of the areas around the mountain is cold e.g., the station Hill, while that of the gentle relief plain of the

town is mild, cold in the early morning and hot in the afternoon. On the average, the BHD has a mild climate which is conducive to work. The BHD is marked by two distinct seasons, the dry and the rainy seasons. The former sets in at the beginning of November and peaks in February as evidenced by the high maximum temperatures.

It begins to subside from the middle of March gradually giving way to the rainy season. The dry season is characterized by the Harmatan, a cold, dry, and biting wind which blows from the Sahara Desert. The evenings and the mornings are very chilly. The vegetation of the environment surrounding the BHD is uniform to that of the entire region. The natural vegetation is predominantly savannah with shrubs dotted here and there.

The 95% of the BHD is situated on the Bamenda plateau. There are several major rivers and swampy areas. The highest point in the district is the Station hill with a height of about 600m. The BHD is within the jurisdiction of the senior divisional officer of Mezam and houses the headquarters of the region. There are three subdivisions with three sub divisional officers at the head.

There is a city council with three sub-divisional councils of Bamenda I, II and III. The district covers seven fondoms: Mbatu, Chomba, Nsongw, Mankon, Nkwen, Mendankwe and Ndzah. Each fondom is independently headed by a traditional ruler called the Fon.

Table 1. *Health Units in the Bamenda Health district*

Subdivision	*Health Area*	*Health Facilities*	*Type*
Bamenda I	Mendankwe	Mendankwe IHC	Public
		Military Hospital	Public
		Bamenda Station Polyclinic	Private
Bamenda II	Akumlam	Akumlam IHC	Public
	Alabukam	Alabukam IHC	Public
	Alakuma	St Mary Soledad	Confessional
	Alamandom	Alamandum IHC	Public
	Atuakom	Atuakom IHC	Public
		Foundation Clinic	Private
	Azire	Alpha Royal Clinic	Private
		Azire IHC	Public
		Mezam Polyclinic	Private
		Broadgreen Maternity	Private
		Regional Hospital	Public
		Mount Zion Clinic	Private
		God's Glory Clinic	Private
	Mankon	CMA Mankon	Public
	Mbachongwa	Mbachongwa IHC	Public
		Full Gospel IHC Nsongwa	Private
	Mulang	Mulang IHC	Public
		God's Will Maternity	Private
	Ntambag	Ntambag IHC	Public
		St Blaise Clinic	Confessional
		CNPS Clinic	Public
		Military IHC	Public
	Ntamulung	PHC Ntamulung	Confessional
	Ntankah	Ntankah IHC	Public
Bamenda III	Ndzah	Ndzah IHC	Public
	Nkwen Baptist	Nkwen Baptist IHC	Confessional
	Nkwen Rural	Nkwen Rural IHC	Public
	Ntasen	St Francis MHC Ntasen	Confessional
	Nkwen Urban	CMA Nkwen	Public
		Providence Polyclinic	Private
		GreenField Dynamic Medical Centre	Private
		St Louis Clinic	Private

Source: WHO, 2018

This study adopts a survey research design. The data collected for this study was obtained from two main sources: the primary and the secondary sources. Primary data was obtained from the field and contributed to the realization of our specific objectives.

Firsthand information through questionnaire, researchers' observation, personal experience and statistical data was all obtained via the

primary source. The data collected using questionnaires involved information on the socio-economic characteristics of respondents such as: age, level of education, medical records and healthcare delivery. The secondary source had to do with the collection of relevant literature from: record archives, internet, books, reports, journal articles and internship coordination meetings. This gathered information was obtained among health centers in Bamenda I, II and III municipalities respectively.

This study used the probability sampling method known as the stratified random sampling for quantitative data collection. It is used to select people based on a random procedure and this sampling was made by grouping or separating the participants into non-overlapping groups according to their districts and fields of work in Bamenda I, II and III municipalities. The key participants included the information and records units' managers and/or overall supervisors/heads of the information and records management units at the hospitals. A total of 267 health workers were sampled out of a population of 402 health workers in Bamenda I, II and III municipalities using stratified sampling technique. Generally, the stratified random sampling is a technique used to improve the accuracy of survey results, or to lower the cost of the survey without losing accuracy.

In relation to data issues, both qualitative and quantitative data was collected. This is because the qualitative method helped to explain the understanding and interest of the population and the quantitative method helped to confirm the respondents' understanding of the outcomes of the study.

Thus, the questionnaires were administered to 267 participants. The questionnaires were printed out and with a set of 19 closed-ended questions sub-divided into four sections: section A, deals with the questions related to the socio-economic characteristics of the respondents (age, level of education, socio-economic status, etc.) is presented in Table 2 of the results section.

Section B covers the questions related to medical records (keeping records, type of records, frequency of keeping, usage of records, etc., section C presents the questions related to healthcare service delivery (diagnoses, prescription of drugs, treatment, patient recovery) while section D covers the challenges associated with quality healthcare service delivery (shortage of filing space, misfiling and missing files, damage to records, etc.) and complementary questions (total number of qualified doctors, number of patients received per day, working hours of personnel, etc.) in Bamenda I, II and III municipalities.

Model specification

The Human Capital Model proposed by Schultz in 1961 and the systems theory form the conceptual basis for our analysis (Njingun *et al.*, 2023) of the contribution of well-preserved paper based medical records on quality healthcare service delivery among Health Centers in the Bamenda Municipality. The generic model of quality healthcare delivery is assumed to be:

$$QD_i = \lambda_1 \chi_i + \delta_1 PBMR_i + \varepsilon_{1i} \qquad (1)$$

Whereby QD is a binary variable representing quality healthcare delivery; and χ_i is a vector of staff characteristics such as gender, level of education, age group, marital status, etc. These are the factors believed to be influencing the quality of healthcare service delivery apart from paper based medical records. $PBMR_i$ represents the health centers' paper based medical records.

Further, ε_i is a random error term, while the coefficient δ_1 is the parameter of primary interest and represents the impact that paper based medical records have on the quality of healthcare service delivery and λ_i shows the effect of the other factors apart from paper based medical records.

The equation (1) above reports the probit estimate that measures the marginal effects of paper based medical records on the quality of healthcare service delivery. The probit estimate is an appropriate estimate in this type of a study because it attempts to capture the additional impact of paper based medical

records on the quality of healthcare service delivery.

However, this single-equation estimate may be upward or downward biased depending upon the effect that paper based medical records have on the quality of healthcare service delivery and on the correlation between omitted variables and the quality of healthcare service delivery. For example, if paper based medical records have a positive impact on the quality of healthcare service delivery, then we would expect the probit estimate of δ_1 to be biased upward. To avoid this problem of endogeneity, we have seriously scrutinized our selection of variables in the quality of healthcare service delivery equation. This means that our model is void of any bias.

We can calculate the marginal effects of paper based medical records on the quality of healthcare service delivery based on the following equation;

$$ME(\chi^K) = \frac{1}{N}\sum_i \frac{\delta p(QD_i = 1/\chi_i, PBSD_i, \hat{\beta}, \hat{\lambda}, \hat{\delta})}{\delta \chi_i^k} \quad (2)$$

Where: χ^k is the average of the marginal effect of everyone in the sample and χ_i is a vector of characteristics with χ_i^k the k'th element in that vector, thus, the marginal effect of paper based medical records on quality of healthcare service delivery will be:

$$ME((\chi) = \frac{1}{N}\sum_i \langle P(QD_i = 1 PBMR_i = 1) - P(QSD_i = 1 PBMR_i = 0)\rangle \quad (3)$$

The marginal effect of paper based medical records on the quality of healthcare service delivery will be estimated in STATA 13.0 as will be seen in the following chapter.

4. Presentation of Results

4.1 *Sample Characteristic of Medical Personnel*

Table 2 indicates that out of 267 medical personnel respondents, 52.8% were male and 47.2% were female. This observation shows that there are more male medical personnel working with the health sector of Bamenda I, II and III municipalities than female. This may be because more women are educated now than men. The level of education of the medical health personnel of Bamenda I, II and III municipality shows that all the health personnel have a minimum post-secondary education or diploma that is HND and above.

The age group of the respondents who participated in the survey questionnaire was 56 (21%) <25 years, 132(49.4%) between 25-35 years, 58 (21.7%) between 36-45 years, 21 (7.9%) >45years. Through this analysis, we can see that 246 medical personnel (92.1%) fall within the youthful population. This means that with the level of education and expertise in the health sector, the quality of healthcare service delivery will be achieved.

The marital status of the population sample shows that188 members of the medical personnel (70.4%) are single, which implies they can put in more time at work with less distraction from family while the remaining 79 members of the medical personnel (29.6%) are married. The social and financial status of the medical personnel in Bamenda I, II and III is as follows, ranging between 150,000 -250,000 FCFA are averagely rich with a frequency of 140 medical personnel (52.4%), <150,000 FCFA are poor with a frequency of 58 medical personnel (21.7%), 250,000-350,000FCFA are rich with a frequency of 60 medical personnel (22.5%), >350,000FCFA are very rich with a frequency of 9 medical personnel (3.4%) of the sample population.

The household size of the respondents is as follows: ranging between 5-10 persons, with the frequency of 121 medical personnel (45.3%), <5 persons, with the frequency of 96 medical personnel (36%), and >10 persons, with the frequency of 50 medical personnel (18.7%) of the sample population.

Table 2. *Sample Characteristic of Medical Personnel Sampled*

Variable	*Percent*
Male health personnel	47.2
Female health personnel	52.8
Postgraduate education	100
< 25 years	21
Between 25 - 35 years old	49.4
Between 36 - 45 years old	21.7
> 45 years old	7.9
Poor personnel	21.7
Averagely rich personnel	52.4
Rich personnel	22.5
Rich personnel	3.4
Small household size	36
Average household size	45.3
Large household size	18.7

Source: Author

4.2 *Well-preserved medical based records and healthcare delivery*

From Table 3, with the coefficient of well-preserved medical based records being 0.429, we observed that an increase in the way records are preserved by 1%, will lead to an increase in the quality healthcare service delivery by 42.9%. This result is statistically significant at 1%. This implies that well-preserved medical based records will enhance quality healthcare service delivery. This may be because the records will help the medical practitioners to get the history of the patient for continuity of the service they are giving the patient. This result is similar to that of Njiemanted *et al*. (2017), which assert that a medical record is the cornerstone in the delivery of quality healthcare service and efficiency of patient care during hospitalization and subsequent follow up visits.

The variables such as age and level of education, with a coefficient of 0.105 and 1.846 respectively, indicate that an increase in the years of working experience in the medical sector or the level of education (formal or informal training) by 1 year will enhance in the quality of healthcare service delivery by 10.5% and 184.6%. It has a t-statistics of 3.70 and 25.66 indicating that this result is statistically significant at 1% (99% true). This may be attributed to the fact that, the more years medical personnel invest in the medical sector, they are faced with different healthcare challenges and sometimes have workshops and training on the different options used to resolve these health challenges.

Table 3. *Estimated of Medical based record on quality healthcare delivery*

Variable	*Marginal Effect Estimate*
	Quality healthcare delivery
Preserved medical based record	0.429*** (6.77)
Age	0.105*** (3.70)
Male gender	-0.001*** (3.82)
Tertiary education	1.846 *** (25.66)
30mins – 1 hour record retrieval time	-0.695*** (9.85)
Married household	0.242*** (4.25)
<30 minutes waiting time	0.031*** (4.65)
Financial rich household	0.211*** (13.38)
Electronic tracking system	0.011*** (10.18)
Number of staff	0.002 (0.25)
Paper based record	-0.144*** (6.65)
Pseudo R-square	0.2134
Chi Square	58.67 [0.0000]
Observation	267

Source: Author; absolute value of robust t-statistics in parentheses beneath estimates. *, **, *** indicates statistical significance at 10%, 5% and 1% level.

Conversely, records retrieval time may negatively affect the quality of healthcare service delivery. The coefficient of record retrieval time is -0.695, which implies that an increase in the length of time used to retrieve a patient's record will reduce the chances of the patient surviving by 69.5%. The result is significant at 1% (99% correct). When the medical history of a patient cannot be reached on time or medical records are not well preserved and managed properly, they may be

lost forever. Missing or incomplete files can have a negative impact on the lives of patients. However, Bless *et al*. (2006) revealed that prior to the adoption of information technology in healthcare service delivery, there were challenges of incorrect recording of diagnosis, unavailability of patient information, delays in retrieval of medical records storage, and insufficient personnel.

The social nature of medical personnel may affect the quality of healthcare service delivery. This aspect can be captured in their financial status and marital status. From Table 3, the coefficient of financial status is 0.211 and marital status is 0.242, indicating that medical personnel being well paid or a percentage increase in their finances, will lead to an increase in the way services are delivered by 21.1% and with the well paid package, most of them are married responsible persons thereby improving on the quality of healthcare service delivered by 24.2%.

These results are significant at 1% (99% true). This implies that when the medical personnel are well paid, they may be less worried about financial issues and consequently, more psychologically fit to concentrate on his/her job, thereby improving the quality of healthcare service delivered. The result obtained from our chi square test of 58.67[11, 267; 0.0000] shows that the explanatory variables are globally significant in determining the quality of healthcare service delivery, significant at 1% level of significance. However, our R^2 reveals that 21.34% of variation in quality of healthcare service delivery is being explained by the independent variables specified in our model. Thus, other important variables that affect the quality of healthcare service delivery were captured in the error term.

4.3 *Medical based records effects on healthcare by type of record*

From Table 4, we observed that the coefficient of well-preserved medical based records is 0.344, which means an increase in well-preserved medical based records by 1%, will lead to an increase in the quality of healthcare service delivery by 34.4% for paper based medical records and is significant at 10%. On the other hand, electronic medical based records will increase the quality of healthcare service delivery by 1.0% and are significant at 1% level of significant. With both paper and electronic medical based records, the quality of healthcare service delivery will increase by 52.1% and is significant at 1% level, which is the best when compared to paper based or electronic medical records. This implies that when medical records are kept in both electronic and paper based mode, both records may serve as substitute.

In case of power failure or system malfunction for electronic records, the paper based records are put in use immediately. Likewise, in case the paper records are damaged, missing or misfiled, or if difficulties in retrieving them on time occur, the electronic may be the best option. The finding is in conformity with Laohakangvalvit *et al*. (2015), who revealed that some healthcare workers thought that paper based medical records were easier and quicker to use and, therefore, preferred them to computerized records. The challenge though is the waiting time for the retrieval of folders. In an electronic environment, Laohakangvalvit *et al*. (2015) argue that patient care and the delivery of healthcare service are improved due to the speed of record retrieval.

In addition, experience shows that an increase in the working experience of medical personnel by 1 year will lead to an increase in the quality of healthcare service delivery by 0.3% for paper based medical records and this result is significant at 1% level of significance. For electronic medical records, the quality of healthcare service delivery will increase by 0.01%, which is significant at 10% level of significance and with both types of medical records, the quality of healthcare service delivery will increase by 16.6% and the result is statistically significant at 5% level of significance.

Concerning the level of education, we can observe that tertiary education influences the quality of healthcare service delivery negatively with respect to paper based records by 0.2%, which is statistically significant at 1% level of significance. This may be because when medical personnel or institutions have a higher level of tertiary education, they are more likely

to reduce the use of paper records, as they aim to advance in their careers and adopt electronic medical records. On the other hand, tertiary education will influence the quality of healthcare service delivery positively by 3.6% and is statistically significant at 1% level of significance. This may be because with the high level of education, they may rather prefer using electronic devices over handwritten records. Both paper and electronic types are not significant when dealing with tertiary education.

Table 4. *Medical based records and healthcare delivery by type of record*

Variable	*Marginal Effect Estimate*		
	Paper	*Electronic*	*Both*
	Quality healthcare delivery		
Preserved medical record	0.344* (1.69)	0.010*** (3.34)	0.521*** (5.15)
Age	0.003*** (3.10)	0.000* (3.11)	0. 166** (2.33)
Male gender	0.004*** (3.19)	0.088*** (3.37)	0.059 (1.07)
Tertiary education	-0.002*** (4.63)	0.036*** (3.18)	-0.006 (0.80)
30mins – 1 hour record retrieval time	0.045*** (6.76)	0.010* (1.71)	0.051 (1.53)
Married household	0.020*** (3.20)	-0.002*** (2.80)	-0.006*** (9.93)
<30 minutes Waiting time	0.017*** (3.31)	-0.000* (1.68)	0.047*** (2.79)
Rich household	-0.000*** (3.02)	0.003*** (2.93)	0.109*** (6.11)
Electronic tracking system	0.007*** (4.03)	0.011*** (3.97)	-0.261 (1.42)
Number of staff	0.004 (0.568)	0.039*** (5.51)	0.178** (2.19)
Pseudo R^2	0.3021	0.2621	0.4621
Chi Square	12.16 [0.0000]	8.17 [0.0000]	23.67 [0.000]
Observation	206	4	57

Source: Author; absolute value of robust t-statistics in parentheses beneath estimates. *, **, *** indicates statistical significance at 10%, 5% and 1% level.

4.4. *Challenges associated with medical record keeping*

From Table 5, we observed that the medical sector of Bamenda I, II and III municipalities face amongst other problems; Shortage of Filing Space, Misfiling and Missing Files, Damage to Records, Incompetent/unskilled staff, Shortage of Staff, Lack of support for resources (inadequate budget), and Insufficient budget. When it comes to the shortage of filing space, 95.1% of the respondents were of the opinion that shortage of filing space is a major problem because of the number of patients they have and the and the duration of the facility is 4.9% of the respondents were of the opinion that it is not a problem to the health sector, because they have fewer patients and have not been long in that sector. Exactly 90.2% difference after computations shows that the shortage in the space to fill is a major problem in Bamenda I, II and III municipalities. Secondly, 67.4% of the respondents were of the opinion that misfiling and missing files was a major problem while 32.6% of the medical personnel did not see it as a major issue. Some 34.8% difference after computations shows that misfiling and missing files is a problem of the municipalities. This occurs when records are moved from one service to another or due to limited filing space. During this movement, some documents in the medical record may become misplaced, fall out, or have their order changed.

Table 5. *Challenges associated with medical record keeping*

Variable	*C (%)*	*NC (%)*	*D (%)*
Shortage of filing space	95.1	4.9	90.2
Misfiling and missing files	67.4	32.6	34.8
Damage to records	95.5	4.5	91
Incompetent/unskilled staff	72.3	27.7	44.6
Shortage of staff	84.6	15.4	69.2
Lack of support for resources	80.5	19.5	61
Awareness about the importance of records	5.6	94.4	-88.8
Insufficient budget	82.8	17.2	65.6

Source: Author, NB: C= Challenge, NC = Non challenge, D = Difference

Also, one of the major problems in study was that of damage to records; 95.5% of the medical

personnel in Bamenda I, II and III municipalities saw this as a challenge because patients' records have over the years been stored in places where they are exposed to water or rain. Because of the shortage of filing space, most of these records are moved to corridors and verandas where moisture can easily damage the records. Some 4.5% of the respondent did not see this as a challenge at all but after computations, 91% of the respondents were of the opinion that it poses a challenge to this sector. Next is the issue of incompetent or unskilled staff in record management. A total of 72.3% of the respondents identified this as a problem in the health sector, while 27.7% of medical personnel considered it a non-challenging issue. After computations, 44.6% of the respondents agreed that incompetent or unskilled staff is a significant problem. Many staff members are unfamiliar with records management and are new to the field, highlighting a lack of experienced personnel, weak administrative leadership, poor individual dedication, and the absence of properly designated records management staff in these health facilities."

As indicated in the table above, 84.6% of the respondents were of the opinion that there is a staff shortage due to the ongoing socio-political crisis in the region. Many staff members no longer report to work regularly and some do not come at all However, 15.4% of the respondents, in contrast to the 84.6%, stated that staff shortage is not a problem. The 69.2% difference after computations confirms that staff shortage is a major problem faced by health facilities of Bamenda I, II and III municipalities. This is evident in the doctor-to-patient ratio of 1 medical doctor to 17,000 inhabitants (WHO, 2018), as well as in the long retrieval times patient records and extended patient waiting times. In addition, the lack of support for resources (inadequate budget) is seen as one of the major problems faced by the health sector in Bamenda municipalities; 80.5% of the respondents were of the opinion that it is a major problem as opposed to 19.5% of the respondents who did not see it as a problem. After computations, 61% of the respondents show that the lack of support for resources (inadequate budget) is a general problem.

5. Conclusion and recommendations

From the foregoing, despite the recognized importance of medical records, 5.6% of the respondents were of the opinion that general staff awareness about their importance remains a problem in the health sector. Meanwhile, 94.4% of the respondents acknowledged the role of medical records in ensuring quality healthcare service delivery in Bamenda municipalities. After computations, statistics from the sample population shows that 88.8% of medical personnel in Bamenda municipalities are informed about the importance of medical records. Lastly, 82.8% of the respondents were of the opinion that insufficient budget is a major problem compared to 17.2% who did not consider it an issue. However, after computations, 65.6% of the overall respondents identified it as the most critical problem, stating that with adequate funding, other issues such as shortage of filing space, misfiling, missing files, and damage to records could be effectively addressed.

Based on the study's findings, the following recommendations are made: (1) decision makers should place greater value on medical record keeping since well-preserved medical records enhance medical healthcare service delivery; (2) record-keeping should be integrated into the training curriculum within the health sector, (3) health administrators should increase awareness of the importance of proper medical record management. These steps represent a major advancement toward improved healthcare in Bamenda municipalities in particular, and globally in general.

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