

**A COMPARATIVE STUDY OF MATERNAL AND NEONATAL OUTCOMES DURING
THE 2016/17 DOCTORS STRIKE IN PUBLIC HOSPITALS AND A SIMILAR PERIOD
THE PREVIOUS YEAR AT NAZARETH HOSPITAL; A PRIVATE FAITH-BASED
FACILITY**

A pre and post Observation study

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A Thesis Dissertation Submitted in Part Fulfilment for the Award of a degree in Master of Medicine in
Obstetrics and Gynaecology, School of Medicine, University of Nairobi.

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This is to declare that this dissertation is my original work, carried out with guidance of my supervisors, and references made to work done by others' have been indicated and to the best of my knowledge has not been presented for the award of any other degree or diploma at the University of Nairobi or any other educational Institution.

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ACKNOWLEDGEMENTS

This work would not have been possible without the concerted effort of my supervisors, faculty and fellow postgraduate students at the University of Nairobi and the staff at Nazareth Hospital. I sincerely appreciate your advice, motivation and cooperation in any and all facets of the study.

DEDICATION

To members of my family without whose prayers, support, encouragement and understanding this work would not have been possible. To my father; Peter M. Ndungu, my mother; Teresia W. M. Ndungu; my siblings; Kamiti, Sally and Kimani, I say a big ‘thank you’.

LIST OF ABBREVIATIONS

CBA	Collective Bargaining Agreement
COTU (K)	Central Organisation of Trade Unions
ILO	International Labour Organisation
KHHEUS	Kenya Household Health Expenditure and Utilization Survey
KHSSP	Kenya Health Sector Strategic and Investment Plan
KMA	Kenya Medical Association
KMPDU	Kenya Medical Practitioners and Dentists Union
KNH	Kenyatta National Hospital
MMED	Master in Medicine
NBU	Newborn Unit
NHA	National Health Accounts
NHIF	National Hospital Insurance Fund
NHS	National Health Service
PI	Principal Investigator
UON	University of Nairobi
WHO	World Health Organization

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DEFINITION OF TERMS

Strike: Events occurring when two or more parties have opposing attitudes or approaches to a particular situation, issue, or person; that action from a host of roots such as difference of an opinion, problematic working conditions, unrealistic work expectations through discriminatory behaviour such as racism or sexism, poor communications or non-compliance with organizational norms or values. In this study we consider the national strike by doctors in the public health facilities from 5th December 2016 to 14th March 2017.

Health system: by the WHO definition, a health system consists of all organizations, people and actions whose primary interest is to promote, restore or maintain health through well-defined six building blocks. We consider the Kenya public health system in this case and its role of provision, restoration and maintenance of the health of the Kenyan people.

Maternal mortality: The WHO defines maternal mortality as the death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. Any death of a woman who meets these criteria at Nazareth Hospital will be considered maternal mortality.

Birth asphyxia: Also known as perinatal asphyxia is the presence of severe metabolic acidosis at birth in a newborn exhibiting early signs of moderate to severe encephalopathy. Evaluation of newborn babies with birth asphyxia at Nazareth Hospital will be done.

Caesarian section: Delivery of a baby through incisions made in the mother's abdomen and uterus. All deliveries of this nature at Nazareth Hospital will be considered.

Neonate: A child under 28 days of age.

ABSTRACT

Background: The 2016/2017 Kenyan Doctors' strike lasted 100 days involving all Public Health facilities. Pregnant women sought alternative care including from private or faith-based facilities. Studies done on effects of doctors' strike on service delivery show conflicting data with some showing a change in maternal and neonatal outcomes and others none.

Justification: Maternal and neonatal outcomes are likely to be impacted in private and faith based health facilities during doctors' strike in public health facilities due to a likely increase in the number of patients attended.

Objectives: To compare the maternal and neonatal outcomes during the 2016/17 public sector doctors strike and a similar period during the previous year at Nazareth Hospital; a faith based hospital.

Methodology: This was a pre and post observational study using a 'before and after' design. Data were collected from the Nazareth hospital, maternity ward from 5th December 2016 to 14th March 2017, when the doctors were on strike and with a comparison group from 5th December 2015 to 14th March 2016. Using Fox's formula, sample size was estimated at 474 women in each group. However, for this study the whole population was studied; 500 women before the strike and 1300 during it. Data were collected using a structured questionnaire de-identified and entered in an Excel spreadsheet. Analysis was done using Statistical Package for Social Sciences (SPSS) version 20. Relevant tests of significance were applied and P-values of less than 0.05 considered statistically significant. Data were presented using tables and figures as appropriate.

Results: There was three times more admissions in the maternity department during the strike than before the strike. Significant changes were seen in the following maternal and neonatal outcomes: increase of mean duration of time in minutes from diagnosis to decision implementation during the strike period compared to before the strike (OR 183.2; 95% CI 164.4-202 vs 117.5 95% 94.8-140.2; p val <0.001), an increase in the number of livebirths (OR 1.4; 95% CI 1.1-1.8; p val 0.037), macerated stillbirths (OR 6.5; 95% CI 1.05-49; p val 0.037) and neonatal deaths (OR 18.4; 95% CI 2.5-133.7; p val <0.01); decreased neonates with birth asphyxia (OR 0.05; 95% CI 0.01-0.43; p val <0.01) and admissions to the Newborn Unit (OR 0.5; 95% CI 0.4-0.7; p val <0.01). Other maternal outcomes showed no significant change namely: mode of delivery (OR 0.9; 95% CI 0.7-1.1; p val =0.324); eclampsia (OR 2.3; 95% CI 0.3-19; p val=0.435); postpartum haemorrhage (OR 0.8; 95% CI 0.3-2.2; p val = 0.606) and referrals to other facilities (OR 0.5; 95% CI 0.03-6.0; p val = 0.407) respectively. There was no significant change in the number of fresh still births (OR 0.9; 95% C.I 0.4-2.2; p val <0.037).

Conclusion: The 2016/17 Kenyan Doctors' strike was associated with a change in most neonatal outcomes especially increased neonatal deaths and an increase in time taken from diagnosis to decision implementation as the change in maternal outcome.

Recommendations: There should be increased focus on public-private partnership with public health facilities to plan for increased patient load in private and faith based facilities during doctors' strikes in public health facilities to ameliorate adverse neonatal outcomes.

1 INTRODUCTION

Background

World over, strikes are the most overt and the most significant aspects of industrial conflicts; they are unfortunately only a part of the phenomenon of conflict (1). Industrial action looks at all kinds of opposition or antagonistic interactions in, or among individuals, groups, and/or organizations. Fajana defines industrial action as a dispute, difference, or struggle between two parties that is indicated by open expression of hostility and/or intentional interference in the goal achievement of the opposing party (2).

Bain described strikes as events occurring when two or more parties have opposing attitudes of approaches to a particular situation, issue, or person; that action from a host of roots such as difference of an opinion, problematic working conditions, unrealistic work expectations through discriminatory behaviour such as racism or sexism, poor communications or non-compliance with organizational norms or values (3).

In related terms, Bankole agreed that industrial action occurs when two or more people or groups perceive that they have incompatibility of goals, and interdependence of activity (4). Hence, industrial action is a disagreement between or among actors in industrial relations, mostly over issues of divergent interest.

Slowdowns and strikes represent the concerted collective withholding of their labour by groups of workers for the purposes of extracting certain concessions. While in general the concessions are for the economic benefit of the strikers, exceptions exist (5).

These definitions according to Ootobo (2005), suggest that industrial action occurs between groups at the collective level, with personality and other structural variables coming into play. He further shows that it tends to restrict the phenomenon to what transpires between two opposing groups, owners/managers versus working people and their organizations (6).

It has been suggested that since strikes are considered a fundamental right or entitlement during collective bargaining and labour negotiations, to deny any employee the right to strike would be an argument for enslavement of such an employee as this would simply mean that whatever the circumstances such an individual must work! A situation deemed to be both ethically and morally indefensible (4).

The first recorded strike action in history took place during the reign of Ramses III in the twelfth century BC. Health workers' strikes have remained commonplace throughout history (7). The impact of these strikes however appears more severe in developing countries challenged by poorer socio-economic circumstances, embedded infrastructural deficiencies, and lack of viable alternative means of obtaining healthcare (1).

Workers strikes usually arise due to a breakdown in negotiation as well as disagreements between employer(s) and the employees (1). Strikes connote a temporary stoppage of work resulting from the pursuance of grievance(s) by a given group of workers (2,6,8–11). It could equally arise as a result of fall out in negotiations or disagreements in the behaviour of the employer (and their association) and the employees (and their representatives) (1). It has been argued that to deny any group of workers, including “essential workers” the right to strike is akin to enslavement which is ethically and morally indefensible. |

Causes of Doctors' Strikes

Various causes are given for Doctors' strikes. Nwabueze found that strikes in Nigerian public hospitals persist due to a number of factors namely: unsatisfactory physical conditions in public hospitals, decline of doctors' remuneration relative to other professions, inadequate remuneration relative to educational and professional qualifications, lack of promotions, substandard hospital equipment and bureaucracy (12). Emphasis on the issue of remuneration in Africa is shown during the health workers strike at a major tertiary hospital in Malawi. The grievances were lack of risk allowances, poor professional allowances, low salaries and low housing allowances (13). Additional reasons for doctors strikes internationally include changes in: working hours, government pension and insurance disputes (5,14–16).

Health workers need to be kept motivated and in an enabling environment (17). Zuger investigated causes that lead to doctors' dissatisfaction with medical practice and illustrated several causes namely; increased managed care by health maintenance organisations leading to reduced autonomy, increased medical malpractice litigation, disparate expectations, lack of time to accomplish necessary tasks and increased nonmedical roles doctors have to play (16).

In Kenya, several similar challenges have been identified that precipitate these strikes. Challenges affecting doctors personally include: un-harmonized salaries and allowances, delayed salaries, non-remittance of health workers' statutory deductions, delayed promotions and re-designations, staff shortages and inadequate budgets (18–20). There also exist several systemic challenges that were experienced with the onset of devolution of healthcare services such as: the counties' unpreparedness to manage devolved health services, a demanding public, deteriorating health service delivery, unequal distribution of staff, inadequate and lack of essential tools and medical and non-medical supplies and poor leadership and governance (18,19).

The Kenya Health Sector Human Resources strategy was developed specifically to combat the above human resources challenges through addressing the availability of appropriate and equitably distributed health workers; attraction and retention of required health workers; improving institutional and health worker performance; training, capacity building and development of health workforce (18). It was developed specifically to support the implementation of the Kenya Health Sector Strategic Plan (18).

Ethical context of Doctors' Strikes

Given that Doctors' and other healthcare workers take an oath to preserve and protect life, strikes and industrial action by this cadre of workers has brought a significant amount of opposition as to their ethical basis (12). The doctor is faced by a dilemma as to which interest reigns supreme, the doctors' own self and professional interest, or the interest of their patients. This is especially so in public health systems because they are usually heavily subsidized and are seen to mainly act as welfare rather than as an economic service (12). Badgeley argues that 'if the rights and health of patients and the public are preserved, strikes can serve as an important catalyst in converting a rigid and conservative health system into a more flexible democratic organization for all its workers' (21). However it is difficult to separate fact from exaggeration during doctors' strikes due to the media hype and the multiple interests at play (7).

The ethical guide to doctors' service provision is to 'do no harm' and 'preserve life'; concepts that were first laid down in the Hippocratic Oath that most doctors take on attaining qualification (12). While the right of patients is enshrined in this oath, the right of caregivers is notably absent. Doctors thus tend to perceive bias, imbalance or injustice in the spirit and letters of the oath (12). Conflicting expectations are thus seen whereby doctors' expect a certain minimum conditions of

practice and compensation while a significant proportion of the population believe that doctors' should volunteer their work as it is seen to be humanitarian in nature (12).

In some countries such as The United Kingdom, doctors' are prevented by law from partaking in actions that put the public at risk such as doctors' strikes (22). Some of the harms that may occur to patients during doctors' strikes include: loss of working time/wages, wasted transport resources, treatment delays, prolongation of suffering, irreversible damage to health, dangerous drug interruptions and even death (7).

Osakede et al argue that an ethical approach from all stakeholders is important in minimizing the incidence and effects of healthcare workers strikes. He continues that 'all parties have an equal moral obligation to serve the best interest of society. Thus employers should implement legitimate CBA's and employees should desist from making unrealistic wage demands (1).

Health care workers strikes in Kenya

The Constitution of Kenya, 2010, which is the supreme law of the land, provides for extensive rights and privileges of the employees and trade unions as well as employers and employers' organizations on matters concerning industrial relations (11). For example, the Bill of Rights under Article 41 on Labour Relations provides for: workers right to fair practices; fair remuneration; reasonable working conditions and participation in the programs of trade unions. The Article also provides for trade unions and employers right to: form and join organizations; determine own administration programs and activities; and engage in collective bargaining (11,23).

Articles 36 and 37 of the Constitution further provides for freedom of association and rights to assembly, demonstration, picketing and petition, while Article 43 provides for the basic

standards of health, accessible and adequate housing and clean and safe water in adequate quantities (11). Other Principles governing labour relations are outlined in Chapter two on the ‘Republic of Kenya’; Clause 10 on ‘National Values and Principles of Governance’; Clause 27 on ‘Equality and freedom from discrimination’; Clause 28 on ‘Human Dignity’; Chapter 33 on ‘Freedom of Expression’; Clause 35 on ‘Access to Information’; Clause 36 on ‘Freedom of Association’; Clause 41 on ‘Labour relations’; Clause 43 on ‘Economic and Social rights’; Chapter 13 on ‘The Public Service’ and lastly Chapter 15 on ‘Commissions and Independent Offices’ (19). Other principles that govern labour relations are drawn from Labour laws, Public Service Commission guidelines and Ministry of Health Guidelines (19).

Due to increased conflict amongst health professionals and their employers, conflict needs to be mediated by involving health workers collective bargaining units in mediation and conciliation efforts (5). The concept of Collective Bargaining Agreements (CBA) was conceived in the 19th century following the emergence of industrial conflict and growth of trade unions (23). The advocates of collective bargaining believed that it would promote a system of peaceful and routine bargaining that would eliminate industrial strife and violence, create industrial democracy and make capitalism work (24). The International Labour Organization (ILO) was subsequently established at the conclusion of the First World War to champion collective bargaining as a mode of determining working conditions (23). Collective Bargaining in Kenya is achieved through alternative dispute resolution mechanisms which can take three forms: mediation, conciliation or negotiation (11,25). Guidelines to these mechanisms have been laid out by the Public Service Commission to apply to all human resources management- related disputes in the Public Service that can be resolved without litigation (25).

Later, the Declaration of Philadelphia (1944) recognized the “solemn obligation” of the ILO to promote programs that would achieve full employment and raise living standards, protect the life and health of workers in all occupations, provide for child welfare and maternity protection and assure equality of education (23).

The first wage earners' associations in Kenya can be traced back to the early 1940s and soon after the Second World War (24). The first trade union regulation was made through the introduction of Ordinance No. 35 of 1939 that required all crafts organizations to apply for registration which they could be granted or denied depending on whether they had legitimate dealings consistent with government policy (24). In 1948, in order to gain complete hold on the wage earners organizations the government brought in a Trade Union Labor Officer to be attached to the Labor Department with the duty to foster "responsible" unionism (24).

In 1962, a landmark was established with the signing of the Industrial Relations Charter by the government of Kenya, the Federation of Kenya Employers and the Kenya Federation of Labor, the forerunner of COTU (K), the Central Organization Of Trade Unions (Kenya) (24). The Industrial Relations Charter spelt out the agreed responsibilities of management and unions and their respective obligations in the field of industrial relations, it defined a model recognition agreement as a guide to parties involved, and it set up a joint Dispute Commission (24).

The first nationwide strike by the Kenyan doctors to champion for the establishment of the CBA was in 1993; this was organized by the Kenya Medical Association (KMA). With the advent of devolution and with the formation of the Kenya Medical Doctors, Pharmacists and Dentists Union (KMPDU), there have been an increasing number of strikes by health workers with a total of 26 strikes between the years 2011 to 2014 (20). The most recent national doctor’s strike lasted

more than 100 days from December 2016 to March 2017. It involved Doctors working in public health facilities. It led to closure of Public Health facilities countrywide

Situation analysis of the health sector in Kenya

The Kenya Health Policy 2012-2030 has a goal of attaining the highest possible health standards in a manner responsive to the population needs through provision of equitable, affordable and quality health and related services at the highest attainable standards to all Kenyans (26).

Organizational structure

The Kenya Household Health Expenditure and Utilization Survey (KHHEUS) divides the health service provision in Kenya to private (20.0 %), Government (48.3%) and mission hospitals 16.5% (27). Government medical services on the other hand are structured into primary, secondary and tertiary care provided jointly by both the County and national governments (27). Owing to cash constraints and to public health facilities being more affordable, available and accessible, they are more likely to be utilized by a larger segment of the population particularly the rural dwellers (65.3%) (27).

The Kenya Essential Package for Health categorizes health service delivery into levels from level 1 to level 6 in an ascending fashion namely: Level 1; the community level, Level 2; dispensaries/clinics, Level 3; health centres, maternities, nursing homes, Level 4; primary hospitals, Level 5; secondary hospitals, Level 6; tertiary hospitals (26). Majority of county referral hospitals are level 4 hospitals. This is because level 5 hospitals are few as majority were formerly called provincial general hospitals serving several counties prior to devolution of health services (26).

The activities and services of these tiers of government facilities are coordinated, interfaced and regulated by the ministry of health. Patients pay for services except in special programs such as HIV/AIDS, Tuberculosis, and ad-hoc free medical services by non-governmental organizations with about 90% of HIV / AIDS funds being sourced from abroad.

The two levels of government – national and county – have designated roles in the spirit of the Constitution. Health policy formulation, capacity building and technical assistance are the functions of the national government as outlined in the Fourth Schedule (19). The Intergovernmental Relations Act 2012 establishes a framework for consultation and co-operation between the national and county governments and among county governments, to provide mechanisms for the resolution of intergovernmental disputes, pursuant to Articles 6 and 189 of the Constitution (19). As such, there should be cooperation between the two levels as anticipated in the principles of devolution (19).

For a long time, service delivery in health has been be-devilled by discrimination by orthodox practitioners, lack of infusion of modern research, science and new technology, dosage problems, lack of universal standards of knowledge, training, practice and ethics. Orthodox medicine is be-devilled by brain-drain, crisis in remuneration policy as between pay parity or unified scales versus special scales. Disagreement among health sector professionals, frequent work stoppage and preference for offshore services by government top shots are the other problems (20,28,29).

Financing

Health care financing in Kenya is largely through out of pocket (80%) with only 17.1% of the population insured either through the NHIF scheme or other private insurance schemes (27). Owing to recurrent budget shortfalls, equipment is obsolete, remuneration is poor and services

sub- standard in the public health system. Patients shoulder substantial veiled and overt expenses by themselves, paying the total cost of services in private health systems and alternative service outlets which operate as business enterprises.

Maternal and Neonatal Healthcare Financing

Since the year 2013 maternity services in all levels of public hospitals have been free of charge (30). In addition, there are free services for neonates and children under the age of 5 (30). All pregnant mothers are thus entitled to delivery services both spontaneous and operative at no cost to the patient (30). 61% of livebirths are delivered in a health facility (31). As has been alluded to earlier, majority of the patients visit public hospitals for maternal and newborn services. With the doctors' strike they sought alternative places to seek services such as Faith based organizations; Nazareth Hospital being amongst them.

Physical and Human Resources

Physical resources in health care comprise hospital buildings, beds, theatre equipment, ambulance services, technical support facilities and consumables, etc. The health care system generally shares the culture of low mechanization of production systems. Budget constraints militate against procurement of adequate and up- to-date equipment in hospitals most of which are imported from overseas. The sample index of physical inadequacy in this sector is the population- hospital bed ratio in the country which is less than 2 beds per 1000 people (32).

Human resources comprise health personnel of varied specializations, functions and expertise. They include doctors, nurses, pharmacists, radiographers, physiotherapists, technologists, and public health inspectors, etc. Effective delivery of health services requires the health workforce

to be available, accessible, acceptable and of high quality (17). There is gross inadequacy of health care personnel in the country going by their number or quality. Doctors lead the medical team and their situation constitutes a very vital index of health personnel resources in the country. The doctor patient ratio in Kenya is 0.2:1000 or 36 doctors per 10,000 population, a figure that is way below the recommended WHO standard of 1:300 (33,34). As per statistics in 2012, the government has a total of 1080 doctors and consultants as compared to 653 in Faith Based Organizations and Non-Governmental organizations (18).

2

LITERATURE REVIEW

Introduction

Maternal and neonatal morbidity and mortality continue to be recognized internationally as public health priorities (30). In 2013, there was an estimated 289,000 maternal deaths globally with sub-Saharan Africa accounting for 62% of these deaths (30,35). Kenya is one of the countries classified as having made insufficient progress towards attaining this goal with a maternal mortality rate of 362 per 100,000 live births (31,36). Causes of maternal mortality in the African region in order of decreasing frequency are: haemorrhage (45%), sepsis (13%), hypertensive disorders (12%), other direct causes (10%), HIV/AIDS (9%), obstructed labour (6%) and abortion (5%) (37). In Kenya, the commonest causes are: obstructed labour (29.5%), postpartum haemorrhage (25%), antepartum haemorrhage (16.9%) and pre-eclampsia (16.9%) (30).

Of the 133 million live births in 2004, 3.7 million neonates died, with most of these deaths (98%) occurring in the developing world (38). In Kenya, the neonatal mortality rate is 22 deaths per 1,000 live births (31). The top causes of neonatal deaths in Africa are infections (29%), prematurity (25%), and asphyxia (24%). In Kenya the order is pre-maturity and low birth weight (30%), neonatal infections (27%) and birth asphyxia (30).

According to WHO, a health system consists of all organizations, people and actions whose primary interest is to promote, restore or maintain health through well-defined six building blocks. Among these building blocks is a robust and effective health workforce. These should be adequate in numbers and cadres, fairly distributed, well-motivated to work and provided with a conducive working environment (39).

WHO states that health services are only as effective as the persons responsible for delivering them (17). Workers' strikes involve the collective withholding of labour/services by a group of workers for the purpose of extracting certain concessions or benefits and are usually intended for the economic benefits of the strikers. Service delivery is thus bound to be grossly affected whenever health care workers go on strike (10).

Kenya, like most other developing countries, is faced with a deficit of health care workers especially the cadre of medical doctors. With a doctor: population ratio of 1:1000, against the WHO recommended ratio of 1:300, any form of unrest therefore, in a way to seek better remuneration and working conditions, has the potential to destabilize the service delivery especially in the public health sector, where a majority poor seek their services from (33).

Effect of doctors strike on service delivery

There is varied literature regarding the effects of a doctors' strike on service delivery with some studies showing an improvement in service delivery and even outcomes and others reporting the opposite to be true. Slater et al reported an increased volume of patients visiting the emergency room though there was a decrease in the percentage of patients admitted to the hospital (40). They also concluded that the vast majority of excess strike related emergency department visits were for trivial illnesses and many people with medical symptoms decided not to seek any medical attention during the strike (40). The New Zealand national Junior Doctors' strike also resulted in cancellation of elective admissions and outpatient clinics (15). In Varkaus, Finland during the Finnish Doctors' strike there was a decrease of urgent visits to the physicians of 55.9% and an overall decrease of visits of 70% (14).

During the 21st June 2012 National Health Service (United Kingdom) doctors' strike there was a fall in emergency admissions by 2.4 % while elective admissions decreased by 12.8 %. There was also a 7.8 % drop in the number of outpatients seen with 45.5 % of appointments being cancelled at NHS hospitals. Accident and Emergency attendances dropped by 4.7 %. There was no significant change in inpatient mortality between the strike and the non-strike period. They concluded that the doctors strike significantly affected the provision of healthcare at NHS hospitals(22). These findings differ with those of Gruber et al who found an increased in-hospital mortality coupled with an increased risk of patient readmission within 30 days (42).

According to Robinson et al senior physicians covering the emergency department during doctors strike leads to increased efficiency in the emergency department patient processing (15). This, according to Salazar et al leads to fewer laboratory and radiographical tests ordered and shorter stays in the emergency department (41).

Effect of doctors strike on maternal and neonatal outcomes

Global

Conflicting data exists in literature about the effect of doctors' strike on health service outcomes, with some indicating an increase in adverse outcomes while others showing a paradoxical pattern where mortality stays level or even decreases. In a literature review of 156 articles about strikes occurring between 1976 and 2003 and lasting between nine days and seventeen weeks, it was paradoxically found that physician strikes are associated with reduced mortality. This may have been explained by several factors: most importantly being that elective surgeries were curtailed during strikes; further, hospitals often re-assigned scarce staff and emergency care was available in all these studied strikes. Finally, none of the strikes may have lasted long enough to assess the

effects of long-term reduced access to a physician (43). While most studies have focussed on mortalities within the hospital or health facility setup, Erceg et al analysed countrywide mortality data before, during and after the physicians' strike in Croatia (44). There was no change in population mortality during the strike period in this instance (44).

In an Israeli study, the incidence of high-risk cases of multiple and premature deliveries were unchanged during the strike: there was a significant rise ($P < 0.01$) in the rate of caesarean sections during the strike; 10.8%, compared with 7.8% before the strike (40). A significant reduction in instrumental deliveries and labour inductions was observed during the strike and for 4 months afterwards. There was no change in the perinatal mortality (total and corrected) or in Apgar scores (40). This indicates that good perinatal results were achieved despite drastic disturbances in organized perinatal care. These findings are supported by the findings of Daga et al who posted medical officers from a primary health centre and rural hospital to a neonatal care unit during a residents' strike. These medical officers underwent a period of four-week training and were put as first on call. There was no significant difference in the number of high-risk deliveries, admissions and neonatal deaths during the pre-strike, strike and post-strike period (45).

In England, a 24-hour doctors' strike led to a decline in emergency admissions by 2.4%, elective admissions by 12.8%, and 7.8% in out-patients seen (22).

A study done by Mustard et al reported that the caesarian section rate in the strike interval was lower than the levels. These reductions were mainly among breech deliveries and among women with a previous caesarian section. There were however no differences observed in the rates of individual adverse maternal or newborn outcomes. The pooled incidences of adverse newborn outcomes were significantly higher during the strike period (46).

Regional

Not much has been published on the effects of the doctors' strikes in service delivery in Africa and other developing countries, with majority of the publications focusing on the ethics of doctors' and other health workers strikes and causes of the same (12). Doctors strikes have however happened in several countries in the continent such as Malawi, Nigeria and South Africa (12,13,47).

Bhuiyan et al assessed the impact of a 20-day strike in Polokwane Hospital in Limpopo Province, South Africa. This is a tertiary hospital and was the only facility offering emergency healthcare services during the doctors' strike in the entire province's 5.5 million population, 90% of whom have no medical aid and thus were heavily dependent on public hospitals. The doctors' strike seriously and significantly affected service delivery reflected in the significant reduction in the number of admissions and number of surgical operations carried out during the strike. During the strike period, the mortality reduced though disproportionately to the number of admissions. When mortality was correlated with the reduced number of admissions, there was a threefold increase in the overall hospital mortality and a doubling of the same in the surgical department (47).

Local context

The Kenyan constitution through the Bill of Rights states that every person has the right to the highest attainable standard of health, which includes the right to health care services, including reproductive health care. It further states that no individual at any moment may be denied access to emergency health services including reproductive health services (11). Though not much published data exists about the effect of the doctors' strikes on service delivery in Kenya,

anecdotal and media reports indicated a significant impact especially among the poor and other vulnerable groups.

Given the role that doctors play in the management of emergency and complicated services, management of hospitals and coordination of commodity flow, a strike by doctors has the potential to severely affect service delivery offered by other cadres of staff. Traditionally, a doctor is the head of the health care service delivery team; their absence therefore leads to a near shut down of service delivery. It is worth noting though that for those who can afford to pay for the services in the relatively more expensive private and faith based hospitals, the services continued being offered, though with some disruptions in some private hospitals where the doctors joined their colleagues in the public sector in advocating for improved services.

A study conducted by Njuguna et al about the impact of the 2014 doctors' strike on service delivery in Mombasa County Referral Hospital indicated a decline in outpatient attendance from a monthly mean of 7,089 to 2,327; decline in the special clinics attendance from a monthly mean of 3,755 to 805 (48). During this period, the total number of deliveries conducted declined from a monthly mean of 1,035 to 546. Maternal and Child Health/ Family Planning clinic attendance declined from a monthly mean of 1,511 to 360, radiological tests declined from a monthly mean of 2,747 to 1,260. Inpatient admissions also declined from a monthly mean of 2,770 to 1,209 with subsequent decline in inpatient deaths from a monthly mean of 197 to 123 (48).

The strike led to a closure of the hospital and this may have led to arbitrary discharge of the very sick patients with some patients being transferred to private health facilities. Those who were unable to afford the private health facilities either sought help from traditional healers or were looked after by their relatives at home. The mainstream media did highlight cases of patients suffering as a result of the strike with reports of patients dying due to lack of treatment and those

on management of chronic conditions such as diabetes and HIV going for days without medications (48).

The effect that this scenario would have is a reduction in the number of patients attending services at the public hospitals with a resultant increase in the numbers seeking alternative services at the private facilities and traditional healers. Assessing the population effect is however difficult as deaths occurring outside the health facility are not captured by the Kenya Health Information System; neither are the numbers of patients seeking alternative service health care captured (48).

Adam et al examined data for newborn and both paediatric medical and surgical patients during the 12 months prior to the Kenya doctors' strike from December 2016 to March 2017 and obstetrics data 3 months immediately prior to the same strike. They also collected post-strike data for the months of April and May. This study was conducted at AIC Kijabe Hospital, a not for profit, faith-based Kenyan Hospital. The study found an increase in the number of admissions during the strike period as compared to before the strike period with a concomitant decrease post-strike. There was a fourfold increase in the mortality rate in the paediatric newborn unit and a nearly eightfold increase in the paediatric surgical unit. They also found an approximately threefold increase in monthly maternal deaths though this was not statistically significant (49).

Problem statement

With the promulgation of the constitution of Kenya in 2010, the health function was devolved to the Counties; this has largely contributed to the stalemate that subsequently led to the doctors' strike (19). A World Vision Report identified several challenges in the health sector namely

political interference, policy gaps on attraction and retention of health workers and preference of health workers from own counties as challenges in the health sector (20).

Another study by the World Vision conducted in 2014 to assess the terms and conditions of service for the health workers since devolution identified other challenges that included un - harmonized salaries and allowances, delayed salaries, non-remittance of health workers' statutory deductions, delayed promotions and re-designations, staff shortages and inadequate budgets (29). The major concerns noted were inequitable distribution of health workers, deteriorating working conditions, loss of skilled and specialized manpower, unclear procedures for career progression and inadequate equipment and infrastructure in health facilities (29).

Doctors are vital to public healthcare service hence their persistent strikes jeopardizes effectiveness and efficiency of public health infrastructure and service delivery (12). Though going on strike is not inherently destructive, and may in fact be constructive, incessant and prolonged work stoppages impair the health of patients and erode confidence on the capacity of the state to protect the citizens (12). █

In a way to address the above issues, in December 2016, the doctors in Kenya's public hospitals downed their tools in the latest round of strikes to press for higher pay and recognition of the CBA as signed between KMPDU and the National government. Thousands of desperate patients were left without care with Public hospitals, usually the easiest and most affordable places to access health services for most Kenyans remaining closed. During such times, faith based, and private facilities witness an avalanche of patients, especially those who can afford the relatively costlier services or the very sick ones especially women and children.

Conceptual framework

Health services are only as effective as the persons responsible for delivering them (17). Industrial action more often than not leads to interference in service delivery; doctor and health care worker strikes therefore have the potential to create tension between the obligations on doctors to provide adequate care to current patients versus the need to advocate for improved healthcare services for future patients and for society in general (3). |

Comprehensive analysis shows that when a strike takes place, most emergency cases are attended by non-striking personnel or by other institutions substituting for striking hospitals (15,22). The impact of the doctors' strike working in the public sector can therefore be reviewed from two aspects: impact on service delivery in the public hospitals and on the faith based and private facilities.

A review by Cunningham *et al.* spanning 1976 - 2003 reported that mortality reduced or stayed the same in the public hospitals (43). In these cases, elective procedures are deferred until the strike is over with most, potentially fatal cases treated outside the hospitals, by general practitioners and private clinics, hence reducing the figures. However, the reduction of in-hospital mortality is compensated by an increased patient death rate outside of the striking hospitals – in other institutions or in patients' homes (40,43,47).

As a result of this potential harm to the patients, it is proposed that they (workers and the management) elect to resolve any form of strikes (especially work stoppage) and would not allow it to degenerate owing to the fact that they incur some form of losses (50). The employees will forgo their income while the organization will lose output (resulting in low productivity).

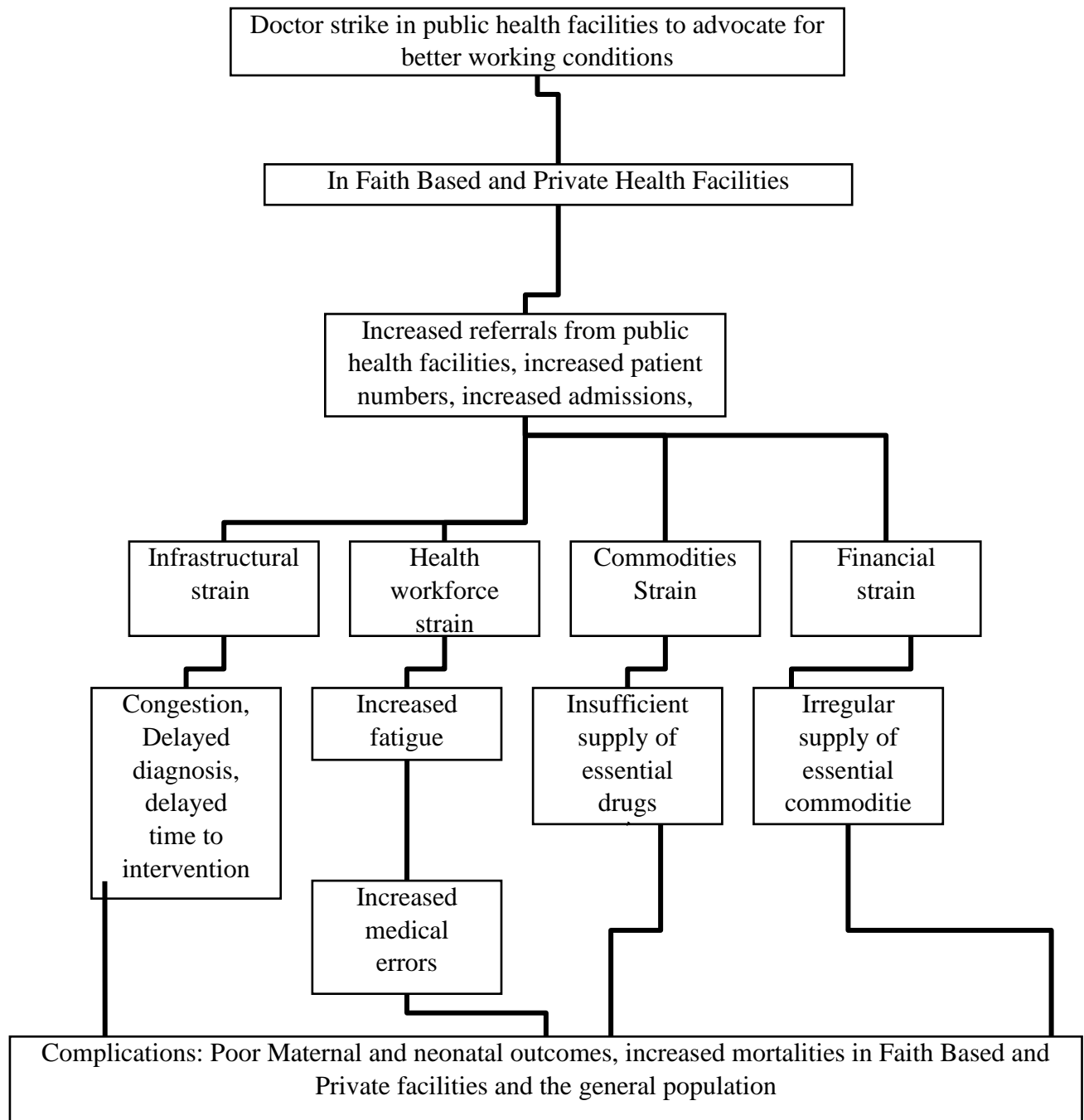


Figure 1: Conceptual Framework (Adapted from WHO health systems framework building blocks)

Study justification

Service delivery may be expected to be affected seriously and deleteriously during health professional strikes. Maternity and Newborn services form part of essential health services that are provided for in the Kenya Essential Package for Health (26). These services are provided free of charge in public health facilities and thus cater to the majority Kenyans who need the said service (26). Maternal and neonatal outcomes are thus likely to be among the most highly impacted in the case of a doctors' strike in public health facilities. Comprehensive analysis shows that when a strike takes place, most emergency cases are attended by non-striking personnel or by other institutions substituting for striking hospitals (47). Elective procedures are deferred until the strike is over. Most cases are treated outside the hospitals, by general practitioners and private clinics (47). Other findings by Cunningham *et al.* spanning 1976 - 2003 reported that mortality reduced or stayed the same (43). However, the reduction of in-hospital mortality is compensated by an increased patient death rate outside of the striking hospitals – in other institutions or in patients' homes (40,43,47).

While there was anecdotal and general media reporting of increased morbidity, mortality and general suffering among patients, with a focus on the deserted public facilities, minimal attention and documentation exists on the impact that such strikes have on the private facilities. Limited literature exists on the effect that this has on maternity services. As a result of the increased workload and stretching of the existing resources, patient care outcomes are bound to be affected.

This study, therefore, applying a retrospective, before and after technique, aimed at evaluating the impact that the doctors strike had on the service delivery at a typical faith based facility within the outskirts of a major population centre, namely the capital city; Nairobi City. The study focused on globally reportable maternal and neonatal indicators for women and children who

obtained services at the Nazareth hospital, measuring the outcomes before and during the strike. It is envisioned that the findings of this study will not only add to the knowledge base in this field, but also help managers and health service delivery planners' focus on providing more resources to especially faith-based facilities during the strikes.

Research Question

What was the effect of the 2016/17 doctors strike on maternal and neonatal outcomes at the Nazareth hospital?

Null Hypothesis

There was no difference in maternal and neonatal outcomes at Nazareth Hospital during the 2016/17 medical doctors' strike compared to a similar period in 2015/2016.

Broad Objective

To compare the maternal and neonatal outcomes during the 2016/17 doctors strike and a similar period during the previous year

Specific Objectives

- 1) To compare the number of admissions in maternity and the Newborn Unit during the 2016/17 doctors strike and a similar period the previous year.
- 2) To compare the maternal outcomes (mode of delivery-caesarian or vaginal, eclampsia, postpartum haemorrhage, referral to other facilities, mean duration of time from diagnosis to

implementation and maternal mortality) as documented during the 2016/17 doctors strike and a similar period the previous year

- 3) To compare the neonatal outcomes (birth outcomes-livebirths, fresh still births, macerated stillbirths and birth asphyxia, admissions to the newborn unit and neonatal status on discharge-live neonates or neonatal deaths) as documented during the 2016/17doctors strike and a similar period the previous year

3

METHODOLOGY

Introduction

This chapter covers the research design and methodology, including sampling method, study population, data collection, data analysis and ethical considerations.

Study design

This was a pre and post observational study. Records of 1300 women were collected from the health information system at the Nazareth hospital, maternity ward from December 2016 to March 2017 (during the strike period). Both patient files and monthly reports were used for data collection. Records of 500 women during a similar time the previous year, December 2015 to March 2016 (before the strike period), were used for comparison. Using a ‘before and after’ design, a comparative analysis of the key measurable maternal and neonatal indicators was done.

Study site and setting

The study was undertaken at Nazareth Hospital that was conveniently selected in view of the relatively well-established health information system and data utilization. Among other things, data on direct and indirect encounters, diagnoses, procedures, prescriptions, and laboratory results are routinely entered in the system on a real-time basis. It is also relatively affordable hence providing an alternative place for patients to seek health care services.

Nazareth hospital is a mission hospital under the Catholic Archdiocese of Nairobi, under the management of the Franciscan Sisters of the Immaculate Heart of Mary (FIHM). It is in Kiambu County, Limuru Sub County. It is a non-profit making organization catering for the economically

challenged members of our society. It was started in 1964 as a dispensary, which has developed into a referral hospital with a capacity of 220 beds.

The Department of Health-Kiambu County is responsible for promotion, regulation and provision of healthcare services to the residents of Kiambu County. Kiambu County Health Office is headquartered in Thika Town, north of Kenya's Capital City of Nairobi. The department of Health is headed by a minister/ County Executive Committee member for Health who in turn gets technical support from a Chief Officer for Health and a County Director of Health through a County Health Management Team.

Kiambu County is served by several public health facilities the highest level being a tier 5 (inter-county) referral hospital. It has 13 tier 4 hospitals, 24 health centres and 70 dispensaries. All these facilities were non-functional during the doctors' strike period. Patients during this period were directed and referred to faith based and mission facilities such as Nazareth Hospital.

Nazareth hospital is a faith-based facility equivalent to a level 5 public facility. It mainly serves the population around Kiambu and Nairobi areas. It acts as a referral facility to both public and private facilities surrounding it. The hospital offers outpatient services namely 24-hour casualty and specialized clinics that combined see over 45,000 patients per year. The hospital has a bed capacity of 220 beds. It offers surgical, orthopaedic, medical, obstetric, gynaecologic and paediatric inpatient facilities. In addition, it has a High Dependency Unit. The inpatient department treats approximately 10,000 patients a year.

The maternity department has a bed capacity of 62 beds. The Newborn Unit has a capacity of 12 incubators. The maternity unit is served by one consultant obstetrician gynaecologist, one registrar in obstetrics and gynaecology, two medical officer interns and two clinical officer interns. It also is served by 21 nurses who are at the Kenya Registered Community Health Nurse

level. The newborn unit is served by a visiting paediatrician, fulltime resident medical officer, two medical officer interns, two clinical officer interns and two fulltime nurses with the maternity department nurses also rotating in this unit. It has no Neonatal Intensive Care facilities. The hospital infrastructure and staffing levels remained the same before and during the doctors' strike. The hospital acts as a referral facility to surrounding facilities. It refers patients with maternal and neonatal complications it cannot handle to Kenyatta National Hospital.

Study population

The study population was all women of childbearing age (15 to 49 years) admitted to the maternity department and all neonates (0 to 28 days) admitted to the Newborn Unit during the study period.

Women admitted to the Nazareth Hospital Maternity Unit and Neonates admitted to the New-Born Unit from 5th December 2016 to 14th March 2017 were compared to women and neonates admitted to the same units from 5th December 2015 to 14th March 2016. All women and neonates with complete information on selected variables were included in the study.

Selection and enrolment of study participants

Inclusion criteria

- a) All records for women who were admitted at the Nazareth hospital maternity unit from December 2015 to March 2016 were reviewed
- b) All records for neonates who were born and admitted to the newborn unit from December 2015 to March 2016 at the Nazareth hospital were reviewed

- c) All records for women who were admitted at the Nazareth hospital maternity unit from December 2016 to March 2017 were reviewed
- d) All records for neonates who were born and admitted to the newborn unit from December 2016 to March 2017 at the Nazareth hospital were reviewed

Exclusion criteria

- a) Newborns referred to Nazareth hospital, these newborns are not normally admitted in the Newborn Unit in the Hospital but at a separate facility in the paediatric ward.
- b) Mothers who delivered outside of Nazareth Hospital or in other facilities because their outcome does not reflect on the care offered to them at Nazareth Hospital.

Sample size and sampling procedure

Sample size will be calculated using Fox's formula (51);

Where,

= Desired sample size

= constant which is a function of α and β ($\alpha = 0.05$ and $\beta = 0.2$) which is 7.9

= proportion of Neonatal deaths prestrike (estimated at 1.6%, from study conducted by Adam et al (2017), looking at paediatric and obstetric outcomes at a faith-based hospital during the 100-day public sector physician strike in Kenya, found 1.6% neonatal deaths prestrike) (49).

= proportion of Neonatal deaths during strike period which is estimated at 4.8%, from study conducted by Adam et al (49).

The sample for each for each of the group,

A minimum sample size of 474 per group is required, thus a total 948 will be required for the study.

For this study all patients meeting the above criteria for the period of the study were included; a total of 1800 records for women who delivered from the facility were identified within a period of three months for administration of the data collection tool (checklist as attached in annex 2). Data from all the patients who attended services in the maternity unit and newborn unit was evaluated.

Recruitment

Records for all patients to be included in the study and who meet the inclusion criteria were assessed and outcomes of interest during their stay at the hospital documented in the data collection tool by the research assistant or principal investigator. A total of 1758 records were assessed, and further information collected from the monthly reports and from the hospital management.

Data variables

The maternal outcome variables analysed were mode of delivery (caesarian or vaginal), number of women who had eclampsia, number of women who suffered from postpartum haemorrhage, number of women referred to other facilities and the mean duration of time from diagnosis to implementation of the decision in minutes.

The neonatal outcome variables analysed were birth outcomes (livebirths, fresh stillbirths and macerated stillbirths), birth asphyxia, admissions to the newborn unit and the neonatal status on discharge (alive or neonatal death).

Data collection

A structured questionnaire (annex 3), was used to collect data from the hospital information system in the maternity unit. Prior to data collection, a manual defining the variables was developed by principal investigator based on the study objectives to help in documenting all the study data. The data extraction form was developed, face validity was applied and piloted with 50 records before the study period. These procedures helped maintain quality assurance. This entailed using the data collection registers and patients' files. The files were assigned unique identification numbers and at no point were the patients names documented. Two research assistants, both clinical officers, were trained on data collection, documentation and ethical principles in research and used for data collection and entry. Similarly, comparison data was collected from the hospital information system for a similar non striking period in the previous year. Daily checking of the quantitative data from the questionnaire was done by the principal investigator. Once collected, data on the variables of interest: admissions, operations and deaths were entered into excel computer software for cleaning and then transcribed into SPSS software for analysis.

Since the data was collected from patients' records, upon approval by the hospital management, there was no anticipated interruption of service delivery at the facility. The research assistants were mandated to identify the appropriate files and registers (this being a retrospective study the files and registers were not in active use but archived in the records department). Upon identification, the research assistants sat at a designated office within the registry for data abstraction and recording.

Data management and analysis

Quantitative data from the checklist was checked daily for completeness. The patients' names were de-identified for confidentiality and coded for appropriate computer entry then entered into an Excel spreadsheet for cleaning. Equivalent responses were pooled to arrange the response in different categories. Data was entered into SPSS software version 20 computer program for data cleaning, analysis and identification of outliers. The study utilized univariate and bivariate analysis for description of the various variables and their relationships.

In univariate analysis, frequency distributions showed the distribution of the study population by background characteristics such as age, parity, gestation stay etc.; this was represented in forms of frequency n (%). In bivariate analysis, cross tabulations were used to measure the association between the dependent and independent variables.

Odds ratios using 95% confidence intervals and intergroup two-tailed p-values for comparisons of frequencies (pre-strike vs. strike) were generated for testing the significance of departure, in the observed direction, from the null hypothesis of zero rate difference. The Mantel-Haenszel chi-square test for incidence density data was applied. Chi-square values were used to test the significance of the association for the available categorical data while students T test was used to test association between outcome variables and continuous independent variables. A p-value of <0.05 was considered statistically significant. The results were then be presented using tables, graphs and figures, based on the type of data as was deemed necessary.

Control of biases and errors

Measurement bias: the data collection tool was pretested for validity and reliability

Sampling bias: Nazareth hospital was conveniently selected, being a mid-level private hospital, may therefore not be representative across the country.

Quality of data collected and entered by the research assistants was verified daily by the PI.

Study limitations

The following limitations were foreseen:

Sampling bias; the choice of Nazareth hospital was purely based on ease of data collection and accessibility to client information

Few patients meeting the inclusion criteria as the period of the strike was limited to 100 days

Variable data as collected from the patient files and other hospital records

Ethical considerations

Before the study was carried out, permission was sought from the KNH and UON Ethics Research Committee to carry out this study as part of the UON thesis dissertation, Approval number P708/12/2017. Permission was also sought from Nazareth Hospital where the study was carried out.

All information was handled with uttermost confidentiality throughout the tenure of the study, held in trust by the investigator, research assistants and the study institution. A password protected computer accessed by the primary investigator and research assistants only were used.

The participants were given study identification numbers and no information concerning the study participants was released to an unauthorized third party without prior written approval of the study institution or the Ethics Research Committee.

All patient information and identifiers were delinked from the collected data before sending to the data analyst. The study findings were presented to the University of Nairobi, Department of Obstetrics and Gynaecology as part of the requirement of the Master in Medicine (MMED) course.

4 RESULTS

Introduction

The findings of the study are presented in this chapter. The broad objective of the study was to compare the maternal and neonatal outcomes during the 2016/17 doctors strike and a similar period during the previous year. The study was conducted at the Maternity Department of the Nazareth Hospital. A total of 1800 files were reviewed from the records department at Nazareth Hospital and data extracted from them for analysis. Of these, a total of 490 patient files were reviewed for the period between December 2015 to March 2016 for group 1, and 1300 patient files were reviewed for the period between December 2016 to March 2017 for group 2. 8 files were excluded from the analysis in group 1 due to missing information to leave a total of 482 files. Similarly, 24 files were excluded from group 2 files due to missing information to leave a total of 1276 files for analysis. This is shown in the study flow chart presented in figure 2

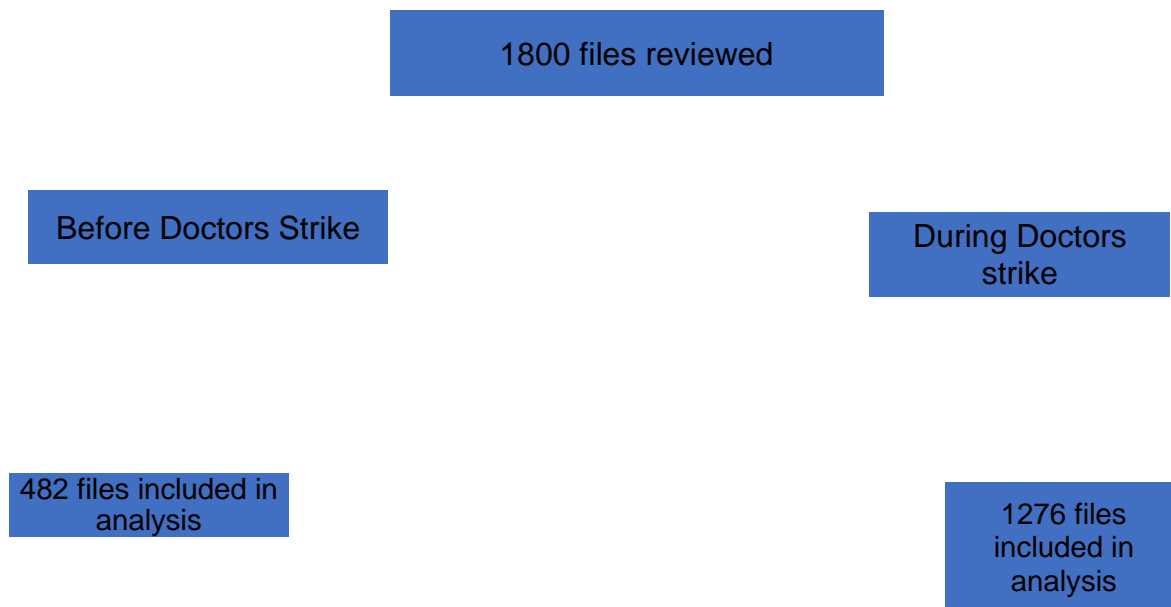


Figure 2: Study flowchart of patient files reviewed and analysed before and during the 2016/17 doctors' strike

There was a threefold increase in the number of admissions from 500 before the strike period to 1500 during the strike period.

General and Obstetric Characteristics

The general and obstetric characteristics of the patients studied are summarized in table 1 below. This section presents the patients' biodata and the relationship between the patients' demographic status and clinical findings. Odds Ratios were calculated with a 95% confidence interval. A P value <0.05 was considered statistically significant.

There was no significant difference in the ages of those who presented before the strike when compared to those who presented during the strike ($P=0.118$). Majority of patients were sequestered in two age groups namely 18-25 (42.5% for group 1 vs 40.7% for group 2) and 26-35 age group (52.1% vs 48.0%).

There was a statistically significant difference in parity before the strike period as compared to during the strike period ($P=0.118$) with the main difference coming in the primigravidae women (OR 1.0; 95% C.I 1.2-1.8; P val =0.027) (37.3% vs 29.0%). The largest proportion of patients before the strike had a parity of 1 (33.8%) while those during the strike were primigravid (37%). Majority of study participants in both the before the strike and during the strike groups were at term (83.5% vs 89.9%). There was no significant difference between the two groups in terms of gestation ($P=0.904$).

26% of the women underwent elective caesarian section before the strike period Vis a Vis 23% during the strike period. 24% of patients both before and during the strike underwent emergency caesarian sections. There was however no significant difference among the two groups as regards the scheduling of caesarian sections ($P=0.655$).

When analysing patients who had undergone previous caesarian sections in both groups; a majority had undergone one caesarian section compared to two caesarian sections in both groups (73.5% vs 66.2%). There was no significant difference between the two groups in terms of number of previous caesarian sections ($P=0.199$). Majority of women admitted in both groups had no history of a prior caesarian section scar (49% versus 54%).

There was also a significant difference between the two groups in terms of the foetal presentation ($P<0.001$) with cephalic presentation being the majority in both groups (93.3% vs 85.5%) but showing a decline during the doctors' strike period (OR 0.4; 95% CI 0.3-0.6; p val; <0.001).

Table 1: Comparison of general and obstetric characteristics of women admitted in the maternity unit at the Nazareth Hospital before and during the 2016/17 doctors' strike

Characteristics	Frequency n = (%)		OR (95%C. I)	P value
	Before the strike (482)	During the strike (1276)		
Age				
Less than 18	0.8	1.6	1.0 (2.0-5.9)	0.118
18 – 25	42.5	40.7	0.5 (0.8-1.2)	
26 – 35	52.1	47.9	0.5 (0.7-1.0)	
36+	4.6	9.8	1.1 (1.4-3.6)	
Parity				
0	29.0	35.0	1.0 (1.2-1.8)	0.027
1	33.8	32.1	0.8 (0.7-1.1)	
2	26.3	22.4	0.7 (0.6-1.0)	
3	8.3	6.5	0.7(0.5-1.1)	
>3	2.6	2.4	0.8(0.5-1.9)	
Gestation				
<28weeks	0.8	1.7	2.0(0.7-5.9)	0.904
28-36 weeks	11.5	6.9	0.6(0.4-0.8)	
37-41 weeks	83.5	89.9	1.6(1.2-2.2)	
>=42 weeks	4.2	1.5	0.4(0.2-0.7)	
Scheduling of Caesarian Section				
Elective	26	23	0.8 (0.6-1.2)	0.655
Emergency	24	24	1.0(0.7-1.4)	
Not indicated	50	53	3.2(2.0-5.3)	
Number of Previous				

Caesarian sections				
0	49	54	7.6 (4.9-12.0)	0.621
1	37	30	0.7(0.5-1.0)	
>=2	14	16	1.2(0.7-1.9)	
Foetal presentation				
Cephalic	93.3	85.5	0.4 (0.3-0.6)	
Breech	2.3	3.8	1.7 (0.9-3.4)	<0.001
Other	4.4	10.7	1.0 (0.3-3.3)	

Presenting Complaints

Majority of the women in both before the strike and during the strike groups complained of abdominal pains (70.8% vs 73.9%) though there was no statistically significant difference among the two groups. There was an increase in women who presented with drainage of liquor (OR 1.8; 95% CI 1.8-2.2; p val =0.007) while women who presented with vaginal bleeding (OR 0.3; 95% CI 0.2-0.7 p val =0.004) and other presenting complaints (OR 0.7; 95% CI 0.5-0.9; p val; =0.008) decreased. These findings are summarized in Table 2 below.

Table 2: Comparison of presenting complaints of women admitted in the maternity unit at Nazareth hospital before and during the 2016/17 doctors' strike

Complaints	Frequency n = (%)		OR (95% C.I)	P value
	Before the Strike	During the strike		
Vaginal bleeding	3.1	1.1	0.3 (0.2-0.7)	0.004
Abdominal pain	70.8	73.9	1.1 (0.9-1.4)	0.261
Drainage of liquor	5.7	10.0	1.8 (1.2-2.8)	0.007
Other	20.4	15.0	0.7 (0.5-0.9)	0.008

Diagnosis

The diagnosis of patients before and during the strike is summarized in Table 3 below. Majority of women in both groups were admitted due to normal labour (44% vs 47 %) though the difference was statistically insignificant ($P < 0.254$). Women with labour dystocia (OR 4.7; 95% CI 2.3-9.7; p val < 0.001) and malpresentation (OR 1.8; 95% CI 1.1-2.7; p val =0.010) had a statistically significant increase during the strike period as compared to before the strike period ($P < 0.001$, $P < 0.01$) respectively. The diagnosis of preterm premature rupture of membranes/preterm labour decreased during the strike (OR 0.8; 95% CI; 0.4-0.8; p val < 0.001). The other diagnoses had no statistically significant differences among the two groups.

Table 3: Comparison of diagnosis of women admitted in the maternity unit at Nazareth hospital before and during the 2016/17 doctors' strike

Diagnosis	Frequency n = (%)		OR (95% C.I)	P value
	Before the strike	During the strike		

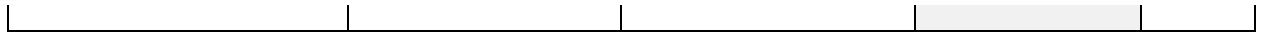
Patient admitted for caesarian section- Elective or Emergency	19.5	17.1	0.9 (0.7-1.1)	0.237
Labour dystocia	1.7	7.3	4.7 (2.3-9.7)	<0.001
Normal labour	44.0	47.0	1.1 (0.9-1.4)	0.254
Non-reassuring foetal status	8.3	5.8	0.7 (0.5-1.0)	0.058
Medical and obstetric emergency in pregnancy: pre-eclampsia, eclampsia, asthma, HIV	5.2	4.0	0.7 (0.3-1.2)	0.208
Antepartum Haemorrhage/	3.5	2.4	48 (2.7)	0.208
Malpresentation	5.6	9.4	1.8 (1.1-2.7)	0.010
Preterm Premature Rupture of Membranes (PPROM)/Preterm labour	12.2	7.0	0.5 (0.4-0.8)	<0.001

Maternal Outcomes

Five outcomes were measured in both groups before the strike and during the strike periods as summarized in table 4 and figure 3 below. The only significant maternal outcome was an increase during the strike of mean duration of time in minutes from diagnosis to decision implementation strike (OR 183.2; 95% CI 164.4-202 vs 117.5 95% 94.8-140.2; p val <0.001). Although there was a tendency toward reduction in the other maternal outcomes during the strike period, these were not significant. There were no women who experienced uterine ruptures and no maternal mortalities recorded before or during the strike. Maternal outcomes of eclampsia, post-partum haemorrhage and referral to other facilities accounted for less than 1% for each group respectively.

Table 4: Comparison of maternal outcomes of women admitted in the maternity unit at Nazareth hospital before and during the 2016/17 doctors' strike

Maternal Outcome	Frequency n (%)		OR (95% C.I)	P value
	Before the strike	During the strike		



	(482)	(1276)		
Mode of delivery				
Caesarian Section	41	38.9	0.9 (0.7-1.1)	0.324
Vaginal Delivery	59	61.1		
Eclampsias				
Yes	1	1	2.3 (0.3-19)	0.435
No	99	99		
Post-partum haemorrhage				
Yes	1	1	0.8 (0.3-2.2)	0.606
No	99	99		
Referrals to Other Facilities				
Yes	1	0	0.5 (0.03-6.0)	0.473
No	99	100		
Mean duration (mins.) from diagnosis to implementation (95% CI)	117.5(94.8-140.2)	183.2(164.4-202.0)	<0.001	

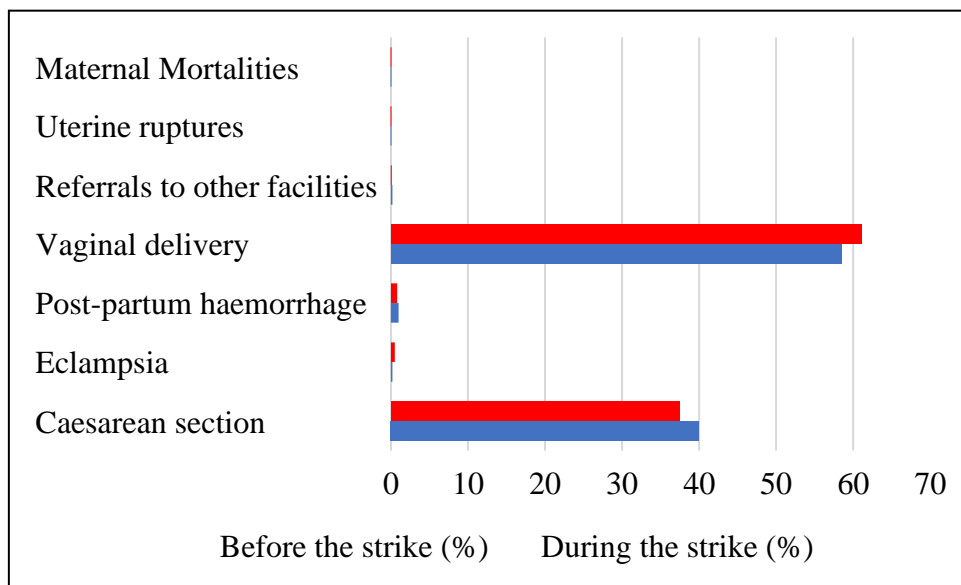




Figure 3: Comparison of maternal outcomes of women admitted in the maternity unit at Nazareth hospital before and during the 2016/17 doctors' strike

Neonatal Outcomes

A comparison of neonatal outcomes of those neonates who were delivered before and during the strike period is shown in table 5 and figure 4 below. There was a statistically significant decrease

of neonates with birth asphyxia (OR 0.05; 95% CI 0.01-0.43; P val <0.001) and those admitted to newborn unit (OR 0.5; 95% CI; 0.4-0.7; P val <0.001) during the strike. There was a statistically significant increase in the number of livebirths (OR 1.4; 95% CI 1.1-1.8; p val =0.037), macerated stillbirths (OR 6.5; 95% CI 1-49; p val =0.037) and neonatal deaths (OR 18.4; 95% CI 2.5-133.7; p val <0.001). The decrease in number of fresh stillbirths during the strike was not significant (OR 0.9; 95% CI 0.4-2.2; p val =0.037).

Table 5: A comparison of neonatal outcomes of neonates delivered at Nazareth hospital before and during the 2016/17 doctors' strike

Neonatal Outcomes	Frequency n (%)		OR (95% C.I)	P value
	Before the strike (482)	During the strike (1276)		
Birth Outcome				
Livebirth (n. delivery)	77	82	1.4 (1.1-1.8) 0.9 (0.4-2.2) 6.5 (1-49)	0.037
Fresh Stillbirth	7	1		
Macerated stillbirth	0	1		
Birth Asphyxia				
Yes	2	0	0.05 (0.01-0.43)	<0.001
No	99	100		
Admissions to Newborn Unit				
Yes	20	12	0.5 (0.4-0.7)	<0.001
No	80	80		
Neonatal status on discharge				
Alive	100	96	18.4 (2.5-133.7)	<0.001
Neonatal Death	0	4		

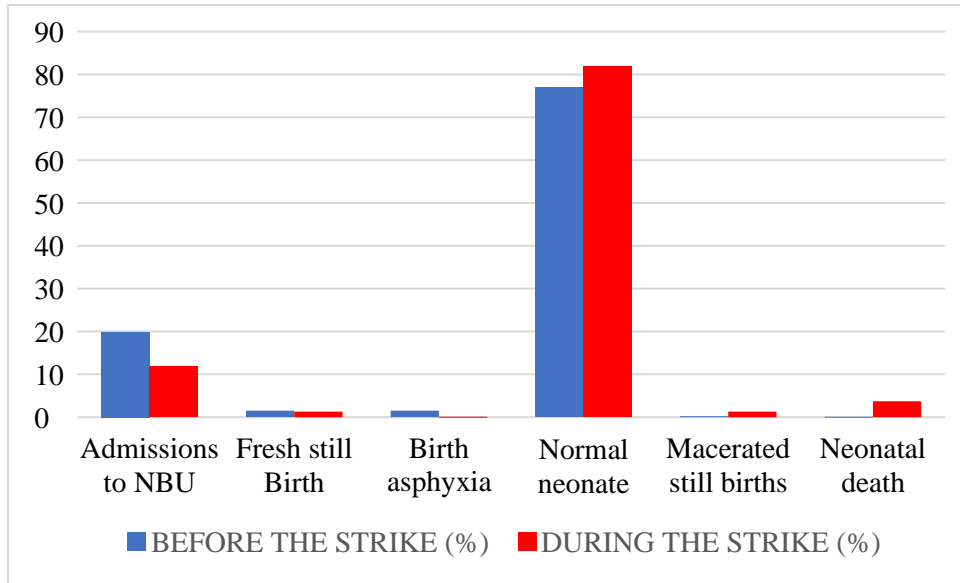


Figure 4: A comparison of neonatal outcomes of neonates delivered at Nazareth hospital before and during the 2016/17 doctors' strike

5 DISCUSSION

This study found an increase in the overall number of women admitted during the strike period. This can be attributed to reduced availability of health services in public hospitals during the strike period. The differences in general and obstetric characteristics between the two groups were mainly in the parity and foetal presentation segments. There was an increase in primigravidae and cephalic foetal presentation during the strike as compared to before the strike which can be attributed to increased admissions during the strike period.

The presenting complaints showed a significant increase in women who presented with vaginal bleeding, drainage of liquor and other complaints. The women diagnosed with labour dystocia and malpresentation showed a statistically significant increase which can be attributed to the increased number of admissions during the strike period. The only finding that was decreased was in women who presented with preterm premature rupture of membranes.

The study findings with regards to maternal outcomes are comparable to those found by several studies. Cunningham et al and Erceg et al where there was a decline or no change in mortality during a doctors' strike findings similar to ours (43,44). This is even though the above two mentioned studies were reviews of countrywide data or a review of published literature as is the case of Cunningham et al while our study shows facility-based data. Bhuiyan et al and Njuguna et al showed a decrease in number of mortalities which can be explained by the decreased number of admissions during their studies (47,48). These studies find support in the similar findings of Ruiz et al (22).

Adam et al in a study in a Kenyan facility most similar to that of our study showed an increase in maternal mortality due to an increase in admissions (49). Gruber et al also showed an increase in mortality during nurses' strikes in New York State. They suggest this is as a result of reduced

quality of care during the strike. This difference can be explained by the study of multiple facilities in this study with the different cadre of health workers being on strike(nurses) (42). When individual maternal outcomes are considered mustard et al found a reduction in the caesarean section rates during the Los Angeles strike unlike our study that showed no change. Similarities however exist with our study findings in that she found no changes in maternal adverse outcomes (46). These findings are however contradicted by those of slater et al who found a significant increase in the caesarean section rate, findings that can be explained by the reduction in instrumental deliveries that was experienced during the doctors strike period (40). There was a significant difference in neonatal outcomes during the doctors' strike indicated by a marked increase in the number of neonatal deaths, an increase in the number of livebirths and macerated stillbirths. Neonates who suffered from birth asphyxia and those who were admitted to the newborn unit decreased. The number of fresh stillbirths remained the same. Only one maternal outcome changed; an increase during the strike of mean duration of time from diagnosis to decision implementation. Outcomes that showed no change were: mode of delivery (caesarean section, vaginal delivery); women who suffered from eclampsia, postpartum haemorrhage; patients referred to other facilities.

These findings can be explained by several factors namely. Firstly, increased livebirths predisposed more neonates to neonatal complications. Secondly, an increase in the number of primigravidae during the strike period who lacked experience in taking care of babies may have increased the risk of neonatal complications and subsequent neonatal death. Increase in the time it took from decision making to effecting management may have contributed to delay in implementing care leading to poorer neonatal outcomes. Lack of regular dedicated nursing staff to deal with neonates in the newborn unit contributed to lack of continuity of care with nurses

dealing with neonates not having continued experience of practice. Lack of a fulltime paediatrician or neonatologist deprived the newborn unit of specialised neonatal care and leadership in neonatal healthcare delivery. The number of normal neonates increased likely due to increased number of admissions to the maternity unit at Nazareth Hospital. It is important to note that not all mothers admitted to the maternity unit at Nazareth Hospital necessarily delivered during that admission or in that same facility thus explaining the increase observed in the number of neonates born without a corresponding increase in vaginal deliveries. The number of macerated still births increased likely due to lack of adequate obstetric care to mothers prior to admission at Nazareth Hospital. This was either due to lack of access to maternity care services at public facilities that were on strike and thus could not offer services to these mothers. It could also be due to delays in seeking health care services especially primary and secondary delays. The increase in time from when diagnosis was made to when the decision implementation was made can be attributed to the increased number of patients admitted during the strike leading to an increased workload to the healthcare staff at Nazareth Hospital. Increased emphasis on intrapartum care of women to avoid adverse maternal outcomes led to there being no change in maternal outcomes. It is also important to note that the maternity unit at Nazareth Hospital was well staffed during the strike period and headed by a resident obstetrician gynaecologist. These reasons could also explain why no uterine ruptures or maternal mortalities were observed both before and during the doctors' strike period and why there was no change in the number of referrals of mother out of the facility in that similar period. The subtle increases in the number of vaginal deliveries, number of caesarian sections, number of mothers suffering postpartum haemorrhage and number of those with eclampsia can be attributed to a rise in the number of mothers admitted to the maternity unit during this strike period.

When comparing individual neonatal outcomes there was a similarity in increased number of neonatal admissions in the newborn unit in the study by Adam et al. This can be explained by an increased number of deliveries undertaken during the doctors strike period (49). Daga et al showed no change in number of admissions to the newborn unit. These findings can be explained by the fact that trained doctors were reassigned to the striking facility and ensured that there was continuity of care comparable to the prestrike level (45). Other studies showed a decrease in the general number of admissions which can be explained by the fact that the facilities where these studies were carried out were on strike unlike in our study (15,22,40,47,48).

The fourfold increase in neonatal mortality findings in a similar hospital can also be explained by the increased number of admissions and subsequent increase in workload (49). Slater et al however, showed no change in perinatal mortality, findings supported by Mustard et al who also found no change in adverse neonatal outcomes (40,46).

Slater et al also showed no significant change in the rates of birth asphyxia, unlike our study which showed reduced rates of the same (40). These findings indicate a continuum of intrapartum care during doctors strikes; findings that are supported by those of Mustard et al which showed no change in adverse neonatal outcomes during the strike period (46).

The strengths of this study include use of the whole population as the study sample thus increasing the power of the study. Secondly, unlike other studies it has focussed on individual maternal and neonatal outcomes some of which are previously unstudied, for example; eclampsia, postpartum haemorrhage, referral to other facilities, birth outcomes and birth asphyxia. Another strength is the use of STROBE guidelines for reporting our study findings. This study was also able to offer the experience of a facility that was fully functioning during the

doctors' strike unlike most international studies which were done in facilities where the strike was occurring.

Our study has several limitations. First, it is from a single health facility and without regional or county level data can be difficult to generalize across all facilities. Secondly, the inability to trace and study participants who did not present to the hospital. Women admitted to Nazareth Hospital are required to pay an admission deposit fee except for emergency admissions. There are no records of these women and thus these women could not be studied. Missing data is also a limitation. A total of 42 files were excluded due to missing vital information.

6 CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The 2016/2017 Kenyan Doctors' strike was associated with an increase in specific neonatal outcomes (number of livebirths and macerated stillbirths) when compared to a similar period the previous year at Nazareth Hospital, a faith-based hospital. There was a decrease in the number of neonates with birth asphyxia and those admitted to the newborn unit. Fresh still births showed no change.

Only one maternal outcome changed during the strike; an increase of mean duration of time from diagnosis to decision implementation. Outcomes that showed no change were: mode of delivery (caesarean section, vaginal delivery); women who suffered from eclampsia, postpartum haemorrhage; patients referred to other facilities.

RECOMMENDATIONS

Measures should be undertaken to seek solutions for public doctors' grievances to prevent them from going on strike. This is because newborn lives matter during doctors' strikes. This will prevent all the adverse neonatal outcomes during doctors' strikes.

Public-private partnerships should be fostered to ensure that quality and continuum of maternal and neonatal care is maintained whether there is industrial action or not.

More effective training on emergency neonatal care will equip healthcare workers with the skills required to effectively manage neonatal emergencies and minimise adverse neonatal outcomes.

Further research should be done to show region-wide and countrywide effects of doctors' strikes.

Further research should also be done to elucidate reasons for the increase in adverse neonatal outcomes especially neonatal mortality during doctors' strikes.

Timeframe/

Activity

Proposal

Development

and

defence

Ethical

clearance

Clinical

evaluation

Data

collection

Data

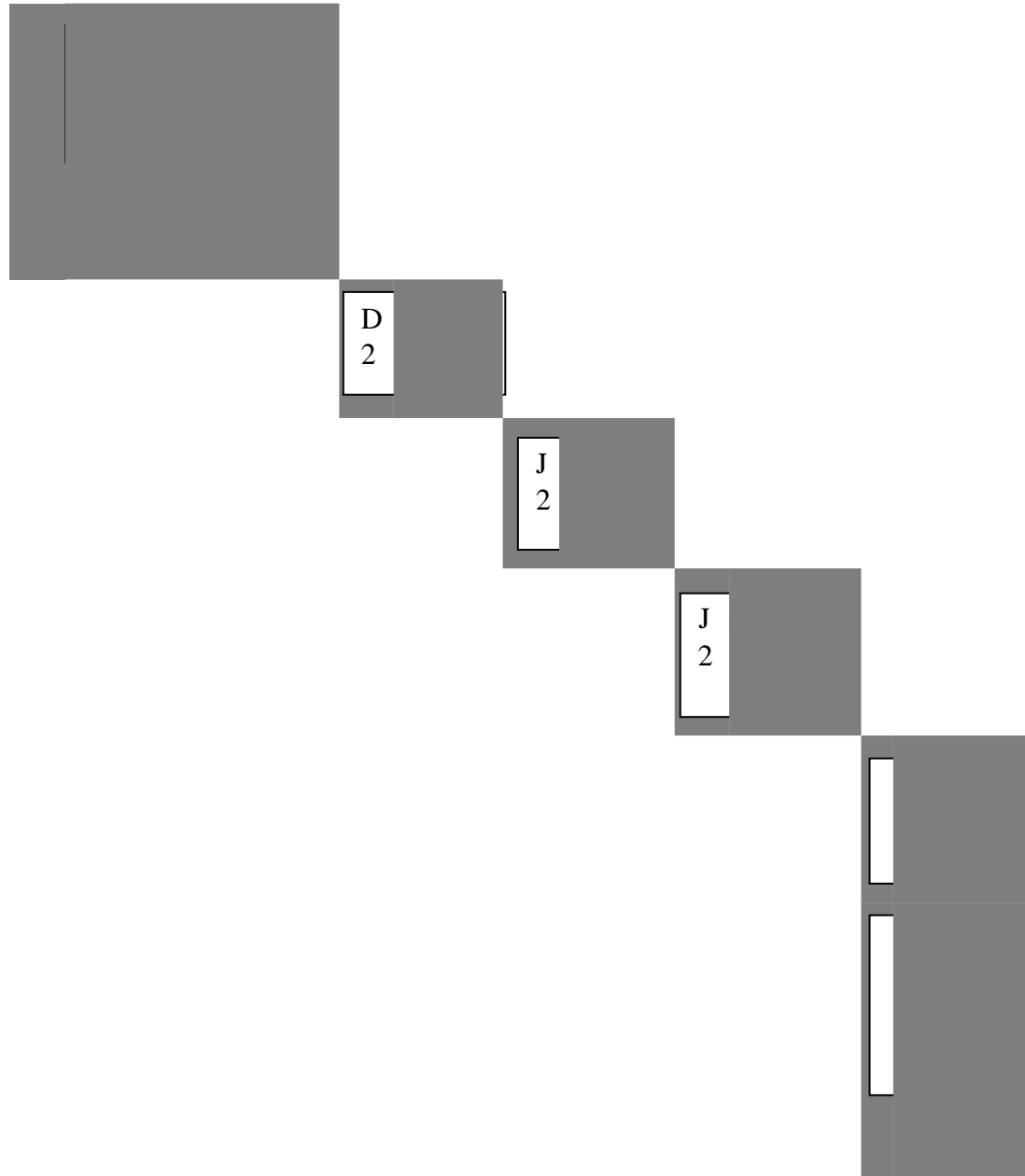
Analysis

Thesis and

manuscript

writing and

defence



8 Budget

ITEM DESCRIPTION	COST KSH
1. Transport	10,000
2. Research assistant at Kshs. 8000 each per month for 3 months	24,000
3. Printing of data collection forms	10,000
4. Printing and binding of manuscripts and proposal	5,000
5. Statistician	50,000
6. Printing of posters	2,000
7. Miscellaneous	5,000
8. ERC Review fee	2,000
9. Nazareth Hospital Research Permit	5,000
10. Communication costs	3,000
Total	110,000

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Letter to/ Approval from KNH/ERC

DR NDUNGU MUCHIRI
(MBChB)
H58/80638/2017
MMed Obstetrics and Gynecology

The Chairperson,
Ethics, Research and Standards Committee,
Kenyatta National Hospital and University of Nairobi,
P.O. Box 20723,
Nairobi

Thro'
The Dean,
School of Medicine,
Thro'
The Chairperson,
Department of Obstetrics and Gynecology

Dear Sir/Madam,

RE: SUBMISSION OF MASTERS DEGREE RESEARCH PROPOSAL FOR APPROVAL

I wish to submit my research proposal for approval by your esteemed committee. I am currently a second year student pursuing a Master's Degree in Obstetrics and Gynecology at the University of Nairobi, College of Health Sciences.

Yours Sincerely,

Dr. Ndung'u Muchiri,
Department of Obstetrics and Gynecology,
School of Medicine,
University of Nairobi

Checklist

Maternal and Neonatal Outcomes during the 2016/17 Doctors strike and a similar period the previous year

Instructions: Fill in the following information

Questionnaire: Effects of the doctors’ strike on patient outcomes at the Nazareth hospital maternity and newborn units:

- a. Date
- b. Number of admissions
- c. Caesarian section rates
- d. Adverse outcomes: eclampsia, postpartum haemorrhage, uterine rupture, maternal mortality
- e. Neonatal: NBU admissions, Fresh still births, birth asphyxia

OUTCOME	DEC 2015	DEC 2016	JAN 2016	JAN 2017	FEB 2016	FEB 2017	MARC H 2016	MARC H 2017
# of mothers admitted in maternity								
# of neonates admitted in NBU								
Caesarian Sections								
Eclampsia								
Postpartum Haemorrhage								
Vaginal Deliveries								
Referral to other facilities								
Maternal mortality								
Fresh still births								
Birth asphyxia								
Normal neonates								
Macerated still births								
Neonatal Death								

**Questionnaire: Effects of the doctors' strike on patient outcomes at the Nazareth
hospital maternity and new born units**

1. Serial number

2. Date when admitted to hospital

____/____/____

3. Time when decision for definitive management was made

4. Time when definitive management was started

5. Year of Birth (*dd/mm/year*)

____/____/____

6. Parity:

Number of live births (*more than 28 weeks*) _____

Number of miscarriages (*less than 28 weeks*) _____

7. Clinical presentation and period in days (*mark as appropriate*)

i. Per Vaginal Bleeding for _____ days

ii. Lower abdominal pain for _____ days

iii. Draining of liquor for _____ days

iv. Any other symptom (*kindly specify*) _____ for
_____ days

8. Clinical diagnosis (*at admission*)

9. Maternal Outcomes

- Caesarean section
- Eclampsia
- Post-partum haemorrhage
- Maternal Mortality
- Other, please indicate.....

10. Neonatal Outcomes

- Admission to NBU
- Fresh still birth
- Birth asphyxia
- Other, please indicate.....

11. Date when patient was discharged from the hospital/died (*dd/mm/year*)

____/____/____

Letter to the facility management

DR NDUNG'U MUCHIRI
(MBChB)
H58/80638/2017
MMed Obstetrics and Gynecology

The Hospital Administrator,
Nazareth Hospital,
P.O. Box 49682-00100,
Nairobi

Thro'
The Medical Officer in Charge,
Nazareth Hospital,

Dear Madam,

RE: REQUEST TO UNDERTAKE A STUDY AT NAZARETH HOSPITAL

I am a resident in Obstetrics and Gynaecology at the University of Nairobi. I wish to undertake a study at your facility titled: A comparative study of maternal and neonatal outcomes before and during the 2016/17 Doctors strike; a case study of Nazareth Hospital. This is in part fulfillment of my course requirements.

Yours Sincerely,

Dr. Ndung'u Muchiri,
Department of Obstetrics and Gynecology,
School of Medicine,
University of Nairobi