ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF PUBLIC HEALTH

To Assess and Improve the Low Bed Occupancy Rate in Mida Weremo Primary Hospital, Amhara, Ethiopia 2019

BY PETROS ANBERBIR

ADVISORS: - Ms. ADIAM NEGA

Ms. BIRHAN TASSEW

CAPSTON PROJECT SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEG OF HEALTH SCIENCE SCHOOL OF PUBLIC HEALTH IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER IN HOSPITAL AND HEALTH CARE ADMINISTRATION.

JULY /2019

ADDISS ABABAB, ETIOPIA

Declaration

This capstone is my original work, and all those sources of material all are used for the Capstone project has been duly acknowledged.

Student's Name Petros Anberbir Signature……Place Addis Ababa University Date of submission……/2019

This capstone project has been evaluated under my approval as a university examiner

Examiner's Name…….. Signature …….

……Place Addis Ababa University

Addis Ababa University College of Health Sciences

School of Public Health

Master of Hospital & Health Care Administration

Hospital Capstone Project

Name of investigator	Petros Anberbir Werkagegn
Name of advisor	Adiam Nega and Birhan Tassew
Full title of the project	Assess and Improve the Low Bed Occupancy Rate in Mida Weremo Primary Hospital ,Meragna, 2019
Duration of project	Feb 2019 to May 2019
Project description	Hospital capstone project on assess and improve the low bed occupancy rate in Mida Weremo primary hospital
Total cost of the project	18,1146.30birr
Address of investigator	Adiam Nega Telephone:- 0910365878 Email:-adiamnega123@gmail.com Birhan Tassew Telephone:- 0911365200 Email:- tassewbirhan@gmail.com

Acknowledgement

First and for most I would like to express my deepest gratitude and appreciation to my primary advisor Ms, Adiam Nega and my co-advisor Mrs. Birhan Tassew for unreserved all rounded, support and enriching comment throughout the study period.

I also thank the Amhara regional health bureau, Mida Weremo Primery hospital, especially Dr Mulugeta Bogale (GP) Hospital Quality unite head , Mr. Libase Afele (BSc nurse) Hospital Quality unite secretary and Dr Rodas Tilahun Hospital CCO who comment my Capstone project according to EHSTQ (Ethiopian Hospital service transformation in quality) and selection of the main problem.

I am also grateful the staffs of Mida Weremo primary hospitals for logistic supply and good commitment. My special thanks also go to my innocent classmate representative Mr. Abate Beyene for sharing new information from Addis Ababa University SPH.

My appreciations go to all Public health departments' staffs for their unreserved support throughout the course work.

Acronyms

ARHB….Amhara Regional Health Bureau

ART……Anti-retroviral therapy

BOR……Bed occupancy rate

CCO…...Chief clinical Officer

CEO…...Chief Executive Officer

EHSTG…Ethiopian Hospital service transformation guideline

EPSA…..Ethiopian Pharmaceuticals Supply Agency

Gyn……Gynecology

HBO…..Hospital Bed Occupancy

KOH…..Potassium hydro oxide

NICU….Neonatal incentive care unit

HMIS….Health Management Information System

HPMI… Hospital Performance Monitoring and Improvement

HSTQ….Hospital sector Transformation in Quality

IESO…..Integrated emergency surgical officer

IPD…….In patient department

KPI…...Key performance indicator

MCH…Maternal and Child Health

NICU…Neonatal Intensive Care Unite

TB/HIV. Tuberculosis and Human immune virus

List of table

List of figures

Table of content

Abstract

Introduction: Low bed occupancy rate (BOR) is the one of the biggest problem of the hospital. As a result it brings the indication of low quality health care services, customer and staff dissatisfaction and poor revenue generation. In this study measured and improved bed occupancy rate focused on installing operation care materials and start operation care service and provided post operative care at surgical ward in Mida Weremo primary hospital in Amhara /Ethiopia.

Objective: To assess and improve low bed occupancy rate from 33.2% to 75% by the end of May 2019 G.C

Methodology: A pre-post intervention study design was used to improve the low bed occupancy rate in Mida Weremo Primary Hospital. Data was collect from the admission and discharge registration log books including all patients admitted pre and post intervention by using the check list from each ward by data collectors. Total of 331 admitted patients were enrolled in study. Data was analyzed by using the following formula to calculate the BOR

$$\text{Formula of BOR} = \frac{\text{Total number of patient days for a given period (length of stay) x 100}}{\text{Available beds (bed complement) x the number of days in the period}}$$

Result: Socio-demographic section of the study most admitted patients are male (59.3%) and Christian (82.7%). The mean ± SD age was 33.7 ± 27 and 32.4 ± 24.4 in the pre intervention and post intervention respectively. During the pre intervention study the BOR was 32.3%, 32%, 36% and 30.1% on September, October, November and December respectively. Operation service was started at the month of January. In this pre-post study BOR when we see the progress of BOR in each month with in the intervention periods 55.8%, 63.3%, 74.1% and 86.6% on February, March, April and May respectively.

Conclusion: The fact that the hospital hasn't started giving operation and post operation care service was attributed for low BOR and initiating this service was the main change idea. During post intervention period BOR was increased from 33.8% to 70% in this intervention period.

Recommendation: It was recommended to hospital manager to give more attention and that the departments should record and report the necessary data accurately. It was also recommended to give more emphasis and do more researches on this field.

Chapter 1 Introduction

1.1 Organizational Description

The project was implemented in Amhara region N/shoa zone Mida Weremo primary hospital. It is a relatively new Hospital and has been serving the community since 2017 and has served over 100,000 people residing in Mida Weremo town, surrounding Weredas (district) including neighboring Weredas. The hospital started work with few equipments, some health professionals and partially functional departments. The hospital has 55 professional and 55 supportive/administrative staff. The professional staff are 10 general practitioners ,15 nurses, 5 laboratory professionals, 6 pharmacy professionals, 2 Integrated emergency surgery officers, 2 Anesthetists, 10 midwifes, 5 other health professionals. The total number of staff is thus 110 employees. There are 20 functional beds in 4 wards (medical ward 06, surgical ward 07, Gynecology and Obstetrics ward 03, and pediatric ward 04). The number of outpatient visit in 2010 E.c was 10,000 patients and 254 patients seen in the inpatient department. Average length of stay and bed occupancy rate is 5 days per one patient was 34.5% according to 2010 EFY hospital report. According to Ethiopian Hospital Service Transformation Guide line reform implementation results was 60%. (1)

Service provided by Mida Weremo Primary Hospital. Outpatient service: (adult and pediatric OPD, Family planning, EpI, ANC), Emergency Service. Inpatient services: Psychiatry, Obstetrics, Gynecology, Pediatrics, Internal medicine. Laboratory service: Parasitological, Microbiology, Serology, Hematology. Pharmacy service: (Dispensing, DIS, Clinical Pharmacy.) Conventional. (1)

The vision of Mida Weremo Hospital is: To be a model hospital in high quality care, operational research and community ownership in Ethiopia. (1)

The mission of Mida Weremo Hospital is: To reduce morbidity, mortality, and disability by providing basic curative & rehabilitative services, encouraging community participation, collaborating with other stake holders, conducting operational research and creating a conducive hospital environment to retain qualified health personnel for the benefit of the community.(1)

1.2 Background

A locative planning is process of making decisions about how resources should be spent in an organization. One good hospital management includes an effective locative planning for beds in a patients fare while admitted in hospital. Bed-occupancy rates and length of stay are the measures that reflect the functional ability of a hospital. (2)

Hospital bed-occupancy rates have been proposed as measures that reflect the ability of a hospital to provide proper care for patients. This measure can be considered useful in guiding the planning and operational management of hospital beds in a way that improves how well profitability, there are several factors considered in the hospital performance measures. One such crucial factor is hospital bed occupancy which shows the actual utilization of the hospital's inpatient health facility within a given time frame. Ideal value of hospital BOR is around 85%. If Hospital bed occupancy rate <80% medical staff is less engaged leading to low workforce utilization and decrease of hospital revenues. (3)

In hospitals that are managed scientifically, bed occupancy rates range from 84% to 85% according to international standards, meaning the proper use of hospital facilities, hospital resources and success of its management. 15% to 16% consider the rest of the beds for medical emergencies (i.e. utilization of resources) have been optimal. According to the Ministry of Health and Medical Education, ward occupancy rate of more than 70% is desirable, between 60% and 70% is moderate and less than 60% is not recommended. Hospital bed is an important and cost effective resource for all health systems. (6)

With efficient management, U.S. hospitals should be able to achieve at least an 80%-90% BOR. (8)

Ethiopian national Average length of stay (ALOS) 3.9 days and Bed occupancy rate 24.1%.In Amhara region Average length of stay 3.9 days and BOR 28.0% (11)

Mida Weremo primary hospital Average length of stay (ALOS) 5 days and BOR 33% (1)

1.3 Statement of the Problem

The major compliant for the last year was the presence of many beds without patients. Although there were many problems the hospital faced needed special attention, the existence of low bed occupancy rate was one of the biggest problems of the hospital. As a result it indicates of low quality health care services, customer and staff dissatisfaction and poor revenue generation. The capstone projects has its own contribution to improving bed occupancy rate in the hospital which brought about a significant improvement in the health care service ,customer and staff satisfaction and revenue generation.

Bed in hospital are expected to be utilized up to 80% and should not exceed 90%.This range is considered to be optimum for hospital inpatient activity. Bed occupancy rate below 80% is supposed to be under utilization of hospital resources. (4) The resources recruited to each bed must be appropriately utilized to achieve optimum efficiency. Possibly low cost should be incurred to serve maximum possible number of patients with good clinical effectiveness in the previous year; the bed occupancy rate of Mida Weremo primary hospital had been very low throughout the year. It was 34.8% which is below the standard. Even though the problem was big, no improvement measure had been taken. The standard bed occupancy rate in the hospital according to HPMI guide line is 80-85%.

Ideal value of HBO is around 85 %.(3)

In this study measured and improved Bed Occupancy Rate focusing on installing operation and post operation materials like operation table, light and anesthesia machine and others, Availing all whole essential drugs and other materials from EPSA. Purchasing other administrative equipment, tools and items by hospital finance department and start operation and post operation care service leads to increase BOR of the hospital which ware listed 33.2%.

Table 1 Important collected data for bed occupancy rate in Pre intervention period

Months	Total no of pts admitted in the period	Total no of pts discharged in the period	Average length of stay= Total Length of stay in days/n0 of discharged pts		No of bed	BOR
September	40	40	208	208/40=5.2	20	34.7
October	40	40	192	192/40=4.8	20	32.0
November	47	47	216	216/47=4.6	20	36.0
December	42	42	181	181/42=4.3	20	30.1
Total	169	169	797	4.7	20	33.2

Source:-*Mida Weremo primary hospital IPD registration book.*

Formula of BOR= $\frac{\text{Total number of patient days for a given period (length of stay) x 100}}{\text{Available beds (bed complement) x the number of days in the period}}$

Ex. September = *number of patient days for a given period (length of stay) =* 797

Available bed=20, Number of days in the period= 30

BOR = $\frac{797*100}{20*120} = \frac{79700}{2400} = 33.2$

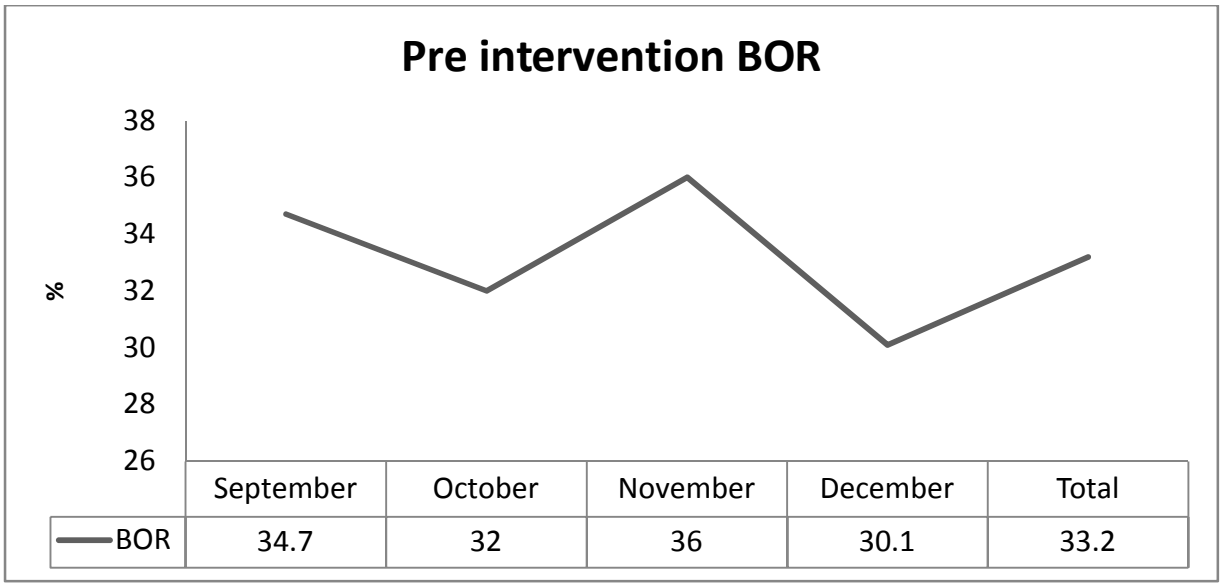


Figure 1: The collected important data for bed occupancy rate in Pre intervention period,

1.4 Significance of the study:

The aim of this study to assess and improve bed occupancy rate. The result from the study will improve the service quality and increases patients receive standardize treatment in IPD at Midda Weremo Primery hospital.

So this research may have its own contribution to improving bed occupancy rate in the hospital which brings about a significant improvement in the health care service, customer and staff satisfaction and revenue generation.

This research may add to the few available materials and increase the awareness and the sensitivity of the problem to health professionals, hospital managements and ministry of health for better management of the problem at any level. In addition to this, the result of the study will motivate and simulate for more detailed research.

Chapter 2 Objective

2.1 General objective

- To improve the low Bed occupancy rate at Mida Weremo primary hospital.

2.2 Specific objective

- To start operation care service at Mida Weremo primary hospital in January, 2019.
- To increase number admitted patient who need post operation care at Mida Weremo primary hospital from 0 to 206 in February, 2019 to May 30, 2019.
- To improve the low bed occupancy rate at Mida Weremo primary hospital from 33.2% to 75% in February, 2019 to May 30, 2019.

Chapter 3 Root Cause analysis

3.1 Methods used to identify the root causes.

Assessments of data by using operational standards, Discussion with quality committee like the hospital medical director, the respected OPD health workers (OPD case manager, case team and Emergency case team,) Inpatient case teams (medical ward, surgical ward and Gynecology and Obstetrics ward case teams), chief nursing officer (matron office) & other selected staffs.

All senior management team (SMT) members in Mida Weremo primary hospital were actively participated in identifying the potential causes for the problem. Furthermore, relevant information was collected and pertinent data from hospital quality assurance officers have obtained. Hospital bed occupancy rate baseline data are obtained from the HMIS monthly report.

Tools have used, a Fishbone Diagram: For open discussion, ideas are generated quickly, group understanding develops, an alternative approach emerges. Causes of this problem are grouped into four categories: People, Process/policy, Supplies and Environment. The root causes for low bed occupancy was investigated using fishbone diagram as follows:

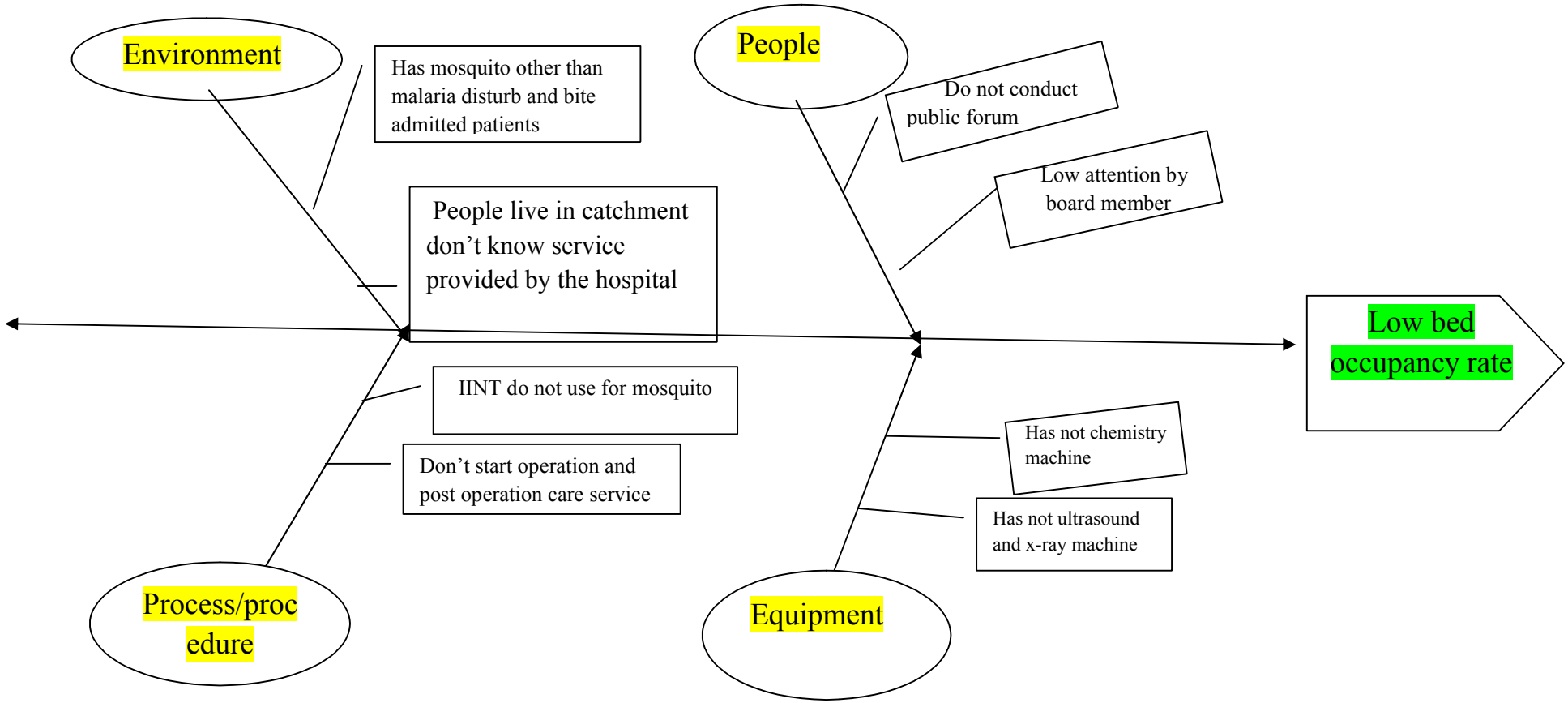


Figure 2 *Fish bone diagram summarize generated idea that cause low bed occupancy rate.*

3.2 Verification of the root cause

Using discussion with SMT, Nurses working in the inpatient department and observation of document in hospitals for data verification of the root causes discuses below

a. The first root cause mentioned during group discussion was **absence of bed net disturb and bite inpatients**. From the discussion we had with the nurses working in the inpatients department we found that absence of IINT (bed net) affect only the self discharge rate but not admission rate. The self discharge rate in our hospital 1.6%. Compared prior research, however, has shown that specific patient populations may experience greater AMA discharge rates, as up to 4.9% of asthma-related hospitalizations, 13% of HIV-related hospitalizations, and 30% of psychiatric-related hospitalizations have been shown to end with the patient leaving AMA. So we rejected as not root cause. (5)

b. The other root cause that was found out during our discussion was **lack of awareness of the public about the hospital**. From our study from patient registration more than 75% our patient are by referral from catchment health centers. From the discussion we held with all health center directors, Leaders of the Wereda health bureau and representatives of all Kebele health extension workers, we found out that the community members are aware of the services the hospital provided and even ask to be referred to our hospital this indicated they are aware of all the services the hospital provide. So we rejected as not root cause.

c. Low attention by hospital board members: From the board member meeting minute record we found out that the hospital board has met 3 out of the 4 meetings. According to EHSTG standards board members has to meet and discuss about the hospital every quarter this shows 100% implementation and there were not meetings cancelled or deferred. At least one board member has participated on the entire previous quarterly staff meeting which is 100% implementation. So we rejected this root cause. (6)

d. **Lack of public forum:** From the public forum meeting registration book 3 public forums were conducted over the past one year (pre and study period) which consists of 75% accomplishment. We found out that the hospital has good image in the eyes of the public. So we rejected this root cause.

e. **Absence of chemistry machine:** In order to verify this root cause a study was done from our referral out registration book patients that war referred to other hospital like our nearest hospital (Alem ketema Enat hospital) due to lack of chemistry machine consist of only 1.5% of the total referral which is lower compared to other reasons for referral. As opposed to patients requiring surgical treatment which was cited as cause in 35% of the reporting period. So we rejected this root cause. So we rejected this root cause.

Table 2 patients Referral rate

s/n	Causes of referral	Percentage of referrals
1	Patients needed surgical treatment	35
2	TB work up	24.4
3	Radiological and ultrasound evaluation	21.8
4	Anti rabbis vaccine	16.2
5	Other	6.1
6	Lab test like chemistry	1.5

(Source: Mida Weremo primary hospital 2010 EFY report)

f. **Lack of x-ray and ultrasound:** As it can be seen from the above table patients referred for further radiological evaluation are the third most common reason .The cost of x-ray machine is estimated to be more than 3 million Ethiopian birr which the hospital cannot solve by itself so the group decided that lack of x-ray and ultrasound machine is one of the root causes but is not the main one. So we discussed to work on more feasible root causes. So we rejected this root cause.

g. Lack of operation and post operation care service

In order to verify this root cause we used three methods

A discussion was organized by the capstone project team in order to discuss the issue with them and stakeholders i.e. IESO Medical director and other medical staffs about benefit of the hospital start initiating the operation and post operation care service. The response we gathered was that initiation of the operation service is feasible. Because all machines were stored in hospital store so check out and install all machines at operation care service unit. Availing all whole essential drugs and other materials from EPSA. Purchasing other administrative equipment, tools and items by hospital finance department and Start operation and post operation care service in a short period of time.

Study was done from referral out registration book to find out the highest reasons for our high referral rate which was 8.9% which did not met the regional and national standard of making it 5-8% (7). 35% of our referred out patients was for operation service which is by far the commonest reason for referral which decreases the number of admitted patients and even make the number of admitted patients for surgical reason was 0. During this referral audit we found out that 2 patients has died during transportation and because of lack of cesarean section service neonates that are referred from our hospital had high rate of neonatal asphyxia because of the delay of transportation associated with the referral.

We finally held an interview with 10 random patients who were referred to other hospital for the operation purpose and they all responded that the hospital should start the operation service and that made the patient satisfaction rate lower.

So our group decided that **lack of operation care service** in the hospital is higher than the other root causes. Therefore, the main root cause for low bed occupancy rate was linked to lack of operation and post operation care service.

Chapter 4 Literature review

A good hospital management includes an effective a locative planning for beds in a hospital. Bed-occupancy rates and length of stay are the measures that reflect the functional ability of a hospital. Hospital bed-occupancy rates have been proposed as measures that reflect the ability of a hospital to provide proper care for patients. This measure can be considered useful in guiding the planning and operational management of hospital beds in a way that improves how well patients fare while admitted in hospital. The bed occupancy rate & average length of stay in hospital are the two most important indicators of the health services utilization. Empirically, the average occupancy rate is positively related to the admission rate in a hospital.8 Bed Occupancy Rate (BOR) is the percent of occupancy obtained by dividing the average daily census, i.e., the number of available beds in a particular ward. The average length of stay in a ward is an indicator which measures the average duration of hospital stay of admitted patients. In our study the bed occupancy rate was 51.33% in all medical and allied wards. Keegan A cited in his article that in the department of health in United Kingdom had studied that bed occupancy rates exceeding 85% in acute care hospitals were associated with problems in handling both emergency and elective admissions.5 A very high bed occupancy rate damages the quality and safety of in-patient care. Bed utilization is at its most efficient when it is not allowed to exceed 85 percent.(2)

For gauging a hospital's profitability, there are several factors considered in the hospital performance measures. One such crucial factor is Hospital Bed Occupancy (HBO) which shows the actual utilization of the hospital's inpatient health facility within a given time frame. It is calculated by ratio of total number of beds actually occupied by in-patients against the total number of beds available in the hospitals rooms for a specified period. To increase the occupancy rate, Healthcare Consulting Services (HCS) can help hospitals by deploying relevant strategies there by impacting its bottom-line directly. (3)

Ideal value of HBO is around 85%. This is so because if occupancy is low, medical staff is less engaged leading to low workforce utilization and decrease of hospital revenues. On the contrary, if HBO is 100%, staff-burnouts occur, patient admissions are refused which defeats the very

purpose of providing healthcare services and also hampers the hospital's reputation and new patient referrals in the long run.(3)

The bed occupancy rate (BOR) is a measure of the efficiency of inpatient services. Hospitals are most efficient at a BOR of 80 – 90%. If the BOR is lower, resources may be wasted. If the BOR is higher than 90% there is a danger of staff burnout and of over-crowding during sudden increases in demand for services. Hospital bed-occupancy rates have been proposed as a measure that reflects the ability of a hospital to properly care for patients. Whether this measure can be considered useful in guiding the planning and operational management of hospital beds in a way that improves how well patients fare while in hospital depends on the answers to two questions. Firstly, does the bed-occupancy rate influence patient outcomes? And secondly, what would be an appropriate level of occupancy to aspire to?

Hospital beds include inpatient beds available in public, private, general, and specialized hospitals and rehabilitation centre's. In most cases, beds for both acute and chronic care are included. Inpatient bed density serves as proxy for availability of health service delivery.

A greater number of hospital beds suggest greater availability of inpatient health services. Conversely, some countries (e.g., Organization for Economic Cooperation and Development) have witnessed a downward trend in hospital beds per 10,000 populations as outpatient surgery increases. (4)

In hospitals that are managed scientifically, bed occupancy rates range from 84% to 85% according to international standards, meaning the proper use of hospital facilities, hospital resources and success of its management. Fifteen to 16% consider the rest of the beds for medical emergencies (i.e. utilization of resources) have been optimal. According to the Ministry of Health and Medical Education, ward occupancy rate of more than 70% is desirable, between 60 and 70 is moderate and less than 60% is recommended. Hospital bed is an important and cost effective resource for all health systems. (6)

One of the most searched for KPIs of all time on our website, % Hospital bed occupancy rate, is irreplaceable for effective hospital management, both in the private and public sector, regardless of geographical region or social aspects. Together with # Length of stay, this metric is used to

assess the functionality degree of a hospital and the institution's ability to efficiently manage its resources. regarding the ideal values for this month's indicator, the result – calculated in the example above – 87,5% is optimal. Market data from our database, resulting from comprehensive global research on this KPI, indicates that **85-90%** is the **ideal range** for % Hospital bed occupancy rate, as a rate higher than 90% may induce the danger of overcrowding, indicating that hospitals may have to turn away patients and postpone the provision of needed, possibly crucial, healthcare. On the other hand, if results are below 85%, this might indicate that resources are managed inefficiently and inequitably. If results are between 70-85% respectively 90-95%, they are still within tolerance levels (and at the same time they represent a **call to action**), while values under 70% or over 95% can be regarded as reasons for concern (and corrective measures are to be taken immediately).Very high occupancy rates, e.g. 98%, increase the danger of harm, including hospital-originated infections, while low rates – 40% – reflect inefficient resource utilization. Therein lays the importance of this month's **smart KPI**, which should be monitored daily in order to ensure patient safety and satisfaction, and maintain an efficient & effective resource management process.(7)

With efficient management, U.S. **hospitals** should be able to achieve at least an 80%-90% **bed occupancy rate.** (8)

Hospital beds include inpatient beds available in public, private, general, and specialized hospitals and rehabilitation centre's. In most cases, beds for both acute and chronic care are included. Inpatient bed density serves as proxy for availability of health service delivery.(9,10,11)

Bed occupancy rate average percentage of occupied beds during the period under review (usually one year). Average length of stay (in days) of patients in an inpatient facility during a given period of time. Ethiopian national Average length of stay (ALOS) 3.9 days and Amhara region Average length of stay 3.9 days. Ethiopian national Bed occupancy rate 24.1% and Amhara region Bed occupancy rate 28.0% (11)

Total length of stay in days (sum total of each daily inpatient census) during reporting period /[number of beds available * number of days in reporting period](14,15)

Chapter 5 Methods and materials

5.1 Study area and period:

Study was conduct in Mida Weremo primary hospital (February – May, 2019).It is one of the primary hospitals of Amhara region established in 2017 G.c in Meragan town and has four wards. It gives service to more than 100,000 people residing in Meragna town, surrounding Weredas (district) including n neighboring people .It's climatic condition is Dega.

5.2 Study design

Pre-post intervention study design was used.

5.3 Source population

The source population of the study was all patients coming to the hospital for service seeking in the study period

5.4 Study Population

All patients admitted in the hospital in all wards with in pre and post intervention periods /September – December / and /February - May /2019 respectively.

5.5 Inclusion and exclusion criteria

Inclusion criteria: - All admitted patients at IPD, NICU and MCH department

Exclusion criteria: - All patients admitted at emergency department

5.6 Sampling

There was no sample size and sampling technique used because all numbers of patients discharged in pre intervention {169} and all numbers of patients discharged in the intervention period {331} was included so it is a complete enumeration of study population. It is like censes type. Considering Assess and improve the low bed occupancy rate in ABI-ADI Hospital, Tigray, Ethiopia (4).

5.7 Data Collection Procedure

Data was collect from the admission and discharge registration books using check list designed to collect important data by data collectors /HMIS personnel/ after they trained for one day how to collect important data for BOR. The check list includes all measures for BOR such as number

of patients admitted, number of patients discharged, length of stay inwards for each patient in days and number of patients not registered their date of discharge and length of stay in days in the study period.

5.8 Study variables

5.8.1 Dependent variable

The percentage of occupied bed at IPD.

5.8.2 Independent variable(s)

Numbers of admitted patients at IPD, Length of stay (days), number of beds at IPD, socio-demographic characteristics.

5.9 Data quality management

One HMIS personnel and one nurse was trained how to collect data for BOR in one day, during the actual data collection process the data quality was cross checked with the registration log book. Quality of registration system was cross checked daily by liaison officer and BOR was calculated every month in the intervention period.

5.10 Data processing and analysis

Data was measured and calculated using the stated formulas by Ethiopian Federal ministry of health (Health Management Information System) (14).

BOR = the sum total length of stay in days during reporting period ÷ [Average number of operational beds during reporting period x number of days in reporting period] x 100

Numerator The sum total length of stay in days during the reporting period

Denominator Average number of operational beds during reporting period x number of days in reporting period.

Formula Total number of patient days for a given period(length of stay) x 100
Available beds (bed complement) x the number of days in the period

Example A hospital with 32 available beds (excluding newborn bassinets) rendered 400 patient days in September. September has 30 days. The percentage of occupancy for the hospital in September was:

$$\textbf{BOR} = \frac{400*100}{32*30} = \frac{40000}{640} = \textbf{33.2}$$

5.11 Ethical clearance

Before intervention started Ethical clearance was obtain from Addis Ababa University School of public health ethical committee. Consent was given by the senior management committee of Mida Weremo hospital all ward heads liaison and HMIS personals

5.12 Dissemination

After the project is finished the result will be presented for defense comments and suggestions will be incorporated and finally it will be disseminated to all respected bodies such as Mida Weremo Primary hospital, Amhara regional health bureau, Addis Ababa University and other respected institutions.

5.13 Operational definition(s)

Hospital bed-occupancy rates: - The average percentage of occupied beds during the reporting period

Average length of stay:- Managed care The total number of Pt days divided by the number of admissions and discharges during a specified period of time, which results in an average number of days in the hospital for each person admitted

Chapter 6 Intervention

Intervention strategy after identifying the root causes the four alternative interventions mentioned below were taken in to consideration and the best intervention is selected using decision matrix tool.

Installing operation care materials like operation table, light and anesthesia machine and others, availing drugs and start operation care and post operation care service at IPD.

Fixed room for operation and post operation care service

Increasing IESO and Anesthetics for operation and post operation care service

Giving training for emergency surgeon, anesthetics and operation care nurses

6.1 More description about intervention as follows:

Installing operation care materials like operation table, light and anesthesia machine and others, availing drugs and start operation care and post operation care service at IPD.

All machines were stored in hospital store so check out and install all machines at operation care service unit. Availing all whole essential drugs and other materials from EPSA. Purchasing other administrative equipment, tools and items by hospital finance department and Start operation and post operation care service by earlier recruited professionals.

Fixed room for operation and post operation care service. Follow through room cleanness, secured for patient safety and infection prevention.

Increasing number of IESO and Anesthetists for operation and post operation care service. Conducting recruitment process and assigning additional 01 IESO and Anesthetists.

At first giving training for emergency surgeon, anesthetics and operation care nurses on how to practice their skill at hospital, experience receiving from other hospital in order to start operation and post operation care service.

6.2 Perform comparative analysis of the best alternatives

It was a direction in a project that contributes to success of starting operation and post operation care service, based impact, expense, time, political feasibility, from this point of view by using decision matrix when analyzing the possible intervention, decide which of them based on criteria, the highest score were selected from this project interventions.

Table 3: Create decision matrix qualitative Evaluation criteria (5=V.good 4=good 3=high2=low 1=bad)

S/n	Strategic alternatives	Evaluation criteria			
		Impact on problem	Expense	Time	Political feasibility
1	Hiring Additional staff for operation and post operation care service	Bad	Good	A month	Low
2	Adjust room for operation and post operation care service	High	High	Days	Low
3	Installing operation care materials like operation table, light and anesthesia machine and others, availing drugs and start operation care and post operation care service at IPD.	V.good	Low	Month	V.good
4	Giving training for emergency surgeon and anesthesia	Low	Good	Day	High

Table 4: Create decision matrix qualitative Evaluation criteria (5=V. good 4=good 3=high2=low 1=bad)

S/n	Strategic alternatives	Evaluation criteria				
		Impact on problem	Expense	Time	Impact on problem	Total
1	Hiring Additional staff for operation and post operation care service	0	4	2	4	10
2	Adjust room for operation and post operation care service	3	4	5	2	14
3	Installing operation care materials like operation table, light and anesthesia machine and others, availing drugs and start operation care and post operation care service at IPD.	5	2	3	5	15
4	Giving training for emergency surgeon and anesthesia	2	4	4	3	13

By using decision matrix based on impact, cost, time, political visibility, the highest score were selected for this project intervention. It is called, ***Installing operation care materials like operation table, light and anesthesia machine and others, availing drugs and starts operation care and post operation care service and provide post operation care at IPD*** were selected for this project intervention implemented at Mida Weremo primary hospital and to bring good result for the success of high bed occupancy rate.

After best strategy was selected focus group was formed to implement the strategies with their responsibilities from each discipline of the hospital who has contribution and an impact on increase admission rate by installing operation and post operation materials like operation table, light and anesthesia machine and others, Availing all whole essential drugs and other materials from EPSA. Purchasing other administrative equipment, tools and items by hospital finance department and start operation and post operation care service leads to increase BOR of the hospital which ware listed 33.2%

Table 5 Focus group to implement the strategies

s/n	Focused group	Member responsibility
1	Mr, Petros Anberbir	CEO
2	Mr, Libase Afele	Matron
3	Sr Zemetu Shewanqetaw	Medical ward head nurse
4	S/r Shemsia Kemal	Surgical ward head nurse
5	Mr, Habtamu Walelign	Gyn ward head
6	Mr, Adane Ejigu	Liaisons officer
7	Mr, Basaznew Mosie	HMIS officer
8	Ms Adis Feysa	Emergency surgeon
9	Mr, Dagnachew Ababu	Anesthetists

Responsibility of the members the emergency surgeon and anesthetists to list material and drugs needed to start operation care service. Faineance department perches materials needed by quality team for the purpose of operation care service. HMIS personals responsibility is checking the number of all admitted patients and the progress admitted by operation care service. My responsibility (CEO investigator) is to follow (check) the activity, develop action plan and control and lead every activity communicate and installing operation care materials. Finally calculate BOR every month by tallying the total length of stay of all pts admitted and discharged plus admission by surgery within a month and seeing the result and discussing the progress with the group members and filling intervention gaps accordingly.

Chapter 7 Result

7.1 Socio demographic statistics

As it was indicated on the socio-demographic section of the study most admitted patients are male and Christian in religion both in the pre and post intervention periods of the study. 59.3% and 82.7% of the admitted patients were male and Christian respectively during the pre intervention period. This is also shown on the post intervention period of the study.

During the pre intervention period the study indicated that the mean age group from the patients that was admitted was 33.7 yrs. During the post intervention period the mean age group was 32.2. The commonest kebeles where the patients were admitted from are the same both in the pre and post intervention period. These top three kebeles were “Meragna”, “Agema” and “Behera”. 8 kebeles has less patients are admitted that accounts 24.8% from total admission.

Table 6 Socio-demographic characteristics of admitted patients

Background characterstics	Pre intervention		Post intervention	
	Frequency	Percentage	Frequency	Percentage
Age group				
0-5yrs	31	18.5	49	14.8
5-14	33	19.1	67	20.2
15-24	22	15.9	53	16
25-54	19	11.1	57	17.2
55-64	34	20.4	63	19.3
65-75	30	17.9	42	12.7
Gender				
Male	100	45.3	131	45.3
Female	69	40.8	158	54.7
Religion				
Christian (any kind)	138	82.7	299	90.3
Muslim	31	17.3	32	9.7
Others	0	0	0	0
Catchment area (kebele)	Accunt hign number of participants (Above median of 17)			
Meragna	23	13.6	35	10.6
Behera	14	8.3	25	7.6
Agema	17	10.1	25	7.6
Minaze	9	5.3	21	6.3
Tegora	12	7.1	18	5.4
Kerkere	9	5.3	21	6.3
Garda	9	5.3	21	6.3
Rema dire	10	5.9	21	6.3
Rema	11	6.5	22	6.6
Ketemana dere	8	4.7	20	6.0
Sorich	9	5.3	20	6.0
The rest 8 kebeles	38	22.5	82	24.8
Total	169	100	331	100

7.2 Pre and post intervention period

The pre intervention period of the study was done from September up to December.

According to table 1 at the beginning of the study the total number of discharged patients in September is 40. And the total length of stay in days was 208 and the bed occupancy rate was 32.3%. Within the whole period of the pre intervention study the number of discharged patients was almost the same being 40, 47 and 42 on October, November and December respectively. The bed occupancy rate was also 32%, 36% and 30.1% on the above mentioned months.

Post intervention period of the study was done from February up to May.

In Midda Weremo Primary hospital the operation service was started at the month of January. In this pre-post study bed occupancy rate is increased from 33.2% to 70% when we see the progress of BOR in each month with in the above intervention and periods. As it can be seen from table 7 below the number of patients that are admitted and discharged after the operation service was initiated has increased dramatically.

The number of discharged patients during this period was 66, 76 89 and 105 on February, March, April and May respectively. This shows that the number of admitted and discharged patients in the hospital is increasing as time passes. During the month of February the total length of stay in days was 335.

The table also shows the:-

In March 76 patients were admitted and their total length of stay was 380 days,

In April 89 patients were admitted and their total length of stay was 445 days,

In May 105 patients were admitted and their total length of stay was 520 days and

In the post intervention period [Feb-May] 331 patients were admitted and their total length of stay was 1680 days.

Table 7: The data for bed occupancy rate in post intervention period by

Months	Total no of pts admitted in the period	Total no of pts discharged in the period	Total Length of stay in days	Average 1 day patients length of stay
	A	B	C	D= C/B
February	66	66	335	5.08
March	76	76	380	5.00
April	89	89	445	5.00
May	105	105	520	4.95
Total	331	331	1680	5.08

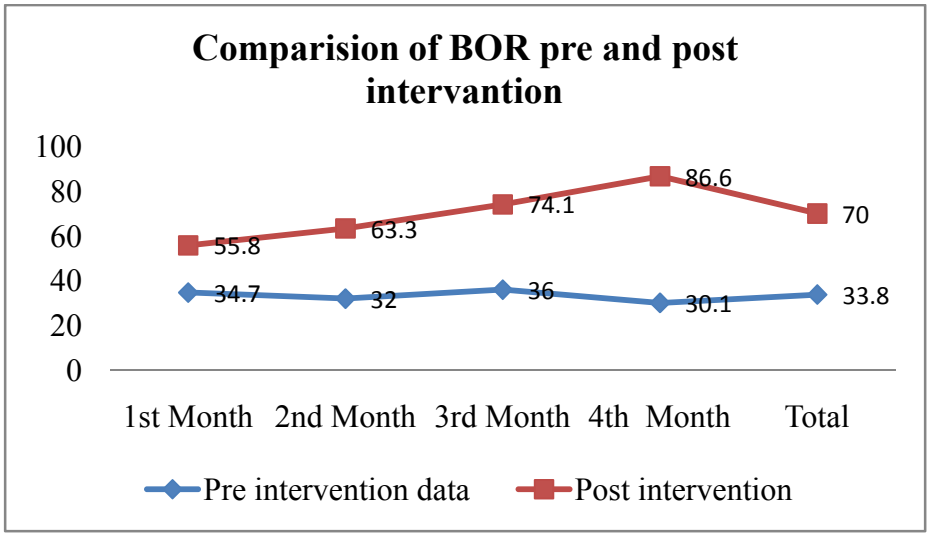
Table 8 and figure 3 below compare the bed occupancy rate of the hospital before and after the initiation of the operation service. This was done for each month and can see the difference from the pre intervention period. The average bed occupancy rate during the pre intervention period was 32.2% over the four months.

During the post intervention period the average bed occupancy rate was increased to 70%. When we see this rate monthly it has increased to 55.8%, 63.3%, 74.1% and 86.6% on February, March, April and May respectively. Figure 3 clearly shows the difference of the bed occupancy rate before and after the intervention which is the beginning of the operation service in Midda Weremo Primary hospital at the month of January.

Table 8 Pre-post intervention comparison of data across months,

Pre intervention data			Post intervention data		
Months	Total Length of stay in days	Bed Occupancy Rate	Months	Total Length of stay in days	Bed Occupancy Rate
September	208	34.7	Feb	335	55.8
October	192	32	March	380	63.3
November	216.2	36	April	445	74.1
December	180.6	30.1	May	520	86.6
Total	811.2	32.3	Total	1680	70

Figure 3 Per- post intervention comparison of bed occupancy rate across months



The study also showed the contribution of surgical patients on the increment of the increased bed occupancy rate. Since there was no operation service the contribution was 0 from September to December. This number has an increasing trend after the initiation of the operation service. The contribution of the operation service in percent after the intervention was 21.1%, 31.3%, 38.1% and 56.5% on February, March, April and May respectively. This is shown below on Table 9 and figure

Table 9 Contribution of operation care service for Bed Occupancy rate

Pre intervention			Post intervention		
Month	% of Bed Occupancy rate	Contribution of operation care service for Bed Occupancy Rate	Month	% of Bed Occupancy rate	Contribution of operation care service for Bed Occupancy Rate
September	34.7	0	Feb	55.8	21.1
October	32	0	March	63.3	31.3
November	36	0	April	74.1	38.1
December	30.1	0	May	86.6	56.5
Total	33.8	0	Total	70	36.2

Figure 4 % of Bed Occupancy Rate by operation care service and admitted in surgical ward

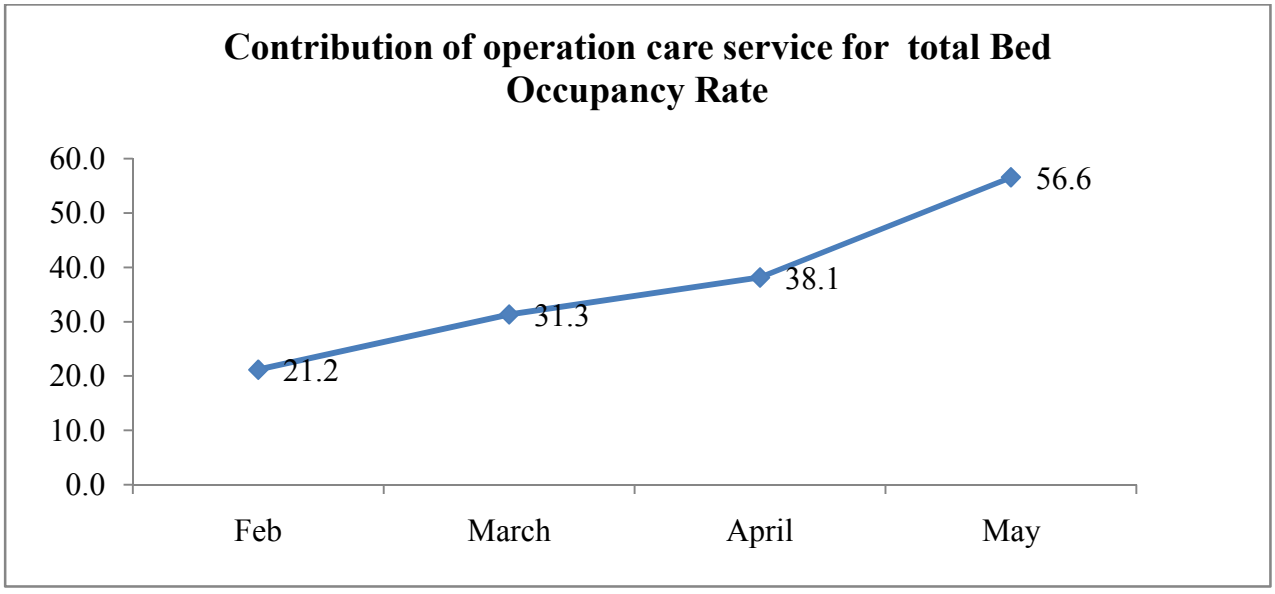


Figure 5 below shows the overall trend of bed occupancy rate over the pre and post intervention period and contribution of operation care service for BOR which is from September to May.

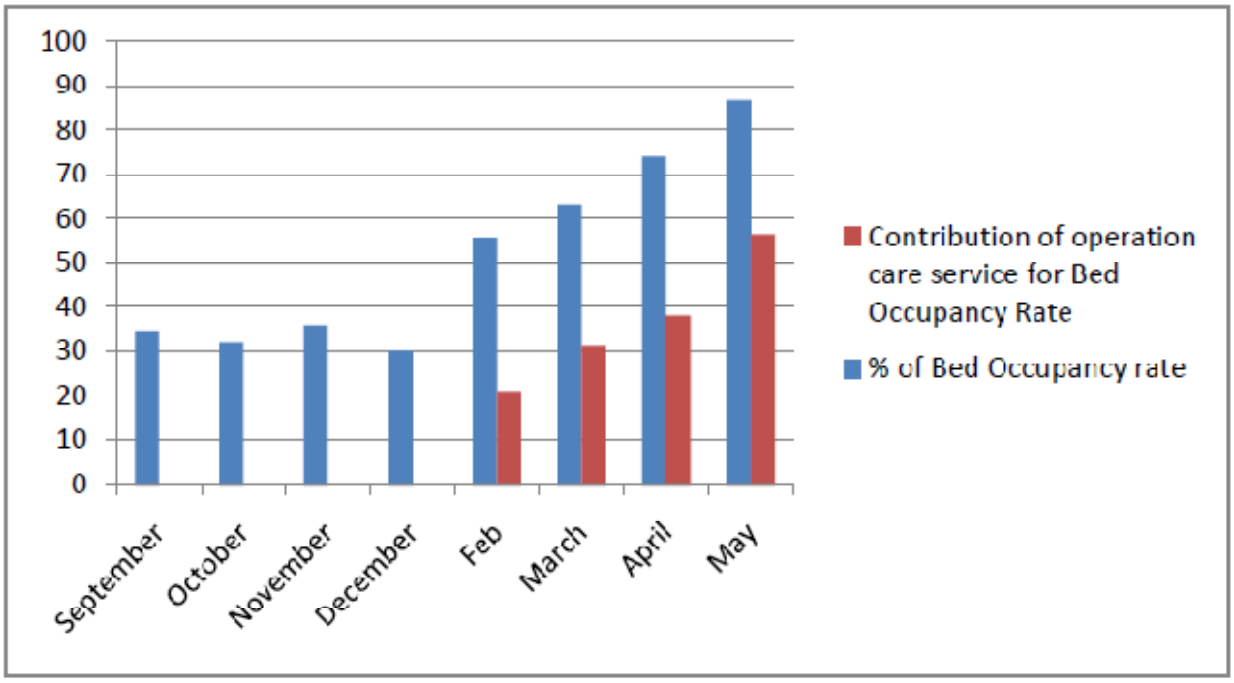
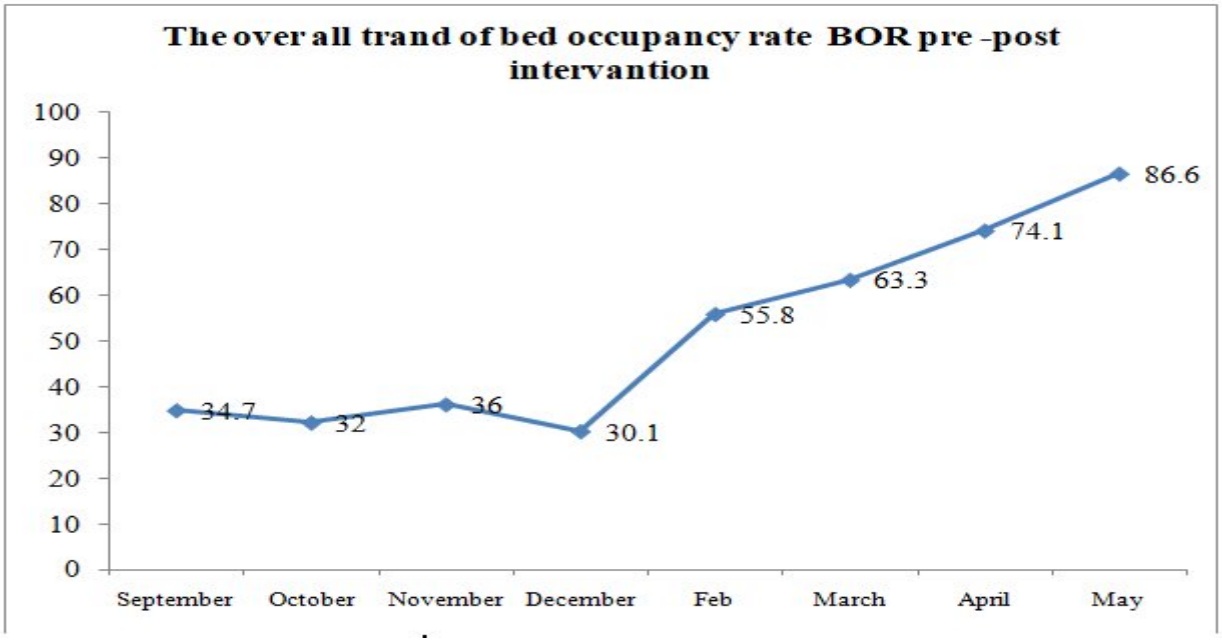


Figure 6 The over all trend with in pre and post intervention period



Chapter 8 Discussion

This is the first study in Mida Weremo primary hospital addressing bed occupancy rate issues and compares the pre and post intervention result. It is known that the bed occupancy rate (BOR) is a measure of the efficiency of inpatient services. Hospitals are most efficient at a BOR of 80 – 85%. If the BOR is lower, resources may be wasted. If the BOR is higher than 90% there is a danger of staff burnout and of over-crowding during sudden increases in demand for services. Knowledge of the BOR helps hospitals to identify inefficiencies in service delivery in order to investigate and take action to address this, and also to plan for future staff or other resource requirements (, 2, 6, and 7). The result of the study shows that the average pre and post intervention bed occupancy rate is 33.8% and 70% respectively. The improvement after intervention is 55.8%, 63.3%, 74.1% and 86.6% from February to May orderly.

In the national key performance indicator manual bed occupancy formula the numerator is sum total length of stay in days during the reporting period. According to the pre–post intervention study done in Mida Weremo primary hospital during the pre intervention period over the four months the total number of discharged patients was 162 making the total length of stay was only 797. As it can be seen from the study after the initiation of the operation service in the hospital, the number of discharged patients and the total length of stay have increased dramatically to 331 and 1680 respectively. During the post intervention period out of the total number of discharged patients [331] around 36% of them are patients who took operation care service and admitted in surgical ward. This shows that increasing number of patients by starting of operation care service in the hospital has a big contribution to the increment in the bed occupancy rate. So a hospital without operation care service is associated with decreased percentage of bed occupancy rate.

Hospital bed-occupancy rates have been proposed as a measure that reflects the ability of a hospital to properly care for patients and giving service with its full capacity. Whether this measure can be considered useful in guiding the planning and operational management of hospital beds in a way that improves how well patients fare while in hospital? (6, 8, 9, 11, and 12) similarly this study indicates that opening and establishing new medical and surgical care is very important to manage resources correctly and ready to give efficient service for newly admitted patients.

Chapter 9 Conclusion and Recommendation

9.1 Conclusion

During our group discussion four change ideas were raised to increase the low bed occupancy rate. But only one was selected for intervention in the study after taking impact, feasibility, cost effectiveness', time constraints into consideration. With this consideration the fact that the hospital hasn't started giving operation and post operation care service was attributed for low bed occupancy rate in pre intervention period and initiating this service was the main change idea.

Sustainability of operation care service has big impact in increasing bed occupancy rate. Almost all 162[36.2%] patients who admitted to the hospital were access operation care service and admitted in surgical ward, date of discharge and total length of stay in the intervention period this indicates that starting of operation care service to fill the gap is very important to improve bed occupancy rate.

Finally this study indicates that using problem solving strategy by doing root cause analysis and setting best strategy is effective to solve problem with minimal resources.

9.2 Recommendation

9.2.1 Hospital Management

Hospital management committee should give attention and do daily follow up by the CEO and CCO for its sustainability.

Full implementation and proper management should be strengthened and the full support from hospital leadership is the key to success.

Hospital bed-occupancy rates have been proposed as a measure that reflects the ability of a hospital to properly care for patients. So efforts need to be strengthened to sustaining of operation care service towards bed occupancy rate. Hospital management committee should establish other new medical service area like operation care service to improve bed occupancy rate like NICU(Neonatal Intensive care unit).

9.2.2 Departments/Case Teams

A systematic approach (Such as PDSA Cycle) should be approached. Report and document BOR routinely.

9.2.3 Researcher

Starting of operation and post operation care service have significant change in BOR and needs further in depth assessment of other factors contributing to cause for low bed occupancy rate to see the desired change.

Chapter 10 Strength and Limitation

10.1 Strength

Primary data is used close follow up in the intervention period acceptance and commitment of management committee and quality committee to support the project work.

10.2 Limitation

Short duration of time for study

Reference

1. *Mida Weremo Primary Hospital, Key Performance Indicators report, Meragna, Amhara , Ethiopia. Jun,2018, Unpublished.*
2. *Gulzar Usman, Khalida Naz Memon, Shazia Shaikh BED OCCUPANCY RATE AND LENGTH OF STAY PATIENTS IN MEDICAL AND ALLIED WARDS OF A TERTIARY CARE HOSPITAL in J.Ayub Medical College, Abbottabad ;2015 27(2)*
3. *FrontEnders;5 Ways to Increase the Bed Occupancy Rate of Your Hospital; January 08,2018*
4. *G/slassie G/meskel; Assess and improve the low bed occupancy rate in ABI-ADI Hospital, Tigray, Ethiopia ,AUGUST, 2013*
5. *Charles Darwin University: report Prepared for the Department of health and Community Service: SAELF –discharge against medical advice from Northern Territory Hospital: Feb 2007*
6. *Marzieh Marahem1, Magid Seyed Ghodraty2, Haleh Farzin3, Dawood Agamohammadi3, Ömür Erçelen4, The Importance of Bed Occupancy Rate in Evaluate the Utilization of Hospitals, Crescent Journal of Medical and Biological Sciences; Vol. 5, No. 4, October 2018, 270–271Ana Lichintan , smart KPI: % Hospital Bed Occupancy Rate April's,18,2017*
7. *Jane Anderson, Hospital occupancy cane be increased with improve surgery scheduling, Fb 7,2011*
8. *World health organization, Health Service Delivery Module. 2000.*
9. *Health Service Utilization in Amhara Region of Ethiopia. 2000.*
10. *International Federation of Health information management Association: Healthcare Statistics, 2012.*
11. *Federal Democratic Republic of Ethiopia Ministry of Health, Health and Health related indicatos2005E.C(2012/2013), Version 2, Oct 2014.*
12. *Ministry of Ethiopian Hospital Service Transformation Implementations Guidelines volume one Addis Ababa ,Ethiopia May 2017 G.C*
13. *Federal Democratic Republic of Ethiopia Ministry of Health Revised Health Management Information System Indicator reference Guidelines Addis Ababa ,Ethiopia August 2017*
14. *World health organization, Performance Assessment Tool for Quality: Improvement in Hospitals (PATH): An Analysis of the Pilot Implementation in 37 Hospitals. 2008, 20 (3)*

Annexes

Developed data collection tools for pre-post intervention study on BOR in Mida Weremo hospital, Amhara, Ethiopia, 2019, [Feb-May, 2019]

Name of region ……Zone……..Hospital…….....date……..... Questionnaire number……..……. Patient MRN…….

PART ONE:

SOCIO DEMOGRAPHIC CHARACTERISTICS						
Age	<5	5-14	15-24	25-54	55-64	> 65
Gender	Male			Female		
Religion	Christian	Muslim	others			
Kebele	Meragna	Behera	Rema dire	Ketemana dere	Alabo Biraba	S/girar
	Minaze	Agema	Werke	Kerkere	Sorich	Lebka
	Dengore	Garda	Rema	Tegora	Afer bayne	Azima
	Yigovia	Tebabit	Kara Mejit	T/giorgis		

Part two

Data obtained from IPD registration book		
Date of Admission (dd /mm/ yy)		
Date of Discharge (dd /mm/ yy)		
Length of stay (days)		
Condition of discharge	improved	Same
	deteriorated	left against medical advice
	died	referred to higher facility
Case type	medical	Surgical
	obstetrics	Others

BOR= Total number of patient days for a given period *100

Available bed (compliment)*the number of day in number