

Contribution of Completed Modified World Health Organization Partograph on Maternal and Foetal Mortality Reduction in Health Facilities in Makueni County, Kenya

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Abstract: Background: Maternal and foetal mortality is one of the major health problem facing low income countries as compared to the high income countries. This burden is mostly felt in sub Saharan Africa and Southeast Asia where 99% of the global burden of maternal death is found. The World Health Organization (WHO) promotes partograph use in the monitoring and management of mothers in labour enabling timely decision-making regarding interventions to be undertaken. Objective: To assess the relationship between complete modified world health organization partograph and maternal and foetal outcomes in health facilities in Makueni County, Kenya Methods: This was a cross sectional study design. The study used a structured questionnaire to collect data from the partographs retrospectively. Data analysis was done using SPSS version 20.0 and chi-square tests were used to assess the relationship of variables. The cut off point for the level of significance was 0.05. Phi and Cramer's V test was used to determine the strength of association Findings: Descriptive statistics and frequency tables were used to describe the extent to which the partograph was used. The use of partograph had effects on both foetal and maternal outcomes. The study established method of delivery had a significance association with foetal monitoring (foetal heart rate, liquor, and moulding), labour progress monitoring (descent, contractions and cervical dilatation) and referral monitoring at $\alpha = 0.05$. The study also found significant association between foetal outcome and contraction, gravidity, parity, foetal heart rate and moulding at $\alpha = 0.05$. Conclusion: There is a significant association between maternal, foetal outcomes and labour progress and partograph completeness in Makueni County. The study therefore recommends increased mobilization and routine check by supervisors to ensure partographs are filed on time and hospitals to embrace training programme to enable midwifery care-providers acquire relevant skills to complete partographs during the labour process.

Keywords: WHO Partograph, Maternity, Foetal, Outcomes

1. Background

Complications of labour are a significant cause of mortality, morbidity and long-term complications for both the mothers and their babies, especially in low-income settings [1]. Complicated deliveries are deleterious and cause serious psychological and physical harm to women and their families as well yet a lot of investment has been made to avert any

foetal or maternal adverse outcomes [2]. Most of these negative outcomes occur mostly in the community or at primary level health facilities, where women either deliver alone or are assisted by unskilled birth attendants under unfavourable conditions for childbirth [3]. According to World Health Organization (WHO), 8% (42,000) of maternal deaths annually are as a result of obstructed labour [4]. In the developed world, obstructed labour rarely causes maternal mortality because facilities for emergency obstetric care are

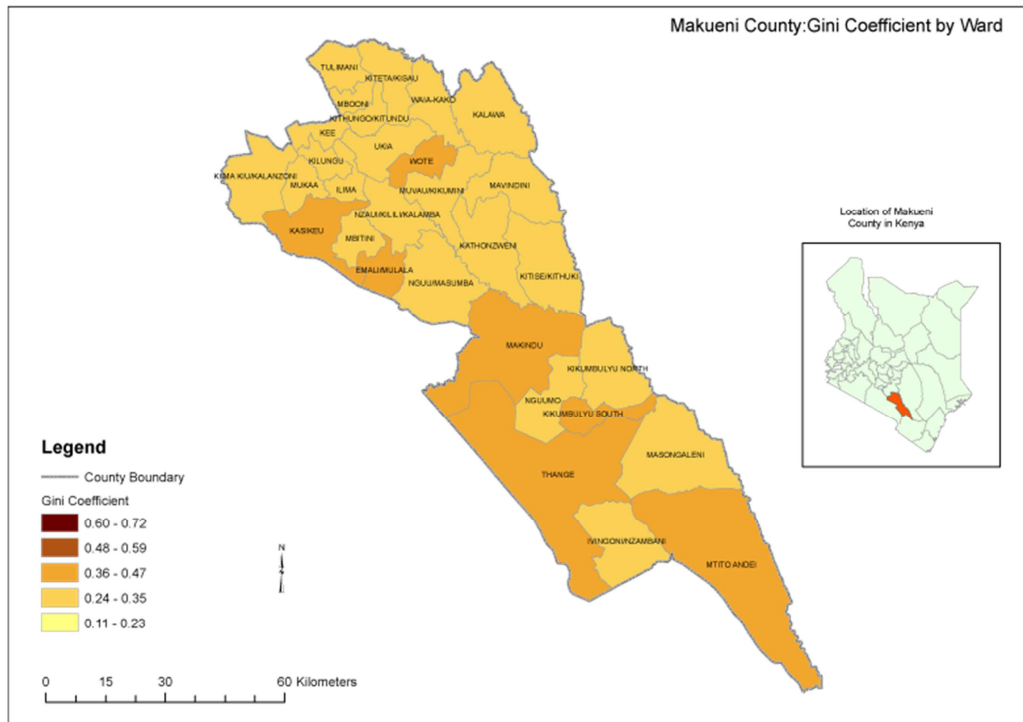
available, for example caesarean sections [5]. Whereas in the developing world, maternal deaths caused by obstructed labour are often not reported but instead the complications brought about by obstructed labour, like haemorrhage and sepsis, are reported instead, hence a wrong conclusion is made on the cause of maternal mortality [4]. Other maternal morbidities like obstetric fistula are also as a result of obstructed labour. Kenya is currently reported to have infant mortality rate of 39 deaths per 1,000 births, while the maternal mortality rate (MMR) was reported at 362 per 100,000 live births according to KDHS (2014), against the sustainable development goals (SDGs) target of less than 70 deaths per 100,000 live births and ending of needless deaths of new-borns and children below five years by the year 2030 [6]. In Makueni County, though there has been a reduction of MMR, infant mortality is still high. From January to June 2018, Makueni County reported eighty-nine (89) neonatal deaths and four (4) maternal deaths. This is a worrying trend and correct use of partograph with timely interventions would probably prevent these deaths [7]. The partograph is a graphical presentation of the progress of labour, and of foetal and maternal condition during labour and it assists birth attendants in monitoring labour [8]. Parameters like foetal heart rate, cervical dilatation, uterine contractions, pulse rate and blood pressure of the mother are plotted on the graph. This data enables the skilled birth attendant to promptly point out any deviation from the normal process and make appropriate decisions regarding the management of the mother [9]. In modern obstetric care, one of the key components is the partograph. WHO has recommended universal partograph use in labour management [10]. Compared to free written patient notes, the partograph

accords birth attendants an easy method to monitor labour and communicate easily on labour progress and are able to identify complications like obstructed labour early enough before they become detrimental to the mother and the baby [11]. When used by a knowledgeable and a skilled birth attendant, it has been shown to detect deviations early and timely interventions are taken [12]. However, the major problem for improving birth outcomes is that intrapartum monitoring using the partograph is a tedious process which consumes a lot of time hence its either not used or when it's used, it's done incorrectly, leading to incorrect interpretations [13-15]. Lack of proper training including in-service training, resource shortages, high workload in relation to the staff ratios, inadequate knowledge and negative attitude like the perspective that the partograph is time consuming and redundant, among healthcare workers, have been reported as some of the issues that impede correct use of the partograph [16]. Studies conducted elsewhere and Kenya has documented insufficient and incorrect partograph use in all levels of maternity care [17]. While most barriers to partograph use are well documented, in the study area little information is available regarding the status of utilization of the partograph and the outcomes thereof [18]. This study seeks to assess the relationship between complete modified world health organization partograph and maternal and foetal outcomes in health facilities in Makueni County, Kenya.

2. Methods

2.1. Study Design

This is a quantitative cross-sectional study design.



Source: Geo Names

Figure 1. Map of Makueni County.

2.2. Study Site

Makueni County Referral Hospital and Makindu Sub-County Hospital both in Makueni County, Kenya formed the sites for this study. The study site was purposively chosen by the researcher, and from review of literature no study of this nature had been carried out in this area. Makueni County covers an area of 8,034.7 Km². The county lies in the arid and semi-arid zones of the eastern region of the country. The County is currently divided into six sub-counties namely Makueni, Kaiti, Kilome, Kibwezi East, Kibwezi West, and Mbooni. In the year 2012 the projected population in the county was 922,183 consisting of 449,036 males and 473,147 females. Makueni County has six sub county hospitals namely Makindu and Makueni (which are modelled as referral hospitals), Mbooni, Kilungu, Sultan Hamud, and Kibwezi west. The County also has 21 level three facilities (health centers) and 125 dispensaries. In total the County has 156 public health facilities.

2.3. Study Population

A retrospective review of all partographs of the deliveries conducted one month before data collection was done. The study population included all nurses and midwives who provide obstetric care in the selected health facilities.

2.3.1. Inclusion Criteria

Partographs for all women reporting for labour. Women admitted in labour with cervical dilatation on admission of any measure in centimetres. Pregnancy at any gestation was monitored with a partograph. Partographs for all women delivered one month before data collection. Partographs for all methods of delivery. Nurses and Midwives working in maternity wing in Makueni county referral hospital and Makindu sub county hospital, and who consented to participate in the study.

2.3.2. Exclusion Criteria

Nurses and Midwives who work in other departments and clients who denied to consent for data collection.

2.4. Sampling Techniques

Simple random sampling method was used to select the patient files to be included in the study. To select the files to be included in the study, all the files of the preceding month before data collection (May 2018) were retrieved from the registry. Sequential numbers were assigned to each of the 420 files. This formed the sampling frame. A random number generator was used to select a sample of 221 from the total files of 420.

2.5. Sample Size Determination

Sample size was calculated using the formula: $n = t^2 \times p(1-p) / d^2$

n = the required sample size for population above 10,000

t = the confidence level at 95% (standard value of ± 1.96)

p = the estimated proportion of the partographs used and completed, in this study it is not known and will be estimated

at 50%

d = the standard error or precision at 5% (standard value of 0.05)

$$n = (1.96)^2 \times 0.05(1-0.05) / 0.05^2$$

$$n = 3.8416 \times 0.05(1-0.05) / 0.0025$$

$$n = 384$$

Since the target population was less than 10,000, required sample size is smaller and to calculate a final sample estimate, (nf) the following formulae was used;

$$nf = n / [(1+n)/N]$$

nf = desired sample size (when the population is less than 10,000)

n = the desired sample size (when the population is more than 10,000)

N = the estimation of population size

Target population per month = 420 (average number of deliveries in the two facilities per month- Makindu hospital 220 and Makueni hospital 200 deliveries)

$$nf = 384[(1+384)/420]$$

$$nf = 384 / (1+0.91)$$

$$nf = 384 / 1.91$$

$$nf = 201$$

10% of $n=201$ is expected to be missing in the study, so we calculated 10% of 201 and we added to keep the study's power. This gave a total of 221. This sample was divided equally in the two facilities.

2.6. Data Collection Tools & Procedures

An open-ended questionnaire was used to extract data from labour charts. A retrospective partograph review was carried out on deliveries conducted the month preceding the start of data collection. The labour ward delivery book was used to check number of deliveries. The researcher worked with data clerks to retrieve patient's files. All deliveries were included irrespective of mode of delivery and time admitted to labour ward. Data from 221 labour charts were extracted and filled in the questionnaire. Using the parameters described below, the labour charts were assessed by inspection of documentation of the parameters as filled in or not filled in (yes or no, complete or not complete). Degree to which these parameters were filled in (adequate or not adequate) was also assessed. The independent variables which were of main interest were: Foetal monitoring was assessed on FHR, status of membranes, liquor and moulding. Maternal condition was assessed on temperature, blood pressure and pulse rate. Labour progress was assessed on cervical dilatation, uterine contractions, and descent of foetal head. Alert line if crossed and action line if reached was also be assessed. Documentation of other parameters like personal details, first examination on admission, first vaginal examination, pelvic assessment, second stage of labour (date and time of delivery, method of delivery, Apgar score in 1 and 5 minutes), status of newborn, sex, weight, third stage of labour to include delivery of placenta, blood loss, completeness of placenta and membranes, state of perineum and time duration between admission in labour and delivery were assessed. The dependent (outcome)

variables on status of mother included: method of delivery i.e. spontaneous vertex delivery (SVD), vacuum extraction (V/Ext), breech delivery and caesarean section delivery. The dependent variables on foetal outcomes included: status of baby at birth i.e. alive or dead. To weigh staff work load, data was collected from the delivery registers against the number of midwives on duty per day.

2.7. Data Analysis

The variables were coded, entered and analysed using SPSS version 20.0. The researcher and the statistician performed the data cleaning, clarification and quality control. Descriptive statistics and frequency tables were used to describe the extent to which the partograph was used. Chi-square test was also used to find out the association between independent variables and the dependent variables. The cut off point for the level of significance was set at $\alpha = 0.05$. Phi and Cramer's V test was used to determine the strength of association.

3. Findings

3.1. Partograph and Completeness of the Maternal, Foetal and Labour Parameters

3.1.1. Personal Information

Recording of patients' name, address age and gravida was done at 99.5% while that of parity was 98.2%.

3.1.2. Admission Details

98.2% of partographs admission date, 95.9% admission time, 70.5% date time of onset labour completely, 72.7% date and time membranes ruptured were completely filled and 2.7% recorded completeness in abnormal symptoms recording (table 1).

Table 1. Admission details.

| | | n | % |
|----------------------------------|----------------|-------|-------|
| Date | Yes | 216 | 98.2 |
| | No | 4 | 1.8 |
| | Total | 220 | 100.0 |
| Time of admission | Yes | 211 | 95.9 |
| | No | 9 | 4.1 |
| | Total | 220 | 100.0 |
| Date and time of onset labour | Yes | 155 | 70.5 |
| | No | 54 | 24.5 |
| | Non-response | 11 | 5.0 |
| | Total | 220 | 100.0 |
| Date and time membranes ruptured | Yes | 160 | 72.7 |
| | No | 44 | 20.0 |
| | Not applicable | 1 | .5 |
| | Non-response | 15 | 6.8 |
| Total | 220 | 100.0 | |
| Abnormal symptoms | Yes | 6 | 2.7 |

Table 3. Number of plotted foetal heart rates.

| Descriptive Statistics | N | Minimum | Maximum | Mean | Std. Deviation |
|--------------------------------------|-----|---------|---------|------|----------------|
| Number of plotted foetal heart rates | 189 | 1 | 28 | 9.21 | 6.310 |
| Valid N (list wise) | 189 | | | | |

| | n | % |
|--------------|-----|-------|
| No | 211 | 95.9 |
| Non-response | 3 | 1.4 |
| Total | 220 | 100.0 |

3.1.3. Examination on Admission

99% of the partographs had recording of the first examination of the patients. Once the first examination has been conducted on the patients, the doctor determines if to admit the patient or refer to another hospital.

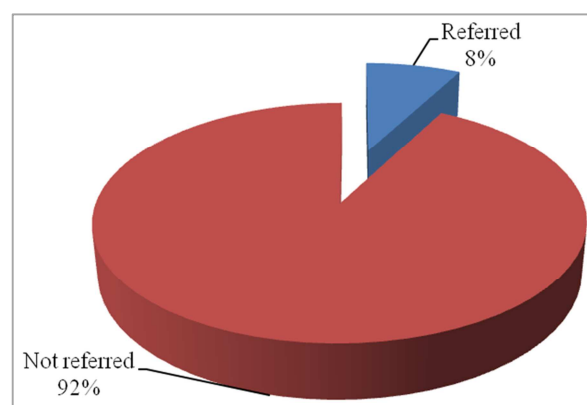


Figure 2. Patients' referral status record.

8% were referred to other hospitals upon the first examination. The reasons for referral included meconium grade III (MG3), non-reassuring foetal status (NRFS), obstructed labour, previous scar (PSC), pre-eclampsia (PET), per vaginal (PV) bleeding, and poor progress of labour due to malposition and prolonged second stage. However, the study found that in 3 cases, the reason for referral was not indicated while in 2 cases the referral letters were missing.

3.1.4. Foetal Monitoring

The key elements captured in this section include; foetal heart rate, number of plotted foetal heart rate, foetal liquor, and number of plotted foetal liquor, moulding and number of plotted moulding. 92.7% of partographs had foetal heart rate record, 6.4% had not been recorded (Table 2).

Table 2. Foetal monitoring.

| | n | % | |
|-------------------|--------------|-----|-------|
| Foetal heart rate | Yes | 204 | 92.7 |
| | No | 14 | 6.4 |
| | Non-response | 2 | .9 |
| | Total | 220 | 100.0 |

Regarding the number of recorded foetal heart rates, 189 cases were plotted out of 220 with a mean of 9.21 ± 6.31 cases. The number of plotted cases ranged from a minimum of 1 and maximum of 28 cases (Table 3).

86.4% of partographs had foetal liquor recorded while 12.7% had not been recorded and only 80% of the partographs had moulding recording while 18.6% were found to have incomplete information on moulding (table 4).

Table 4. Plotting of liquor and Moulding in partographs.

| | | n | % |
|----------|--------------|-----|------|
| Liquor | Yes | 190 | 86.4 |
| | No | 28 | 12.7 |
| | Non-response | 2 | 0.9 |
| | Total | 220 | 100 |
| Moulding | Yes | 176 | 80 |
| | No | 41 | 18.6 |
| | Non-response | 3 | 1.4 |
| Total | | 220 | 100 |

3.1.5. Labor Process

Other component comprises of cervical dilation, descent, contractions, whether the alert line was crossed, if yes any action taken as well as the number of times each of them was plotted. With 95.0% completeness for cervical dilation, 94.5% for descent, 94.1% for contractions, 17.3% of partograph indicated that the alert line was crossed with no action taken at all. Furthermore 2.3% of action line was reached and 0.9% action taken (Table 5).

Table 5. Labour process indicators completeness.

| | | n | % |
|-------------------|-----|-----|------|
| Cervical dilation | Yes | 209 | 95.0 |
| | No | 6 | 2.7 |

Table 6. Frequency of cervical dilation, Descent and Contractions plotting.

| Descriptive Statistics | | | | | |
|------------------------|-----|---------|---------|------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Cervical dilation | 209 | 1 | 6 | 2.28 | 0.873 |
| Descent | 208 | 1 | 5 | 2.25 | 0.837 |
| Contractions | 208 | 1 | 24 | 5.53 | 5.280 |
| Valid N (list wise) | 208 | | | | |

3.1.6. Maternal Monitoring

Blood pressure and pulse rate records for completeness was 95.0% each, while temperature record for completeness was 79.1% from the targeted institutions (Table 7).

Table 7. Completeness of maternal monitoring.

| | | n | % |
|-----------------|--------------|-----|-------|
| Blood Pressure. | Yes | 209 | 95.0 |
| | No | 9 | 4.1 |
| | Non-response | 2 | .9 |
| | Total | 220 | 100.0 |

| | | n | % |
|-----------------------------|--------------|-----|-------|
| Descent | Non-response | 5 | 2.3 |
| | Total | 220 | 100.0 |
| | Yes | 208 | 94.5 |
| Contractions | No | 6 | 2.7 |
| | Non-response | 6 | 2.7 |
| | Total | 220 | 100.0 |
| Was the alert line crossed | Yes | 207 | 94.1 |
| | No | 7 | 3.2 |
| | Non-response | 6 | 2.7 |
| If yes any action taken | Total | 220 | 100.0 |
| | Yes | 38 | 17.3 |
| | No | 174 | 79.1 |
| Was the action line reached | Non-response | 8 | 3.6 |
| | Total | 220 | 100.0 |
| | No | 11 | 5.0 |
| If yes any action taken | Non-response | 209 | 95.0 |
| | Total | 220 | 100.0 |
| | Yes | 5 | 2.3 |
| If yes any action taken | No | 206 | 93.6 |
| | Non-response | 9 | 4.1 |
| | Total | 220 | 100.0 |
| If yes any action taken | Yes | 2 | 0.9 |
| | No | 1 | 0.5 |
| | Non-response | 217 | 98.6 |
| Total | | 220 | 100.0 |

Cervical dilation, descent and contractions were distributed with a mean of 2.28, 2.25, 5.53 and ± 0.873 , 0.837 and 5.280 respectively (Table 6).

| | | n | % |
|-------------|--------------|-----|-------|
| Pulse | Yes | 209 | 95.0 |
| | No | 9 | 4.1 |
| | Non-response | 2 | .9 |
| | Total | 220 | 100.0 |
| Temperature | Yes | 174 | 79.1 |
| | No | 43 | 19.5 |
| | Non-response | 3 | 1.4 |
| Total | | 220 | 100.0 |

The average number of times blood pressure was recorded was 2.34 ± 2.439 and the average number of times pulse rate was recorded was 5.58 ± 5.325 (table 8).

Table 8. Number of maternal monitoring records.

| Descriptive Statistics | | | | | |
|---|-----|---------|---------|------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Number of times blood pressure was recorded | 109 | 1 | 17 | 2.34 | 2.439 |
| Number of times pulse rate recorded | 109 | 1 | 23 | 5.58 | 5.325 |
| Valid N | 109 | | | | |

3.1.7. First Vaginal Examination

100% of first information on vaginal examination was recorded

(i). Second Stage of Labour

The records of date and time of full dilatation of cervix in partographs was 80.0% completed, 98.6% of partographs had delivery date and 98.6% of delivery time was completed in partographs (table 9).

Table 9. Second stage of labour records completeness.

| | | n | % |
|--|--------------|-----|-------|
| Date and time of full dilatation of cervix | Yes | 176 | 80.0 |
| | No | 40 | 18.2 |
| | Non-response | 4 | 1.8 |
| | Total | 220 | 100.0 |
| Delivery date | Yes | 217 | 98.6 |
| | No | 3 | 1.4 |
| | Total | 220 | 100.0 |
| Delivery time | Yes | 217 | 98.6 |
| | No | 3 | 1.4 |
| | Total | 220 | 100.0 |

The majority of women gave birth through SVD methods (65.9%). However, cases of C/S accounted for 32.3% and 0.5% were breech while 1.4% were with non-response (Figure 3).

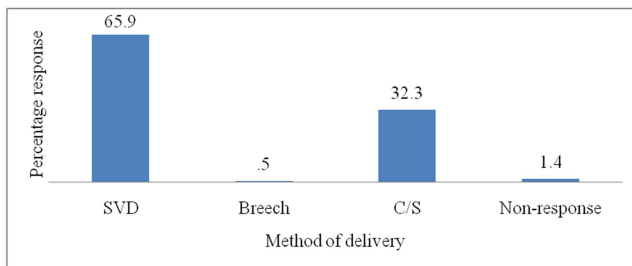


Figure 3. Method of delivery recorded in partographs.

Apgar scores were also recorded "Appearance, Pulse, Grimace, Activity, and Respiration." at 1 minute and at 5 minutes. 98.6% of the partographs had records of Apgar at 1 minute and at 5 minutes accordingly (Table 10).

Table 10. Apgar score recording.

| | | n | % |
|--------------------|--------------|-----|-------|
| Apgar at 1 minutes | Yes | 217 | 98.6 |
| | Non-response | 3 | 1.4 |
| | Total | 220 | 100.0 |
| Apgar at 5 minutes | Yes | 217 | 98.6 |
| | Non-response | 3 | 1.4 |
| | Total | 220 | 100.0 |

Among the recorded status of new born 80.0% of new born was LFT, 1.8% were premature, 0.9% was FSB and 0.5% recorded as macerated. It was noted that 16.8% partographs were not completed (Figure 4).

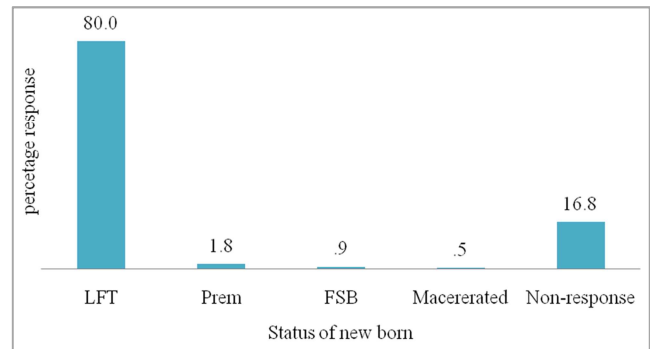


Figure 4. Status of new born.

The new-born's sex was recorded in 99.5% of the partographs, abnormalities in 50.5%, weight in 99.1%, length in 54.1%, head circumference in 54.5% baby to nursery in 7.7% of the partographs, delivery by signature in 98.6% of the partographs (Table 11).

Table 11. New born characteristics records completeness.

| | | n | % |
|--|--------------|-----|-------|
| Sex | Yes | 219 | 99.5 |
| | No | 1 | .5 |
| | Total | 220 | 100.0 |
| Abnormalities | Yes | 111 | 50.5 |
| | No | 109 | 49.5 |
| | Total | 220 | 100.0 |
| Weight | Yes | 218 | 99.1 |
| | No | 2 | .9 |
| | Total | 220 | 100.0 |
| Length | Yes | 119 | 54.1 |
| | No | 99 | 45.0 |
| | Non-response | 2 | .9 |
| Head circumference | Yes | 120 | 54.5 |
| | No | 98 | 44.5 |
| | Non-response | 2 | .9 |
| Baby to Nursery | Yes | 17 | 7.7 |
| | No | 201 | 91.4 |
| | Non-response | 2 | .9 |
| Delivered by (Circle if signed or not) | Yes | 217 | 98.6 |
| | Non-response | 3 | 1.4 |
| | Total | 220 | 100.0 |

(ii). Third Stage of Labour

93.2% of the partographs had information on time of delivery of placenta, 99.5% had mode of delivery record completed, 93.6% had records on blood loss completed, 96.4% had placenta recorded completed and another 93.6% membranes record completed (Table 12).

Table 12. Third stage of labour records completeness.

| | | n | % |
|------------------------------|--------------|-----|-------|
| Time of delivery of placenta | Yes | 205 | 93.2 |
| | No | 14 | 6.4 |
| | Non-response | 1 | .5 |
| | Total | 220 | 100.0 |
| Mode of delivery | Yes | 219 | 99.5 |
| | Non-response | 1 | .5 |
| | Total | 220 | 100.0 |

| | | n | % |
|------------|---------------|-----|-------|
| Blood loss | Yes | 206 | 93.6 |
| | No | 12 | 5.5 |
| | Non-response | 2 | .9 |
| | Total | 220 | 100.0 |
| Placenta | Completed | 212 | 96.4 |
| | Not indicated | 8 | 3.6 |
| | Total | 220 | 100.0 |
| Membranes | Completed | 206 | 93.6 |
| | Not indicated | 14 | 6.4 |
| | Total | 220 | 100.0 |

(iii). Perineum

78% of the partographs had the records on perineum 1% had no record and 21% had not been indicated.

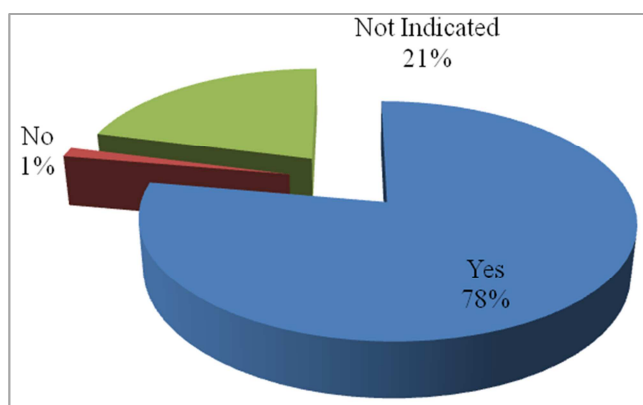


Figure 5. Completeness of perineum records.

(iv). Postnatal Check

97% of partographs had records on postnatal check records (figure 6).

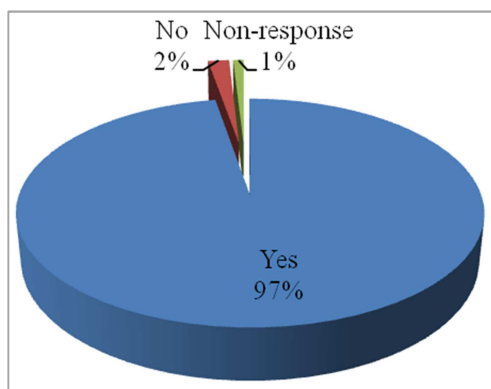


Figure 6. Completeness of postnatal records.

3.2. Relationship Between Maternal and Foetal Outcomes to the Completeness of the Partograph

The Who modified partograph with the explanatory variables on the three components are foetal monitoring (FHR, moulding, liquor); maternal monitoring (blood pressure, pulse, temperature); labour progress (descent, contractions, cervical dilation, crossing of alert line and reaching of action line). The maternal outcome was the methods of delivery which were SVD, breech, vacuum extraction and C/S. There was no maternal death among the

partographs which were reviewed.

3.2.1. Association Between Use of Partograph and Maternal Outcome

Chi-square test was performed to determine association between use of the partograph and the delivery methods (SVD, C/S, Breech and Vacuum Extraction). Method of delivery had a significance association with foetal monitoring (foetal heart rate, liquor, and moulding), labour progress monitoring (descent, contractions and cervical dilatation) and referral monitoring at $\alpha = 0.05$. The association between method of delivery and foetal monitoring (foetal heart rate, liquor, and moulding), labour progress monitoring (descent, contractions and cervical dilatation) and referral was found to be significantly high as indicated by Phi and Cramer's Values (foetal monitoring (foetal heart rate = 0.347, liquor = 0.244, and moulding = 0.242), labour progress monitoring (descent = 0.254, contractions = 0.275 and cervical dilatation = 0.251) and referral = 0.235). These values imply foetal monitoring (foetal heart rate, liquor, and moulding), labour progress monitoring (descent, contractions and cervical dilatation) could help determine the appropriate method of delivery.

However, monitoring of gravida, parity, maternal monitoring (blood pressure, pulse rate and temperature) reaching of action line and crossing of action line did not have significant association with delivery method at $\alpha = 0.05$. The study further noted a moderate association between method of delivery and use of partograph factors such as gravida, parity, maternal monitoring (blood pressure, pulse rate and temperature) reaching of action line and crossing of action line; these can be deduced from Phi and Cramer's values which ranged from 0.098 to 0.152 with gravida recording Phi and Cramer's value of 0.098, parity = 0.098, maternal monitoring (blood pressure = 0.152, pulse rate = 0.152 and temperature = 0.158) reaching of action line = 0.102 and crossing of action line = 0.132. The association between method of delivery and maternal monitoring tended to be slight high though not significant.

3.2.2. Association Between Use of Partograph and Foetal Outcome

The use of partograph had effect on the status of the new born. The baby could be born LFT, premature, FSB or macerated. There was a significant association between foetal outcome and contraction, gravidity, parity, foetal heart rate and moulding ($\alpha = 0.05$). The association was more strong between foetal outcome and gravida, parity and foetal heart rate (p-value < 0.01) with 99% confidence. There was existence of strong association between foetal outcome and contraction, gravida, parity, foetal heart rate and colour of liquor as shown by a Phi and Cramer's values of 0.243, 0.495, 0.496, 0.505, and 0.232 respectively. However, the association between foetal outcome and liquor, descent, cervical dilatation, crossing of alert line and the reaching of action line was not significant. Consequently, the association between foetal outcome and liquor, descent, cervical dilatation, crossing of alert line and the reaching of action line was found to be weak as implied by Phi and Cramer's

values of 0.139, 0.031, 0.031, 0.094 and 0.032 respectively. The findings of this study additionally indicated a strong association between delivery method, foetal outcome and the contraction, foetal heart rate and moulding. This implies that monitoring of contraction, foetal heart rate and moulding could help anticipate the method of delivery and the status of new born.

3.2.3. Probability of Foetal Death and Use of Partograph

Foetal outcomes (alive or dead) were assessed against the explanatory variables (parameters on the partograph) to find the probability of foetus dying if the parameters were not monitored. The odds of delivering a dead foetus were significantly reduced by 66.7% when monitoring of FHR and liquor was done and 33.3% in monitoring moulding. Checking for state of liquor after membrane rupture also reduced the odds of foetal death by 100%. Monitoring of cervical dilatation reduced the odds of foetal death by 100%. It was also observed that monitoring of descent and contractions reduced the odds of foetal death by 100%. The results of the study also found that where the alert line was not crossed as well as the cases where action line was not reached, no foetal death occurred. This implies that the probability that no foetal death will occur if the alert line is not crossed or action line reached was 1.

4. Discussion

In order to understand the relationship between parameters, we started discussing the review of partographs and completeness of the maternal, foetal and labour. The study examined completeness of various components of partographs in Makueni county referral hospital and Makindu sub county hospital. The components of partograph examined includes personal details, admission details, examination on admission, foetal monitoring, labour process, maternal monitoring, first vaginal examination, second stage of labour, third stage of labour, perineum and postnatal check. On admission details, most of partographs had admission date, admission time date and time of onset labour and date and time membranes ruptured completely filled. However, there was little record on abnormal symptoms. There was also high completeness on examination on admission and referral cases. However, in some cases details on referral were missing. Under foetal monitoring, it was found majority of partographs had records on foetal heart rates (92.7%), liquor (86.4%) and moulding recorded but low plotting (80%). Labour process record is another component of partograph that was found important for this study. Majority of partograph had records on cervical dilation (95%), descent (94.5%), contractions (94.5%) and low record on reaching of action. It was also noted that number of time the plotting of cervical dilation, descent and contractions were distributed with a mean of 2.28 ± 0.873 , 2.25 ± 0.837 , 5.53 ± 0.828 . The results of this study noted the completion rate on labour process, maternal monitoring, first-vaginal examination, second-stage of

labour, third-stage of labour, perineum and postnatal check were adequately completed in most of partographs. These results are higher than those of a Ghanaian study [19] whereby parameters pertaining to the progress of labour (contractions, cervical dilatation and descent) recording to standard occurred in 55-60% of cases. In Accra (Ghana) [13] it was found out that only 25.6% were recorded to standard while in an Ethiopian study, cervical dilatation, uterine contractions and descent were recorded to standard in 32%, 21% and 6.9% respectively [20]. In at least 40% of cases in this study, abnormal/slow progress could not have been identified since parameters pertaining to labour progress were not recorded as expected. These results point out the lack of understanding of what the partograph is designed for. Of the parameters pertaining to Foetal wellbeing (heart rate, moulding and nature of liquor), foetal heart rate was recorded properly in about half of cases. The other parameters were recorded to standard in about a third of cases. A study in Ethiopia [21] also revealed that in 73 (30.5 %) partograph forms, foetal heart rates were not totally recorded and the documentation were substandard in 59 (24.7 %) and standard in 107 (44.8) partograph forms. The finding further revealed that moulding for the great majority (94.1 %) of partograph forms were not recorded, and 11 (4.6 %) partographs were documented to substandard and 3 (1.3 %) to standard level. For the relationship between maternal and foetal outcomes to the completeness of the partograph, the method of delivery had a significance association with foetal monitoring (foetal heart rate, liquor, and moulding), labour progress monitoring (descent, contractions and cervical dilatation) and referral monitoring ($\alpha=0.05$). The association between method of delivery and foetal monitoring (foetal heart rate, liquor, and moulding), labour progress monitoring (descent, contractions and cervical dilatation) and referral was found to be significantly high. There was a significant association between foetal outcome and contraction, gravidity, parity, foetal heart rate and moulding ($\alpha = 0.05$). The study found that the association was more strong between foetal outcome and gravida, parity and foetal heart rate ($p < 0.01$). The study further noted existence of strong association between foetal outcome and contraction, gravida, parity and foetal heart rate. The odds of delivering a dead foetus were significantly reduced by 66.7% when monitoring of FHR and liquor was done and 33.3% in monitoring moulding. Checking for membrane rupture also reduced the odds of foetal death by 100%. This is in contrast with a study done in Ethiopia [19] which showed that the odds of foetal deaths and use of partograph had a weak association. The odds of foetal deaths were reduced by 59.5% when proper monitoring of the FHR was done. Monitoring of cervical dilatation reduced the odds of foetal death by 100%. It was also observed that monitoring of descent and concentrations reduced the odds of foetal death by 100%. The study also found that where the alert line was not crossed as well as the cases where action line was not reached, no foetal death occurred.

5. Conclusion

The study concludes that most of midwifery care-providers partially filled partographs. The study further concludes that there exist a significant association between partograph completeness and maternal, foetal outcomes and labour progress in Makueni County. This implies in cases where maternal, foetal outcomes and labour progress is positive, there is high likelihood of having a properly filled partograph filled. The study recommends increased mobilization and routine check by supervisors to ensure partographs are filed on time. The study recommends assessing the effects of utilization of the modified world health organization (WHO) partograph on quality of maternal health.

Ethical Considerations

Ethical approval was sought from Kenyatta University Research Ethics Committee. Research permit was applied from the National Commission for Science, Technology and Innovation (NACOSTI). Approval by the County administration and Hospital Management Teams of the various hospitals was also sought. Informed written consent was obtained from each study participants, before the data collection exercise. Any personal identification of the study participants was not recorded during data collection. Confidentiality of information was observed by keeping the questionnaires and data in a lockable place. Data collected was used for the purpose of this study only.

Further Research

The study recommends further research to assess documentation of partograph by using direct observation method of data collection to avoid report bias as well as to make sure whether the filled partograph forms are filled appropriately or not at the spot.

Policy Implications

The results of this study will help health care leaders of the county to focus on completeness of the partograph by initiating trainings of health workers on impact of completeness of a partograph if the county is committed to reduce the burden of maternal and infant mortality in Makueni County.

Authors Contributions

UMM conceptualized the study, developed the proposal and drafted the final report. MGN reviewed the proposal and guided UMM throughout the study. MS reviewed the methodology and the final report.

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Conflict of Interest

Authors declare no conflict of interest.

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