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# Partograph Utilization and Associated Factors among Obstetric Care Providers in Public Hospitals, Addis Ababa, Ethiopia, 2021

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## ABSTRACT

**Background**
Worldwide, 13% of maternal deaths were caused by protracted and difficult labour, which can be decreased by wise use of the partograph while giving birth. It is crucial to spot any irregularity during labour by employing a partograph during professional aided delivery. Partograph use is influenced by a variety of circumstances according to the literature however, the extent of partograph use and the associated factors are not well understood in the research area. The purpose of this study was to assess the magnitude of partographs utilization and associated factors among obstetric care providers in public hospitals in Addis Ababa, Ethiopia, 2021.

**Methods**
A cross-sectional study was carried out at 296 obstetric care providers in selected public hospitals in Addis Ababa, Ethiopia. Systematic random sampling techniques were used to select study participants. A structured self-administered questionnaire and direct observation was used to collect data. Epi-data version 4.6 was used to enter the collected data, which was then exported to statistical package for the social sciences (SPSS) version 26 for analysis. Variables with $p$-value≤0.25 were included in the multivariable model to control for confounders. The statistical significance level was declared at $p$-value≤0.05.

**Results**
The study included 296 (100%) obstetric care providers. 184 (62.0%) of those who used partographs did so on a regular basis for all laboring mothers. Service year ≤5-years (AOR=10.66, 95% CI: 3.11, 36.51) and 5-10-years (AOR=4.74, 95% CI: 1.27, 17.73), on-the-job training (AOR=2.72, 95% CI (1.53, 4.83), knowledge (AOR=2.78, 95% CI (1.29, 5.99) and attitude (AOR=4.11, 95% CI (2.31, 7.32).

**Conclusion**
The overall utilization of partographs was low. Partograph utilization was significantly associated with service year (year of work experience), on-the-job training, partograph knowledge, and obstetric care providers' attitudes toward partograph. To follow the progress of labour, these observation findings indicated that molding of fetal head, status of amniotic fluid, continuous monitoring of maternal and fetal condition was lacking.

**Keywords**
Utilization; Partograph; Obstetric care providers; Ethiopia.

## INTRODUCTION

Partograph is a useful tool for monitoring labour, and when used correctly, it helps to avoid obstructed labour, which accounts for about 8% of maternal deaths worldwide. As a result, it functions as a "early warning system", assisting in early transfer decisions, intervention decisions in hospitals, and ongoing evaluation of the effectiveness of interventions. The World Health Orga-

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nization (WHO) has promoted partograph as the "gold" standard for assessing labour progress in most low-resource countries such as Ethiopia.[1]

In 2015, approximately 303,000 maternal deaths occurred worldwide during and after pregnancy or childbirth. Almost all the deaths, 99%, occurred in developing countries, with 546 per 100,000 live births occurring only in Sub-Saharan Africa.[2] The WHO suggests using the partograph to monitor labor and delivery in order to improve health care and reduce maternal and fetal morbidity and mortality.[3,4] The partograph is a graphic representation of labor and is an excellent visual resource for examining the cervix, uterine contractions, and fetal presentation in relation to time. However, poor utilization of the partograph was discovered in public health institutions, indicating poor monitoring of mothers in labor and/or poor pregnancy outcome.[5]

The global burden of maternal mortality is not evenly distributed. Sub-Saharan Africa has by far the highest obstetric risk. In 2015, the maternal mortality ratio (MMR) for Sub-Saharan Africa was estimated to be close to (546/100,000) live births, three times that of South Asia (182/100,000), eight times that of Latin America and the Caribbean (68/100,000), and more than 30 times that of industrialized countries (16/100,000).[2]

When partograph is used effectively, it prevents obstructed labor, which accounts for about 8% of maternal deaths worldwide and 13% maternal deaths in Ethiopia. It serves as an "early warning system".[6] In the absence of early detection and monitoring, the improvement of labor as a result of poor partograph utilization may result in obstructed labor and other obstetric problems. Lack of pre-printed partograph in health institutions, being a general practitioner, and poor knowledge and attitude toward partograph were the reasons for not using partograph during labor; however, all of these barriers to partograph use can be overcome by pre-service and on-the-job training on partograph.[7]

Evidences from developing country including Ethiopia established that the utilization of partograph is poor despite making the tool that is simple and cheap for *intra partum* monitoring of labor.[8] In Ethiopia, since the major sources of maternal and neonatal morbidity and mortality are related to poor labor and delivery care.[9] Despite the fact that partograph is a tool that can help manage obstructed labor and avoid prolonged labor with its complications, the level of utilization and factors influencing use among obstetric care providers have not been studied in the study area. However, little is known about the use of partograph among health care providers; thus, the goal of this study was to assess the use of partograph and associated factors among obstetric care providers in Addis Ababa public hospitals in Ethiopia.

## MATERIALS AND METHODS

### Study Area, Design and Study Period

The study was carried out in public hospitals in Addis Ababa. Addis Ababa is the capital city of Ethiopia and the headquarters of the African Union and the United Nations World Economic Commission for Africa. It has 11 sub-cities and a total area of 527 square kilometres. According to population projections for 2020, the city has an estimated population of 4.592 million people.[10] The city has twelve public hospitals. As a result, the study was carried out in five Addis Ababa public hospitals that were chosen at random. These selected hospitals are Gandhi Memorial hospital, Ras-Desta Damtew memorial hospital, St' Paul's Hospital millennium medical college hospital, Yekatit 12 hospital medical college and Zewditu memorial hospital. An institution based cross-sectional study design was conducted. Before starting data collection, ethical clearance was secured from the Institutional Review Board (IRB) of the Rift Valley University.

### Population

The source populations were all obstetric care providers in public hospitals in Addis Ababa. The study population consisted of obstetric care providers working in the maternity units of various public hospitals.

### Inclusion and Exclusion Criteria

Participants were enrolled in the study after receiving confirmation to work in delivery units on a regular basis, by rotation, or at night duty, regardless of how long the provider stayed in the delivery unit. Those who refused to participate voluntarily were excluded from the study. In addition, providers on annual leave and sick leave were excluded from the study.

### Sample Size and Sampling Procedure

The sample size (n) was determined by using single population proportion formula, and calculated by taking the following statistical assumptions.

p=the proportion taken from the research done North Shoa Zone were (40.2%)[11]
Z α/2=the corresponding Z-score of 95% CI
d=Margin of error (5%)
N=Sample size

$$N=\frac{Z\,(a/2)^2\,P\,(1-P)}{d^2}=\frac{(1.96)2\times0.402\times0.598}{0.0025}=370$$

Since, the source population was less than 10,000, correction factor was used to estimate the final sample size required.

$$n=\frac{no}{1+\frac{no}{N}}$$

nf=final sample size
N=total number of source population 983

$$nf=\frac{370}{1+\frac{370}{983}}=268.8$$

$$nf=269$$

Taking non-response rate, the total sample size for this study was 269+27=296

**Second objective sample size calculation for different factors associated with partograph utilization:** For the second specific objective sample size is calculated considering two population proportions using Epi-info version 7.0. Factors which were significantly related with dependent variable were used based on the following assumptions 95% level of confidence, 80% power and finally the two-sample size is compared and formula that provide maximum sample size was used (Table 1).

Therefore, from the calculation of sample sizes for both objectives, the maximum sample size from objective one was taken 296 as sample size for this study.

### Sampling Procedure and Technique

The research was carried out in public hospitals in Addis Ababa that had a labor and delivery unit. Except for Amanuel Hospital, each of the 12 public hospitals has its own labor and delivery unit. Five hospitals (Gandhi Memorial Hospital, Ras-Desta Damtew memorial hospital, St' Paul's Hospital millennium medical college hospital, Yekatit 12 hospital medical college, and Zewditu memorial hospital) are chosen at random from the remaining 11 hospitals. Simple random sampling was used to collect samples of obstetrician and gynecologists, residents, interns, general practitioners, and midwives from labor and delivery units at each hospital. Each hospital's delivery units provided a list of obstetric care providers. The sample size is distributed proportionally to each hospital's delivery units.

### Study Variables

The dependent variable was partograph utilization, while the independent variables were socio-demographic characteristics like, Sex, age, service year, educational. Knowledge: Pre-service and in-service training. Workload, supervision, and the availability of pre-printed partographs and equipment to perform vital signs and pens are all challenges for health care facilities. Attitudes toward the use of partographs:

### Operational Definitions/Definition of Terms

**Partograph utilization:** It was determined by the number of obstetric care workers who routinely used partograph for all labouring mothers.

**Obstetric care providers:** These include obstetrician and gynaecologists, residents, interns, general practitioners, and midwives who deliver babies on a regular, rotating, and duty schedule.

**Not utilizing partograph:** Obstetric care workers who have only used partograph occasionally or infrequently are not using it.

**Knowledgeable:** Obstetric care workers who answer knowledge-related questions with a mean value or higher.

### Data Collection Tool and Procedure

The survey questionnaires are adopted from different literature developed for similar purposes by different authors.[9,11-13] The questionnaires were written in English and were intended to collect information about study participants as well as various variables pertaining to the magnitude and determinants of partograph utilization. The questionnaire was used to gather information on the professional characteristics of obstetric care providers, as well as their knowledge, practices, and attitudes toward partograph. Questions about partograph were used to assess knowledge, practice, and attitude. Both supervisors received two days of training prior to the actual work on the purpose of the study, procedures, and data collection techniques effectiveness through the questionnaires, as well as explanations on the way. Direct observations were undergone by principal investigator among 296 items recorded from each hospital whether they use the partograph in obstetric ward/unit, during active first stage of labor while they follow women in labor and how they use and fill parameters on the chart, by using structured checklist which were developed from the partograph.

### Data Analysis Procedure

Epi Data version 4.6 was used to enter data, and statistical package for the social sciences (SPSS) Software version 26 was used to analyse it. The mean, standard deviation, frequency, percentage, and odds ratio were computed. Following data entry and coding, descriptive statistics such as proportion, frequencies, cross tabulation, and measure of central tendency will be calculated. To account for all potential confounders, all variables with *p*-values of ≤0.25 were included in the multivariable model. The level of as-

**Table 1.** *Calculated Sample Size for Factors Associated with Partograph Utilization among Obstetric Care Providers*

| Factors | CI | Power (1-β) | Ratio | Proportion of Outcome among Exposed | Proportion of outcome among unexposed | OR | Sample Size(n) | Final sample size (by adding 10% non-responses...) | Source |
|---|---|---|---|---|---|---|---|---|---|
| Work place | 95% | 80% | 1 | 26.0% | 45.7% | 2.96 | 130 | 143 | 20 |
| Availability of partograph | 95% | 80% | 1 | 74.1% | 10.4% | 8.8 | 50 | 55 | 12 |
| Knowledge | 95% | 80% | 1 | 48.6% | 20.2% | 3.79 | 98 | 108 | 11 |
| Getting on job training | 95% | 80% | 1 | 51.0% | 24.4% | 2.86 | 146 | 161 | 11 |

sociation between dependent and independent variables was determined using an odds ratio with a 95% confidence interval and a *p*-value of ≤0.05.

## RESULTS

### Socio-Demographic Factors of the Study Participants with their Index Mothers

The study included 296 obstetric care providers (response rate=100.0%). Female midwives accounted for 152 (51.4%), while male midwives accounted for 144. (48.6%). The average age of midwives at the time was 29.4-years, with a standard deviation of (4.4). Approximately 224 (75.7%) of the obstetric care professionals had less than 5-years of experience. Those who served 5-10-years were 52 (17.6%), while those who served more than 10-years were 10 (6.8%). In terms of profession, 183 (61.8%) had a BSc in midwifery and 46 (15.5%) were residents (Table 2).

### Partograph Utilization

Almost all 296 (100%) obstetric care providers responded because they use a partograph to monitor labor. Of those who used partograph on a regular basis, 184 (62.0%) used it regularly, while 112 (38.0%) did not (Figure 1).

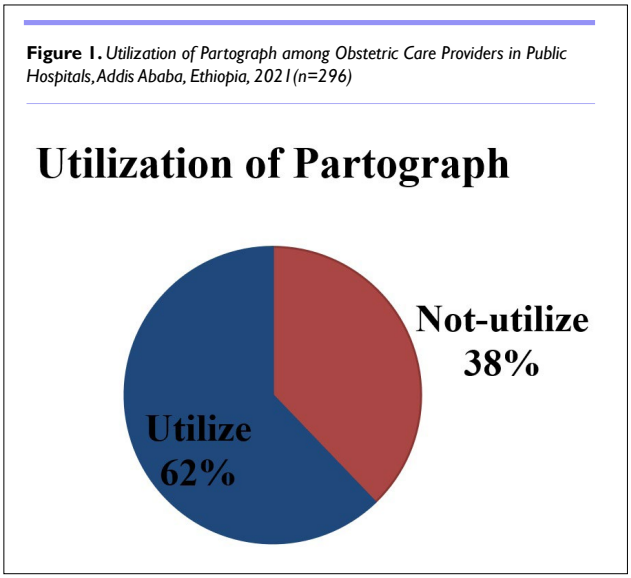
**Table 2.** *Socio-demographic Characteristics of Study Participants in Rift Valley University, Abichu Campus, Addis Ababa, Ethiopia, 2021 (n=296)*

| Variables | Frequency | Percentage % |
|---|---|---|
| **Age** | | |
| <24 | 24 | 8.1 |
| 25-29 | 141 | 47.6 |
| 30-34 | 105 | 35.5 |
| >35 | 26 | 8.8 |
| **Sex** | | |
| Male | 144 | 48.6 |
| Female | 152 | 51.4 |
| **Marital Status** | | |
| Single | 166 | 56.1 |
| Married | 125 | 42.2 |
| Divorced | 5 | 1.7 |
| **Service Year** | | |
| <5-years | 224 | 75.7 |
| 5-10-years | 52 | 17.6 |
| >10-years | 10 | 6.8 |
| **Training on Partograph** | | |
| Yes | 172 | 58.1 |
| No | 124 | 41.9 |

### Knowledge of Obstetric Care Provider about Partograph

The overall score of obstetric care providers with good knowledge of partograph utilization was 249. (84.1%, CI: 79.7-88.2%). The majority of 256 (86.5%) of them define partograph, and the majority of 83.1% of the women know when to begin plotting partograph at 4 cm cervical dilation. 77.5% of mothers are in the active first stage of labor and require the use of a partograph.

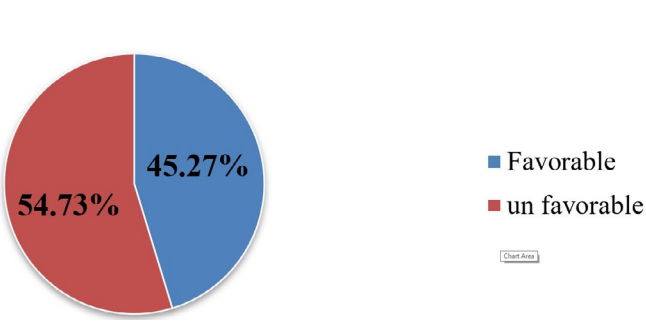
**Figure 1.** *Utilization of Partograph among Obstetric Care Providers in Public Hospitals, Addis Ababa, Ethiopia, 2021 (n=296)*




### Attitude of Obstetric Care Providers Toward Partograph Utilization

The majority of study participants, 187 (54.7%), were negative about using partographs, while the remaining 15 (45.3%) were positive. According to this study, the main factors influencing those who did not use the partograph on a regular basis were a lack of commitment, a lack of partograph availability in the labor ward, a lack of orientation, and a lack of supervision (Figure 2).

**Figure 2.** *Attitude Score of Partograph Utilization by Obstetric Care Providers of Public Health Institution in Public Hospitals, Addis Ababa, Ethiopia, 2021 (n=296)*




### Observational Parameters

Among the total parameters on the partograph (client name and card number) were completed properly. Molding of fetal head and status of amniotic fluid were never recorded in all client sheet other parameters also not monitored timely according to the standard (Table 3).

**Table 3.** *Items Recorded by Obstetric Health Providers in Partographs While Attending Labour in Selected Public Hospitals of Addis Ababa, Ethiopia, 2022 (n=296)*

| Variables | Frequency | Percentage %) |
|---|---|---|
| **Client Name** | | |
| Yes | 100 | 100 |
| No | 0 | 0 |
| **Card Number** | | |
| Yes | 100 | 86.1 |
| No | 0 | 13.9 |
| **Date and Time of Admission** | | |
| Yes | 233 | 78.7 |
| No | 63 | 21.3 |
| **Time of Rupture of Membrane** | | |
| Yes | 64 | 21.6 |
| No | 232 | 78.4 |
| **Status of Amniotic Fluid** | | |
| Yes | 0 | 0 |
| No | 296 | 100 |
| **Descent of the Head** | | |
| Yes | 0 | 0 |
| No | 296 | 100 |
| **Maternal Temperature** | | |
| Yes | 242 | 81.8 |
| No | 54 | 18.2 |
| **Maternal Pulse** | | |
| Yes | 221 | 74.5 |
| No | 75 | 25.3 |
| **Maternal Blood Pressure** | | |
| Yes | 221 | 74.5 |
| No | 75 | 25.3 |
| **Gravida/Para** | | |
| Yes | 122 | 41.2 |
| No | 174 | 58.8 |
| **Client Name** | | |
| Yes | 187 | 63.2 |
| No | 109 | 36.8 |
| **Uterine Contraction** | | |
| Yes | 203 | 68.6 |
| No | 93 | 31.4 |
| **Client Name** | | |
| Yes | 216 | 73.0 |
| No | 80 | 27.0 |

### Factors Associated with Partograph Utilization by Obstetric Care Providers

The independent and dependent variables' associations were first tested using bi-variable analysis variables that were associated ($p \leq 0.25$) were tested in the final multivariable analysis to see if they had a significant association with partograph utilization (Table 4).

## DISCUSSION

The aim of this study was to identify utilization of partograph and associated factors among obstetric care providers in public hospitals, Addis Ababa, Ethiopia, 2021. About 184(62.0) percent of people were determined to be partograph users. This finding is lower than studies conducted in Delta Region of Nigeria (98.8%),[8] Calabar, Nigeria (80.7%),[14] in Addis Ababa city administration, Ethiopia (68.9%)[15] and Tigray, northern Ethiopia (73.3%).[16] However, it was higher than the findings in India Mahatma Gandhi University (50%),[17] in Ethiopia, Amhara region North Shoa Zone (40.2%)[13] and Jimma University Specialized Hospital (6.9%).[7] Variations in these results could be attributed to methodological differences, such as differences in the study population, study setting, and time period; the availability of well-organized and coordinated programs, strategies, and policies; and the commitment to using

**Table 4.** *Bi-variable and Multivariable Logistic Regression for to Partograph Utilization among Obstetric Care Providers in Public Hospitals, Addis Ababa, Ethiopia from April to July, 2021 (n=296)*

| Variables | Partograph Utilization | | COR (95% of CI) | AOR (95% of CI) |
|---|---|---|---|---|
| | No | Yes | | |
| **Sex** | | | | |
| Male | 46(33.3%) | 92(66.7%) | 1.44(0.89-2.31)* | 1.63(0.92-2.88) |
| Female | 66(41.8%) | 92(58.2%) | 1 | 1 |
| **Service Year** | | | | |
| < 5-years | 74(33.0%) | 150(67.0%) | 6.08(2.13-17.37)* | 10.66(3.11-36.51)* |
| 5-10-years | 23(44.2%) | 29(55.8%) | 3.78(1.19-11.95)* | 4.74(1.27-17.73)* |
| >10-years | 15(75.0%) | 5(25.0%) | 1 | 1 |
| **Training on Partograph** | | | | |
| Yes | 50(30.2%) | 120(69.8%) | 2.16(1.34=3.49)* | 2.72(1.53-4.83)* |
| No | 60(48.4%) | 64(51.6%) | 1 | 1 |
| **Knowledge** | | | | |
| Yes | 83(33.3%) | 166(66.7%) | 2.29(1.42-3.72)* | 2.78(1.29-5.99)* |
| No | 29(61.7%) | 18(38.3%) | 1 | 1 |
| **Attitude** | | | | |
| Favorable | 31(23.1%) | 103(76.9%) | 3.32(2.00-5.51)* | 4.11(2.31-7.32)* |
| Unfavorable | 81(50.0%) | 81(50.0%) | 1 | 1 |
| **Partograph always available** | | | | |
| Yes | 90(34.7%) | 169(65.3%) | 2.75(1.36-5.57)* | 1.81(0.79-4.11) |
| No | 22(59.5%) | 15(40.5%) | 1 | |

*1=Reference; *Statistically significant by COR at p-value≤0.25; **Statistically significant by AOR at p-value<0.05*

partograph on a regular basis for each laboring mother. Another reason could be the effectiveness of mentoring, the supportive nature of monitoring, and caretakers' attitudes toward the use of partographs.

When compared to service years of 5-10-years, clinical service years/work experience of 5 was 11 times more likely to use partograph. Furthermore, those with clinical service years of 5-10-years were 5 times more likely to use partograph than those with work experience of >10-years. This finding is consistent with a study conducted in Nigeria's Niger Delta region (2=4.818, df=4, *p* 0.05),[8] in North Shoa, Ethiopia,[11] and in Wolaita Zone, southern Ethiopia.[18] This may be due to the fresh knowledge those health provider have and also they may believe that they have to stick to procedures as per their school exposure and avoiding risk because of their lack of experience.

Furthermore, obstetric care providers who received on-the-job partograph training were approximately three times more likely to use partograph routinely than those who did not receive on-the-job partograph training. This finding is consistent with the North Shoa, Northern Ethiopia study. (AOR=2.86; 95% confidence interval: 1.69-4.86),[13] in East Gojam Zone, Northwest Ethiopia,[9] in Tigray, northern Ethiopia,[19] in hospitals of Western Oromia, Ethiopia,[12] and study done in Amhara, Ethiopia.[14] This could be because obstetric care providers who received on-the-job training had more knowledge about partograph than others, which improved their partograph utilization.

Health workers who were knowledgeable about partograph were approximately three times more likely than those who were not to use partograph on a regular basis. A comparable study was carried out in Ethiopia's west Shoa zone,[13] in Hadiya Zone, Southern Ethiopia,[20] in East Gojam Zone, Northwest Ethiopia[9] Bale Zone Ethiopia,[12] Ghana,[5] Nigeria Calabar University,[14] India[17] and Nigeria Enugu metropolis.[8] This allows them to anticipate when critical stages of labour will occur and to make decisions about alternatives such as referral and caesarean section.

In addition to the aforementioned factors, those with a favourable attitude toward partograph utilization were approximately four times more likely than their counterparts to use partograph on a regular basis. Partograph use was significantly higher among obstetric care providers with a positive attitude compared to those with an unfavourable attitude. This finding is consistent with the findings of a study conducted in North Shoa, Northern Ethiopia (AOR=2.35, 95% CI: 1.14, 4.87),[13] in Hadiya Zone, Southern Ethiopia[20] and also line with study done in Amhara region, North Ethiopia.[11] This could be due to the fact that, having a good attitude towards partograph utilization might come after having knowledge about partograph that may influence the utilization of partograph.

## CONCLUSION

The study found that a higher proportion of obstetric care providers use partograph to track the progress of labor than in previous studies. Service year (year of work experience), on-the-job training, partograph knowledge, and obstetric care providers' attitudes toward partograph were all significantly associated with partograph utilization. Lack of commitment, lack of availability of partograph

in the labor ward, lack of orientation, and lack of supervision were all reasons for not using partograph during labor. The majority of partograph parameters are only plotted once upon admission, and some providers just complete the operation (conducted delivery) and then attach the partograph paper to the client card to complete the format for reporting. This will endanger both the mother and the unborn child. Additionally, great attention must be paid to the fact that specialists are unaware of the commencement time and application of a partograph in order to prevent difficulties.

## DECLARATIONS

### Ethical Considerations

The department of adult health nursing at Rift Valley University Abichu campus's Research and Ethics Committee was consulted for ethical approval. To obtain permission to conduct the study at the selected hospitals, an official letter was obtained from the department of adult health nursing at Rift Valley University. The Addis Ababa public health research and emergency management directorate provided ethical approval. All information provided by respondents was used solely for research purposes, and confidentiality and privacy were maintained by omitting the respondents' names during the data collection procedure, and after data collection information from the study was placed without participants' names, and the questionnaires were locked with a key.

### Availability of Data and Materials

The data and other documents used in this study are available from the corresponding author.

### Author's Contributions

MG: Conceptualization, Methodology, Data entry, Data cleaning, Data analysis, writing original draft, GS, YG, AT, EM and DB, validation, tool evaluation, methodology, reviewing and editing. Finally, all authors approved the manuscript.

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### Consent for Publication

All authors approved that this manuscript is eligible for publication.

### Conflicts of Interest

The authors declare that they have no conflict of interest.

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