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Prevalence and associated factors of preterm birth in Ethiopia: systematic review and meta-analysis protocol

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ABSTRACT

Introduction Preterm birth (PTB) complications are the leading cause of death among neonates globally. The reduction in neonatal mortality is not remarkable in Ethiopia. Therefore, this review will assess the magnitude and associated factors of PTB in Ethiopia.

Methods and analysis The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline will be followed during the systematic review. We will include all observational studies published from 1 January 2009 to 31 December 2019 that examined the level and/or associated factors of any type of PTB among live births in Ethiopia. Inclusion criteria will be all live births, PTB defined as delivery before 37 weeks gestation. The primary outcome will be PTB <37 weeks, and secondary outcomes including PTB <34, <32 and <28 weeks will be analysed. PubMed and Science Direct databases as well as Google search engine and Google Scholar will be searched. The pooled prevalence of preterm and effect size of association for associated factors will be analysed using the Stata software V.14. The heterogeneity between studies will be measured by I^2 statistics. A random-effects model will be used to estimate if heterogeneity detected. Publication bias will be assessed using a funnel plot. Subgroup analysis will be sought based on possible characteristics of the studies, specific morbidity (like pre-eclampsia, hypertension), type of PTB (spontaneous or iotrogenic) and quality of study (high-quality or low-risk). Meta-regression will be considered for major covariates (maternal age and maternal body mass index) related to PTB. Forest plots will be used to present the combined estimate with 95% CIs. The quality of evidence of the outcomes will be assessed with the GRADE (Grading of Recommendations, Assessment, Development and Evaluations) approach.

Ethics and dissemination No ethical approval is necessary for this systematic review. The findings will be published in a peer-reviewed journal.

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Strengths and limitations of this study

► The proposed study will provide updated knowledge on the prevalence of preterm birth (PTB), leading cause of neonatal death, in Ethiopia where reduction in neonatal mortality is not remarkable.
► The proposed study will provide a comprehensive knowledge on the associated factors of PTB in Ethiopia.
► The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline will be followed during the proposed systematic review.
► Standard tool for critical appraisal and data extraction will be used.
► Only quantitative observational studies published in English will be included.

reasons.[2] Currently, WHO is committed to reduce the health problems and lives lost as a result of PTBs.

Globally, 14.9 million babies born preterm making a birth rate of 11.1%, ranging from 5% to 18%, in 2010.[3] The majority (60%) of these births occurred in sub-Saharan Africa and South Asia where 52% of global live births occur. The estimated global PTB rate was also 10.6%, 14.84 million live PTBs, in 2014.[4] Twelve million (81·1%) of these PTBs occurred in Asia and sub-Saharan Africa[4] showing the contribution is raised from 2010. Ethiopia is one of the low/middle-income countries in sub-Saharan Africa.

PTB remains a crucial issue in child mortality and improving quality of maternal and newborn care.[4] Complications of PTB is the leading cause of death among under-five children with risk of dying ranged between 1.9 and 155.1 per 1000 live births, in 2015.[5] In the same report, it had been found as the leading cause of death among neonates contributing for 0.944 million deaths. Complication of infants born preterm result in significant cost to the health sector, parents and the society

INTRODUCTION

Preterm birth (PTB) is a birth before 37 completed weeks of gestation.[1] It is more prevalent in Africa and Asia. PTB complications remained the leading cause of under-five and neonatal mortalities. PTB, the majority being spontaneously, occurs for a variety of

in that preterm neonates take the first place for neonatal intensive care unit admission and longer hospital stay globally.[4]

Currently, WHO is committed to reduce the health problems and lives lost as a result of PTBs.[6] Hence, WHO had developed new guidelines including interventions provided to the mother and the newborn baby.[6] The Every Woman Every Child movement is also aiming to intensify national and international commitment and action to ensure that women, children and adolescents are at the heart of development. The movement puts into action the global strategy (2016–2030).[7] The strategy is aimed to end all preventable deaths of women, children and adolescents within a generation and ensuring their well-being. Though Ethiopia achieved the millennium development goal 4 with 67% under-five mortality reduction from the 1990 estimate, the reduction in neonatal mortality is not remarkable.[8] However, Ethiopia has planned to reduce neonatal mortality rate from 28 in 2015/2016 to 10 by 2019/2020.[9] Furthermore, the country is also devoted to end preventable deaths of newborns and children under 5 years of age by 2030.[10]

There are local studies on PTBs conducted in Ethiopia. The need for an accurate and reliable result,[11 12] a single study aggregating these studies is necessary for policy makers and implementers. Even though, there is a systematic review[13] done, it addressed only the effect of pregnancy induced hypertension and multiple pregnancies on PTB. However, literatures show that more factors affect PTB. Among some of the identified associated factors of PTB in Ethiopia are obstetric complication during the current pregnancy[14] specifically including pregnancy induced hypertension,[15 16] premature rapture of membrane[17 18] and hypertension during pregnancy[17]; history of obstetric complications including history of abortion,[17] history of stillbirth,[17] history of low birth weight[17] and history of PTB[17]; chronic illness,[15 18] nutritional status,[14] anaemia,[18] antenatal care follow-up,[14 16 18] substance intake during pregnancy,[17] multiple gestation[16 17] and income status.[18] Hence, conducting a systematic review and meta-analysis on PTB is paramount important in Ethiopia by updating the latest possible evidences.

Therefore, this review is aimed at assessing the magnitude and associated factors of PTB in Ethiopia.

METHODS AND ANALYSIS
Development of the review method
The methods of this systematic review and meta-analysis protocol was developed based on the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols 2015 statement.[19] The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline will be followed during the systematic review.[20 21] The result of the review will be reported according to the PRISMA guideline for reporting.[22] The four phases that were drawn from the PRISMA flow chart[23] will be documented in the results to show the study selection process

from initially identified records to finally included studies. The protocol for this systematic review and meta-analysis is registered in International Prospective Register of Systematic Reviews (PROSPERO) and obtained the registration number. The initial anticipated or actual start date as well as anticipated completion date were updated with brief details on PROSPERO records. We would like to disclose that the update was not related to any problem to the present study.

Eligibility criteria
We will include all observational studies that examined the level and/or associated factors of any type of PTB among live births in Ethiopia. Inclusion criteria will be all live births, PTB defined as delivery before 37 weeks gestation. The primary outcome will be PTB, with PTB defined as a delivery occurring before 37 completed weeks of gestation. Other relevant secondary outcomes to PTB will be considered including PTB <34, <32 or <28 weeks. Reviews, editorials, case series and case reports on PTB as well as studies that only reported qualitative findings on PTB will be excluded. In studies that reported both quantitative and qualitative results, we will only consider the quantitative findings. Studies will be considered relevant if they assessed the magnitude of PTB and/or examined the associated factors of PTB. Regarding magnitude, only those studies that reported percentages out of live births will be eligible.

Search strategy
Major medical electronic databases such as PubMed and Science Direct will be searched to identify relevant literature for the review. To cover grey literature, we will hand-search literature using the Google search engine and Google Scholar. Further, references list will also be considered from relevant studies considered for critical appraisal.

The literature search will be carried out by the primary author (KFM). The search will be limited to humans, and journal studies published in English from 1 January 2009 to 31 December 2019. We will apply Medical Subject Headings terms from PubMed, and combined key words to identify studies in the databases.

Accordingly, literatures will be retrieved using the exact search phrase ("Premature Birth/epidemiology"[Mesh] OR "Premature Birth/etiology"[Mesh] OR "Premature Birth/statistics and numerical data"[Mesh] OR premature birth* [MeSH] OR preterm birth OR premature birth OR preterm labo* OR preterm deliver* OR preterm infant OR preterm neonate* OR preterm newborn* OR birth outcome OR pregnancy outcome$ OR pregnancy complication$ OR birth outcome$ OR birth complication$) AND Ethiopia AND ((incidence OR prevalence OR magnitude OR burden) OR (predict* OR associated factor* OR risk factor* OR determinant*)) from PubMed. This will be customised for other databases.

Study selection process

The retrieved studies will be exported to the citation manager (EndNote) and then duplicates excluded. The titles and abstracts of the studies will be reviewed for screening by two authors (KFM and AML) for obvious exclusion according to the eligibility/inclusion criteria. Based on this screening, the titles and abstracts of the studies will be classified as included, excluded and undecided. Full text of all the included and the undecided studies will be searched for further eligibility assessment.

The full texts of the included and undecided categories of the studies will be independently reviewed by two authors (KFM and AML) against the eligibility criteria for final inclusion. Studies that are not eligible based on the examination of the full-text will be excluded by stating the reasons according to the inclusion criteria. Disagreements between the two reviewers will be resolved through discussion and consensus.

Studies deemed to be appropriate will be scanned in full to determine relevance. Second, the references lists of all relevant studies will be reviewed to find additional studies that may have been difficult to detect in the database search due to non-reporting in the abstract (possibly due to non-significant effects). Studies published by the same team will be carefully reviewed to ensure the results of a given study are not included twice in this review.

Critical appraisal

All of the included studies will be critically appraised for their validity. The three authors (DFT, MKY, FAM) will check the methodological robustness and validity of the findings using the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI).[24] Uncertainties will be resolved by joint discussion between the reviewers. Disagreements among the reviewers will be resolved through discussion and consensus.

The JBI-MAStARI will be used for critical appraisal.[25] This tool contains a separate appraisal checklist for each type of the study design. The reviewers will independently assess articles prior to inclusion in the final review using this instrument. Any disagreement among the reviewers will be resolved through discussion, and by involving another reviewer. A study with quality assessment score of 50% and above and a study having a response rate of 80% and above will be included in the final review.

Data extraction

The JBI data extraction form will be used to extract the characteristics of the studies and prevalence of PTB (primary outcome and secondary outcomes) as well as OR. A standardised excel sheet will be created and information from the standardised review forms will be transferred in order to be readily available for the systematic review. Three reviewers (KFM, MMS and AML) will extract data independently. Disagreements among the reviewers will be resolved through discussion and consensus.

This tool will include information on the author, year of publication, objective, study setting, year of survey, study design, sample size, data collection method, study participants, definition used for PTB, prevalence of preterm, 95% CI for prevalence of PTB and list of associated factors with their effect size. A quantitative data of cross-tabulation between the subject's characteristics (associated factors) and the PTB will also systematically abstracted.

Data synthesis and statistical analysis

The individual studies will be concisely described using a summary table. The summary table particularly describes the characteristics of the included studies and the main findings.

The data will be analysed by the Stata software V.14. For studies which did not present an SE, it will be calculated using the formula; $SE = \sqrt{(p \times (1-p)/n)}$. The calculated SE and prevalence rate of each study will then be entered into Stata software to calculate the overall prevalence and its 95% CI. Similarly, the relationship between factors and PTB will be summarised using statistical estimates of effect sizes, OR. Subgroup analysis will be sought based on possible characteristics of the studies, specific morbidity (like pre-eclampsia, hypertension), type of PTB (spontaneous or iatrogenic) and quality of study (high-quality or low-risk). Meta-regression will be considered for major covariates (maternal age and maternal body mass index) related to PTB.

The level of heterogeneity among the studies will be quantified using the I^2 statistics.[26] Meta-analysis using random effects model will be conducted for the I^2 value of more than 75%, considered as heterogeneity. Publication bias will be assessed using a funnel plot and Egger's test of small study bias. Symmetric funnel plot as well as insignificant Egger's test will be taken as evidence for no serious small study bias (publication bias). Trim and fill technique will be considered for substantial publication bias. Further, sensitivity analysis will be used to assess the influential studies on the pooled estimate.

Forest plots will be used to present the combined estimate with 95% CI. The quality of evidence of the outcomes will be assessed with the GRADE approach. If no more than one study will be found for each of the objective, then the finding will be synthesised narratively.

Potential limitations

Only quantitative observational studies published in English will be included. This might exclude studies those published in other languages. Further, qualitative studies that assessed the associated factors might be excluded. Therefore, the readers are advised to take this into account.

Patient and public involvement

It was not appropriate to involve patients or the public in the design, or conduct, or reporting, or dissemination

plans of our research as no individual information will be discussed.

Ethics and dissemination

The review will be based on published data, and thus there is no requirement for ethical approval. The results will be disseminated through publication in a peer-reviewed journal, and through presentations at academic conferences.

Discussion

It is crucial to know the importance of PTB and contributing factors considering the latest statistics in a country. Hence, this review will present on the country wide magnitude of PTB and the associated factors of PTB. The result will provide information to guide health professionals and health policy makers for monitoring PTB strategy and applying necessary preventive and appropriate measures to decrease PTB.

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