Preconception Care in Sub Saharan Africa: A Systematic Review and Meta-analysis on Prevalence and Its Correlation With Knowledge Level Among Women in Reproductive Age Group

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Abstract

Background

The aim of the preconception care (PCC) is to promote the health of women in the reproductive age before the conception in order to reduce preventable poor pregnancy outcomes. Although there are several published primary studies from Sub Saharan African (SSA) countries on PCC, they do not quantify the extent of PCC Utilisation, Knowledge level about PCC and the association between them among women in the reproductive age group in this region. This systematic review and meta-analysis aimed to estimate the pooled utilisation of PCC, Pooled knowledge level about PCC and their association among women in the reproductive age group in Sub Saharan Africa.

Methods

Databases including PubMed, Science Direct, Hinari, Google Scholar and Cochrane library were systematically searched for literature. Additionally, the references of appended articles were checked for further possible sources. The Cochrane Q test statistics and I² tests were used to assess the heterogeneity of the included studies. A random-effect meta-analysis model was used to estimate pooled the prevalence of PCC, knowledge level of PCC and their correlation among reproductive aged women in Sub-Saharan African countries.

Results

Of the identified 1593 articles, 20 studies were included in the final analysis. The pooled utilisation of PCC and good knowledge level towards PCC among women of reproductive age group in Sub Saharan Africa were found to be 24.05% (95% CI: 16.61, 31.49) and 33.27% (95% CI: 24.78, 41.77), respectively. Women in the reproductive age group with good knowledge level were two times more likely to utilize the PCC than the women with poor knowledge level in Sub Saharan Africa (OR: 2.35, 95% CI: 1.16, 4.76).

Conclusion

In SSA Countries, the utilisation of PCC and knowledge towards PCC were low. Additionally, the current meta-analysis found good knowledge level to be significantly associated with utilisation of PCC among women in the reproductive age. These findings indicate that, it is imperative to launch programs to uplift knowledge level about PCC utilisation among women in reproductive age group in SSA countries.

Plain English Summary

Preconception care (PCC) includes any intervention to optimise a woman's health before pregnancy to improve maternal, new-born, and child health outcomes. It is vital for identifying risky behaviours before pregnancy and reducing the number of unintended pregnancies. This risk of maternal and infant mortality and pregnancy-related complications can be reduced by utilizing preconception care and inter conception care. Although there are several published primary studies from Sub Saharan African (SSA) countries on PCC, they do not quantify the extent of PCC Utilisation, Knowledge level about PCC and the association between them among women in the reproductive age group in this region. This systematic review and meta-analysis aimed to estimate the pooled utilisation of PCC, Pooled knowledge level about PCC and their association among women in the reproductive age group in Sub Saharan Africa.

Background

The preconception care (PCC) is the provision of biomedical, behavioural and social health interventions to women and couples before the conception and between pregnancies. This care provision is aimed at reducing poor maternal and child health outcomes by improving women's and couples' health status (1).

The World Health Organization (WHO) has recommended a package of interventions for PCC: maternal nutrition such as micronutrient supplementation (iron, folic acids and others), vaccination, cessation of tobacco and excessive alcohol use, prevention of interpersonal violence, sexuality education, and protection from environmental hazards, genetic counselling, and support for mental health. Adolescence is a prime – though not the only – window of opportunity to deliver these interventions (2).

Despite the growing body of evidence that PCC improves the health and well-being of women and couples, and subsequently increasing the pregnancies and child health outcomes, evidence exists that a gap exists in the continuum of PCC for women in the reproductive age group (1, 3).

Adequate and equitable access to improved reproductive healthcare lowers fertility rates, reduces sexually transmitted infections (STIs) and improves pregnancy outcomes, with broader individual, family and societal benefits. Such benefits may include a healthier and more productive workforce, access to greater financial and other resources for children, especially those in smaller families. Furthermore, access to adequate and quality reproductive health services is linked to the achievement of the SDG 3 targets, advocating for healthy lives and well-being for all at all ages (4).

It has been acknowledged that 41% of all women report their pregnancies as unplanned, highlighting a significant necessity for preconception good health, and a call for providing the needed health interventions for both the woman and her partner before their decision to have a child (5).

Maternal and neonatal death could be averted through effective utilisation of PCC. For example, evidence informs that maternal under nutrition and iron-deficiency anaemia increase the risk of maternal death by at least 20% in the worldwide. In 2010 alone, 58 000 new born babies died from neonatal tetanus, up to 35% of pregnancies among women with untreated gonococcal-infections resulted in low birth weight infants and premature deliveries, and up to 10% pregnancies resulted in perinatal death of a Children (6).
Sub-Saharan Africa is one of the regions with inequitably high maternal mortality ratio in the world. For example, in 2015 this region recorded nearly 550 maternal deaths per 100,000 live births compared to a global rate of 216 deaths per 100,000 live births. Spatial inequalities in access to life-saving maternal and new-born health services persist within SSA (6). Pre-conception care is reported to be among the poorly provided maternal health services in the region (4).

A number of individual studies conducted in Sub Saharan Africa region have shown inconsistent magnitudes about utilisation of PCC among women in the reproductive age group ranging from 13.4% to 34.1%. Among many other factors, by controlling the confounding effect of covariates, knowledge about PCC care has also been reported as a factor that impedes utilisation of the care in many of the studies although with lower and higher odds ratio in different studies. Further, the level of knowledge varies in sub-Saharan African countries with the range of 8.3% to 65.3% (2, 7-14). These inconsistencies may not be sufficient for health policy makers and planners to use for decision making and program planning. This systematic review and Meta-analysis will present pooled estimates on PCC utilisation and level of knowledge among women in reproductive age group and the correlation between these two parameters to effectively inform policy and practices and improve maternal and child health outcomes.

Methods

Eligibility criteria and review process:
The review used published articles and gray literature on utilisation of preconception care and knowledge towards PPC among women in reproductive age group in SSA. Studies published up to 17 April 2021 were systematically searched and identified in the following electronic databases: PubMed, Science Direct, Hinari, Google Scholar and Cochrane library. Additionally, the references of appended articles were checked for further possible sources. All identified citations were collected and uploaded into EndNote version 8.0 and duplicates removed. Using Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) flow diagram (Supporting file), studies were identified. The Cochrane acronym PEO or PICOC, which stands for population, Exposure, comparison and outcomes (context), was used to decide on all key components prior to starting the review. Filters were applied to select the relevant studies from the searches. The first step involved pre-screening, to decide which studies would be retrieved fully. The second step included selecting the studies that needed to be re-examined and for the progress of each individual article review. Titles and abstracts were screened by two independent reviewers for assessment against the selection criteria as follows:

Inclusion criteria

Population: Studies conducted among women in reproductive age in SSA countries to determine the pool the utilisation of PCC and a good knowledge level about PCC

Study setting: Studies conducted at community or institutional levels

Study design: All types of observational studies

Publication type: Published and gray articles written in English language. If studies were published in more than one report, the most comprehensive and up-to-date versions were considered.

Exclusion criteria

Letters to editors, case series and case–control studies were excluded from the analysis because of their insufficient data. Title, abstract and full text of studies were evaluated and assessed before being included in the final review and meta-analysis. Studies that were not accessed after at least two email contacts of the primary authors were excluded for the difficulty encountered during assessing the methodological quality in the absence of the full text. Studies that appeared under more than one search term, reported by another language other than English, studies that are self-identified as pilot/feasibility work, follow-up work with no new outcome measures and research with multiple publications were also excluded.

Study selection

Following the screening processes described above, eligible articles were selected based on the study design, publication year, language, choice among multiple studies, sample size, similarity of exposure and completeness of information. All relevant studies, including those thesis and relevant reports were included. The full text of selected citations was assessed in detail against the inclusion criteria by two independent reviewers.

Data Extraction and quality assessment of the studies

Data were extracted by DW and DE then assessed by a third author (ZH) to check for discrepancies, for which, if any discrepancies were encountered, they were evaluated and resolved. Data were extracted using Microsoft Excel (Version 16.2) before the meta-analysis was conducted. Information was collected relating to the study author, year, country, and aims; participant characteristics (including population, sample size, setting, and inclusion/exclusion criteria); methods (study design, measures, analyses conducted); and main findings. All reviewers independently assessed the methodological quality of included studies by using the Newcastle-Ottawa Scale (NOS) (15, 16). The studies which have at least six NOS criteria were considered to be high-quality studies.

Statistical Analysis

Data extraction was performed using Microsoft Excel spread sheet, and the statistical analysis was performed using STATA version 14 statistical software. For the analysis, standard error (SE) values were extracted from the studies, since they are more commonly reported with 95% confidence interval. When both
SE and 95% CI were not provided, SE was calculated using the formula \( SE = \sqrt{\frac{P \times (1 - P)}{n}} \), where P is the proportion of the cases reported and n is the denominator of the prevalence estimate (17).

Statistical heterogeneity was assessed using the Cochran Q test (chi-squared statistic), \( I^2 \) test statistic and by visual examination of the forest plot (overlap of confidence intervals). Cochran’s Q test was used to test the null hypothesis of no significant heterogeneity across the studies (18). Cochran’s Q is calculated as the weighted sum of squared differences between individual study effects and the pooled effect across studies, with the weights being those used in the pooling method. Cochran’s Q statistic follows a chi-squared distribution with \( k - 1 \) degree of freedom where \( k \) is the number of studies. Cochran's Q statistical heterogeneity test is considered as statistically significant.

The \( I^2 \) statistic was also estimated because of the fact that the percentage of variation (inconsistency) in the measures of association across studies is due to heterogeneity rather than chance (19). The \( I^2 \) statistic is equal to the quantity of Cochran's Q minus its degree of freedom (df) divided by Cochran's Q times 100%, \( I^2 = \frac{100 \times (Q - df)}{Q} \). The value of \( I^2 \) ranges between 0 and 100%, where 0% indicates no observed heterogeneity and large values indicate increasing heterogeneity (19). An \( I^2 \) value of 25%, 50%, and 75% is considered as low, moderate, and high heterogeneity respectively (19). Egger's weighted regression and Begg's rank correlation tests were used to check for the publication bias (\( P < 0.05 \) is considered statistically significant).

Random-effects meta-analyses were used to combine the results of included studies, and was measured as proportions of utilisation and good knowledge level of PCC among reproductive age group with 95% CIs.

In this review, test statistic showed there was a significant heterogeneity among the included studies \( (I^2 \geq 98\%, \ p < 0.001) \). As a result a random effects model was used to estimate the Der Simonian and Laird’s pooled effect. To identify the possible source of heterogeneity, meta-regression was undertaken by taking the sample size and year of publication. However, none of them were found to be statistically significant (\( p>0.05 \)). The pooled effect was articulated in the form of odds ratio.

**Results**

**Selection and identification of studies**

A total of 1593 articles were obtained from electronic databases and five studies were included from other sources. Among these, 55 were duplicates. Titles and abstracts of 1538 articles were checked and 1397 were found irrelevant. One hundred and twenty one articles were excluded after checking their full text. Finally, 20 articles were selected for inclusion in the meta-analysis (Figure 1).

**Description of included studies**

All included articles were designed as cross-sectional studies. Eleven of studies were facility based and nine were community based, with a total population of 9075 participants. From included studies, both the highest and lowest sample size were from studies conducted in Nigeria (20, 21). Studies reporting the highest preconception care utilisation and highest good knowledge level about preconception care, 72.6% and 70.7%, were conducted in Kenya and Nigeria, respectively (10, 13). Thirteen studies were from Eastern Africa (12, 22-32), seven from Western Africa (10, 20, 21, 33-36) and there were no studies from Southern Africa. Based on the Newcastle-Ottawa Scale for cross-sectional studies quality assessment tool, the score ranged from medium (7) to highest (9). Regarding the response rate, nineteen studies had a response rate of greater than 90%, and only one study had a response rate of 88.7% (21) (Table 1).

**Table 1:** Summary of the 20 included studies in the meta-analysis to level of Knowledge and Utilisation of PCC in Sub-Sahara African country, 2021
<table>
<thead>
<tr>
<th>No</th>
<th>Author</th>
<th>Publication year</th>
<th>Study Design</th>
<th>Country</th>
<th>study setting</th>
<th>Total SS</th>
<th>Included SS</th>
<th>Response rate</th>
<th>Pop /practice/</th>
<th>prevalence Utilisation</th>
<th>Outcome for knowledge level</th>
<th>Prevalence of knowledge level</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Gezahegn et al.(22)</td>
<td>2016</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Facility based</td>
<td>634</td>
<td>634</td>
<td>100</td>
<td>242</td>
<td>38.17</td>
<td>402</td>
<td>63.40</td>
</tr>
<tr>
<td>2</td>
<td>Ahmed, K., et al.(12)</td>
<td>2015</td>
<td>CSS</td>
<td>Sudan</td>
<td>Facility based</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>11</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Akinajo, O. R., et al. (20)</td>
<td>2019</td>
<td>CSS</td>
<td>Nigeria</td>
<td>Facility based</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>41</td>
<td>82</td>
<td>26</td>
<td>52</td>
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<tr>
<td>4</td>
<td>Asresu, T. T., et al. (23)</td>
<td>2019</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Community based</td>
<td>564</td>
<td>561</td>
<td>99.47</td>
<td>102</td>
<td>18.18</td>
<td>77</td>
<td>13.72</td>
</tr>
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<td>5</td>
<td>Ayalew, Y., et al. (24)</td>
<td>2017</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Community based</td>
<td>422</td>
<td>422</td>
<td>100</td>
<td>0</td>
<td>116</td>
<td>27.48</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Boakye-Yiadom, A., et al. (33)</td>
<td>2020</td>
<td>CSS</td>
<td>Ghana</td>
<td>Community based</td>
<td>200</td>
<td>200</td>
<td>100</td>
<td>0</td>
<td>47</td>
<td>23.5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Demisse, T. L., et al. (25)</td>
<td>2019</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Community based</td>
<td>424</td>
<td>410</td>
<td>96.7</td>
<td>55</td>
<td>13.41</td>
<td>71</td>
<td>17.31</td>
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<tr>
<td>8</td>
<td>Ekem, N. N., et al. (34)</td>
<td>2018</td>
<td>CSS</td>
<td>Nigeria</td>
<td>Facility based</td>
<td>453</td>
<td>450</td>
<td>99.34</td>
<td>44</td>
<td>9.778</td>
<td>199</td>
<td>44.22</td>
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<td>9</td>
<td>Ezegwui, H., et al. (21)</td>
<td>2008</td>
<td>CSS</td>
<td>Nigeria</td>
<td>Facility based</td>
<td>1500</td>
<td>1331</td>
<td>88.73</td>
<td>187</td>
<td>14.05</td>
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<td>10</td>
<td>Jocye, C. (26)</td>
<td>2018</td>
<td>CSS</td>
<td>Kenya</td>
<td>Facility based</td>
<td>384</td>
<td>384</td>
<td>100</td>
<td>279</td>
<td>72.66</td>
<td>237</td>
<td>61.71</td>
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<tr>
<td>11</td>
<td>Kassa, A. and Z. Yohannes. (27)</td>
<td>2018</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Facility based</td>
<td>580</td>
<td>580</td>
<td>100</td>
<td>0</td>
<td>115</td>
<td>19.82</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Lemma, T., et al.</td>
<td>2017</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Community based</td>
<td>424</td>
<td>410</td>
<td>96.7</td>
<td>55</td>
<td>13.41</td>
<td>71</td>
<td>17.31</td>
</tr>
<tr>
<td>13</td>
<td>Okemo, J., et al. (28)</td>
<td>2020</td>
<td>CSS</td>
<td>Kenya</td>
<td>Facility based</td>
<td>194</td>
<td>194</td>
<td>100</td>
<td>50</td>
<td>25.77</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Olowokere, A., et al. (10)</td>
<td>2015</td>
<td>CSS</td>
<td>Nigeria</td>
<td>Community based</td>
<td>379</td>
<td>349</td>
<td>92.08</td>
<td>128</td>
<td>36.68</td>
<td>247</td>
<td>70.77</td>
</tr>
<tr>
<td>15</td>
<td>Setegn, M. (29)</td>
<td>2021</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Community based</td>
<td>624</td>
<td>605</td>
<td>96.96</td>
<td>62</td>
<td>10.25</td>
<td>161</td>
<td>26.61</td>
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<tr>
<td>16</td>
<td>Teshome, F., et al. (30)</td>
<td>2020</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Community based</td>
<td>636</td>
<td>623</td>
<td>97.96</td>
<td>0</td>
<td>133</td>
<td>21.34</td>
<td></td>
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<tr>
<td>17</td>
<td>Umar, A. G., et al. (35)</td>
<td>2019</td>
<td>CSS</td>
<td>Nigeria</td>
<td>Facility based</td>
<td>131</td>
<td>131</td>
<td>100</td>
<td>15</td>
<td>11.45</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Lawal, T. A. and A. O. Adeleye. (36)</td>
<td>2014</td>
<td>CSS</td>
<td>Nigeria</td>
<td>Facility based</td>
<td>602</td>
<td>602</td>
<td>100</td>
<td>163</td>
<td>27.08</td>
<td>0</td>
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</tr>
<tr>
<td>19</td>
<td>Yohannes, Z., et al. (31)</td>
<td>2019</td>
<td>CSS</td>
<td>Ethiopia</td>
<td>Facility based</td>
<td>374</td>
<td>370</td>
<td>98.93</td>
<td>0</td>
<td>196</td>
<td>52.97</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** CSS: - Cross sectional study; SS:- Sample size; RR:- Response rate
Meta-analysis

Pooled prevalence of PCC utilisation among reproductive age group

Fourteen included studies revealed that a pooled prevalence of PCC utilisation among women in reproductive age group in Sub Saharan Africa was 24.05% (95%CI: 16.61, 31.49) (Figure 2). High heterogeneity was observed across the included studies ($I^2 = 98.5$, $p=0.000$). Therefore, a random effect meta-analysis model was executed to estimate the pooled utilisation of preconception care in Sub Saharan Africa. From this meta-analysis, the pooled prevalence of preconception care utilisation in Eastern Africa was 25.73% (95%CI: 13.58, 37.88) whereas in Western Africa was 21.44% (95%CI: 13.60, 29.28) (Table 2).

Knowledge level about PCC among reproductive age group

The Pooled prevalence of good knowledge level of PCC among women in reproductive age group in Sub Sahara Africa was 33.27% (95% CI: 24.78, 41.77) (Figure 3). Subgroup analysis for knowledge level of PCC based on the regions of Sub Saharan Africa showed that 29.93% (95% CI: 20.14, 39.45) in Eastern Africa and 41.52% (95% CI: 27.15, 55.89) in Western Africa (Table 2).

The association between preconception care utilisation and knowledge level

From included studies, seven studies showed the association between PCC utilisation and good knowledge among women in reproductive age group in Sub-Saharan Africa (20, 22, 23, 25, 29, 32, 34). From seven studies, five of the studies showed that there was statistically positive association between preconception care utilisation and good knowledge level (22, 23, 25, 29, 34), whereas one study showed that there was negative association between preconception care utilisation and good knowledge (32) among women in reproductive age group in Sub Saharan Africa. The pooled finding of the analysis with 3379 participants showed that, women in reproductive age group with good knowledge level were 2.35 fold more likely to utilize PCC than those with poor knowledge level (OR: 2.35, 95% CI: 1.16, 4.76). Random effect model was computed due to highest heterogeneity ($I^2=92.3$, $p=0.000$) (Figure 4).

Heterogeneity and publication bias

A significant heterogeneity was observed among the studies in terms of the pool preconception care utilisation and good knowledge level of preconception care (i.e. $I^2 = 98.5$, $p=0.000$ & $I^2 = 98.8$, $p=0.000$, respectively). To address this, random effects meta-analysis model was used to estimate the Der Simonian and Laird’s pooled effect. Meta-regression was implemented to identify possible sources of heterogeneity using sample size. However, the finding was not statistically significant ($p=0.05$). In this meta-analysis, possible publication biases were visualized through funnel plots. Symmetrical large inverted funnels resembled the absence of publication biases (Figure 5 & 6). Additionally, the probability of publication biases was tested using Egger’s and Begg’s tests. The Egger’s weighted regression ($p=0.439$) and Begg’s rank correlation test ($p=0.187$) methods also showed no significant publication bias ($p>0.05$). To detect the influence of one study on the overall meta-analysis estimate, sensitivity analysis was conducted using a random effects model, but did not show strong evidence for the influence of a single study on the overall result.

Table 2: Sub group analysis for pooled utilisation of PCC and Knowledge level in Sub Sahara Africa, 2021

<table>
<thead>
<tr>
<th>Regions</th>
<th>PCC Utilisation (CI)</th>
<th>Knowledge level about PCC (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pooled value and CI</td>
<td>$\hat{\tau}^2$</td>
</tr>
<tr>
<td>Eastern Africa</td>
<td>25.73 (13.53, 37.88)</td>
<td>99.1</td>
</tr>
<tr>
<td>Western Africa</td>
<td>21.44 (13.60, 29.28)</td>
<td>96.3</td>
</tr>
</tbody>
</table>

Discussion

This review is the first of its kind to evaluate the literature and conduct a meta-analysis on the preconception care utilisation and its association with knowledge level of women in reproductive age group in Sub Saharan Africa. The findings provide insightful information to the recent preconception care utilisation and topographical distribution in Sub Saharan Africa.

Fourteen (24.05%) included studies revealed that only one fourth of women in reproductive age group in SSA countries utilized preconception care. This finding was consistent with a systematic review and meta-analysis conducted world-wide (37). Although there have been reports about poor policies and guidelines and low media coverage for PCC in SSA, the similarities in the findings between utilisation of PCC between worldwide and SSA evidence might be explained by factors such as the differences in socio-demographic status, study setting, study participants, and healthcare system in these countries. On the other hand however, this finding was higher from evidence produced by systematic reviews and meta-analysis conducted in individual and specific countries such as Ethiopia, Nepal, Iran, Iraq, Sudan, Brazil (12, 38-42). We presume that this variability may be related to differences in each country’s study population’s education, culture, and study setting. For example in Ethiopian context, the evidence from the previous study was based on the study conducted a long time ago, and we hypothesise that as the time increased, the health service demand might have increased as well.

In SSA, one third (33.27%) of women in reproductive age group had a good knowledge level about PCC. This finding was consistent with two studies conducted in Ethiopia and Utah (38, 43, 44), but lower than a systematic review and meta-analysis conducted of studies from across the world including from Saudi Arabia, China and Kenya (13, 45-47). Women’s knowledge of preconception care seemed to vary across countries, with some countries reported to have preconception care guidelines and routinely practiced preconception care, while others did not have such guidelines or routine practices on PCC. These findings highlight important issues including that, women’s level of knowledge on preconception care is vital for the alleviation of adverse pregnancy
outcomes and to decrease maternal and child death and illness (48, 49). We hypothesise that the low level of knowledge reported in this study might be due to many factors related to social determinants of health (ie social environment factors in which people are born and live in, and shaped by the distribution of power, money and other resources in society) (50). It is therefore reasonable to allude that, in the context of SSA, and in women of reproductive age in the current study, the social determinants that would have affected their knowledge of preconception care would be multifaceted including: the low socio-economic status, the discrepancy in the infrastructure of the health sectors, lack of promotion of PCC reported in the media, the insufficient attention given to PCC implementation by the health care system across the country, lack of preconception clinic at the health institution level, and low commitment of health care workers due to high case flow of the patient/clients (23, 25, 51)

It was also noted that women in reproductive age group with good knowledge were 2.35 fold more likely to utilise preconception care than women with poor knowledge. This find was consistent with three primary studies conducted in Ethiopia (2, 7, 8), and was not surprising given that social determinants of health (50), including poverty, poor education and poor infrastructure affect multiple health outcomes in populations across settings, with SSA being no exceptional.

Women with some basic level of knowledge were more aware of costs associated with not using PCC services. Moreover, comprehensive knowledge of PCC would provide better insight and awareness, which would positively impact the overall health and life of women, new-borns, and the wider-community.

**Conclusion And Recommendation**

In Sub Saharan African countries, the utilisation PCC and good knowledge level about PCC among women of reproductive age groups remain low. However, the findings of the study findings that there was positive association between good knowledge and utilisation of PCC among reproductive age group women. These findings provide insightful information and would be imperative to launch programs to uplift knowledge level about PCC among women in reproductive age group in sub-Saharan African countries.

**Strengths and Limitations**

The strength of this review lies with the exhaustive search used on published and gray literature and utilisation of rigorous methodology to analyse the data. The main limitation of this review was the lack of studies from the southern region of sub-Saharan Africa countries, which might limit the generalizability of the study to southern region of sub-Sahara Africa. Moreover, the pooled utilisation of preconception utilisation and knowledge level was not separately estimated for different components of preconception care services due lack of separation in reporting these components from the included studies. Separate analysis for each specific component of preconception care could be more informative for scientific community and other beneficiaries; however, the primary interest of the review was the general utilisation and knowledge level preconception care among women in reproductive age group without differentiating the specific components.

**Abbreviations**

AOR: Adjusted odds ratio, PCC: Preconception Care, PRISMA: preferred reporting items for systematic reviews and meta-analyses

**Declarations**

Ethics approval and consent to participation: Not applicable

Consent for publication: Not applicable

Availability of data and material

This study was based on a literature review of published studies in Sub-Saharan Africa. Anyone who needs to access the data can contact the author concerning the studies included in the analysis. The reference list can also be used to directly access the articles.

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Authors' contributions

DW: Conception of the research protocol, study design, literature review, data extraction, data analysis, interpretation and drafting of the manuscript. DW: data extraction, quality assessment, data analysis and (BS, YT, ZH, DE and ZH) reviewing the manuscript. All authors have read and approved the manuscript.

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Figures

Flow diagram shows the study selection of the systematic review and meta-analysis on Knowledge level and utilisation PPC in Sub-Saharan Africa, 2020
Figure 2
Forest plot of the pooled utilisation of PCC in Sub Sahara Africa, 2021
Figure 3

Forest plot of the pooled good knowledge level of PCC among reproductive age group women in Sub Sahara Africa, 2021

NOTE: Weights are from random effects analysis
Figure 4

Forest plot of the association between knowledge level and utilisation of PCC Sub Sahara Africa, 2021
Figure 5

Funnel plot to test the publication bias of 17 studies
Figure 6

Funnel plot to test the publication bias of 16 studies

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- PRISMA2020checklist.docx