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Factors Influencing Coverage of Elimination Mother to Child Transmission of HIV: A Systematic Literature Review

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Abstract— In Indonesia, the rate of HIV transmission from mother to child is the highest in the world due to the low coverage of HIV testing and therapy among pregnant women. This study examined published research on the prevention of mother to child HIV transmission (PMTCT) and its associated factors. A systematic review using ProQuest,Ebsco, PubMed, and SpringerLink databases for the period 2009-2019 found 12 relevant publications. Of pregnant women surveyed, 22-98% had an antenatal care (ANC) visit at least once; 7.3-99.4% received pre-HIV test counseling; 37.9-95.2% were advised to get tested for HIV; 6-97% were tested for HIV; 3.3-98% received their results; 22.1% received post-HIV test counseling; and 41-84.6% received antiretroviral (ARV). The factors influencing PMTCT were socio-demographics, distance to health care facilities, number of ANC visits, knowledge and awareness, partner engagement, stigma, and counseling. PMTCT publications were limited in terms of geographical coverage and none of the publications contained quality and sustainability aspects. There is a need to conduct research to improve the coverage of PMTCT in Indonesia as well as service quality and sustainability.

Keywords— HIV prevention, PMTCT, Systematic Review, ART, Coverage

1. Introduction

The Sustainable Development Goals (SDGs) number 3 target 3.3. is ending the epidemic AIDS by 2030 and indicator 3.3.1 states the number of new HIV infections including HIV transmission from mother to child (1). UNAIDS report on HIV transmission rate from mother to child point out that Indonesia is the highest in rank in the world (2). This may due to the low coverage of HIV testing and ARV therapy among pregnant women in Indonesia, which ae only 28% and 13%, respectively (3). While, the target coverage of EMTCT is Fast Track 90-90-90, where 90% of all pregnant women living with HIV know their HIV status, 90% of all pregnant women with diagnosed HIV infection will receive sustained antiretroviral therapy, and 90% of all pregnant women receiving antiretroviral therapy will have viral suppression(4).

The coverage of EMTCT in Indonesia is always low from year to year, which shows that the EMTCT seems to be neglected. The coverage of HIV testing on pregnant women in Indonesia in 2015 is <1%, which slightly higher to 28% in 2017. The coverage of ARV treatment for pregnant women in Indonesia is low as well where is 8% in 2015, 10% in 2016 and 13% in 2017. Meanwhile, globally the coverage of pregnant women receiving ARV in 2017 is already 80% (5).

The government of Indonesia has in fact issued Regulation of the Minister of Health number 51-year 2013 concerning the EMTCT Guidelines and Regulation, and Regulation of the Minister of Health number 21-year 2013 covering the HIV and AIDS Prevention, which require pregnant women to receive HIV testing during ANC in all regions of Indonesia. This means that every pregnant woman who come for ANC service must receive HIV testing after a counseling session from health providers, specifically midwives. The low coverage in HIV testing and ARV therapy is allegedly because not every health care service, both in the province and district areas, is able to perform the mandatory.

Indonesia must work hard to achieve the target of HIV treatment considering many obstacles in HIV treatment, such as high stigma (6), low rate of mothers' knowledge on HIV and EMTCT (7)(8), bad perception on HIV and people with HIV (9), and the high cost of HIV testing. Demographic and women health status factors also contribute to HIV transmission from mother to child. The demographic factors are low social-economic status in relation to family income, geographical isolation to access to adequate HIV treatment (10), and women without spouses (11). Factors of women health include malnourished, women with sexually transmitted diseases, a history of being infected with herpes zoster, and pulmonary tuberculosis(12). Furthermore, factors related to delivery such as vaginal delivery, viral load > 10.000, and low CD4 + T (≤350)(12).

The effect on HIV transmission from mother to child is the increase in new HIV infection and the increase in maternal and child morbidity and mortality rate (13). The estimation and cumulative projection on the number of people with HIV/AIDS age ≥15 years of age in Indonesia in 2017 are 628,492 people with deaths as many as 40,468 lives (14). The long-term effect will influence the quality and future of children who are the country's next generation. Whereas this effect can be prevented if pregnant women with HIV positive are not transmitting the virus to their newborn babies.

The study objective is to examine journal publications related to eliminating mother to child transmission of HIV (EMTCT) and its factors associated.

2. Method

This research is conducted using Systematic Literature Review, consists of 2 main points: eligibility criteria and search strategy.

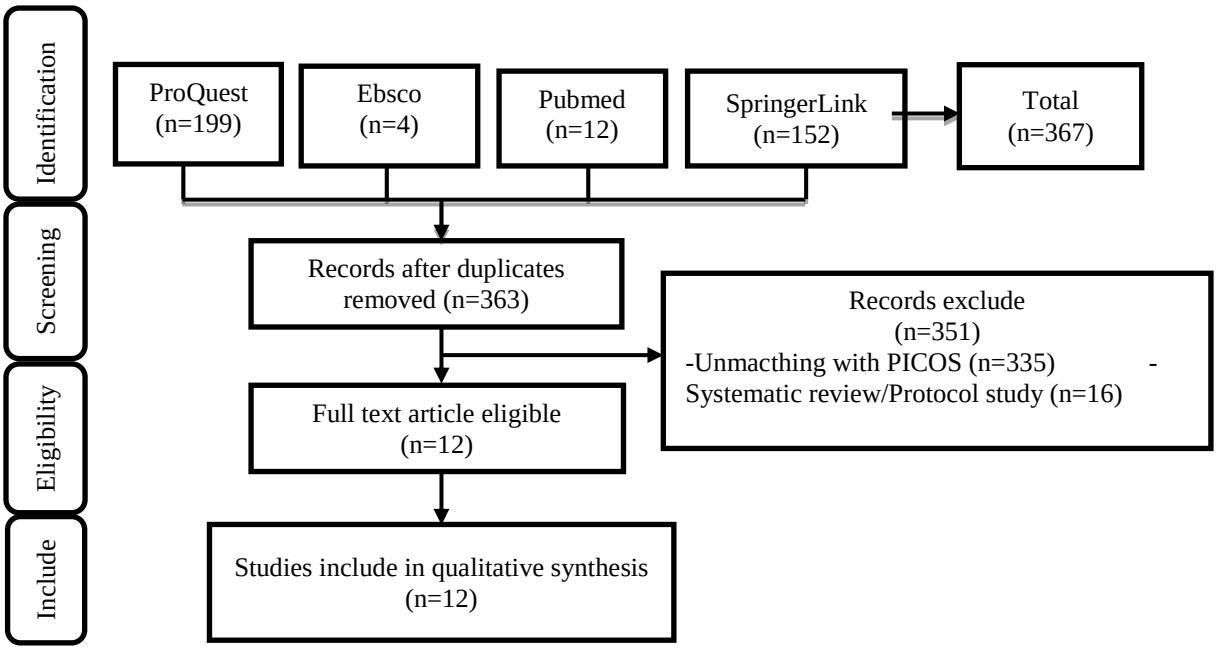
2.1. Eligibility criteria

The inclusion criteria consist of a) academic journals from online database, that are ProQuest, Ebsco, PubMed, and SpringerLink, b)issued in April 2009-April 2019, c) articles in English, d) articles contain outcome of the cascade of EMTCT and its associated factors, e) population taken is pregnant women who visited ANC service center. The outcome expected is comprehensive including of pregnant women who had ANC visit at least once, received pre- and post-HIV counseling, advised get tested for HIV, tested for HIV, received the result, and received ARV therapy. Also collects factors associated with the coverage of HIV testing on pregnant women.

2.2. Search strategy

References are managed using Mendeley software. Study selection process includes 4 stages: identification, screening, eligibility and include. In identification stage, keywords used are Antenatal care AND PMTCT AND coverage AND quality to search articles on the database. In screening stage, selected duplicate and filtered articles according to inclusion criteria. In eligibility stage, critical appraisal and full text downloads were carried out. In inclusion stage, the selected articles are extracted and analyzed. The result presented using *Preferred Reporting Items for Systematic Reviews & Metanalyses* (PRISMA) 2009 (see Figure 1).

Figure 1. Flow chart of study selection process



3. Results

3.1. Article Characteristics

The study found 12 articles on EMTCT coverage from the last 10 years publication (2009-2019). The latest publication was found in 2018 and the oldest in 2011. Most of them (7 articles) were conducted in the last five years. The study period was conducted from 2002 to 2016. The study in Africa were conducted in various countries, which are Ethiopia, Benin, Congo, Cote d'Ivoire, Gabon, Ghana, Kenya, Lesotho, Malawi, Nigeria, Rwanda, South Africa, Tanzania, Togo, Uganda and Zambia. Meanwhile, the article from Central America was conducted in El Salvador. Almost every study using cross-sectional survey (11 articles), except 1 article using cohort study. Sample size are between 401 to 283410 of pregnant women with variation sampling method, which are two stage cluster sampling, systematic sampling, multistage stratified sampling, consecutive sampling and random sampling. The articles using data set which are Demographic and Health Survey (DHS), The Smallest Administrative Government System, The Academic Model Providing Access to Health care Program, HIV/AIDS and Malaria Indicator Survey, Ministry of Health Statistical Yearbook, Hospital Administered, Baseline Household Survey, Health Demographic Surveillance Site (DHSS), Maternity in Migori and AUDS Stigma Study (MAMAS Study) (see Table 1).

Table 1. Articles Characteristics

No	***Author/ Year***	***Studyperiod***	***Country***	***Research method***	***Sampling method***	***Sample size***	***Data set***
1	*Ejigu Y, 2018*	*2016*	*Ethiopia - Afrika*	*Cross Sectional Survey*	*Two stage cluster sampling*	*2114*	*Ethiopian Demographic and Health Survey*
2	*Muyunda B, 2018*	*2014*	*Zambia - Afrika*	*Cross Sectional Survey*	*Systematic sampling*	*6139*	*The Zambia Demographics and Health Survey*
3	*Belato DT, 2017*	*2015*	*Ethiopia - Afrika*	*Cross Sectional Survey*	*Multistage stratified sampling*	*401*	*The Smallest Administrative Unit in Ethiopian Government System*
4	*Ndege S, 2016*	*2007*	*Kenya – Afrika*	*Cross Sectional Survey*	*N/A*	*7396*	*The Academic Model Providing Access to Health care Program (AMPATH) initiated HBCT*
5	*Semali I, 2014*	*2011-2012*	*Tanzania - Afrika*	*Cross Sectional Survey*	*Multi-stage stratified sampling*	*3555*	*Tanzania HIV/AIDS and Malaria Indicator Survey (THMIS) individual dataset*
6	*Coulibaly, 2014*	*2011*	*Burkina Faso - Afrika*	*Cross Sectional Survey*	*N/A*	*67592*	*Ministry of Health statistical yearbook*
7	*Deressa W, 2014*	*2010*	*Ethiopia - Afrika*	*Cross Sectional Survey*	*Consecutive sampling*	*843*	*Hospital administered*
8	*Bcheraoui C, 2013*	*2011*	*El Salvador - Amerika Tengah*	*Cross Sectional Survey*	*Systematic sampling*	*2633*	*El Salvador Baseline Household Survey*
9	*Audureau E, 2013*	*2002- 2005*	*Benin, Kongo, Cote d" Ivoire, Gabon, Ghana, Kenya, Lesotho, Malawi, Nigeria, Rwanda, South Afrika,*	*Cross Sectional Survey*	*N/A*	*283410*	*DHS Afrika*

			Tanzania, Togo, Uganda, Zambia - Afrika				
10	*Larsson EC, 2012*	*2008– 2010*	*Uganda – Afrika*	*Cohort study*	*N/A*	*544*	*Iganga/Mayuge Health and Demographic Surveillance Site (HDSS)*
11	*Turan JM, 2011*	*2007-2009*	*Kenya - Afrika*	*Cross Sectional Survey*	*Cluster sampling*	*1525*	*Maternity in Migori and AIDS Stigma Study (MAMAS Study)*
12	*Ujiji OA, 2011*	*2005-2007*	*Kenya - Afrika*	*Cross Sectional Survey*	*Random sampling*	*900*	*The Kenya Medical Research Institute (KEMRI) Survey*

**N/A: Not Available*

3.2. Coverage of ANC EMTCT Cascade

The coverage of ANC EMTCT cascade in pregnant women varies from low to high. The coverage of pregnant women had ANC visit at least once ranges from 22% to 98%. The coverage pregnant women who received pre-HIV test counselling ranges from 7.3% to 99.4%. The coverage of pregnant woman whom advised get tested for HIV 37.9% – 95,2%. The coverage on tested HIV ranges from 6% to 97%. The coverage of pregnant women who tested for HIV and received the test result ranges 3.3% to 98%. The coverage of pregnant woman received post HIV test counselling 22.1% and the coverage of ARV treatment ranges from 41% to 84.6% (see Table 2).

3.3. Factors related of HIV testing

This research reveals various influencing factors on the coverage of EMTCT, particularly the coverage of HIV testing in pregnant women, including age (15)(16)(17), religion (18), marital status (18), education (18)(19)(16), profession (17), economic status (15)(16)(17)(20), rural/urban domicile (18)(17)(21), distance to health care facility (20), social culture (19), number of ANC visit (22)(17)(21) knowledge (23)(21)(24) and awareness (18)(25), partner engagement(22)(24), stigma (18)(26), and counselling (16)(27)(25).

Table 2. Factors Related to HIV Testing and the Coverage of ANC EMTCT Cascade

No	***Author/ Year***	***ANC EMTCT Cascade (%)***							***Factors related to HIV testing***
		Had ANC visit at least once	***Received pre-HIV test counsel-ing***	***Advised get tested for HIV***	***Tested for HIV***	***Tested for HIV and received the test result***	***Received post HIV test counsel-ing***	***ARV Therapy***	
1	*Ejigu Y. 2018*	*67.3*	*26.6*	*37.9*	*38.2*	*35.1*	*22.1*	*N/A*	*- Education level* *- Marital status*

									- *Religion* - *Awareness* - *Rural/urban domicile* - *Stigma*
2	*Muyunda B, 2018*	*93.9*	*95*	*95.2*	*80.6*	*98*	*N/A*	*N/A*	- *Age* - *Social-economic status*
3	*Belato DT, 2017*	*N/A*	*N/A*	*N/A*	*29.43*	*N/A*	*N/A*	*N/A*	- *Partner engagement* - *Education level* - *Income* - *Social culture*
4	*Ndege S, 2016*	*N/A*	*99.4*	*N/A*	*96.6*	*3.3*	*N/A*	*N/A*	- *Number of ANC visit*
5	*Semali I, 2014*	*N/A*	*57.3*	*81*	*80*	*76*	*N/A*	*N/A*	- *Age* - *Education level* - *Economic status* - *Counselling*
6	*Coulibaly, 2014*	*87.8*	*89*	*N/A*	*96.5*	*N/A*	*N/A*	*41.4*	- *Counselling*
7	*Deressa W, 2014*	*94*	*18*	*N/A*	*9*	*N/A*	*N/A*	*N/A*	- *Knowledge* - *Counselling* - *Awareness and preparedness*
8	*Bcheraoui C, 2013*	*98*	*N/A*	*N/A*	*83*	*N/A*	*N/A*	*N/A*	- *Age* - *Job status* - *Economic status* - *Number of ANC visit* - *Domicile*
9	*Audureau E, 2013*	*N/A*	*N/A*	*N/A*	*61.5*	*N/A*	*N/A*	*84.6*	- *Knowledge on EMTCT* - *Domicile* - *Number of ANC visit*
10	*Larsson EC, 2012*	*78 (health facility with*	*96.2*	*N/A*	*85*	*N/A*	*N/A*	*N/A*	- *Distance from home to health facility with onsite HIV*

		onsite HIV testing) *22 (health facility without onsite HIV testing)*	*7.3*		*6*				*testing* - *Economic status*
11	*Turan JM, 2011*	*N/A*	*N/A*	*N/A*	*93.8*	*N/A*	*N/A*	*N/A*	- *Stigma*
12	*Ujiji OA, 2011*	*N/A*	*90*	*N/A*	*97*	*N/A*	*N/A*	*N/A*	- *Partner engagement* - *Knowledge*

4. Discussions

4.1. Articles Characteristics

The publications on EMTCT are still focusing on the coverage and not the quality and sustainability of EMTCT. The publications on the coverage of EMTCT are still limited in number, which are only 12 articles and the geographical distribution that is in developing countries. Most of the articles come from Africa (11 articles), and 1 article from Central America. Thus, it shows that African countries really prioritized EMTCT, considering the proportion of HIV transmission from mother to child in Africa is the second highest in the world after Indonesia (2). No publication is found from developed countries on EMTCT since HIV transmission from mother to child is considerably low priority compared to developing countries.

Although the articles about EMTCT coverage from Asia in the last 10 years are not found in 4 online databases, there is a Systematic Literature Review from India, which cover 10 years prior to the time frame of this review (28). Likewise, research on EMTCT quality is found from Ethiopia-Africa afterwards, where 89.8% clients claimed satisfaction associated with waiting time, counselling duration and the counselling session performed by counsellors before and after HIV testing (29).

4.2. Coverage of ANC EMTCT Cascade

The findings show the coverage of ANC EMTCT cascade in pregnant women that varies from low too high in Africa and Central America. The coverage of pregnant women had ANC visit at least once ranges from 22% to 98%, received pre-HIV test counselling ranging from 7.3% to 99.4%, advised get tested for HIV from 37.9% to 95,2%, tested of HIV ranges from 6% to 97%, received the test result ranges froms 3.3% to 98%, received post HIV test counselling 22.1% and received ARV treatment ranges from 41% to 84.6%. Indonesia has the highest rate of postnatal HIV transmission from mother to child in the world, and the second highest is Africa(30).

HIV screening in Indonesia is still low with a low coverage of HIV testing among pregnant women (<1% in 2015, 28% in 2017). The low coverage condition in Indonesia is similar with Africa, but very different in comparison to Malaysia (>95% in 2015, 93% in 2017) (5). Moreover, the coverage of ARV treatment for pregnant women in Indonesia is also as low as 8% in 2015, 10% in 2016 and 13% in 2017, while the

coverage of ARV treatment in the world has already reached 80% in 2017 (5). Therefore, the fast track target of 90-90-90 in Indonesia and Africa is not yet reached (31). The low coverage in the HIV cascade seems representing the inadequate of EMTCT.The EMTCT implementation is still limited to HIV testing and not yet covering all cascades of EMTCT comprehensively.

4.3. Factors related to HIV testing

This research reveals various influencing factors on the EMTCT coverage, particularly the coverage of HIV testing among pregnant women, including age, religion, marital status, education, profession, economic status, rural/urban domicile, distance to health care facility, social culture, number of ANC visit, knowledge and awareness, partner engagement, stigma, and counselling.The intervenable factors are knowledge of pregnant women on HIV and EMTCT, awareness and preparedness of pregnant women on HIV testing, and quality of HIV counselling for pregnant women.

The study shows a relation between HIV counselling and HIV testing on pregnant women, however the coverage of HIV counselling on pregnant women varies from low to high coverage. The lowest coverage of HIV counselling of 7.3% is found in the rural areas of Uganda (23) and the highest coverage of 99.4% in Kenya (22). The coverage of HIV counselling is not found in the article from Central America. The success of the HIV counselling on pregnant women during ANC service highly depends on the preparedness of the health workers, their knowledge level, communication skills and the time spent for giving service.

One of the efforts that can be made to improve the effectiveness and quality of HIV counselling is by using auxiliary media during counselling session. A research from Pune (32) reported that culturally proper visual aids during coaching and counselling to a certain group significantly able to improve the understanding of pregnant women on HIV testing. Furthermore, The improvement of information on HIV testing during ANC will be effective when they target on young generation, those with low education and underprivileged (16). The success of counselling is also related to partner engagement. According to Belato(19), the presence of spouse during ANC improves the participation number on HIV testing in pregnant women.

During the study on EMTCT in Indonesia for the last 10 years, based on the 4 databases used, only 1 article of qualitative research is found. The article only discusses the comprehension of 20 women and 20 health workers on the implementation of Option B+ for EMTCT and the barriers to adherence to ARV therapy in Papua (33). The qualitative research in Papua states that the success of EMTCT is in relation with counselling factor, the trust in the efficacy of the ARV therapy and support from spouse. Meanwhile, stigma has been an obstacle. Unfortunately, the EMTCT coverage, quality and sustainability are not found.

4.4. Expected further research

Study reveals strongly the needs for further research in EMTCT in term of coverage, quality and sustainability aspects in developing countries respectively whose number of HIV transmission from mother to child is high, specifically in Indonesia. The research also shows that the majority of EMTCT researches were performed using cross-sectional survey and very few using cohort study. Therefore, further research is expected to use longitudinal study to measure the improvement process and outcome in the areas of coverage, quality and sustainability.

4.5. Study limitations

Study limits access to search for academic journals only on online database of ProQuest, Ebsco, PubMed and SpringerLink. Thus, it does not access other databases or articles of grey materials. Therefore, other EMTCT articles might be available in other databases or grey materials.

5. Conclusions

In the last 10 years, the research publications on EMTCT are still limited on the coverage aspect. Articles that covering quality and sustainability are not found. The number of researches on the coverage are still limited, which are only 12 articles, as well as the geographical distribution, which only covers Africa and Central America, whereas both are developing countries. Most of the articles are from Africa (11 articles) and only 1 article found from Central America. The coverage of ANC EMTCT cascade in pregnant women varies from low to high. The coverage of pregnant women had ANC visit at least once ranges from 22% to 98%, received pre-HIV test counselling ranges from 7.3% to 99.4%, advised get tested for HIV 37.9% – 95,2%, tested for HIV ranges from 6% to 97%, tested for HIV and received the test result ranges 3.3% to 98%, received post HIV test counselling 22.1% and received ARV treatment ranges from 41% to 84.6%.

To fill in the existing gap on similar research in Asia region, a preferably longitudinal research on coverage, quality and sustainability of EMTCT in Indonesia is suggested, considering the very low coverage of EMTCT in Indonesia.

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