[Original Article]

Is Maternal and Child Health Handbook effective?: Meta-Analysis of the Effects of MCH Handbook

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Abstract

Background:

Maternal and child health handbook (MCHH) consists of records of pregnancy, delivery, child development and immunization, as well as child growth charts. MCHH has been utilized in Japan since 1947 and it is now introduced in more than 20 countries in the world.

Objectives:

The objectives of this study were to collect research documents and reports in the past studies of MCHH and to analysis the effect of MCHH on maternal and child health through systematic review.

Methods:

The systematic searches were conducted for the studies published between 1980 and October 2011. After the initial screening of titles and abstracts of the studies, we reviewed 57 documents which were studied for MCHH in maternal and child health (MCH) programs or activities. After the final selection, we identified only 5 documents with 43 question items in Indonesia (1999 and 2001), Bangladesh (2003), the Philippines (2009) and Cambodia (2010).

Results:

The relationship between MCHH and pregnancy care revealed that mothers who used MCHH during pregnancy had higher level of knowledge (OR 1.44, 95% CI: 1.22-1.70) than whose did not use MCHH during pregnancy. The strong significant effects of MCHH were observed in knowledge of antenatal care visit (OR 1.86, 95% CI: 1.59-2.18), and mother should consume more food during pregnancy (OR 1.97, 95% CI: 1.37-2.83). Mothers who got MCHH during pregnancy had safer practice by skilled birth attendants (OR 1.12, 95% CI: 0.95-1.32) and delivered in health facilities (OR 1.31, 95% CI: 1.12-1.53). MCHH showed the effect of knowledge of child health care (OR 1.22, 95% CI; 1.05-1.41).

Discussion:

This study utilizing meta-analyses showed MCHH had higher association with knowledge of mothers than practice in pregnancy and child health care, although the study has its limitation. The illumination of the relationship between knowledge and practice by the effect of MCHH needs more quantitative analysis in both community and hospital settings in many countries.

Keywords: maternal and child health, handbook, pregnancy, delivery, child health care, meta-analysis

I. Introduction

The infant mortality rate (IMR) in Japan has shown a drastic and constant decrease from 76.0 in 1947 to 2.4 in 2009[1]. The decrease rate of IMR was constant and lower than the target of the Millennium Development Goals (MDGs)[2]. The US-Japan joint research team

reached five possible explanations for the success decline of IMR in Japan; narrow socio-economic distribution, national health insurance, maternal and child health handbook (MCHH), population-based screening and health check-ups, and high value placed on childbearing[3].

MCHH consists of records of pregnancy, delivery, child development, immunization, as well as child growth charts. The Handbook is also particularly able to focus people's attention on child health and MCHH can ensure "continuity of care" through provision of all the necessary information in the handbook[4]. The extensive study for 10,900 guardians showed that 87.0 % of respondents answered MCHH was helpful for child bearing, and 81.6% of them said the record for immunization was useful[5]. MCHH could assist in the early recognition of high-risk pregnancy. The feedback system between clients and care providers may improve health care for pregnancy-induced hypertension, and diabetes mellitus[6].

In early 1990s, MCHH started to be introduced in the world. MCHH was introduced in Indonesia in 1993 to ensure the quality of maternal and child health (MCH) services[7]. The study to assess the effects of the utilization of MCHH in West Sumatra Province in Indonesia showed the utilization of MCHH had the potential both to increase the knowledge of maternal health and to increase the utilization of maternal health services[8].

MCHH was recognized in Indonesia to simplify various types of health cards into one handbook. The cards of maternal health, family planning, growth monitoring and child development were often misplaced. It was also very difficult for mothers to keep appropriately many different kinds of cards. As health educational materials, MCHH contributes to the improvement of knowledge and behavior of mothers regarding maternal and child health. MCHH can integrate many health check-up records into one comprehensive record book[9]. MCHH is also useful as a referral document when a pregnant mother or a child is referred to a health center or to a hospital[2],[10].

While MCHH has been used in more than 20 countries, only a few countries provide MCHH nationwide. Many field studies were conducted when MCHH programs were implemented in the pilot provinces or district areas. However, it is needed a

study of the evidence-based to evaluate the effect of the MCHH.

II. Objectives

The objectives of this study were to collect research documents and reports in the past studies of MCHH and to analysis the effect of MCHH on maternal and child health through systematic review.

III. Methods

The systematic searches were undertaken by utilizing electronic databases such as Cochrane Libraries, Medline, and Google Scholar from December 2010 to October 2011. The online searches of major conference proceedings and reports were also conducted in order to identify unpublished literatures. The key search terms were: 'maternal health', 'child health' and 'maternal education.' The systematic searches were conducted for the studies which were published between 1980 and October 2011 (Figure 1). After initial screening of titles and abstracts, we reviewed the full-text publications of the studies the following criteria; the study should use MCHH in MCH programs or activities for mothers and children, the results had to be reported in the quantitative manner to permit calculation of effect size, and the studies could measure the relationship between MCHH and MCH services such as pregnancy, delivery or child health care.

The methods of odds ratios were used to estimate the effect size and confidence intervals. The calculations were conducted with comprehensive meta-analysis V2 software. We computed the log odds ratios and used these numbers to perform all steps in the meta-analysis. However three steps of funnel plot method, Rosenthal's Fail-safe N and Orwin's Fail-safe were taken to confirm the validity of this study. To cope with the fact that each study was conducted by completely different ways, a random or mixed effects model was the appropriate model to choose and gives the most reliable results.

IV. Results

Our searches identified 33,548 titles (Figure 1). After the initial screening of titles and abstracts, we reviewed 57 documents which were studied for the MCHH in relation to MCH programs or activities in

Figure 1 Flow diagram of search strategy of meta-analysis
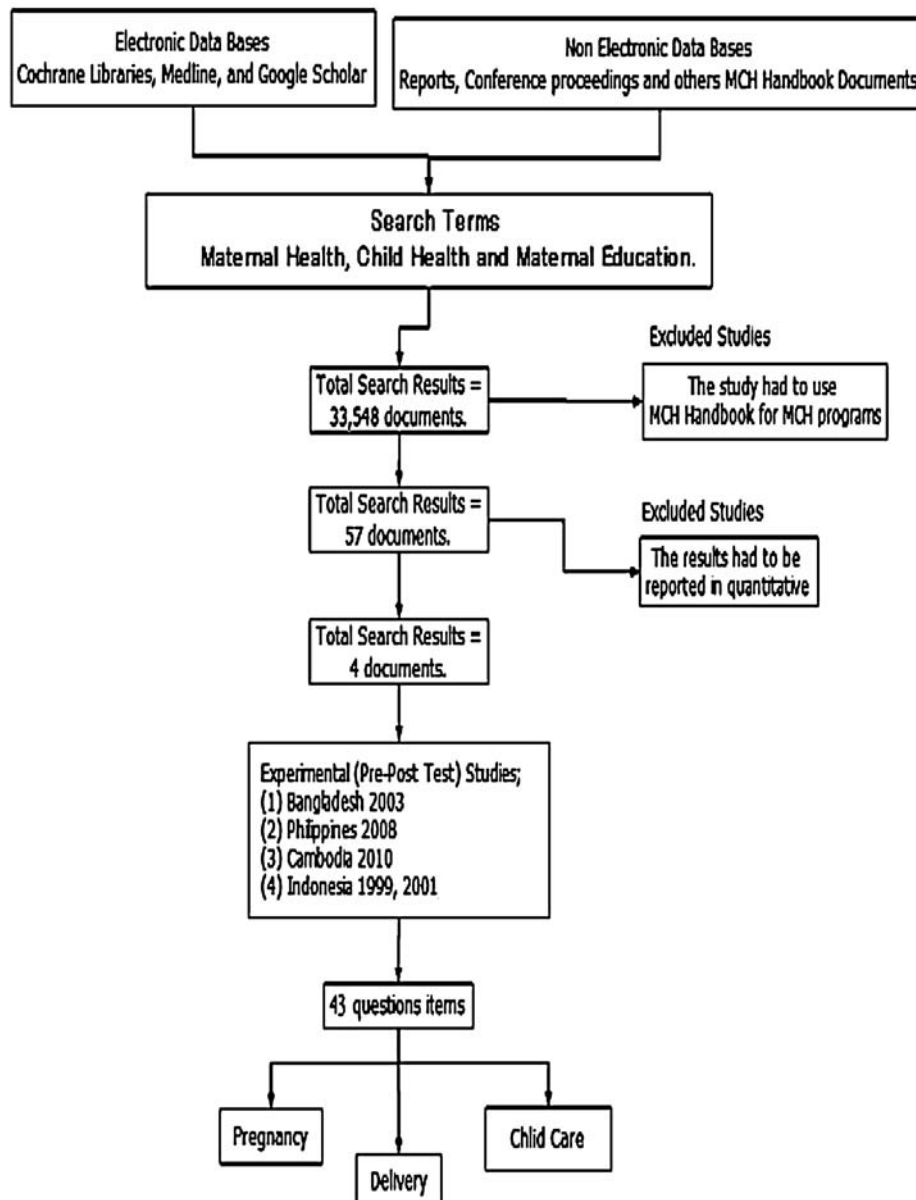
Japan, Thailand, Indonesia and other countries. After the final selection, we identified only five documents, which were written in English by chance. No randomized controlled trials were found. All the studies were conducted in low or middle-income countries. The study in Bangladesh was implemented at a hospital in 2003[11]. The study in Cambodia was a pre-post survey in intervention and control areas in 2010[12]. The studies in Indonesia were carried out in 1999[13] as a pre-test and in 2001[14] as a post test. The study in the Philippines was a pre-post test without any control area, because it was conducted in indigenous population[15]. These 5 documents consisted of 43 question items which were categorized into pregnancy, delivery, and child health care. The total sample size of these studies was 2,435.

The contents of MCHH were actually country-specific. The size, color and volume of MCHH were different in 4 countries. However, the common characteristics in 4 countries were as follows; to consist of records of pregnancy, delivery, child health care, immunizations and child growth charts, to give health information on MCH, to be kept by parents, and to guarantee the continuum of care of maternal, neonatal

and child health across time and location.

The overall effect size of MCHH was 1.19 (95% CI: 1.10–1.29). The sub-analysis was done to determine the effect size and odds ratios of pregnancy, delivery and child care.

1. Pregnancy

The relationship between MCHH and pregnancy care revealed that mothers who used MCHH during pregnancy had higher level of knowledge (OR 1.44, 95% CI: 1.22–1.70) than whose did not use MCHH during pregnancy (Figure 2). The study on knowledge of risk factors during pregnancy had the largest effect on the odds ratio (OR 2.80, 95% CI: 1.97–3.98).

The strong significant effects of MCHH were observed in knowledge of antenatal care visit (OR 1.86, 95% CI: 1.59–2.18), and mother should consume more food during pregnancy (OR 1.97, 95% CI: 1.37–2.83). MCHH was also associated with practice of Tetanus Toxoid (TT) immunization during pregnancy (OR 1.20, 95% CI: 1.00–1.43) and antenatal visits (OR 1.31, 95% CI: 1.11–1.53).
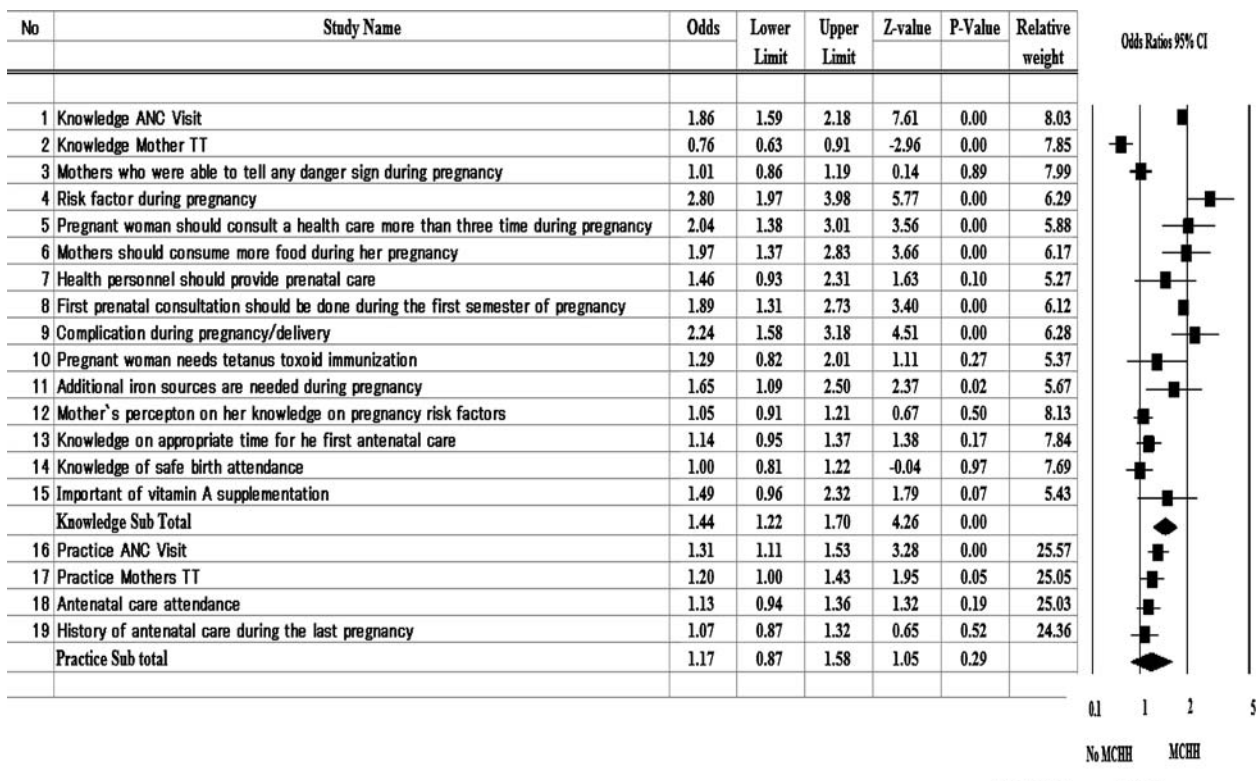
2. Delivery

There were only 5 question items concerning delivery (Figure 3). Meta-analyses showed that MCHH was not related to positive increase in knowledge but to positive increase in practice. Mothers who got MCHH had higher safer practice by skilled birth attendants (OR 1.12, 95% CI: 0.95–1.32) and deliver in health facilities (OR 1.31, 95% CI: 1.12–1.53).

3. Child Health Care

Meta-analyses revealed a variety of results in child health care (Figure 4). MCHH showed the effect of knowledge of child health care (OR 1.22, 95% CI; 1.05–1.41) but the effect of practice was not significant (OR 0.99, 95% CI; 0.87–1.13). Among 10 question items concerning knowledge of child health care, the big effect sizes were found in the question items of knowledge of baby food at six months (OR 2.26, 95% CI: 1.56–3.27) and exclusive breastfeeding for 6 months (OR 2.59, 95% CI: 1.83–3.66). Both questions were closely related to exclusive breastfeeding for the child's first six months to achieve optimal growth, development and health. As for the practice of child care, MCHH didn't show the association with practice of colostrums and immunizations of oral polio vaccine (OPV), Diphtheria-Pertussis-Tetanus (DPT) and BCG.

Figure 2　Summary of meta-analysis examinations the association between MCHH and pregnancy care

No	Study Name	Odds	Lower Limit	Upper Limit	Z-value	P-Value	Relative weight	Odds Ratios 95% CI
1	Knowledge ANC Visit	1.86	1.59	2.18	7.61	0.00	8.03	
2	Knowledge Mother TT	0.76	0.63	0.91	-2.96	0.00	7.85	
3	Mothers who were able to tell any danger sign during pregnancy	1.01	0.86	1.19	0.14	0.89	7.99	
4	Risk factor during pregnancy	2.80	1.97	3.98	5.77	0.00	6.29	
5	Pregnant woman should consult a health care more than three time during pregnancy	2.04	1.38	3.01	3.56	0.00	5.88	
6	Mothers should consume more food during her pregnancy	1.97	1.37	2.83	3.66	0.00	6.17	
7	Health personnel should provide prenatal care	1.46	0.93	2.31	1.63	0.10	5.27	
8	First prenatal consultation should be done during the first semester of pregnancy	1.89	1.31	2.73	3.40	0.00	6.12	
9	Complication during pregnancy/delivery	2.24	1.58	3.18	4.51	0.00	6.28	
10	Pregnant woman needs tetanus toxoid immunization	1.29	0.82	2.01	1.11	0.27	5.37	
11	Additional iron sources are needed during pregnancy	1.65	1.09	2.50	2.37	0.02	5.67	
12	Mother's percepton on her knowledge on pregnancy risk factors	1.05	0.91	1.21	0.67	0.50	8.13	
13	Knowledge on appropriate time for he first antenatal care	1.14	0.95	1.37	1.38	0.17	7.84	
14	Knowledge of safe birth attendance	1.00	0.81	1.22	-0.04	0.97	7.69	
15	Important of vitamin A supplementation	1.49	0.96	2.32	1.79	0.07	5.43	
	Knowledge Sub Total	1.44	1.22	1.70	4.26	0.00		
16	Practice ANC Visit	1.31	1.11	1.53	3.28	0.00	25.57	
17	Practice Mothers TT	1.20	1.00	1.43	1.95	0.05	25.05	
18	Antenatal care attendance	1.13	0.94	1.36	1.32	0.19	25.03	
19	History of antenatal care during the last pregnancy	1.07	0.87	1.32	0.65	0.52	24.36	
	Practice Sub total	1.17	0.87	1.58	1.05	0.29		

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V. Discussion

This study was conducted to quantify the effect of MCHH on pregnancy, delivery and child health care by utilizing meta-analysis for the first time. There were many difficulties in collecting quantitative data to be processed because most studies on MCHH were carried out in qualitative approaches. We searched the literatures and documents through not only online searches but also major conference proceedings and reports. However, we could find only 5 studies with 43 question items.

In this study, meta-analyses revealed the strong relationship between MCHH and knowledge of moth-ers in pregnancy and child health care. The effects of MCHH on knowledge and practice might be different. In question items of pregnancy and child health care, meta-analysis between MCHH and knowledge of mothers showed the higher association than that between MCHH and practice. The study in Thailand showed that the antenatal care (ANC) perception of pregnant women had significant associations with education level, marital status, family support, and behaviors of bringing the MCHH to the ANC visits[16]. The knowledge of mothers can be improved by the provision of MCHH as a health educational material. However, the behavior changes are more challenging

Figure 3　Summary of meta-analysis examinations the association between MCHH and delivery
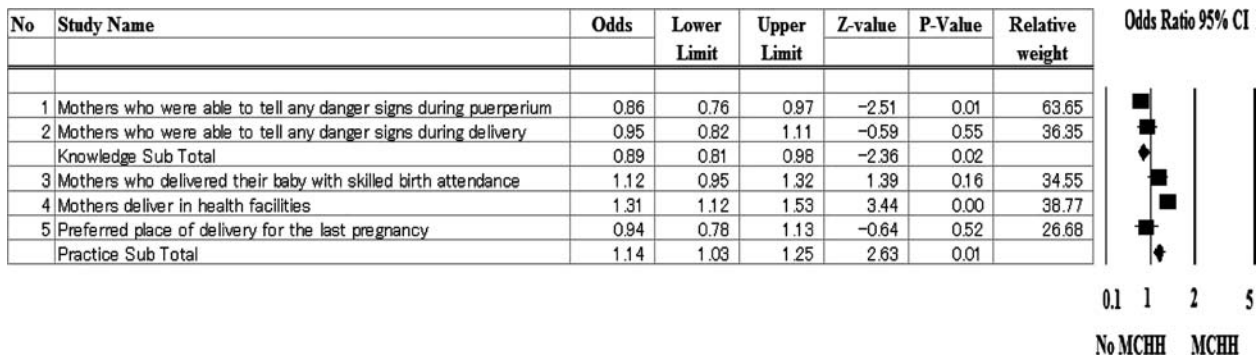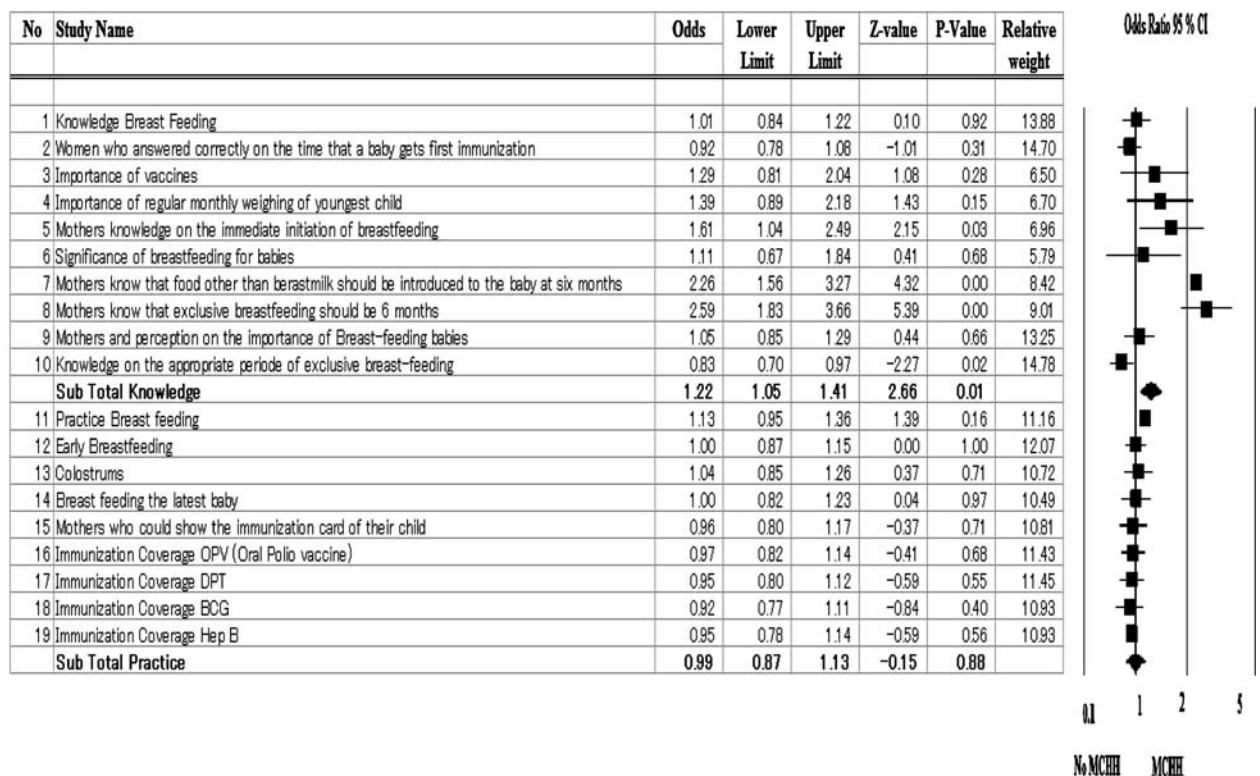
No	Study Name	Odds	Lower Limit	Upper Limit	Z-value	P-Value	Relative weight	Odds Ratio 95% CI
1	Mothers who were able to tell any danger signs during puerperium	0.86	0.76	0.97	-2.51	0.01	63.65	
2	Mothers who were able to tell any danger signs during delivery	0.95	0.82	1.11	-0.59	0.55	36.35	
	Knowledge Sub Total	0.89	0.81	0.98	-2.36	0.02		
3	Mothers who delivered their baby with skilled birth attendance	1.12	0.95	1.32	1.39	0.16	34.55	
4	Mothers deliver in health facilities	1.31	1.12	1.53	3.44	0.00	38.77	
5	Preferred place of delivery for the last pregnancy	0.94	0.78	1.13	-0.64	0.52	26.68	
	Practice Sub Total	1.14	1.03	1.25	2.63	0.01		

Figure 4　Summary of meta-analysis examinations the association between MCHH and child health care

No	Study Name	Odds	Lower Limit	Upper Limit	Z-value	P-Value	Relative weight	Odds Ratio 95 % CI
1	Knowledge Breast Feeding	1.01	0.84	1.22	0.10	0.92	13.88	
2	Women who answered correctly on the time that a baby gets first immunization	0.92	0.78	1.08	-1.01	0.31	14.70	
3	Importance of vaccines	1.29	0.81	2.04	1.08	0.28	6.50	
4	Importance of regular monthly weighing of youngest child	1.39	0.89	2.18	1.43	0.15	6.70	
5	Mothers knowledge on the immediate initiation of breastfeeding	1.61	1.04	2.49	2.15	0.03	6.96	
6	Significance of breastfeeding for babies	1.11	0.67	1.84	0.41	0.68	5.79	
7	Mothers know that food other than berastmilk should be introduced to the baby at six months	2.26	1.56	3.27	4.32	0.00	8.42	
8	Mothers know that exclusive breastfeeding should be 6 months	2.59	1.83	3.66	5.39	0.00	9.01	
9	Mothers and perception on the importance of Breast-feeding babies	1.05	0.85	1.29	0.44	0.66	13.25	
10	Knowledge on the appropriate periode of exclusive breast-feeding	0.83	0.70	0.97	-2.27	0.02	14.78	
	Sub Total Knowledge	1.22	1.05	1.41	2.66	0.01		
11	Practice Breast feeding	1.13	0.95	1.36	1.39	0.16	11.16	
12	Early Breastfeeding	1.00	0.87	1.15	0.00	1.00	12.07	
13	Colostrums	1.04	0.85	1.26	0.37	0.71	10.72	
14	Breast feeding the latest baby	1.00	0.82	1.23	0.04	0.97	10.49	
15	Mothers who could show the immunization card of their child	0.96	0.80	1.17	-0.37	0.71	10.81	
16	Immunization Coverage OPV (Oral Polio vaccine)	0.97	0.82	1.14	-0.41	0.68	11.43	
17	Immunization Coverage DPT	0.95	0.80	1.12	-0.59	0.55	11.45	
18	Immunization Coverage BCG	0.92	0.77	1.11	-0.84	0.40	10.93	
19	Immunization Coverage Hep B	0.95	0.78	1.14	-0.59	0.56	10.93	
	Sub Total Practice	0.99	0.87	1.13	-0.15	0.88		

issues, which are related to education level, socioeconomic situation, and family support. It might be very difficult that only MCHH program promotes the changes of health behavior. All the MCHH activities which were analyzed in this study, had trained health professionals before distribution of MCHH, and had monitoring activities for supervision of MCHH utilization and MCH service delivery. It is very difficult to distinguish the effects between MCHH itself and MCH service which are closely related to MCHH.

This study revealed that MCHH was significantly associated with increasing rate TT immunization during pregnancy. Neonatal tetanus can be prevented by immunizing women of childbearing age with TT, either during pregnancy or after pregnancy. TT immunization protects the mother and also through a transfer of tetanus antibodies to the fetus also her infant. Kusumayati A (2007) found that active usage of MCHH by mothers was strongly associated with knowledge of mothers. When mothers read most or all parts of the MCHH, they might understand the reason why TT immunization is important for pregnant mothers[8].

Meta-analysis showed that MCHH was associated with the practice of deliveries by skilled birth attendants, deliveries in health facilities. However, the relationship between MCHH and immunizations of OPV, DPT and BCG were not identified. The deliveries attended by skilled birth attendants and the deliveries in health facilities are confirmed to reduce maternal mortality ratio and neonatal mortality rates. The study at a pilot hospital in Bangladesh showed that pregnant women who received MCHH had more MCH information, better practices in MCH care, and higher utilization of MCH services than those in control group[17]. MCHH increased the knowledge of safe birth attendants. This direct message might influence the behaviors of pregnant women and delivery.

VI.　Conclusion

This study utilizing meta-analysis showed MCHH had higher association with knowledge of mothers than their practice in pregnancy and child health care. The illumination of the relationship between knowledge and practice by the effect of MCHH needs more quantitative analysis in both community and hospital settings in many countries. Now MCHH is introduced in more than 20 countries. The further studies are expected to clarify the effect of MCHH.

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