A STUDY ON THE EFFECT
OF STIMULATING MEASLES IMMUNIZATION

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Abstract

Penulisan tentang imunisasi campak ini menggunakan perluasan yang berbeda untuk membandingkan hasil dari suatu program, yaitu pendidikan kesehatan (health education = HE) dan sistem pengingat (reminding system = RS) terhadap pengetahuan, sikap terhadap campak dan pencegahannya. Dari hasil penelitian ini diketahui bahwa tidak ada perbedaan bermakna antara pengetahuan, sikap mengenai campak, pengetahuan atas kerentanan, manfaat, dan hambatan untuk mendapatkan imunisasi campak. Cakupan imunisasi di subarea dengan perluasan setelah satu tahun menunjukkan kenaikan lebih dari 27%, sedangkan di subarea yang tanpa perluasan, kenaikan cakupan imunisasi campak hanya 11,7%. Perbedaan ini secara statistik bermakna (p < 0,05) dan secara klinis kenaikan lebih dari 10% bermakna bagi program. Kenalai cakupan dengan beda perluasan tidak menunjukkan perbedaan yang bermakna.

Key words: measles, measles immunization, village health worker, health education, reminding system

Introduction

The measles immunization coverage in most developing countries, including Indonesia remains unsatisfactory. However, the same problem exists in some developed countries where all facilities for the immunization delivery system are adequate. It is clear that besides technical and managerial provisions, the immunization acceptance of the community is very important in achieving an effective coverage of measles immunization.

In Indonesia, the immunization program is not compulsory, e.g. as requirement for school entrance as practised in the United States. Other countries such as Germany and Czechoslovakia which had adopted a compulsory measles immunization have virtually eliminated the disease. This kind of approach has not been adopted in most of the developed or developing countries as Indonesia: the ultimate decision to have their children immunized is the responsibility of the parents.

Attempts to increase the coverage of measles and other vaccines in a particular community can be accomplished through several strategies. A single mass measles immunization campaign was conducted in Yaounde, Cameroon and in Khayelitsha, Cape Town area with discouraging results. The failure to reach the objectives of the program was, among others, due to administration errors, the poor handling of the vaccine, the campaign design and implementation, and the factors related to the mobility of mothers and children. Another strategy for promoting measles immunization was carried out in South
Australia in a great mass media campaign using television, radio, newspapers, posters and leaflets. Although this program realized a higher immunization coverage, this kind of approach can not be applied in most of the developing countries.

Successes were also achieved by some other strategies using community mobilization. For example, this is applied during the national immunization days in a number of countries, following the project in Colombia, and during the pulse immunization project (the community receives annual pulses for vaccination) that was conducted in India and in Mozambique.

In Indonesia, the basic structure for immunization delivery services consists of two components: a fixed site component, i.e. the health center and the subcenter, and village immunization post. The utilization of fixed sites was found to be relatively poor, the greatest immunization coverage was obtained by the outreach activities (mobile team) where the community is involved and participated in the planning, implementation and evaluation of the program. The Village Health Worker (VHW) as a part of the primary health care program, is expected to play an important role to encourage the participation of the community in the immunization program. However, according to the studies carried out in Indonesia, the role of the VHWs for supporting the Expanded Programme on Immunization (EPI) to increase immunization coverage, was found not to be obvious. Here a special training program on measles immunization for VHWs is needed to enhance the effectiveness of their approach to mothers. This means training and motivating VHWs to educate the mothers in having their children immunized.

The factor which may influence the parents' compliance especially with regard to measles immunization is the rather difficult age because children should be immunized the age of preferably 9 months. Usually, a child has completed his/her DPT and OPV vaccinations at the age of 5 months. The interval of 4 months probably is a cause for some mothers to forget or to become reluctant to bring their children for measles immunization. One method to overcome the drawback of the difficult age is the sending of a personal reminder message to the parents. Young et al. (1980) reported a 50% gain in the immunization rate of children who received a mailed reminder for immunization as compared with those without reminder. So, it seems very useful to remind the parents for having their children immunized against measles when their children are nine months of age.

A health education program is less effective when the health education material does not take into account the knowledge, belief and attitude of the community. A full understanding of the community with regard to measles and its prevention is essential for program. The Health Belief Model of Becker & Maiman (1975) may be considered as a suitable model for investigating the factors of influence on the community to accept a recommended health behavior.

A study with different stimulating program for increasing the coverage of measles immunization that was carried out in Gunungkidul regency, Yogyakarta Special Region will be presented.

The aim of the study

The aim of the present study is to evaluate the effect of different intervention program (health education
activities, sending reminder cards and a combination of both approaches) on:
1. the knowledge and attitude towards measles and measles immunization
2. the coverage of measles immunization in young children.

The conceptual framework of the present study was based on the four major components of the Health Belief Model as intervention points for the modification of health behaviour (Figure 1). In this case the aim is to prevent measles by immunization. The Health Belief Model holds that, among other factors, the probability that a person will undertake a particular preventive measure (e.g. measles immunization for a son or daughter), depends on his/her belief that:

1. his/her child is susceptible to the disease and its consequences;
2. the disease (complications included) is serious for his/her child;
3. the measure of immunization will prevent or reduce the severity of the disease;
4. the barriers to get such a prevention are not weighted by its benefits.

In this model, the supply of information by various means such as a mass media campaign, an advice from others, a reminder card from the health workers, which are believed to serve as a cue or trigger to take action, is included as the additional variable as called "cue to action".

Figure 1: The framework of the present study

- perceived susceptibility to measles
- perceived seriousness of measles
- perceived threat of measles
- perceived benefits of measles vaccine minus perceived barriers to get vaccination
- likelihood of taking recommended health action
- measles vaccination

* = included in this study
Hypotheses

Two hypotheses were formulated with regard to the result of the study. Intervention with health education activities would increase the knowledge and result in a more positive attitude of the mothers towards measles and measles immunization. Intervention with health education activities and/or a reminding system for measles vaccination would lead to a higher coverage of measles immunization.

Methods

The design of this study was a prospective study with comparison between the treated and untreated groups. It was anticipated that the proportion of the coverage of measles immunization in the control group is 45% and in the treatment group is 55%. Given alpha error 0.05, 2 tailed, beta error 0.10 and delta between study and control group 10 percentage points. Applying the formula to calculate the sample the sample size estimation that required in this study and allowed for 10% lost of follow up, a total of 212 children aged 18 - 35 months are needed for this study. It is anticipated that 2 subdistricts ("kecamatan") or 2 health centers in each group are able to provide the sample size needed.

From the 25 health centers available in Gunungkidul regency, the service area of the 8 health centers with the lowest measles immunization coverage were chosen as area for this study. These health centers were Wonosari II, Karangmojo II, Rongkop I, Ngawen, Nglipar II, Rongkop II, Patuk II and Playen I. The area used in this study is the same area which was studied for the beliefs and practices about measles and measles prevention. The eight health centers used in this study were roughly identical with regard to the staff personnel, the facilities for immunization services and the condition of the area. The VHW program has been established since 1981; a Posyandu (pos pelayanan terpadu integrated health post) is available in every hamlet in this area. The mothers come to the Posyandu usually by foot; the distance from their homes is generally less than 2 kilometers. Geographically do not seem to be a problem in this area. This study was carried out during the period July 1988 - December 1989. In order to meet the aims of the study, the study was carried out in three phases.

1. Preparatory phase

During the preparatory phase, the investigator visited every health center in the study area. Besides explaining the purpose of the study to the head of the health center, this opportunity was used also to interview the health center personnel involved in the immunization program concerning their knowledge and attitude toward the EPI program and its implementation. From the coordinator of the VHWs in the health center, information was obtained about the VHWs and their activities in each village. It could be observed that facilities for the immunization program, including the cold chain system, were adequate. More information about the implementation of the immunization program in the field and the activities of the VHWs was obtained and observed by visiting several Posyandu. The author joined the routine monthly meetings held by the health center staff in the eight health centers. An informal interview on the knowledge of the VHWs toward the immunization program and the problems faced by VHWs was held during these visits.
In the first phase a cross sectional design was used to collect baseline data in two respects:

1. About the knowledge, attitude, beliefs and practices of the mothers regarding measles and measles immunization. These data were used for training the VHVs and health education material for health education activities;

2. About the measles immunization status of the children aged 18-23 months.

Data collection

Base line data of the measles immunization status of all children aged 18-23 months in the study area were collected. This group of children was chosen because their age was just beyond the target age for measles immunization. The measles immunization status was taken over from the Road-to-Health Card (KMS = Kertu Menuju Sehat) or the immunization card kept by the mothers. If this card was not available at home, the child’s immunization record kept by the vaccinator was consulted.

II. Implementation phase

As mentioned earlier, the eight health centers and their service area which were used for the study on the beliefs and practices about measles and measles prevention were used for this program. These eight health centers were randomly allocated into four subareas (A,B,C,D), each consisting of the service area of two health centers. Each subarea had its own intervention program, namely: Subarea A: extra health education (HE) and a reminding system (RS). This subarea consists of the health centers Wonosari II and Karangmojo II; Subarea B: extra HE, but no RS. Subarea B consists of the health centers Rongkop I and Ngayen; Subarea C: RS, but no extra HE. Subarea C consists of the health centers Nglipar II and Rongkop II; Subarea D: no extra HE or RS (control). Subarea D consists of the health centers Patuk II and Playen II.

In this study each health center was approached individually in order to minimize the chance of mutual influence on the regional program of intervention. The basic routine procedures of the immunization service provided by the local health centers were not changed during the study period. This intervention period lasted 12 months.

Extra health education material:

Based on the data obtained from the initial study of the knowledge, attitude, beliefs and practices of the mothers concerning measles and measles immunization, new health education material in the form of a handy booklet was developed. After fruitful discussions with some experts in medical sociology from the Gadjah Mada University and with the head of the Subdirectory of Health Education, Department of Health, Yogyakarta Province, a field trial concerning the prototype of the booklet was carried out in Pajany subdistrict, Gunungkidul regency, outside of the study area. The booklets were given to 30 VHVs, who were asked to read it and to give comments. After a week, a meeting was held with the purpose to know whether the VHVs had understood the contents of the booklet. During this meeting some valuable comments and suggestions were collected.

The training

A training course for the special health education activities for the VHVs and the health center staff members in subareas A and B was given on two
days, three hours per day. The daily training consisted of a lecture (one hour) and some practice in small groups (two hours). The training focused on better knowledge of measles and measles prevention, and on an adequate communication with parents. The practical training in health education was realized in a stimulation-scene in the small group of participants. Every month at the monthly routine meeting of VHWs, a refresher course was held, organized by the health center staff. On these occasions the practical problems encountered in the villages were discussed. After the training, two general tasks were expected to be performed by every VHW:

1. to provide information about measles and measles immunization in the villages at the monthly meeting organized by the Family Welfare Movement (PKK) and at any other meeting at village and hamlet level;
2. to provide information about measles and measles immunization to 15-20 families with an infant to be immunized in his/her neighborhood every month. The author supervised the activities of the VHWs and helped to solve the problems which they encountered during their work.

Reminding system

A special card was developed with the purpose to remind the parents about the measles immunization of their children. The message in this reminder card was developed based on the Health Belief Model of Becker & Maiman (1975); it emphasized the seriousness of measles, the susceptibility of children to get measles, and the benefits of measles immunization. Also, it mentioned the place, date and time of the immunization session. The reminder card used in this study is shown in Appendix A. Reminder cards were used in three colours: green, yellow and red. Two weeks before the immunization session, a green card was delivered by the Village Health Worker to the mothers whose children should be immunized (age 5 months). If a mother did not come to the immunization post, the second card (a yellow one) was delivered the next month. The third card (in red color) was delivered if the mother did not come after the second reminder.

III. Evaluation

The effects of these four programs were examined one year after the implementation had begun. Using the same questionnaire and procedure as the first time, two aspects were studied: (1) the knowledge and attitude of the mothers with regard to measles and measles immunization, as well as the knowledge of the care of children with measles, and (2) the measles immunization status of the children aged 18-23 months.

The assessment of the knowledge consisted of ten questions: the knowledge with regard to signs and symptoms of measles, the cause, the contagiousness, the mode of transmission, the care and treatment, the possibility to prevent, the type of the prevention measure, the ideal age for immunization and the frequency, and, finally, the contraindications for measles immunization. The right answers given by the mothers for the questions about knowledge were scored 2, while the wrong answer were scored 1. So, the lowest score for knowledge assessment is 10 and the highest 20.

For the perceived susceptibility to measles (7 items), the perceived seriousness of measles (10 items), the perceived benefits of measles
immunization (7 items) and the perceived barriers to get measles immunization (6 items), the assessment was carried out using Likert scales method, giving score 5 for "strongly agree" down to 1 for "strongly disagree" for a favorable attitude statement, whereas for unfavorable statements, it was scored 1 for "strongly agree" up to 5 for "strongly disagree". Thus, the score for the perceived susceptibility ranged between 7 and 35, the score for the perceived seriousness between 10 and 50, the score for the score for the perceived barriers ranged between 6 and 30. For each intervention, the mean scores for the knowledge, attitude and measles immunization coverage were compared with the mean scores of the control group. To determine the statistical significance between experimental and control groups student's t test was used and for the measles immunization coverage z-test was used. A p-value of 0.05 or less was required to accept statistical significance. An increase of measles immunization coverage of 10% or more was used to determine clinical significance.

Results

Of the 1,151 mothers participating in the initial study (per-intervention phase) 82 (7.1%) failed to be interviewed for the second time due to moving to a place outside of the study area. Additionally, 56 mothers who resided in the study area longer than six months before the post-intervention was carried out, were included in the second part of the study. Thus, in the final evaluation, 1,125 mothers were comprised.

In subareas A and C, where a reminding system intervention was applied, a reminder card was delivered to the mothers two weeks before the immunization session, the response of the mothers to this card is shown in Table 1.

<table>
<thead>
<tr>
<th>Type of Card</th>
<th>Subarea A Response</th>
<th>Subarea C Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Card</td>
<td>352</td>
<td>253</td>
</tr>
<tr>
<td>Yellow Card</td>
<td>99</td>
<td>2</td>
</tr>
<tr>
<td>Red Card</td>
<td>97</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>457</td>
<td>73.9</td>
</tr>
</tbody>
</table>

The results showed that in the two subareas the total response of the mothers to the reminder system was not significantly different, even though in subarea A an additional intervention with health education activities was applied. The effect of different intervention program on the knowledge and attitude of the mothers in order to determine the changes of each component of the Health Belief Model, the knowledge of, the perceived susceptibility to, the perceived seriousness of measles, as well as the perceived benefits of measles immunization and the perceived barriers to get measles immunization were analysed. The results of the knowledge assessment is shown in Table 2.

The results show that the score of knowledge in all subareas had significantly increased including subarea D, where no intervention was applied. Further analysis of the results after intervention showed that the maternal knowledge in subarea A was higher than those in subareas B, C and D (p<0.05). The score of maternal knowledge in subarea B was higher than those in subarea D and subarea C (p<0.05). The score of knowledge of the mothers in subareas C and D was significantly different (p<0.05). Although
these differences were statistically significant, from the practical point of view, they were negligible.

Table 2:

The mean score of maternal knowledge concerning measles and measles immunization, before and after different intervention programs in four subareas.

<table>
<thead>
<tr>
<th>subarea</th>
<th>intervention program</th>
<th>before intervention n</th>
<th>mean</th>
<th>after intervention n</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>HE + S</td>
<td>352</td>
<td>14.71</td>
<td>329</td>
<td>18.04</td>
</tr>
<tr>
<td>B</td>
<td>HE</td>
<td>336</td>
<td>14.39</td>
<td>343</td>
<td>17.84</td>
</tr>
<tr>
<td>C</td>
<td>RS</td>
<td>212</td>
<td>14.52</td>
<td>231</td>
<td>17.62</td>
</tr>
<tr>
<td>D</td>
<td>none</td>
<td>251</td>
<td>14.97</td>
<td>242</td>
<td>14.45</td>
</tr>
</tbody>
</table>

Legend: HE = a special health education program on measles and measles immunization; RS = reminding system applied.

The results of the assessment of maternal perception about the susceptibility to measles are shown in Table 3.

Table 3:

The mean score of maternal perception of the susceptibility to measles, before and after different intervention programs in four subareas.

<table>
<thead>
<tr>
<th>subarea</th>
<th>intervention program</th>
<th>before intervention n</th>
<th>mean</th>
<th>after intervention n</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>HE + S</td>
<td>352</td>
<td>14.74</td>
<td>329</td>
<td>17.52</td>
</tr>
<tr>
<td>B</td>
<td>HE</td>
<td>336</td>
<td>25.52</td>
<td>343</td>
<td>27.62</td>
</tr>
<tr>
<td>C</td>
<td>RS</td>
<td>212</td>
<td>32.89</td>
<td>231</td>
<td>24.69</td>
</tr>
<tr>
<td>D</td>
<td>none</td>
<td>251</td>
<td>33.99</td>
<td>242</td>
<td>26.07</td>
</tr>
</tbody>
</table>

Legend: HE and RS see legend Table 2

Similar with the results of the knowledge assessment as described earlier, the score of the perceived susceptibility to measles in all subareas increased. From the analysis to the data on the perceived susceptibility to measles assessment after intervention it was found that the score of perceived susceptibility of the mothers in subarea A was significantly higher than those in subareas A was D (p<0.05), but was not different from the score in subarea B (p>0.05). The score in subarea B was significantly different from the scores in subareas C and D (p<0.05). The scores of subareas C and D did not differ significantly from each other (p>0.05). This result showed that the differences were statistically significant, however, were not relevant.

The result of the assessment on the seriousness of measles as perceived by the mothers are shown in Table 4.

Table 4:

The mean score of maternal perception of the seriousness of measles, before and after different intervention programs in four subareas.

<table>
<thead>
<tr>
<th>subarea</th>
<th>intervention program</th>
<th>before intervention n</th>
<th>mean</th>
<th>after intervention n</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>HE + S</td>
<td>352</td>
<td>32.79</td>
<td>329</td>
<td>38.73</td>
</tr>
<tr>
<td>B</td>
<td>HE</td>
<td>336</td>
<td>32.90</td>
<td>343</td>
<td>38.83</td>
</tr>
<tr>
<td>C</td>
<td>RS</td>
<td>212</td>
<td>22.23</td>
<td>231</td>
<td>37.64</td>
</tr>
<tr>
<td>D</td>
<td>none</td>
<td>251</td>
<td>32.34</td>
<td>242</td>
<td>33.97</td>
</tr>
</tbody>
</table>

After intervention also an increase of the score of the perceived seriousness of measles was found in all subareas. The score of the perceived seriousness of measles after the intervention in subarea A was found to be significantly different from the scores in subarea C and subarea D (p<0.05), but was not different from the score in subarea B (p>0.05). The score in subarea B was significantly different from the scores in subarea C and subarea D (p<0.05). It was found that the scores in subareas C and D did not differ significantly from each other (p>0.05). From this result it came out that the difference between the scores in the experimental subareas and
in the control subarea was not only statistically significant but was also of practical importance. The result of the assessment of the perceived benefits of measles immunization are shown in Table 6. The results of the assessment on the perceived barriers to get immunization are shown in Table 6.

Similar with the results of the assessment of maternal knowledge and the perceived susceptibility to measles as described earlier, in the analysis of the perceived benefits of measles immunization and the perceived barriers to get immunization, no differences could be found.

Table 5
The mean score of maternal perception of the perceived benefits of measles immunization before and after different intervention programs in four subareas.*

<table>
<thead>
<tr>
<th>subarea</th>
<th>intervention program</th>
<th>before intervention</th>
<th>after intervention</th>
<th>n</th>
<th>mean</th>
<th>n</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>HG + S</td>
<td>38            32.77</td>
<td>329            38.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>HG</td>
<td>356            32.90</td>
<td>340            38.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>RS</td>
<td>23              32.23</td>
<td>111            37.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>none</td>
<td>251            32.34</td>
<td>242            33.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*excluding the mothers who had not heard about measles immunization.

Legend: HG and RS see legend Table 2.

Table 6
The mean score of maternal perception of the perceived barriers to get immunization, before and after different intervention programs in four subareas.

<table>
<thead>
<tr>
<th>subarea</th>
<th>intervention program</th>
<th>before intervention</th>
<th>after intervention</th>
<th>n</th>
<th>mean</th>
<th>n</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>HG + S</td>
<td>383            32.77</td>
<td>329            38.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>HG</td>
<td>336            32.90</td>
<td>340            38.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>RS</td>
<td>212            32.22</td>
<td>211            37.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>none</td>
<td>224            32.34</td>
<td>242            33.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend: HG and RS see legend Table 2

Table 7
The measles immunization status of children aged 18-23 months, before and after different intervention programs, in four subareas.

<table>
<thead>
<tr>
<th>intervention</th>
<th>before intervention</th>
<th>after intervention</th>
<th>increase %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: HG + RS</td>
<td>224</td>
<td>779 141</td>
<td>58.2%</td>
</tr>
<tr>
<td>B: HG</td>
<td>227 124</td>
<td>32.3%</td>
<td>277</td>
</tr>
<tr>
<td>C: RS</td>
<td>208 104</td>
<td>55.7%</td>
<td>165</td>
</tr>
<tr>
<td>D: none</td>
<td>206 106</td>
<td>51.5%</td>
<td>153</td>
</tr>
</tbody>
</table>

Legend: HG and RS see legend Table 2.
Discussion

Despite the evidence that the measles vaccine is effective and safe, in most developing countries including Indonesia, but also in a number of developed countries such as in England, the failure for raising the measles immunization coverage is a problem. Several strategies have been proposed in an attempt to increase this coverage. However, whatever strategy will be applied, it has to be realized that it is necessary first to identify the determinants of this problem before such a strategy can be applied. Some studies in England indicated that the problem was partly the fault of the providers (health staffs) as well as partly of the parents. Among others the lack of knowledge and the poor attitude toward measles and measles immunization were apparent. A similar finding was observed in the study of the author. Therefore, the implementation of a health education program for raising the measles immunization coverage was considered to be necessary approach.

Carter and Jones (1986) carried out a health education to increase the measles immunization coverage in Fife area, Scotland. After a two-year period (1983-1985), the coverage had been increased from 60% to 80%. A six-month intervention program conducted by Sloan (1985) in North and West Belfast, England, using health education material mailed to the parents, failed to increase the measles immunization coverage. The achievements of the coverage of measles immunization in the "mailed" group and in the control group were 14.7% and 14.0%, respectively. In contrast with this finding, after a vaccination program carried out in Ohio, United States, 48.1% of the children whose parents received a reminder letter were vaccinated compared with 32.4% of children whose parents did not receive a reminder. A similar success was also achieved by sending a postcard reminder for an influenza vaccination: 51.5% of the recipients were vaccinated versus 20.2% of the controls (Larson et al., 1982).

The present study, with the aim to determine the effect of three different intervention programs on the knowledge and attitude with regard to measles and on the level of measles immunization coverage, was conducted by the author. The study involved the activity of VHWS as a major component of the Primary Health Care program in Indonesia. It was expected that the knowledge and the attitude of the mothers concerning measles and measles immunization in the the subarea with intervention would be better than in the area without intervention.

The result of this study indicates that the maternal knowledge of, the perceived susceptibility to and the perceived seriousness of measles in all subareas including in the control subarea where no intervention was applied, increased after one year of intervention. This may be due to the effect of the maturation, processes within the respondents operating as a function of the passage of time par se, or the first interview (testing effect) or probably due to the effect of other information given by other resources beyond of this study. Moreover, although this study was conducted in the geographically separated areas in Gunungkidul regency and an attempt was made to minimize the diffusion of intervention to the other subareas by approaching the health centers and villages individually, however, with a modern transportation which is currently available in this area, such a contamination, if it occurred, would be difficult to avoid. Nevertheless, the
increase with perceived seriousness of measles in subareas with health education activities, with health education combined with a reminding system as well as with a reminding system alone was found to be higher than in the control area (Table 4). The explanation of this finding is presumably that the VHWs put more emphasis on this subject during their health education activities. As indicated by this study, the effect of different intervention on the perceived susceptibility to measles, the perceived benefits of measles immunization as well as the perceived barriers to get immunization were not shown.

As observed in this study, a higher statistically significant increase of measles immunization coverage was found in the three subarea in which an intervention program was applied as compared with the control subarea. The increase of the measles immunization coverage in the experimental subareas is more than 15% higher than the increase in the control area. This number exceeds the 10% criterium that required to accept clinical relevance. Therefore we conclude that the intervention programs have a substantial impact on measles immunization coverage. However, the increment of measles immunization coverage between the three subareas with an intervention program was not statistically significant. Intervention with a reminding system only, was found to be as effective as in the other two subareas with a different intervention program. One possible explanation of this result could be that the mothers in this subarea were more aware about the necessity to get measles immunization for their children because of a message emphasizing the benefit of measles vaccination for preventing this disease was printed on the reminder card. A health education program, however, can be expected a better approach because its effect will last longer than that of a reminding system which probably only has a short-lived direct effect. The result of this study was evaluated in a rather short period i.e. one year after intervention which could be considered to be insufficient in order to show the influence and change a behaviour pattern. So possibly, in the long run the health education proves to be more fruitfull than the reminding system.

This study suggests that the role of the VHWs in supporting the measles immunization program is significant especially when the VHWs receive a well organized training to educate the community about immunization.

Conclusion

A study on the effects of different intervention programs, carried out by the Village Health Workers, on the knowledge and attitude concerning measles and measles immunization, and on the measles immunization coverage has been conducted in Gunungkidul regency, Yogyakarta Special Region. The results of this study point out that:

- possibly due to the short period of study no considerable difference in the
- knowledge of measles and measles immunization of the mothers was observed after the application of an intervention program;
- a more positive attitude toward perceived seriousness of measles was shown;
- a significant and clinically increase of measles immunization coverage was demonstrated in subareas with different intervention programs.

It remains possible that the effect of a longterm health education program can
give a solid base for increasing the measles immunization coverage in the community.

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