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Dear Authors, Reviewers, Subscribers and Readers,

In this edition, we proudly invite and publish policy brief presented by the honorable Mrs. Meiwita Paulina Budiharsana. Thank you to Mrs. Meiwita for the article titled "Increasing Use of Research Findings in Improving Evidence-Based Health Policy at the National Level". Please readers look at the policy brief we present in this edition. We will present articles other than research articles, such as literature review, systematic review, policy brief or any other required by readers or authors at least once a year by special invitation. **(Editorial Team)**

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Increasing Use of Research Findings in Improving Evidence-Based Health Policy at the National Level

Meningkatkan Pemanfaatan Temuan Penelitian dalam Perubahan Kebijakan Kesehatan Berdasarkan Bukti di Tingkat Nasional

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Abstract

In February 2016, the Minister of Health decided to increase the use of research findings in improving the quality of the national health policy and planning. The Ministry of Health has instructed the National Institute of Health Research and Development or NIHRD to play a stronger role of monitoring and evaluating all health programs, because "their opinion and research findings should be the basis for changes in national health policies and planning". Compared to the past, the Ministry of Health has increased the research budget for evidence-based research tremendously. However, there is a gap between the information needs of program and policy-makers and the information offered by researchers. A close dialogue is needed between the users (program managers, policy makers and planners) and the suppliers (researchers and evaluators) to ensure that the evidence-based supplied by research is useful for programs, planning and health policy.

Keywords: Evidence-based, health policy, national, research, use

Abstrak

Pada bulan Februari 2016, Menteri Kesehatan memutuskan untuk meningkatkan pemanfaatan temuan penelitian sebagai landasan perubahan kebijakan dan perencanaan kesehatan nasional yang lebih berkualitas. Badan penelitian dan pengembangan kesehatan nasional (Balitbangkes) diminta untuk lebih berperan dalam pemantauan dan evaluasi semua program kesehatan karena pendapat para penelitian dan temuan mereka sepatutnya menjadi dasar perubahan kebijakan dan perencanaan kesehatan nasional. Dibandingkan masa lampau, Kementerian Kesehatan telah mengalokasikan dana penelitian yang jauh lebih banyak untuk penelitian *evidence-based* saat ini. Namun, tetap saja terlihat kesenjangan antara informasi yang dibutuhkan program dan pengambilan keputusan dan informasi yang ditawarkan hasil penelitian. Diperlukan dialog antara pengguna (pengelola program/perencana dan pengambil keputusan) dan pemasok informasi (peneliti/evaluator) agar temuan penelitian dapat menjadi bukti dasar perencanaan dan perubahan kebijakan.

Kata kunci:Bukti temuan, kebijakan kesehatan, nasional, penelitian, pemanfaatan

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Introduction

Indonesian Minister of Health has positioned National Institute of Health Research and Development, as the "locomotive" in leading and guarding the implementation of the national health program and policies. The institute is expected to generate the evidence-based research that is relevant, reliable, and with high quality knowledge and information for the stakeholders and users (program managers and health policy planners).[1] In addition, the institute should provide accurate explanations for decision makers and program planners to facilitate rapid policy changes, covering a wider health related and re-emerging health development issues. To achieve this, in 2015, in line with the Ministry of Health 2015-2019 Strategic Plan, the Presidential Regulation No.35/2015 and under the Decree of Minister of Health No.64/2015, the National Institute of Health Research and Development restructured four research centers, namely Biomedical Research and Basic Health Technology, Center for Health Services Research and Development, Research Center for Public Health Interventions, and Research Center for Humanities and Health Management.[2] This article discusses whether this challenging task is deliverable by the institute and whether evidence-based information is needed by the program managers to improve services.

Previous Approaches and Results

The National Institute of Health Research and Development thought that they had implemented evidence-based research when they used Client Oriented Research Activity (CORA) in implementing two types of national level surveys the 2007, 2010, and 2013 National Basic Health Research and the 2011 Health Facilities Research.[3] CORA was considered as the proper approach to implement evidence-based health research because it encompassed multi-sectoral cooperation from the beginning (i.e., involvement of many directorate generals at the Ministry of Health, professional organizations, health experts, Indonesian public health experts, Indonesian doctor association, dentist association, midwife association, nurse association, provincial and district hospitals, Indonesia hospital association, Indonesia vertical hospital association, and many other organizations and universities). CORA was designed to accommodate users (decision makers and policy makers) at national, provincial, and district levels, also cover most of public health needs, yield applicable policy options, develop new medicines, vaccines, and overcome the barriers in communicating results to the wider community.[3]

External Review in 2017

In mid-October 2017, a review of more than 12 proposals submitted by National Institute of Health Research and Development researchers for 2018 funding was carried out by an external reviewer. The reviewer concluded that almost all proposals were not directed to support a particular program measure(s). When asked, the answers revealed that none of the principal investigators (researcher) held discussions with the Ministry of Health program managers or relevant policy makers during proposal writing. Their research objectives were not formulated based on any program-based problems discussed with any program managers. In other words, there was no real collaboration between program and research staff at the Indonesian Ministry of Health. Thus it is no surprise that, although the National Institute of Health Research and Development produced 1,319 studies between 2011 and 2015, very few findings were used by program managers, according to its public relation staff. Most research reports were just kept on the library shelves.[1]

Trainings from the Knowledge Sector Initiative

Between 2013 and 2017, under joint funding from Indonesian and Australian Governments, the Knowledge Sector Initiative (KSI) project managed core grants for organizational development, quality research, and research communication. The focus was the attainment of 2015-2019 Development Plan (*Rencana Strategi*) objectives. The KSI provided technical assistance on improving research capacity including activities known as knowledge demand and use, knowledge intermediation (communicating evidence-informed-advocacy and reporting), and knowledge sector to lessen systemic barriers and foster private sector participation in research. At national level, KSI support is directed to accelerate the mobilization and systematization of data. In research communication, the National Institute of Health Research and Development researchers received trainings in development of policy briefs, support for peer review of journal articles and research proposal writing, and the use of multimedia. By 2015, the institute has successfully produced 24 policy briefs covering selected research results, complete with public-friendly infographics and illustrations.[1]

Literature on Evidence-Based Research that Includes both Policy and Practice

Black,[4] draws a distinction between providing an evidence-based for policy and for practice. Evidence-based policy refers to providing evidence for policies which by the nature are more complex, and takes place over a longer time. Evidence-base for practice refers to providing evidence for specific health practices which are more sharply defined, and usually takes place over shorter period of time. Black points out that, for these reasons, the evidence-base for practice usually has been more

successful in influencing specific practices compared to the evidence-base for policy. This is because policies are often decided on the basis of influences from other sectors (e.g. education, finance, etc) and the broader political environment.[4]

Other than in the National Institute of Health Research and Development, there are many health researchers in the academic community. However, academic community researchers do not show a great interest towards the achievements of particular public health policies and programs. In general, academic community researchers take an independently stance and seem to have only limited engagement in the policy debates. Consequently, they also are not heavily involved in providing evidence for either policy or practice. This is due at least in part, to the rules of their institutions that research is only for providing a new way of conceptualizing previous or existing theoretical frameworks, mapping the decision-making landscape in a local or regional area, or challenging some public health conventional assumptions.

Below, results of a quick review of selected publications in the Kesmas: National Public Health Journal (2013-2017) show how research topics seem to be chosen independent of any Ministry of Health program targets or goals. A group of researchers looked at education, age at the last childbirth, ideal family size, modern versus traditional contraceptive method, survival of preceding birth, and infant mortality records, in relation to birth interval.[5] Another group of researchers found out that constructing healthy rooms in the house could protect children from tuberculosis, even when they were exposed to adult with tuberculosis who live in the same house for a long period, made it no longer a risk factor.[6] Evaluation of breastfeeding counseling implementation in Jambi, Sumatra, found that there was no national guideline on proper breastfeeding counseling in 2014, so the researcher used WHO guidelines.[7]Another group expressed that the central government should allow more authorities to local governments' innovative policy that are felt more effective in reducing maternal and newborn deaths.[8] A framework showing relations between severe pre-eclampsia syndrome and maternal death, was tested using a case-control study design.[9]

The implication of this is that evidence from research findings must be relevant to the problems faced by policy makers if they are to use that for changing policy. On the other hand, researchers are to be mindful that research has little direct influence on service and governance policy currently and in the near future in Indonesia. The relation between research and policy depends on the policy makers. Right now, research evidence is more influential in central policy than local policy, where the use of research depends on the degree of consensus on the policy goal. It is used if it supports the consensus and is used selectively if there is a lack of consensus. Most researchers are politically naive. They have a poor understanding of how policy is made and have unrealistic expectations about what research can achieve.

Conclusion

It is a considerable challenge to change the researchers' attitudes, including within the Ministry of Health's National Institute of Health Research and Development. The researchers may not change because they know that they will be disappointed when program managers and policy makers ignore their findings. They need to acquire a more sophisticated understanding of the policy process, that sometimes sensible decisions may not reflect scientific rationality, and that political context is important too, particularly with policies related to services and governance.

On the other hand, policy makers need to be more involved in the conceptualization and conduct of research. Researchers need greater access to information on the priorities of program managers and policy makers, who in turn need to organize and communicate their needs better. A closer relation between the two groups needs to be sustained during the research and beyond if the work is to have any impact on planning and policy in the future.

Researchers at National Institute of Health Research and Development have been enriched in three aspects: additional research funding, reorganization of the four units, and in the provision of technical and knowledge building. These are to facilitate new partnerships between researchers and program managers/policy makers. However, the researchers at the institute will continue to fail in supplying evidence-based information if they do not have the knowledge about program success measures or targets in their proposed research objectives.

The current situation between researcher and program managers/policy makers can be concluded as first, both sides (research and program staff) are not comfortable to work together because they do not understand how to apply the concept of 'evidence-based research'. Second, the critical issue is to ensure research related to practice is well formulated and carried out so that it has higher probability to be implemented. Operations research provides a way forward for achieving this. Third, operations research is distinguished by its focus on programs and their improvement, and will inevitably direct researchers' attention to the related program manager(s) and performance. When properly understood and implemented, operations research serves as the interface between the researcher and the program manager.

Recommendation

The Ministry of Health should explore ways to pro-

vide incentives for research staff to carry out research on topics agreed with operational (programmatic) units, including researchers from academic community all over the country. To improve evidence-based health policy at the national level, evidence-based health practice is started by understanding the concept of 'evidence-based.' UNICEF's concept of 'evidence-based' identifies two roles in the process: users of evidence or the stakeholders and policy-makers, and the suppliers of evidence or the researchers.[10]

If the evidence (information) is program related, the users can then use the evidence to recognize a policy issue, which may until then have been hidden from the general public, and from policy-makers. Once this is revealed, the users (civil servants, non-government organizations, development agencies or the media) can address this issue; to analyze the identified policy issue(s) to understand the extent and nature of the problem, and then use it as the basis for making policy recommendations; to forecast the future, to see whether a target or policy measure in the short-run will be successful in the long-run as well (or, to assess whether targets are likely to be met); to monitor policy implementation, whether key outputs and outcomes are relevant and associated with the targets (objectives of the policies), or whether these key indicators are going off-track (and thus need a change of policy); and to evaluate policy impact, to see whether each policy produces implicit and explicit impact that are measurables.[10]

Beside understanding the concept of 'evidence-based', another way to improve evidence-based health policy at the national level is by understanding how to apply operations research and select operations research variables to be more specific. The operations research principles include the goal of operations research that is to provide program managers with information they can use to make decisions to improve their programs' operations. This goal can help managers decide between alternative courses of action, identify and take advantage of opportunities, and find solutions to service-delivery problems that limit program effectiveness and efficiency.

The next principle is to phrase these criteria in the language of experimental design: operations research positions independent variables as factors that can be manipulated by managers, i.e., type of training, frequency of supervision and prices. Then *dependent variables* are indicators of program success, such as program outputs (e.g. number of clinic visits, contraceptives distributed), outcomes (e.g. client knowledge, contraceptive continuation rates, prevalence rates), and individual or population impacts (e.g. fulfillment of individual fertility desires, prevention of unwanted pregnancies, maternal morbidity), or cost-effectiveness of program operations. Operations research does make a clear distinction between independent variables that cannot be changed quickly and those that can be changed by programs in the short term.[11]

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The Change in Mental Health Status of Indonesian Health Care Migrant Worker in Japan

Perubahan Status Kesehatan Jiwa Pekerja Kesehatan Indonesia di Jepang

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Abstract

Under the Japan – Indonesia Economic Partnership Agreement, more than 1,000 of Indonesian health care workers have migrated to Japan. Social adjustment during the process of migration is linked to mental health changes. This study aimed to figure out the strongest predictor that influences the change in mental health status as a result of migration. Baseline data were collected in Jakarta in 2013 during pre-departure orientation. Follow-up study was conducted one year after the study participants migrated to Japan in 2014. Using longitudinal design, this study employed 92 participants consisting of nurse and certified care worker candidates. The multiple linear regression analysis was conducted to figure out the predictors that influence the change in mental health status. The prediction model expected to explain 39.9% of the change in mental health status, p value < 0.01, while sex (β = 0.201, p value < 0.05), economic conditions in pre-migration (β = -0.200, p value < 0.05), and the socio cultural adaptation competency (β = -0.238, p value < 0.05). This finding assumed that female candidates and those who have economic constraint in pre-migration stage, and those who have declining in socio-cultural adaptation competency tend to have lower mental health one year after the migration.

Keywords: Candidate, certified care worker, Japan – Indonesia Economic Partnership Agreement, mental health, nurse

Abstrak

Melalui kerja sama kemitraan di bidang ekonomi antara Jepang - Indonesia, sampai saat ini terdapat lebih dari 1.000 pekerja kesehatan Indonesia bekerja di Jepang sejak tahun 2008. Sejumlah penelitian tentang migrasi ke luar negeri menunjukkan bahwa penyesuaian sosial selama proses migrasi berkaitan dengan kesehatan jiwa. Penelitian ini bertujuan untuk mengetahui faktor-faktor yang memengaruhi perubahan status kesehatan jiwa akibat migrasi. Data dasar dikumpulkan di Jakarta tahun 2013 pada saat orientasi sebelum keberangkatan, dan studi lanjutan dilakukan satu tahun setelah peserta berangkat ke Jepang tahun 2014. Dengan menggunakan desain longitudinal, penelitian ini melibatkan 92 orang yang terdiri dari perawat dan pendamping lansia bersertifikasi. Analisis regresi linier berganda dilakukan untuk mengetahui prediktor yang memengaruhi perubahan status kesehatan jiwa. Model regresi menunjukkan 39,9% perubahan status kesehatan mental dipengaruhi oleh jenis kelamin (β = 0,201, nilai p <0,05), kondisi ekonomi sebelum migrasi (β = - 0,200, nilai p < 0,05), dan skor *socio-cultural adaptation competency* (β = - 0,238, nilai p < 0,05). Temuan ini dapat diasumsikan bahwa kandidat perempuan dan mereka yang memiliki kesulitan ekonomi pada saat pra-migrasi, serta mereka yang telah mengalami penurunan dalam kompetensi adaptasi sosio-kultural cenderung memiliki kesehatan jiwa yang lebih rendah satu tahun setelah migrasi.

Kata kunci: Kandidat, pekerja perawat bersetifikat, *Japan – Indonesia Economic Partnership Agreement*, kesehatan jiwa, perawat

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Introduction

International migration has become a social phenomenon in current mobile world. Boosted by the forces of globalization, development and demographic changes, migration has become a defining feature of the economic, social, and political life in a mobile world. The United Nation Foundation for Population Activity (UNFPA).[1] reported that 232 million people (3.2%) of the world's population lived outside their country of origin in 2013.[1] Nurse migration has become one of those phenomena that occurs in the context of increasing global mobility and growing competition for scarce skills, including skills required in the health care sector.[2]

The migration of Indonesian health care workers in Japan began under the bilateral agreement launched in 2008, namely the Japan – Indonesia Economic Partnership Agreement (JIEPA). This program allows Indonesian health care workers to work as nurses and certified care workers in Japan. Health care workers who migrate to Japan under this program are designated as "candidates" until they pass the National Board Examination (NBE) conducted in the Japanese language for both nurses and certified care workers.[3] While preparing for the NBE, the candidates are allowed to work as trainees at medical institutions and/or long-term care facilities in Japan.[4]

Migration is a process of social change whereby an individual moves from one cultural setting to another for the purpose of settling either permanently or for a prolonged period. A basic underlying theme in the existing literature linking migration and mental health is that the disruption of moving to a new environment can negatively affect health, including mental well-being, which may reducing the net benefit of migration.[5,6] According to Berry,[7] migration has been linked to a critical life event. Numerous studies on migration indicate that social adjustment during the process of migration is linked to mental illness, which may be influenced by various sociodemographic factors (sex, age, economic background) as well as socio-cultural adaptation, language barriers, social support, acceptance by the host community and conditions of employment.[8-11]

Migration affects the cultural and psychological change as a result of contact between two or more cultural groups and their individual members. The ability to adjust with the host country depends on their competency in socio cultural adaptation. Kirmayer *et al*,[12] revealed that the mental health condition of migrants is linked to the capacity for socio-cultural adaptation, which may reflect the degree of acculturation and integration with the host country. Moreover, Bughra & Becker,[8] divided the migration process into three stages, namely pre-migration, migration, and post-migration. Each stage is potentially associated with mental health problems. Pre-migration factors, such as the reason for joining migration, may contribute to how well the individual adjusts to cultural differences and subsequently influence the establishment process.[13,14] The reason for migration may reflect the degree of willingness to migrate and resettle in a new environment, which may also influence the migrants' mental health.[15] Additionally, post-migration conditions, such as working conditions, social support and competency in socio-cultural adaptation, have also been reported to be predictors of mental illness.[11,16] Several studies related to the mental health conditions of migrant nurses and certified care worker under JIEPA program showed that some socio-cultural issues, including cultural stress, salary and reward issues, feelings of loneliness and the burden to passing the national board examination, are significant stressors faced by Indonesian nurse and certified care worker candidates in Japan.[17,18] A longitudinal study on mental health condition of the Economic Partnership Agreement (EPA) candidates conducted by Kinkawa *et al,*[19] revealed that the mental health condition of the eicosapentaenoic candidates worsened in six months after being deployed in the work field, compared to the condition at the time of Japanese language training conducted 6 months after they arrived in Japan.

A few studies have examined the changes in mental health status of EPA migrants' in pre-departure and after departure stage. This study examined the mental health condition in pre-migration and post-migration stages, and figure out the mental health changes as a result of migration. Moreover, this study aimed to identify the predictors that influence the mental health changes in the pre-migration and post-migration stages.

Method

This study was conducted in longitudinal design, which consists of twice measurement, namely baseline and follow-up study. Study was the sixth batch of Indonesian candidate nurses and certified caregiver who departed to Japan under JIEPA program in 2013, with a total 148 participants; total population were included in this study. The baseline survey was carried out during the pre-departure orientation in pre-migration period (June 2013 in Jakarta) and the follow-up survey was conducted one year after migration (June 2014 in Japan). This study assessed mental health as the outcome variable. Prior to the study, this study had passed ethical concern and been approved by the ethics committee of Nagasaki University (approval No.13041101, May 2013).

General Health Questionnaire (GHQ)-12 were selected to measure the subject's current mental health condition.[20] The measurements focused on two major areas that are the inability to carry out normal functions and the onset of new and distressing experiences.[21] The dif-

ference in the score of GHQ-12 between the baseline and follow-up study was utilized to identify mental health changes. A positive score corresponded to an increasing in the GHQ score and was interpreted as meaning that the subject's mental health condition was worsening. The validity and reliability of the Indonesian version of the GHQ-12 has been confirmed, with a Cronbach's alpha of 0.670 – 0.776.[21] The predictor variable consists of participant's socio demographic status (sex, age, EPA course), working condition (previous working background, working hours, fatigue, job satisfaction, satisfaction toward support given by preceptors, the extent of struggle against the current working condition), sociocultural adaptation scale (SCAS), and multidimensional scale perceive social support (MSPSS), current economic condition (pre-migration and post-migration).

The participants of the baseline study included the sixth batch of Indonesian EPA nurse and certified care worker candidates who departed in 2013 with a total of 148 participants. Respondents' rate for follow-up study was 62.1% (92 respondents were analyzed in this study). Informed consent for baseline and follow-up study participation as well as a personal contact address such as email was obtained. A seven-page questionnaire was distributed in the pre-migration.

In order to indentify the most appropriate model for this study, the analysis were carried out in the following stages, namely a descriptive analysis, independent sample t-test, paired sample t-test, and Pearson's correlation coefficient were seleceted for bivariate analysis. Furthermore, a multiple linear regression analysis was employed to determine the most appropriate model for the change in GHQ score.

Results

Table 1 shows the distribution of the sociodemographic characteristic of the study participants. The average age of study participants was 25.21 years old, 56.50% of the subjects were female. The percentage of certified care worker candidates was 69.70%, compared to only 31.40% for nurse candidates. Regarding the working background of the candidates before applying to the EPA program, 60.90% of the candidates had previously worked as nurse and 39.10% had not. The language proficiency after migration showed 71.70% rate themselves as "intermediate".

Table 2 presents the mean difference of predictor variables between pre-migration and post-migration. With respect to the current economic conditions, it shows significant different between pre-migration and post migration. The mean SCAS and MSPSS scores showed significant differences between the pre-migration and post-migration periods, whereas the mean score of post-migration lower than the pre-migration mean score. The mean score of the GHQ-12 in pre-migration and post-migration did not show any significant difference. Hence,

Table. 1 Sociodemographic Characteristics and Variable Description

Indicator	Category	Mean (±SD Range)	n	%
Age (M, SD, range)		25.21 (±2.36, range 22 – 35)		
Sex	Male		40	43.5
	Female		52	56.5
EPA course	Nurse		28	31.4
	Certified care worker		64	69.6
Working background in pre-migration	Used to worked as nurse		56	60.9
	Never worked as nurse		36	39.1
Support given by the preceptor	Not satisfied		17	18.5
	Satisfied		75	81.8
The frequency of feeling physically fatigue	Always		21	22.8
	Sometime		61	66.3
	Seldom		10	1.9
Job satisfaction	Not satisfied		22	23.9
	Satisfied		70	76.1
Struggle against the current condition	Yes		63	68.5
	No		29	31.5
Japanese proficiency	Beginner		1	1.1
	Elementary		23	25
	Intermediate		66	71.7
	Advance		2	2.2
The change in GHQ score		1.24(±7.21SD, range, -17 – 17)		
The change in SCAS score		0 .4 (±0.64SD,range-1.1– 2.48)		
The change in MSPSS score		6.03 (±13.01D, range -27 – 35)		
Working hours in a week		37.8 (±8.97SD, range 12 – 63)		
Study hours		10.5 (±8.20SD, range 0 – 32)		

Notes:
SD = Standard Deviation, n = Number of Sample

Table 2. Mean Score Difference between Pre-migration and Post-migration

Description	Pre-migration		Post-migration		t	p Value
	Mean	SD	Mean	SD		
GHQ-12	24.48	4.73	25.73	5.57	1.67	0.098
MSPSS	68.78	7.83	62.75	11.5	-4.45	0.001
SCAS	3.54	0.48	3.13	0.45	-6.16	0.001
Current economic condition	2.57	0.54	2.72	0.49	2.10	0.038
Very difficult to survive	2.20[a]		2.20[a]			
Difficult but able to survive	39.10[a]		23.60[a]			
Not so difficult to survive	58.70[a]		73.90[a]			

Notes:
SD = Standard Deviation

Table 3. Correlation Coefficient between GHQ Score Changes and Predictor Variables

Variables	r	p Value
Age	0.073	0.491
Working hours	0.213	0.044
Study hours	0.016	0.883
SCAS score difference	-0.366	0.001
MSPSS score difference	-0.352	0.001
Economic condition in post-migration	-0.148	0.155
Economic condition in pre-migration	-0.288	0.029
Satisfaction toward support given by the preceptor	-0.287	0.006
Fatigue	-0.359	0.001
Job satisfaction	-0.247	0.001
The extent of struggle against the current condition	-0.282	0.001
Self-rated Japanese language proficiency in post migration	-0.201	0.055

Notes:
r = Correlation

Table 4. The Prediction Model of Mental Health Changes

Variables	Unstandardized regression coefficient		Standardized regression coefficient (β)	p Value
	β	SE		
Sex	2.917	1.392	0.201	0.039
Age	.404	.411	0.119	0.329
EPA course	1.539	1.889	0.099	0.418
Satisfaction toward support given by preceptor	-.868	1.158	-0.087	0.456
Working hours	.048	.092	0.060	0.604
Fatigue	-1.865	1.385	-0.146	0.182
Job satisfaction	.133	1.423	0.010	0.926
The extent of struggle against the current condition	-1.195	1.157	-0.103	0.305
Working background before migration	0.099	0.064	0.141	0.130
Economic condition in pre- migration	-2.684	1.252	-0.200	0.035
SCAS Score change	-2.671	1.183	-0.238	0.027
MSPSS Score change	-0.111	0.059	-0.200	0.064

Notes:
SE = Standard Error

the different score of the GHQ score was selected to determine the change in the participant's mental health condition from before to after migration.

The bivariate analysis (Table 3) showed significant correlations between the change in the GHQ score and the change in the SCAS score (r = -0.366, p value < 0.01), fatigue (r = -0.359, p value < 0.01), change in the MSPSS score (r = -0.352, p value < 0.01), economic conditions in the pre-migration period (r = -0.288, p value < 0.05), satisfaction with the support given by the preceptor (r = -0.287, p value < 0.01), extent of struggle against the current conditions (r = -0.282, p value < 0.01), job satisfaction (r = -0.247, p value < 0.01) and working hours (r = 0.213, p value < 0.05)

All variables showing significant correlation with the GHQ-12 and all demographic variables were combined to develop a model that predicted the mental health change using a multiple linear regression analysis. Based on Table 4, the prediction model was statistically significant, F= 4.212, p value < 0.01, and accounted for approximately 39.90%. The different score of SCAS received a strongest weight in the model (β = -0.238), followed by sex (β = 0.201), and economic condition in pre-migration period (β = -0.200).

Discussion

In this study, showed that the changes in the mental health status of EPA nurse and certified care worker candidates in pre-migration and post-migration were predicted by the competency in socio-cultural adaptation gender (female) and having economic constrain in pre-migration.

This study identified the change in SCAS score as the strongest predictor for the mental health change. The result in independent sample t-test also showed that the SCAS score was significantly decrease after migration. The decreasing score was refer decreasing in socio-cultural adaptation competency. According to Ward & Kennedy,[22] socio-cultural adaptation refers to the ability to fit in or effectively interact with members of the host culture. The cultural distance between Indonesia and Japan, required an appropriate competency in adapting with language, culture, social status and social interaction to fit in with the host country's socio-cultural setting. The score difference between in pre- and post-migration assumes that there was discrepancy between expected competency and the actual competency in socio-cultural adaptation. The study participants tend to face difficulties in post-migration. On the other hand, their adaptability was below their estimation. Migration allowed the migrants facing several changes practically everything that surrounds the person. This situation may raise psychological distress among the migrants. Competency in socio-cultural adaptation positively correlate with healthier mental health.[23] This study showed that decrease in competency to adapt with socio-cultural difference was strongly correlated with the poorer mental health.

Sex was identified as the significant predictor that influences the change in GHQ score according to the multiple linear regression models. This finding was in line with previous study in migration (24–26) which revealed that the female migrants likely have poorer mental health than the males. Nevertheless, further examination regarding distinct migrants' background need to be assessed. The participants of this study migrated alone, most of them were not married and they received equal treatment regardless of sex, under the JI-EPA program. The sex issues which raises in this study may be rotted by the nature of the difference in perceived stressor and protective factor among male and female migrants. This study showed that the female migrant, tend to have poorer psychological well-being. Although women's social empowerment in society is well-received, but the role and social relations of the sex are not equal.[27] Additionally, separation with the sources of social support, such as family members and others, may result in declining mental health. Compared to the male candidates, female with lack of social support, who are exposed to stressful life events, such as migration, are more vulnerable with psychological disorder than male.[26,28-30] The socio-cultural background of the female candidates, which is rooted in their culture of origin, including the patriarchal system in Indonesia may also explain this study finding. The patriarchal system, whereby the man remains the head of household and is expected to act as the decision maker and be responsible for the other family members, is in place in most parts of Indonesian people. According to Herdman & Srivastava,[31] the patriarchal foundation dominates Indonesian people, even among the most liberal and globalized citizens. Despite the fact that Indonesian women currently have equal opportunities to males, as applied in the EPA program, the patriarchal concept continues to dominate when making decisions regarding the candidates' future. Female candidates are not able to easily and freely decide their future without receiving permission from their father or spouse. This situation may lead the occurrence of the internal conflict in female candidates and affect their mental health condition.

The current study found that the economic conditions in the pre-migration period exhibit a significant correlation with the change in the GHQ score, and there is a tendency toward declining mental health after migration among those living with lower economic conditions in the pre-migration period. Those who come from poorer economic condition are possibly burdened with the condition of their family left behind. They express responsibility to their family by sending their revenue to support their family economically. This finding is in accordance with a study conducted by Hirano among Filipinos migrants in Japan, which revealed that those who come from poorer economic condition tend to have poorer mental health.[32] High living expenses in Japan may less favorable for individuals coming from poorer economic conditions. These migrants have spent their income on their daily living costs as well as sending money back home to their family. This finding indicates that the obligation to remit their income reduces their disposable income and thus hinders improvements in their well-being due to living in improved economic conditions following migration. Another assumption is that migrants with economic constraints are less likely to enjoy life in Japan. On the other hand, those who have better economic condi-

tions are able to spend their revenue more freely and enjoy their life in Japan.

The findings of this study are expected to become an input for both sending and receiving countries of the migrants, especially in the evaluation of the program implementation. Most often, migration is linked to stressful events, including barriers and challenges, as well as psycho-social issues. Therefore, appropriate approaches and preventive strategies such as optimizing the pre-departure process should be discussed. Providing felicitous information about working and living environment is effective to help the candidates adapting with their new working field. This is particularly true, when these information is provided through EPA returnees, by sharing their experience while working in Japan, so that the successors will physically and mentally well prepare.

The results of this study need to be considered in the context of their limitation. The limited number of participants in post-migration study (62%) may result the non-response bias. These finding only represent the situation in the first year of migration, therefore, the trends in mental health change and its predictor over time were not assessed. Further study is recommended to determine the overall trends in and predictors of mental health changes.

Conclusion

The present longitudinal study is conducted to identify predictors of mental health changes from the pre-migration to post-migration stages. The multiple linear regression model developed in this study indicated that the SCAS score is the strongest indicator of mental health, followed by sex and the economic conditions in the pre-migration period. The current results indicate the importance of developing a system to help Indonesian candidates adjust to the new culture one year after migrating to Japan. This study must be followed up with further study to clarify the long-term trends in mental health changes among the respondents.

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Husband's Education Level and Alcohol Drinking Habit as Risk Factors of HIV Infection among Housewives in Pati District

Tingkat Pendidikan dan Kebiasaan Mengonsumsi Alkohol Suami sebagai Faktor Risiko Infeksi HIV pada Ibu Rumah Tangga di Kabupaten Pati

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Abstract

Cases of Human Immunodeficiency Virus (HIV) infection in Pati District increase, particularly among housewives. The aim of this study was to analyse the risk factors of HIV infection among housewives in Pati District using case-control study design. The respondents were 90 housewives divided into case and control group. The case group consisted of 30 housewives living with HIV, while the control group comprised 60 housewives living in the similar area of the counterparts. The data collection was focused on demographic, sexual behaviour, and sociocultural variables possessed by housewives and their husbands. The study resulted that the risk factors of HIV infection among housewives based on bivariate analysis were housewife's level of education, husband's level of education, husband's occupation, housewife's sexual transmission disease (STD) record, husband's STD record, husband's participation in religious activities, and husband's alcohol drinking habit. The risk factors that fitted to logistic regression model were education level and alcoholic behaviour of husbands that contributed to 29.1% HIV infection among housewives. In conclusion, the husband's variables are proved having stronger and very significant correlation with HIV infection among housewives than housewife's variables.

Keywords: Alcohol drinking habit, education level, hiv, husband

Abstrak

Kasus infeksi HIV di Kabupaten Pati menunjukkan peningkatan khususnya pada kelompok ibu rumah tangga (IRT). Penelitian ini bertujuan menganalisis faktor risiko penularan HIV pada ibu rumah tangga di Kabupaten Pati dengan desain penelitian kasus kontrol. Jumlah responden adalah 90 IRT yang terbagi dalam kelompok kasus dan kelompok kontrol. Kelompok kasus terdiri dari 30 IRT yang terinfeksi HIV, sedangkan kelompok kontrol terdiri dari 60 IRT yang tidak terinfeksi HIVdan tinggal di desa yang sama dengan responden pada kelompok kasus. Pengumpulan data difokuskan pada variabel demografi, perilaku seksual, dan sosial budaya yang melekat pada IRT dan suami. Hasil penelitian menunjukkan bahwa faktor risiko infeksi HIV pada IRT berdasarkan analisis bivariat adalah tingkat pendidikan IRT, tingkat pendidikan suami, pekerjaan suami, riwayat penyakit infeksi menular seksual (IMS) IRT, riwayat IMS suami, partisipasi suami dalam kegiatan keagamaan, dan kebiasan suami mengonsumsi alkohol. Variabel yang sesuai dengan model regresi logistik adalah tingkat pendidikan suami dan kebiasaan suami mengonsumsi alkohol, dimana kedua variabel memengaruhi 29,1% kasus infeksi HIV pada IRT. Disimpulkan bahwa variabel yang melekat pada suami memiliki signifikasi dan korelasi yang lebih kuat terhadap infeksi HIV dibandingkan kelompok IRT.

Kata kunci: Kebiasaan mengonsumsi alkohol, tingkat pendidikan, hiv, suami

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Introduction

The spreading of Human Immunodeficiency Virus (HIV) infection around the world can be considered as an iceberg phenomenon. United Nation of Acquired Immunodeficiency Syndromes (UNAIDS) revealed that until 2015, the number of people living with HIV reached about 36.7 million people.[1] The efforts to slow down the spread of HIV has been doing massively, but several countries still showed a significant increase of HIV infection. UNAIDS reported that in 2014, the increase of new case of HIV infection in Indonesia reached 48%. It became one of the highest in Asia Pacific.[2] The report from The Ministry of Health report showed that from April 1987 to September 2014, there were 206,095 people living with HIV/AIDS, while the death caused by AIDS reached 9,796 people.[3]

The Ministry of Health revealed that heterosexual intercourse is the main factor of HIV transmission in Indonesia.[3] The number of men living with HIV exceeds the number of women. Interestingly, the rate of new HIV transmission cases among women is higher than that men. In 2008, the ratio of women and men living with HIV was 1:2, while in 2014 that became 7:10.[2] Women are more vulnerable for being infected with HIV compared to men. Ostrach and Singer,[4] mentioned that the vulnerability came from both biological and social factors. Furthermore, that study stated that there is an interconnection between both factors, and even several factors are overlapped, so the explanation of the determining factors of HIV infection among women becomes more complex. Rombo,[5] categorized the risk factors of HIV infection among women into demographic, sexual behavior, and socio-cultural factors. Physically, women are more vulnerable being infected by HIV. The biological processes, including hormonal changes during menstruation, pregnancy, menopause, and hormonal contraception increase the vaginal vulnerability to the development of lesion, which ease HIVs entering woman's body.[4-7]

The social factors, like poverty, indirectly increase the woman's vulnerability to HIV infection. Poverty raises the woman risk acquiring HIV due to lack of access to health care.[4] Another study proved that gender inequality improves the woman's vulnerability to HIV infection.[8] The women being infected with HIV are likely to have a high economic dependency. This situation causes women have lower bargaining position in the households, includes requiring safe sexual behaviors. Among women, housewives are the most vulnerable group for being infected by HIV. Based on the Ministry of Health report, it was estimated that the number of housewives living with HIV was doubled in the period 2011-2014.[1] Until September 2014, the number of housewives living with HIV reached more than 6,500 women and placed them in the second group with the highest number of HIV infection in Indonesia.

Similar situation was found in Pati District, Central Java. Pati was one of districts in Central Java with the rapid increase of HIV infection. The statistical report from the Health Service mentioned that the number of men living with HIV was higher compared to women and found in all subdistricts. However, during the period 2013-2014, more than 50% newly HIV infection cases were found among women, especially housewives.[9,10] Therefore, housewives became the second highest HIV-infected group following business person group. Interview with a national goverment organization (NGO) concerning on women living with HIV named *Rumah Matahari* revealed that about 59% women living with HIV, who were supported by *Rumah Matahari,* are housewives.

Regarding those situations, the spread of HIV infection among housewives has become a serious issue. Beijing Declaration and Platform for Action stated that in poor and developing countries, HIV transmission has greater impacts on women compared to men.[11] HIV transmission among women affected the woman's roles, such as parenting, child bearing, and income earning. For instance, if the woman in a household is infected by HIV, the household's economy could collapse, then it influences the quality of life of the rest members'.[12] WHO mentioned that without any intervention, the rate of mother-to-child HIV transmission ranged from 15 to 45%.[13] A study in eight provincial capitals in Indonesia reported that the prevalence of HIV infection among pregnant women was 0.41%. That number was higher than the prevalence in developed countries although far lower than that in African countries.[14] The impacts were worsened since HIV infections were mostly found at the productive age as per reported by the Ministry of Health. It was about 60% people living with HIV were in age ranged of 20-39 years old.[1] While the data from *Rumah Matahari,* reported about 63% women living with HIV aged 21-45 years old. The objective of this study was to examine the demographic, sexual behavior, and sociocultural variables possessed by housewives and husbands that are potentially effect the HIV infection among housewife.

Method

Using case-control study design, this study was conducted in Pati District. The data were collected during March-August 2015. The number of respondents were 90 women divided into two groups, case and control group. The ratio of the two groups respectively was 1:2. The respondents in the case group were 30 consisting of the housewives living with HIV/AIDS. The naming were given by the NGO *Rumah Matahari.* The control group

comprised of housewives living in similar area with case group respondents of 60 housewives.

This study used both primary and secondary data. The primary data mainly were obtained through interviews using structured questionnaire, while the secondary data were obtained from statistical reports and relevant literature. Most of the housewives from case group did not tell their status. In intreview, the data collection was accompanied by the officer from NGO *Rumah Matahari*. However, the interviews with the housewives from the control group were conducted.

This study examined 13 variables, which were categorized into demographics, sexual behaviour, and sociocultural variables. This categorization refers to the study conducted by Rombo,[5] who categorized the risk factors of HIV infection among women into those three categories. There were three analysis that were used in this study. Univariate analysis was used to describe to respondents' characteristics. The data were displayed using percentage. The second analysis was bivariate analysis using chi square (χ^2) and Fisher's exact tests.This analysis was used to analyse the association between the risk factors and HIV infection among housewives. Furthermore, the strength of the association was shown by the odd ratio (OR). The last one was multivariate analysis using logistic regression. This analysis was the continuation of bivariate analysis, in which the variables that had critical p value < 0.25 in bivariate analysis were involved in the multivariate analysis. The result of logistic regression was a correlation model that was arranged gradually. The final model consisted of variables that had p value < 0.05.

Results

The interviews with the housewives case group revealed that they acquired HIV from their husbands. Most of them realized that they were infected by HIV after their husbands showed the symptoms of AIDS or died due to AIDS. Univariate analysis on the age of housewives showed that those of both groups mostly in their productive age (21-45 years old), where the percentage in the case group was slightly higher than it in the control group. The data from *Rumah Matahari* revealed that the housewives living with HIV were found in all 21 subdistricts of Pati District. The highest number of housewives living with HIV was found in Pati and Kayen (9 cases in each subdistrict). Moreover, in Jaken and Dukuhseti, the number of housewives living with HIV was 8 cases and 7 cases respectively. This result was in line to the data released by the Pati District Health Office that Pati, Kayen,

Tabel 1. The Risk Factors of HIV Infection among the Housewives (n=90)

Variables	Categories	Case		Control		OR	p Value
		n	%	n	%		
Demographic Factors							
Age of housewives	≤ 49 years old	24	80.0	54	90.0	0.44 (0.130 - 1.520)	0.188
	>49 years old	6	20.0	6	10.0		
Age of husbands	≤ 49 years old	21	70.0	47	78.3	0.65 (0.239 - 1.743)	0.386
	>49 years old	9	30.0	13	21.7		
Housewife's education level	≤ 6^{th} grade	19	63.3	19	31.7	3.73 (1.485 - 9.357)	0.004
	> 6^{th} grade	11	36.7	41	68.3		
Husband's education level	≤ 6^{th} grade	23	76.7	23	38.3	5.29 (1.958 - 14.272)	0.001
	> 6^{th} grade	7	23.3	37	61.7		
Income generation activity of housewives	Yes	17	56.7	37	61.7	0.81 (0.334 - 1.98)	0.648
	No	13	43.3	23	38.3		
Husband's occupation	Outside the area	23	76.7	27	45.0	4.02 (1.496 - 10.777)	0.004
	Inside the area	7	23.3	33	55.0		
Sexual behaviour							
Hormonal contraception	Yes	22	73.3	38	63.3	1.60 (0.607 - 4.177)	0.343
	No	8	26.7	22	36.7		
Condom use	Yes	4	13.3	3	5.0	2.93 (0.610 - 14.010)	0.164
	No	26	86.7	57	95.0		
Housewife's record of STDs	Yes	4	13.3	0	0.0	-	0.004
	No	26	86.7	60	100.0	-	
Husband's record of STDs	Yes	7	23.3	0	0.0	-	0.000
	No	23	76.7	60	100.0	-	
Socio-cultural factors							
Housewife's participation in religious activities	Yes	18	60.0	38	62.2	0.87 (0.353 - 2.135)	0.758
	No	12	40.0	22	37.8		
Husband's participation in religious activities	Yes	2	6.7	19	23.3	0.15 (0.033 - 0.715)	0.008
	No	28	93.3	41	76.7		
Easiness access to prostitution	Yes	15	50.0	30	50.0	1.000 (0.416 - 2.408)	1.000
	No	15	50.0	30	50.0		
Husband's alcohol drinking habit	Yes	14	46.7	9	15.0	4.96 (1.809 - 13.590)	0.001
	No	16	53.3	51	85.0		

Table 2.The Logistic Regression's Model of HIV Infection among Housewives

Variables	β	p Value	OR	95% CI
Husband's education level	1.684	0.002	5.385	1.871 – 15.501
Husband's alcohol drinking habit	1.624	0.004	5.072	1.692 – 15.208
Constanta	-4.456	0.001		

Tayu, and Juwana were the subdistricts that significantly contributed to the number of women living with HIV in Pati District.

Bivariate analysis using chi square test was used to examine the correlation between the HIV infections among housewives with the risk factors of HIV infection as the dependent variables. The result of chi square test is presented in Table 1.

The risk factors that belong to demographic factors significantly associated with HIV infection among housewives were the education level of housewives, the education level of husbands, and the occupation of husbands. The OR of those factors were 3.73 (95% CI = 1.958 – 14.272), 5.29 (95% CI = 1.958 – 14.272), and 4.02 (95% CI = 1.96 - 14.27) respectively. The sexual behavior factors related to HIV infection among housewives were housewife's sexual transmission diseases (STDs) record and husband's STDs record. The OR for those variables could not be counted due to the presence of the null-value cells. There were two factors affiliated to sociocultural factors significantly associated with HIV infection among housewives, namely husband's participation in religious activities and husband's alcohol drinking habit with the OR was 0.15 (95% CI = 0.033 - 0.715) and 4.96 (95% CI = 1.809 - 13.590) respectively. The OR of husband's participation in religious activities had OR less than 1, meaning that the OR in control group was bigger compared to that in the case group. Hence, husband's participation in religious activities could be considered as the inhibiting factor of HIV infection among housewives.

The factors having p value < 0.25 were then involved in multivariate analysis using logistic regression. In Table 1, the factors included in logistic regression were housewife's age, housewife's education level, husband's education level, husband's occupation, housewife's income, the use of condom, housewife's STD records, husband's STD records, husband's participation in religious activities, and husband's alcohol drinking habit. The Hosmer and Lameshow Test valued 0.561 (p value > 0.05). It means that there was no difference between empirical and tested data, so the analysis could be continued to the next step. The logistic regression used forward unconditional method and left two variables fitted to the model. The model of logistic regression could predict 73.3% precisely the HIV infection among housewives cases in Pati District. The strength of the correlation between the two risk factors and HIV infection among housewives was shown by Nagelkerke R^2 valued 0.291. The final model of logistic regression is presented in Table 2.

Based on Table 2, the two variables associated with HIV infection among housewives in Pati District were husband's education level and husband's alcohol drinking habit. The husband's education level had OR 5.38 (95% CI = 1.87-15.50), while the husband's alcohol drinking habit had OR 5.07 (95% CI = 1.692-15.208). Those results meant that the housewives having low-educated husband were likely 5.38 times higher to be infected by HIV compared to those having higher education spouses if only the variable of husbands' alcohol drinking was controlled. Otherwise, the housewives having husbands who used to drinking alcohol were likely to be infected by HIV 5.07 times higher compared to the counterparts if only the variable of education level of spouses was controlled.

Discussion

From bivariate analysis, the risk factors of HIV infection among housewives in Pati District were housewife's and husband's education levels, husband's occupations, housewife's and husband's records of STDs, husband's participation in religious activities, and husband's alcohol drinking habit. However, there were only two variables fitted to Logistic Regression Model were husband's education level and husband's alcohol drinking habit.

Demographic factors that were significantly proven as the risk factors of HIV infection among housewives in Pati District according to chi-square analysis were housewife's education level, husband's education level, and husband's occupation. In this study, the education level is categorized into lower than the sixth grade and higher than the sixth grade. Univariate analysis showed that the education level of housewives and husbands in the case group were lower compared to the counterparts with the percentage 63.3% and 31.7% respectively. The OR for this factor was 3.73 meaning that the lower education housewives with lower education were likely 3.73 times to get HIV compared to those having higher education.

The examination towards husband's education level showed similar result. The percentage of husbands having lower education in the case group was 76.7%. It was higher compared to that of the control group. The OR

value for the variable was 5.39, meaning that the housewives having lower education husbands tended to be infected by HIV 5.39 times higher than their counterparts. This variable fitted to the model resulted by logistic regression with the OR 5.38 (95% CI = 1.87-15.50).

The correlation between education level and HIV infection among housewives has been proved by previous study in Nepal. Women having migrant husband who did not ever attend school were likely 5.87 times higher to get HIV.[15] Meanwhile, the women who had husband never attending school were likely 5 times higher to get HIV. Quinn and Overbaugh,[6] stated that lower education was one of the roots of women vulnerability toward HIV infection. The education level relates to the knowledge and access to information. The persons with adequate education tend to have more opportunity to access information, so they had knowledge regarding HIV comprehensively. UNAIDS reported that women and girls who attained higher education showed the better sexual and reproductive outcomes. A data analysis from 44 countries showed that women completing secondary education had lower risk of partner violence, particularly in the countries which showed the high rate of spousal abuse. Moreover, the girls with at least six years of school education tend to be more able to protect themselves from HIV infection and other diseases.[16]

The husband's occupation correlated to HIV infection among housewives as well. In this study, most housewives in the case group (76.7%) had husbands working long distance jobs, such as domestic migrants, fishermen, drivers, and international labour/migrants with the percentage. Meanwhile, those in the control group were 55%. This study proved that husband's long distance job increased the risk factor for HIV infection due to the wider possibility to leave the families in a longer period, then committing the unsafe sexual behaviour, like accessing prostitution.

This result was in line with the previous study conducted at Dr. Soetomo Surabaya Public Hospital. According to that study, majority of patients living with HIV had high mobility jobs, such as salesmen, drivers, and, waitresses in cafe.[17] Another study by Johnson and Budlender proved that kinds of informal jobs that obligate the workers to leave their family for a long period, such as mining workers, truck drivers, and security workers had a higher prevalence for getting by HIV than the formal jobs.[18]

STD record correlated with HIV infection among housewives according to bivariate analysis. This study found that 13.3% housewives and 23.3% their husbands had STD's records before living with HIV, while those in both control groups were reported none STD's records. However, OR could not be counted due to the null cells in the control group. The kinds of STDs suffered by housewives and their spouses were not elaborated in this study. However, the association of STDs and HIV infection has been proved by several previous studies. Generally. STDs may increase the HIV infection due to the presence of genital infection, which effectively becomes an effective entrance for HIV development. Infections caused by STD break the epithelial surface of the genital tract. That may be the entrance for HIV-1 to target cell under theepithelial surface and to build a systemic infection.[19] Moreover, the presence of ulcers in both partner cause blood to blood contact thereby transmission.

Several studies revealed the variation of the odd ratio of the correlation between STDs and HIV infection. Miranda *et al,*[20] reported that the previous sexually transmitted infection (STI) increased the risk of HIV infection (AOR 42.5, 95% CI = 1.89-168.49). Specifically, Johnson and Lewis,[21] revealed that infections in genital tract contribute the largest correlation, in which urethritis with OR 3.1 (95% CI = 1.1-8.6) and Cervicitis with OR 2.7 (95% CI = 1.4-5.2).[21] A study in South Africa finds that the records of syphilis increase 1.86 times the risk of HIV infection among women.[22] Meanwhile, another study in Tanzania reported the higher risk. The women having syphilis record were 9 times likely to be infected by HIV.[23] The infection of syphilis increased the immunity activation of the host, which simultaneously increased the replication of HIV within the cells. Another STD that increase the risk of HIV infection among women is non-ulcerative STDs, like Gonorrhea and Chlamydia. A meta-study by Rotchford *et al,*[24] stated that gonorrhea significantly related to HIV infection, while the result was opposite for Chlamydia. However, another study found out that Chlamydia increased 1.8 times the risk factor to HIV infection.[21]

The sociocultural variables that significantly associated with HIV infection among housewives were the husband's participation in religious activities and husband's alcohol drinking habit. The husbands in both case and control group were not active in religious activities. However, the percentage of those in case group was higher (93.3%) compared to that in control group (76.7%). The OR value for this variable was 0.15 (95% CI = 0.033-0.715). The OR was less than 1 proved that husband's participation in religious activities inhibited the HIV infection among housewives. Otherwise, the housewives having husbands who were not active in religious activities tended to get HIV 6 times higher than their counterparts. This result supported previous study by Kagimu *et al,*[25] who proved the correlation between religiousity and HIV risk behavior in Uganda. The respondents who used religion identity and committed to religious activities continously prone to avoid risky sexual activities, drug abuse, and alcohol drinking habit.

Moreover, religiousity increased the life satisfaction and marriage commitment, so that it may inhibit HIV risk behaviors. The other study by Ludema *et al,*[26] proved that participation in religious activities, such as reading and learning holy book and the faith to God was a strong barrier for sexual behaviors.[26] Furthermore, this study also reported that women having a high level of religiosity and spirituality tended to look for partners whose equal qualities to them, in which their partner had a low risk factor of getting HIV as well.

The husband's alcohol drinking habit significantly related to HIV infection among housewives. This study reported that the husband's alcohol drinking habit found in both case and control group, and the case group's percentage was higher (46.7%) than that of the control group (15%). The OR value was 4.96, meaning that the housewives having husbands with alcohol drinking habit were likely 4.96 times higher to get HIV than those without alcohol drinking habit. Furthermore, the logistic regression test resulted that this variable together with the husbands' education level fitted to the regression model with the OR 5.072 (95% CI = 1.692-15.208). It meant that both variables simultaneously increased the risk for HIV infection among housewives. However, if the husbands' education level was controlled, the risk value of alcohol drinking habit variable was 5.07. The alcohol consumption did not directly increase the risk for HIV transmission. It increased the prevalence of committing sexual risk behavior that directly related to HIV transmission.

The relation of alcohol consumption to HIV transmission has been reported by several previous studies. Baliunas *et al*,[27] proved that 87% alcohol drinker group committed sexual risk behavior and 77% of them got HIV. Another study in Peru by Maguina *et al*,[28] reported that alcohol consumption by both partners increased the prevalence of sexual risk behavior 1.15 times higher. The consumption by the only one partner increased 1.14 times higher the risk for HIV transmission.

Conclusion

Bivariate analysis resulted that the risk factors for HIV infection among housewives in Pati are housewife's STD records, husband's STD records, husband's participation in religious activities; and husband's alcohol drinking habit. Moreover, logistic regression left two variables fitted to the model, namely husband's education level and husbands' alcohol drinking habit. Both factors simultaneously contribute to 29.1% HIV infection among housewives in Pati District. Furthermore, the regression model is 73.3% accurately predicted the HIV infection cases among housewives in the study area. In conclusion, the variables that belong to husband had stronger contribution to HIV infection among housewives.

Recommendation

The efforts to slow down HIV infections among housewives in Pati District should consider the economic and sociocultural factors of communities. The awareness regarding HIV infection/AIDS should be raised to the groups having higher risks of HIV infection, particularly in the areas dominated by husbands having long-distant jobs and alcoholic drinking habit. Then, the promotion of HIV/AIDS knowledge should be focused on the lower education housewives. The voluntary counselling and testing for HIV should be encouraged among couples that are proven suffering from STDs. The last, the communities should take part in these efforts through the increase of religious activities involving husbands to hamper the spread of HIV infections among housewives.

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Implementation of Cigarette Excise Policy against Cigarette Consumption Reduction among Adolescent in Kuningan, Indonesia

Implementasi Kebijakan Cukai Rokok terhadap Penurunan Konsumsi Rokok pada Remaja di Kuningan, Indonesia

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Abstract

Indonesia has the highest prevalence of smoking (50.68%) compared to other ASEAN countries. On January 1st, 2017, the Indonesian government raised cigarette excise taxes. The purpose of this study was to analysis the impact of cigarette excise increase on cigarette consumption among adolescents aged 17 to 25 years. The study design used cross-sectional survey. A total of 153 adolescents were recruited in this study through simple random sampling technique. Questionnaires and observation papers were used in this study. A face-to-face interview was conducted to fulfill the data collection through home visit for each respondent. The data were obtained during May – June 2017. This study used paired t test analysis. The number of cigarettes consumed by adolescent decreased significantly by two cigarettes per day after the increase in cigarette excise tax. There is a significant difference of the average cigarettes price based on the brand after the implementation of cigarette excise tax increase, the difference of cigarette price is IDR 200 per stick of cigarettes after excise tax increase. Increased cigarette excise taxes may affect the increasing of cigarette prices. Threfore, it could reduce the number of cigarette consumption.

Keyword : Adolescent, cigarette, excise, price, tobacco

Abstrak

Indonesia memiliki prevalensi merokok tertinggi (50,68%) dibandingkan negara-negara ASEAN lainnya. Pada tanggal 1 Januari 2017, pemerintah Indonesia menaikkan pajak cukai rokok. Tujuan dari penelitian ini adalah untuk menganalisis dampak kenaikan cukai rokok terhadap konsumsi rokok pada remaja usia 17 sampai 25 tahun. Desain penelitian menggunakan survei potong lintang. Sampel pada penelitian ini adalah 153 remaja yang dipilih melalui teknik *random sampling*. Instrumen pada penelitian ini adalah kuesioner dan lembar observasi. Wawancara tatap muka dilakukan untuk memenuhi pengumpulan data melalui kunjungan ke rumah masing-masing responden. Data diperoleh pada bulan Mei - Juni 2017. Penelitian ini menggunakan analisis uji t berpasangan. Terdapat perbedaan rata-rata yang siginifikan jumlah rokok yang dikonsumsi dan harga rokok per batang antara sebelum dan setelah kenaikan cukai rokok. Jumlah rokok yang dikonsumsi remaja menurun dua batang rokok per hari setelah adanya kenaikan cukai rokok. Rata-rata harga rokok meningkat sebanyak Rp 200.00 per batang setelah kenaikan cukai rokok. Kenaikan cukai rokok dapat memengaruhi kenaikan harga rokok. Dengan demikian hal tersebut dapat mengurangi jumlah konsumsi rokok.

Kata kunci : Remaja, rokok, pajak cukai, harga, tembakau

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Introduction

Tobacco use is one of the leading global health risks for human mortality worldwide (9%). Health risks from smoking also responses for generating the other risks related to chronic diseases.[1] Indonesia has the highest smoking prevalence (50.68%) compared to others ASEAN's countries.[2] According to National Basic Health Research, it is estimated, the prevalence of tobacco smoking increased from 34.2 % in 2007 to 36.3 % in 2013.[3-5] The prevalence of smokers in adolescents (aged 15-19) years has increased from 0.7% in 2007 to 11.2% in 2013, as well as among age of 20-24 years increased from 17.3% in 2007 to 27.2% in 2013. The average age of people early smoking in Indonesia is at 17.6 years. Meanwhile, the average number of cigarettes smoked is about 12.8 cigarettes per day.[3-5]

Due to its negative impact on health, cigarettes as tobacco products should be limited or inhibited consumption. Tobacco control policy is an excellent investment in the health of a country's population. However, Indonesia is the only country in the Southeast Asia Region that has not signed the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).[6,7] Moreover, it is not introduced a wide range of tobacco control policies.[8] One of the efforts to control cigarette consumption by the government is by issuing a cigarette excise policy.

Excise is one of an instrument to control cigarette consumption. Tax price increases that reduce the affordability of tobacco products are among the most effective way to reduce tobacco consumption.[9,10] As recommendation from the World Bank that total tax burden should be 66% to 80% of the retail price. As for WHO and global benchmark 70-75% of retail price is excise tax.[10,11] According to economic study, cigarette price is inversely related to cigarette demand. A 10% increase in price of cigarette would decrease overall adult consumption by approximately 4%.[10] In addition, study of dynamic simulation about excise tax raising in California found a 20% tax-induced cigarette price increase would reduce smoking prevalence from 17% to 11.6%.[12] From year 1999 to 2010, cigarette prices become more affordable as indicated by significant decline in relative income price (apply for the most popular brand), particularly in the Philippines and Indonesia compared to other countries (Cambodia, Lao DPR, Vietnam, Thailand). Since 2005, Thailand is the only country where cigarettes have gradually become less affordable.[10,13]

Several systematic reviews have found that higher cigarette prices lead to a reduction in smoking prevalence and intensity among youth and young adults.[14-16] Study in United States found that cigarette tax increase associated with a substantial reduction in smoking among youth and young adultssuch as the odds of smoking initiation decreased, the odds of past-month smoking also decreased, current smokers smoked on fewer days and smoked fewer cigarettes per day after the tax increase.[17] As for study among young adults in Columbia, found that an increase in the price of cigarettes led to transitions from daily smoking to no smoking, from moderate daily to light daily smoking, and from heavy daily smoking to moderate daily smoking.[18] Youth and the poor are more price sensitive. Evidence in the study suggests that youth and young adults are more sensitive to cigarette price and tax increases than adults.[15,17]

In Indonesia, the tobacco tax averages 37% of sales price. This is low compared to the global benchmark of 70% of sales price. The tax rate is 31% of the government retail price; the maximum allowable tax rate by Indonesian law is 57% of HJE.[9] The HJE is the "retail sales price," and represents the factory price inclusive of taxes, profit, and transaction costs.[19] Since 2009-2017, Indonesia has changed its policy on the development of tobacco excise tariff. The government of Indonesia implements the latest policy in 2017, namely the government raises excise tariffs in the range of 0% to 13.46% for each product according to manufactured. The highest excise tax rate increase of 13.46% applies to machine-packaged white cigarettes. Meanwhile, the lowest increase in excise tariffs by 0% (fixed), applies to the results of hand-made *kretek* cigarettes class IIIB. The government also set an increase in retail price of tobacco products by 12.26%.[20] Its regulation has impacted to cigarette prices. This study examined the effect of cigarette price policy changes on the number of cigarettes consumed by adolescents.

Method

The study design used a cross-sectional survey. Data of cigarette consumption among adolescents were obtained during May – June 2017. Random sampling technique was applied in this study. Adolescent were recruited from community in Baok Village, Ciwaru Subdistrict, Kuningan District, West Java Province, Indonesia. Simple random sampling was employed to select an adolescent who smoked daily or non-daily and aged 17-25 years old. A total of 153 adolescents were recruited in this study. The data were collected through face-to-face interviews and observation by home visit to each respondent. Informed consent was obtained before the questionnaire was distributed. A questionnaire consisted of characteristic of respondent, a number of cigarette consumed per day before and after excise increased, type of cigarette consumed before and after excise increased, price of cigarette per stick according to cigarette brand that consumed, reason of smoking initiation, family smoking status in home, friend smoking status in school, and friend smoking status in home's area. Furthermore, observation

Table 1. Characteristics of Respondent

Characteristics	Category	Frequency	Percentage
Age (year)	15-19	69	45.1
	20-24	84	54.9
Education level	Primary school	9	5.9
	Junior high school	62	40.5
	Senior high school	69	45.1
	Diploma/college/university or more	13	8.5
Employment	Students	91	59.5
	Self-employee	25	16.3
	Non-government employee	37	24.2
Reason of smoking initiation	Fad	58	37.9
	Curious	59	38.6
	Invited/forced	36	23.5
Family smoking status in home	Yes	95	62.1
	No	58	37.9
Friend smoking status in school	Yes	117	76.5
	No	36	23.5
Friend smoking status in home's area	Yes	153	100
	No	0	0

Table 2. Changes Pattern of Cigarette Type Consumed

Cigarette Type Consumed	Before		After	
	n	%	n	%
Machine-made 'kretek' cigarette	117	76.5	122	79.7
Machine-made white cigarette	33	21.6	28	18.3
Hand-made 'kretek' cigarette	3	2	3	2

Table 3. Changes Pattern of Total Number of Cigarettes Consumed According to Cigarette Brand's Consumed

Cigarette Brand's Consumed	Total Number of Cigarettes Consumed		Total Change
	Before	After	
Brand 1	217	172	45
Brand 2	162	176	-14
Brand 3	43	44	-1
Brand 4	45	25	20
Brand 5	27	36	-9
Brand 6	122	87	35
Brand 7	183	147	36
Brand 8	135	109	26
Brand 9	89	59	30
Brand 10	61	32	29
Brand 11	54	45	9
Brand 12	43	28	15
Brand 13	9	0	9
Brand 14	22	17	5
Brand 15	62	59	3

was conducted to indentify the excise increase by Indonesian law in 2017. The existing regulations on Indonesian regulations No.147/PMK.010/2016, which implemented on January 1, 2017, on tobacco excise tariffs are set as indicators after cigarette excise tax increases.[21] In addition, retail price observations that apply to cigarettes per stick or per pack had been analyzed by observation and interviews to the tobacco traders. All statistical tests were analyzed by using statistical software for windows. Paired t-test analysis was used to identify the differences of total cigarette consumed before and after excise increasing. A p value < 0.05 was considered statistically significant.

Results

A total of 153 questionnaires were distributed to adolescents in the village community. The response rate was 100% and all of them completed answers. The majority of respondents (54.9%) were between age 20 and 24 years (Mean = 20.45 years; SD = 2.218). Nearly half (45.1%) of the adolescents were senior high school. The majority of adolescents' employment were student (59.1%). Approximately one-quarter (38.6%) of adolescents reported "curiosity" as a reason to cigarette initiation (Table 1). Moreover, nearly two-thirds (62.1%) of family were smoking at home. Approximately, three-quarter (76.5%) of friends were smoking at school. Furthermore, all of friends are smoking in home's area (Table 1).

In term of the changing of cigarette type consumed before and after cigarette tax increased, the majority of adolescents (76.5%) had consumed machine-made *kretek* before excise tax increased. Furthermore, after it has increased the machine-made *kretek* cigarette type percentage increased (79.7%). As for machine-made white cigarette type has decreased before and after excise tax increased from 21.56% to 18.3% (Table 2). Moreover, the pattern of total number of cigarettes consumed according to cigarette brands has been changed after implementation regulation. More than three-quarters (80%) of cigarette brands consumed have decreased in terms of the number of cigarettes consumed (Table 3). Cigarette Brand 1 had the greatest decline. Cigarette

Table 4. The Mean Difference of Cigarette Brand Prices per Stick Before and After Excise Tax Increased

Cigarette Brand Prices	Mean ± SD	Min-Max	Mean Differences ± SD	95% CI	p Value
Price before	1,12 ± 125.19	1,000-1,250	- 194.44 ± 104.27	- 211.10 - (-177.78)	0.000
Price after	1,31 ± 199.26	1,000-1,500			

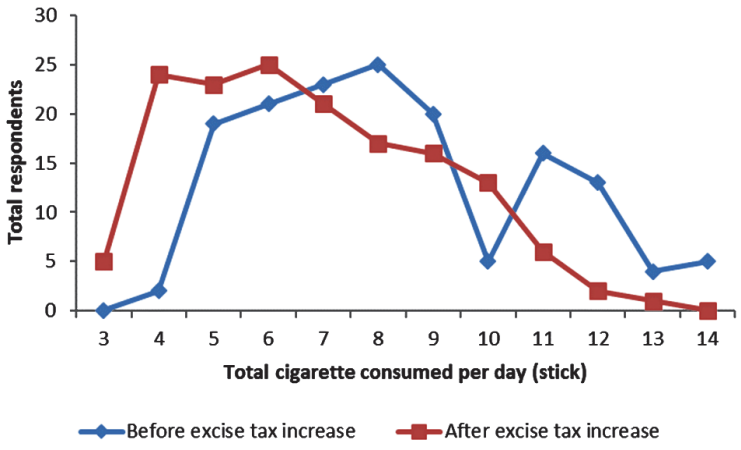

Figure 1. The Difference of Total of Cigarettes Spent in One Day by Adolescent

Table 5. The Mean Difference of Cigarette Consumption Before and After Excise Tax Increased

Category	Mean ± SD	Mean Differences ± SD	95% CI	p Value
Before increasing excise tax	8.33 ± 2.52	1.556 ± 1.02	1.39-1.72	0.000
After increasing excise tax	6.77 ± 2.27			

brand 15 had the lowest decline. Meanwhile, Cigarettes Brand 2, Brand 3, and Brand 5 have increased a little bit in term of total cigarette consumed (Table 3).

The cigarette price per stick for all brand of cigarette has been increased after excise tax increased, except three brands that are Brand 4, Brand 7 and Brand 12 due to its new brand. The highest price of cigarettes before the increase in excise tax was IDR 1,250 per stick and the lowest price was IDR 1,000 per stick. After the excise increase, the highest cigarette price was IDR 1,500 per stick, and the lowest price was IDR 1,000 per stick (Table 4). There was significant difference of cigarette brand prices between before and after cigarette excise tax increased (95% CI: 211.10-177.78, p value < 0.05). The average of cigarette brand prices before excise tax increased was lower than after excise tax increased (mean difference: 194.44, SD: 104.27) (Table 4). The difference of cigarette prices was IDR 200.

Figure 1 shows that before the increase in cigarette excise tax rates, the number of cigarettes spent each day by adolescents' smokers was 4-14 cigarettes stick. Most adolescents spent eight cigarettes per day. However, after cigarette excise tax increased, the number of cigarettes spent every day decreases to 3-13 cigarettes. Most adolescent spend six cigarettes per day. The figure shown the changing pattern of total cigarette consumption before and after excise tax increased. Based on Table 5, there was significant difference of number cigarette consumed pattern among adolescents between before and after cigarette excise tax increased (95% CI: 1.39-1.72, p value < 0.05). The average of cigarette consumption among adolescents before excise tax increased was higher than after excise tax increased, mean = 8.33; SD = 2.52 and mean = 6.77; SD = 2.273), respectively. The number of cigarettes consumed by adolescent decreased significantly by two cigarettes after the increase in cigarette excise tax.

Discussion

The major finding of this study is that there was significantly difference of number of cigarette consumed among adolescent before and after cigarette excise tax increased. Adolescent's cigarette consumption decreased after the tax increased. Daily adolescent smokers smoked on average 1.6 cigarettes (or about two cigarettes) per day less after the excise tax increase. This finding is in line with previous study finding that among youth smokers, the number of days smoked declined after the tax in-

crease, as well as fewer cigarettes were smoked per day after the tax increase. The reduction in the number of cigarettes being larger for daily smokers compared to nondaily smokers.[17] Furthermore, study in the United States found that the large state tobacco tax increases of the past 15 years were associated with significant reduction in smoking participation and frequent smoking by youths.[22] The evidence suggests that the increase in price reduces smoking participation, prevalence and consumption, as well as the level of smoking.[20,23] Based on the literature, the policy of cigarette excise increase will result to the increase of cigarette price. When the price of cigarettes rises, the people's affordability will decrease to buy. Thus, the condition may decrease the number of cigarettes consumed or the prevalence of smokers. Moreover, the production of cigarettes can decrease.[19,20]

Excise is an instrument of tobacco consumption control. The impact of price and tax measures on health and revenue depends on the structure of the market, industry and consumer responses to tax and price increases, and the implementation of the tax. Because the demand for tobacco products responds to changes in price, increasing the price and tax of tobacco products is also the most effective way to reduce tobacco-related morbidity and mortality.[19] Furthermore, the demand for cigarette is more price sensitive for the long-run than the short-run.[24]

This study found that the real price of cigarette per stick was increased due to implementation of Indonesia's cigarette excise regulation No. 147/PMK.010/2016. The average increase in excise tax on each brand of cigarettes was IDR 200 per stick. Excise affects the financial scheme consisting of the price of cigarette products per unit, sales and production volume. In tobacco companies, excise and VAT (value added tax) are included in the calculation of pricing. Where the price of cigarettes per unit acquired is reduced by the excise tax and the payable is then added with the profit the company wants to earn and the result is the Retail Price. The amount of excise duty and VAT payable depends on the size of the retail price because the excise and VAT amount is the product of the excise tax and tax with the retail price and if the selling price of the market is higher than the price indicated on the excise band, then the outstanding taxes increase in accordance with the increase in the price.[25] The evidence suggests that is a positive effect on the price per unit excise tax, this means that any increase in excise duty will increase the price per unit and any excise reduction will lower the price per unit.[26]

Moreover, the study revealed that the high percentage of cigarette type consumed before and after cigarette excise tax increased was machine-made *kretek* cigarette , 76.5% and 79.7%, respectivelly. The previous study about Indonesia tobacco taxes reported that the vast majority of smokers (88%) use *kreteks*, or tobacco-and-clove cigarettes, and a very small segment of smokers in rural areas use roll-your-own or pipe tobacco. As well as a slightly higher percentage of youth (15 to 19 years) prefer white cigarette.[19] Among type of cigarette, *kretek* is the most popular (31.5%), followed by hand-rolled (4.7%) and white cigarette (2.2%) that were consumed by Indonesian community.[7]

Based on the result, over half (59.5%) of adolescentssmoker were students. Nearly half (45.1%) of adolescent smoker were senior high school students. Although majority of them were educated background, they were smoking. It was related to other factors such as social environment influence. According to the result, family smoking at home, friend smoking at school and friend smoking at homes areas were high prevalence, 62.1%, 76.5%, and 100%, respectively. The previous study has shown that social influences have an association with the adolescent is smoking behavior.[27,28] Negative social modeling, negative social pressure, and negative home and school factor were more likely to smoking.[27] Then, smoking rule inside home was significantly associated with smoking behavior.[29] In addition, environment factor is associated with health behavior. Social cognitive theory (SCT) is evolved from Albert Bandura's social learning theory.[30,31] This theory concerned to the social environmental factors, that the personal characteristics of individual, and behavior interact and influence each other.[30]

Conclusion

The increase in cigarette prices can reduce the number of cigarette consumption among adolescents. This study obtains that the average increase in excise tax on each brand of cigarettes is IDR 200 per stick, as well as the number of cigarette consumed among adolescent was significantly different between before and after cigarette excise tax increased. The number of cigarettes consumed by adolescents decreases significantly by two cigarettes after the increase in cigarette excise tax.

Recommendation

This study recommends that the government should increase cigarettes excise tax according to the global benchmark of retail price. At least, the government should implement the maximum allowable tax rate by Indonesian law of retail price. Moreover, the government can control the growth of tobacco products production as a form of controlling the consumption of tobacco products. The important issue for future study is an investigation the elasticity of excise tax increasing to cigarette consumed. As well, additional identifying is needed to substantially reduce tobacco initiation and tobacco cessation among youth and adults.

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Effect of Health Education on Community Participation to Eradicate *Aedes aegypti*-Breeding Sites in Buahbatu and Cinambo Districts, Bandung

Pengaruh Pendidikan Kesehatan pada Partisipasi Masyarakat Memberantas Sarang Nyamuk *Aedes aegypti* di Kecamatan Buahbatu dan Cinambo, Bandung

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Abstract

Dengue hemorrhagic fever (DHF) is still a major public health problem in many regions in Indonesia including Bandung City. Community participation in implementing Eradication of Mosquito-Breeding Sites is still needed as it is considered the most effective method in controlling the dengue fever. This study aimed to determine the influence of health education towards community participation to eradicate mosquito-breeding sites, which was measured by knowledge level and larva index conducted in Bandung, specifically in two different locations with the highest and the lowest incidence rates of DHF. This study used quasi-experimental method. Samples were 100 people living in Cijawura and Cisaranten Wetan Subdistricts taken by using purposive sampling technique. Pre-test results showed that knowledge level of respondents in both subdistricts was significantly increasing (p value = 0.000) after health education was given. Container index (CI) and House index (HI) values in Cijawura Subdistrict were 13.2% and 26.7% respectively, then 9.6% and 28.4% respectively in Cisaranten Wetan Subdistrict. After the health education, CI value in Cijawura and Cisaranten Wetan Subdistricts significantly decreased (p value < 0.05), but HI value did not (p value > 0.05).

Keywords: Dengue hemorrhagic fever, health education, larva index, knowledge

Abstrak

Penyakit demam berdarah dengue (DBD) masih menjadi masalah kesehatan utama di beberapa wilayah di Indonesia, termasuk Kota Bandung. Partisipasi masyarakat dalam melaksanakan Pemberantasan Sarang Nyamuk (PSN) sangat diperlukan karena PSN masih menjadi metode pengendalian DBD yang paling efektif. Penelitian ini bertujuan untuk mengetahui pengaruh pendidikan kesehatan terhadap partisipasi masyarakat dalam memberantas sarang nyamuk *Aedes aegypti* yang diukur dari tingkat pengetahuan dan indikator larva index yang dilakukan di Kota Bandung di dua lokasi berbeda dengan kasus DBD tertinggi dan terendah. Penelitian ini merupakan penelitian *quasi experimental*. Besar sampel sebanyak 100 orang yang tinggal di Kelurahan Cijawura dan Cisaranten Wetan diperoleh melalui teknik *purposive sampling*. Hasil *pre-test* menunjukkan bahwa tingkat pengetahuan responden di dua kelurahan tersebut meningkat secara signifikan (nilai p = 0,000) setelah pendidikan kesehatan diberikan. Nilai *container index* (CI) dan *house index* (HI) saat sebelum tes di Kelurahan Cijawura adalah 13.2% dan 26.7% dan Kelurahan Cisaranten Wetan adalah 9.6% dan 28.4%. Setelah dilakukan penyuluhan, nilai CI di Kelurahan Cijawura maupun Cisaranten Wetan dapat menurun secara signifikan (nilai p < 0,05) namun tidak untuk HI (nilai p > 0,05).

Kata Kunci : Demam berdarah, indeks larva, pengetahuan, penyuluhan

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Introduction

Dengue hemorrhagic fever (DHF) is still a major public health problem in several regions in Indonesia including in Bandung City, West Java. The number of patients in Bandung City has been increasing since the last three years.[1,2]

Eradication of Mosquito-Breeding Sites Program as a method in controlling and preventing dengue fever is still the most effective and efficient method because eradicating mosquito larvae and limiting mosquito breeding sites can reduce its population that will lead to decreasing number of dengue fever transmission risk. The program involves all members of community and this program should be done regularly and continuously, because the community participation is the success key of this activity.[3]

Health education is part of community empowerment process to maintain and improve their health independently. Health education not only changes the behavior of individuals, but also communities in the health sector. Health education on an on-going basis may lead the community to actively participate in the program, because this activity is expected to increase their awareness, so that they will run the program correctly. Because of the aforementioned reasons, this study aimed to determine the effect of health education on community participation in eradicating *Aedes aegypti*-breeding sites measured by the level of knowledge and the existence of larva both inside and outside each house conducted in Bandung City. Buahbatu and Cinambo Subdistricts were selected as the study location in order to compare the level of knowledge and the existence of larvae in those two subdistricts as regions with highest and lowest dengue fever cases in Bandung City.[1,2]

Method

A quasi-experimental with one group pre-test and post-test study design was used to determine the effect of health education. This study was conducted from August to November 2016 in Cijawura Subdistrict, Buahbatu District and Cisaranten Wetan Subdistrict, Cinambo Subdistrict, Bandung City. This study has been approved by the Health Research Ethics Committee, Faculty of Medicine, Padjajaran University with Registration No. 0715020119.

A purposive sampling method was used to select 100 subjects who met the inclusion criteria that were adults representing every house in the study location. This sample size was the minimum number required for larvae surveys in a region under the guidelines of the Ministry of Health of Indonesia in the "Dengue Fever Control Module".[4] The exclusion criteria of this study were those who were not willing to participate in this study, member of a family that was not at home when the study was conducted, and citizens who had already got pre-test but did not participate in the counseling. Of the 129 respondents in Cijawura Subdistrict and 102 respondents from Cisaranten Wetan Subdistrict, only 86 respondents and 88 respondents respectively who met the exclusion criteria.

The instruments of this study were questionnaires that had been validated, counseling books and in form of larvae survey. Before the intervention (health education) took place, pre-test was given to respondents who had received the inform consent. To obtain the knowledge level, respondents filled the questionnaire with 20 multiple choice questions. The level of knowledge was divided into three categories, namely high if the score was higher than 70, adequate if the score was between 35 to 70, and low if the score was lower than 35.[5]

Meanwhile, *Aedes aegypti* larvae surveys were performed in the containers that were replaced inside and outside respondents' houses. The finding would then be presented in the table of larvae-positive containers based on the type of container and the larvae index indicators, namely container index (CI) and house index (HI) according to the Formula 1.[4]

Two weeks after the counseling was provided, the respondents returned to participate in the post-test by filling the questionnaire and performing larvae surveys. Marginal Homogeneity test was used to compare the level of knowledge and CI values before and after the counseling. However, to compare the value of HI, McNemar Test would be conducted.

Results

Table 1 shows that most respondents in Cisaranten Wetan Subdistrictand Cijawura Subdistrict were housewives whose education levels were mostly elementary school, middle school and high school.

Before the counseling, as much as 83.7% of respondents in Cijawura Subdistrict had adequate knowledge and 15.3% of the respondents had high level of knowledge. After counseling, respondents who had high level of knowledge increased from 15.3% to 39.5%, while 60.5% still at the adequate level (Table 2).

The knowledge level of Cisaranten Wetan people can be seen in Table 2. Prior to the counseling, most respondents already had adequate level of knowledge, as much as 79.5% and 18.2% of the respondents had high know-

$$HI = \frac{Number\ of\ houses\ with\ larvae}{Number\ of\ examined\ houses} x\ 100\%$$

$$CI = \frac{Number\ of\ containers\ with\ larvae}{Number\ of\ examined\ containers}\ x\ 100\%$$

Formula 1

Table 1. The Demographic Characteristics of Respondents

General Characteristics	Category	Cijawura		Cisaranten Wetan		Total	
		n	%	n	%	n	%
Age	<45 years old	54	63%	58	66%	112	64.3%
	>45 years old	32	37%	30	34%	62	35.7%
Sex	Male	6	75	10	11.4%	16	9%
	Female	80	93%	78	88.6%	158	81%
Education Level	Under elementary	0	0	0	0	0	0
	Elementary school	25	29%	28	31.8%	53	30.5%
	Junior high school	25	29%	26	29.5%	51	29.3%
	Senior high school	25	29%	27	30.7%	52	29.9%
	Bachelor degree	11	13%	7	8%	18	10.3%
Occupation	Employed	12	14%	19	21.6%	31	17.8%
	Unemployed	74	86%	69	78.4%	143	82.2%

Notes:
n = Number of Sample; % = Percentage

Table 2. The Knowledge Level of Respondents

Education Level	Category	Time of Health Education	
		Before n (%)	After n (%)
Cijawura	Low	0	0
	Adequate	72 (83.7%)	52 (60.5%)
	High	14(15.3%)	34 (39.5%)
Cisaranten Wetan	Low	2 (2.7%)	1 (1.1%)
	Adequate	70 (79.5%)	47 (53.4%)
	High	16 (18.2%)	40 (45.5%)

Notes:
n = Number of Sample; % = Percentage

ledge level. After counseling, the people with high level of knowledge increased to 45.5%, while 53.4% of the respondents were still at adequate level (Table 2).

To find out whether the counseling affected on the increasing knowledge of respondents, Marginal Homogeneity test was used and the result obtained p value = 0.000 (p value < 0.05), which means that there was a significant increase in the level of knowledge before and after the counseling in both subdistricts.

A total of 187 larvae obtained from larvae surveys before the counseling were identified and the results found 97.3% of the larvae were the *Aedes aegypti* species (Table 3). The mosquito larvae was mostly found in the tub, drum, dispenser and bucket in both Cisaranten and Cijawura Wetan Subdistricts. Before the counseling, of 86 houses in Cijawura Village, larvae was found in 23 houses. Meanwhile of 88 houses in Cisaranten Wetan Village, larvae was found in 25 houses (Table 4).

After counseling, there was a decreasing number of containers containing *Aedes* larvae. To determine whether the counseling affected on the HI rate reduction in Cijawura and Cisaranten Wetan Subdistricts, McNemar test was conducted, and the results obtained p value = 0.096 and p value = 0.200 (p value > 0.05), which presents that the counseling did not significantly affect on the decline of HI in those two subdistricts. Furthermore, the influence of the counseling to the CI was analyzed using Marginal Homogeneity test and the results obtained p value = 0.012 and p value = 0.036 (p value < 0.05), which means that counseling significantly affect on the decrease in the number of CI.

Discussion

The knowledge about mosquito-breeding sites control includes the knowledge about the causes of dengue fever and how it transmits; the transmission and the time of transmission; habit and life cycle of the mosquito that transmit the fever; also the practice of closing, draining, and burying including the knowledge of other controls which include using abate and putting the fish inside the containers. From the study, it is known that people living in both subdistricts with different endemicity levels had almost the same level of knowledge, while most of respondents already had adequate level of knowledge about mosquito-breeding sites control (83.7% in Cijawura and 79.5% in Cisaranten Wetan Subdistricts respectively).

After counseling, knowledge level of the respondents in both subdistricts significantly increased (p value = 0.000). These results are in accordance with study by Saleha Sungkar *et al,*[5] in which the knowledge of the people about the mosquito-breeding sites control in Bayah Subdistrict, Banten Province can be significantly increased after the counseling. As well as the study by Su Wei *et al,*[6] to Malaysian students, Bhawna pant *et al,*[7] to students in Meerut India, and Firawan,[8] to the community in Magetan, Indonesia.

According Notoatjomojo,[9] knowledge is the information acquired by someone after a specific sensing of objects either it is through the sense of hearing, sighting, smelling, tasting, or touching. Before the counseling was given, most respondents were already familiar with the term cleaning, covering, burying activity or well-known

Table 3. The Existence of Larvae Based on The Containers Type Before and After Counseling

Containers Type	Cijawura Village				Cisaranten Wetan Village			
	Pre-test		Post-test		Pre-test		Post-test	
	(+) Larvae	(-) Larvae	(+)	(-)	(+) Larvae	(-) Larvae	(+)	(-)
Tub	6	26	5	27	6	42	2	46
Drum	4	14	3	15	7	39	4	42
Crock	0	3	0	3	0	5	0	5
Bucket	18	163	6	175	12	163	6	169
Vas	0	6	1	5	0	2	0	2
Drink containers for animals	0	10	0	10	0	14	0	14
Pond	1	1	0	2	0	3	0	3
Dispenser, refrigerator and AC container	8	29	4	33	4	24	5	23
Non-water containers	0	9	0	9	0	6	0	6
Other containers	0	9	0	9	3	5	0	8
Total	**37**	**270**	**19**	**288**	**32**	**303**	**17**	**318**

Table 4. Container Index and House Index Values

Time of Health Education	Cijawura		Cisaranten Wetan	
	HI	CI	HI	CI
Before	26.7%	13.2%	28.4%	9.58%
After	18.6%	6.7%	19%	5%
p Value	0.096	0.012	0.20	0.036

Notes:
HI= House Index; CI= Container Index

as *menguras, menutup, mengubur* (3M) activity in Indonesia. Thus even before counseling, the respondents already had a sufficient level of knowledge. Mosquito-breeding sites control program itself is not something new to the community and has been widely disseminated through various information media, such as television, radio, leaflets, and posters. Based on the study by Su Wei *et al.,*[6] to Malaysian students, the information about dengue fever is gained mostly from the media information, such as te-levision, newspapers, and the internet than from the counseling. However, this one-way information delivery causes the people to only know without fully understanding how to do the 3M activity correctly. Therefore, counseling gives people the opportunity to acquire knowledge and fully understanding because the way it delivers its information uses two-directions, so residents may ask if there is any information that is not understandable when the counseling takes place.

The purpose of the counseling is not only to educate the people, but also to move the residents to carry out the advice related to their own health, in this case is to implement the program.[10] Knowledge is an important aspect in shaping a person's actions. Counseling is needed to enhance a person's knowledge, so it is expected that the counseling can also increase the community participation in implementing the mosquito breeding sites control program.

The effectiveness of mosquito breeding sites control activity carried out by the community can be measured by mosquito larvae surveys using these indicators, namely CI, HI, Breatau Index (BI).[4] The high density of larvae will increase the risk of dengue fever transmission. According to the World Health Organization (WHO), an area has a high risk of dengue fever if the value CI≥5% and HI≥10%.[11] Before the counseling, Cijawura Subdistrict's HI was 26.7% and CI was 13.2%, while in the Cisaranten Wetan Subdistrict, the HI value was 28.4% and CI was 9.58%. These conditions threaten the two subdistricts at risk of dengue transmission because both of them had CI and HI values exceeding WHO standards. Many factors can affect the high density of larvae. Based on the study by Suyasa *et al.,*[12] that examines the relation of environmental factors with the existence of dengue fever vector, the population density and mobility that affect on dengue fever, also the use of container and the rainwater channel. The neighboring system in the two subdistricts selected are not far from each other which facilitate the spread of mosquito because *Aedes* mosquitoes can only fly in about 200 meter. In addition, these two subdistricts have poor water conditions, so the residents must keep the clean water for daily use using containers and this is the factor that will increase the number of *Aedes aegypti* mosquito breeding.

After counseling, there was a decline in numbers of HI and CI, but not to the extent of minimum standards. Moreover, after conducting the test to determine whether the declines in both indicators were significant or not, the significant result was only in CI, meanwhile the HI number did not decrease significantly with a probability of 0.05. In the post-test or larvae survey, most of the houses which originally had many larvae contained less number of larvae. Even though larva is not completely found in all

containers, it was still found in one or two containers which caused the HI value not decrease significantly. There was also a container which originally had no larva, but after post-test, a number of larvae surprisingly was found. This indicates that the counseling service that was conducted only once could move the people to implement the eradication program, but not completely eradicate the larva inside the house.

The results obtained from this study is slightly different with the results of a study by Saleha Sungkar *et al*.[5] After the counseling was given to Bayah residents, both CI and HI values declined, but did not reach the minimum number of WHO standards, but both CI and HI at Bayah Village decreased even though it was insignificant (p value = 0.5 for CI and p value = 0.1 to HI).[5] This also occurred in a study by Ramadhani *et al.,*[13] in which the counseling has not been able to lower the CI and HI values to the minimum limit in Paseban Village, East Jakarta.

Based on the type of container, most larvae were found in the water containers, such as bath tub, drums and pails. Similar to the results obtained by Saleha Sungkar *et al.,*[5] mostly larvae were found in the tub, drum, and bucket. This also occurred to a study by Wanti and Darman,[14] in which most larvae found in the endemic area is in the water containers like drums and crocks. A study by Sunaryo and Pramestuti,[15] found that tubs and buckets as a major larva positive-containers at four subdistricts in Semarang City. In a study by Joharina,[16] it is argued that the tub is the key container of dengue fever vector, meaning this tub has major play as mosquito-breeding site. Finding the key container is important to determine the primary target in the vector control. Hence, the efforts such as draining and scrubbing the tub and the drum, closing the containers tightly that are parts of the eradication program become important in controling dengue vector. In this study, there was no monitoring of larva in gutters that could be a breeding ground for *Aedes aegypti* mosquitoes, especially in the rainy season which is the limitation to this study.

Another limitation was insufficient number of sample size that should be 100 respondents for 100 houses in each subdistrict due to various constraints, such as time constraint of study, manpower and facilities, also the absence of respondents to participate in the study completely. In addition, environmental factors such as climatic factors (rainfall, temperature, humidity) and the population density can affect on the existence of larva, which is also not examined in this study.

Conclusion

In conclusion, health education given to the community is able to improve level of knowledge and their participation to eradicate *Aedes aegypti* mosquito' breeding sites. This can be seen from the increasing knowledge level of citizens and declining CI in Cijawura Subdistrict, Buahbatu District and Cisaranten Wetan Subdistrict, Cinambo District. However, it has not been able to significantly reduce HI value and lower the dengue vector density to the minimum limit referring to WHO standards, so the people are still likely at high risk of the dengue transmission. The health education should be conducted in a sustainable manner and using more attractive methods, for example, by showing a video or demonstration.

Recommendation

In aim to achieve a decrease in the density and the spread of dengue vectors in the two subdistricts, the counseling should be conducted in a sustainable manner by using more attractive methods to improve knowledge and community participation. In addition, another way is by reactivating cleaning program on Fridays (*Jumat Bersih*) followed by continual survey that requires participation of residents assigned as the larvae monitor.

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Spatial Analysis of Determinants of Filariasis-Endemic Areas in West Sumatra

Analisis Spasial Faktor Determinan Area Endemik Filariasis di Sumatra Barat

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Abstract

West Pasaman District and Agam District are filariasis-endemic areas in West Sumatra with prevalence of 12.40 per 100,000 cases and 11.27 per 100,000 cases respectively. This study aimed to determine risk factors associated with the prevalence of filariasis and mapping the vulnerability of the area in West Sumatra. A case control study design was conducted in the West Pasaman District and Agam District. The study used a sample of 74 cases and 74 controls taken by simple random sampling for the case and purposive random sampling for control. Data analysis used univariate, bivariate, multivariate and spatial. The results in Agam District showed that variables associated relation with filariasis (p value < 0.05) were the level of knowledge, plantations, the paddy, the ceiling of the house. The most dominant risk factor was knowledge. Type of vector that was found was Culex. While in West Pasaman District, the variable associated with filariasis (p value < 0.05) was the use of mosquito nets, the habit of dressing, marshes, and ceiling. The most dominant risk factor was the ceiling of the house.

Keywords: Filariasis, geographic information system, risk, vulnerabilities

Abstrak

Kabupaten Pasaman Barat dan Kabupaten Agam adalah daerah endemis filariasis di Sumatra Barat dengan prevalensi masing-masing 12,40 per 100.000 kasus dan 11,27 per 100.000 kasus. Penelitian ini bertujuan untuk mengetahui faktor risiko yang terkait dengan prevalensi filariasis dan pemetaan kerentanan daerah di Sumatra Barat. Desain studi kasus kontrol dilakukan di Pasaman Barat dan Agam. Penelitian ini menggunakan sampel dari 74 kasus dan 74 kontrol, diambil secara *simple random sampling* untuk kasus dan *purposive random sampling* untuk kontrol. Analisis data menggunakan univariat, bivariat, multivariat dan spasial. Hasil penelitian di Kabupaten Agam menunjukkan bahwa variabel yang berhubungan dengan filariasis (nilai p < 0,05) adalah tingkat pengetahuan, perkebunan, padi, plafon rumah. Faktor risiko yang paling dominan adalah pengetahuan. Jenis vektor yang ditemukan adalah *Culex*. Sedangkan di Kabupaten Pasaman Barat, variabel hubungan dengan filariasis (nilai p < 0,05) adalah penggunaan kelambu, kebiasaan berpakaian, rawa-rawa, plafon rumah. Faktor risiko yang paling dominan adalah plafon rumah.

Kata kunci: Filariasis, *geographic information system*, risiko, kerentanan

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Introduction

Filariasis has become a global public health problem in accordance with the resolution of the World Health Assembly (WHA) in 1997. Filariasis elimination program in Indonesia starts in 2002. To achieve elimination, two pillars are set to be implemented in Indonesia that are cutting off the transmission by prevention with filariasis mass drug administration in endemic areas, and preventing and limiting disabilities due to filariasis.[1]

Indonesia is a filariasis-endemic country. Filariasis spread across Indonesia, especially eastern Indonesia which have a higher prevalence. From year to year, several provinces report the increase in filariasis cases. The number of filariasis cases in 2000 was 6,233 cases, but it highly increased in 2009 as many as 11,914 cases. While the numbers of filariasis incidence in Indonesia in 2010, 2011, 2012 were 11,969, 12,066 and 11,903 cases respectively.[2]

Distribution of the spread of filariasis cases in Indonesia covers almost all provinces, including West Sumatra Province. West Sumatra Province is a filariasis-endemic area that ranked the eleventh highest filariasis cases in 2013 with the number of 225 cases spreading across many districts and cities. Of districts and cities in West Sumatra, West Pasaman District and Agam District have high prevalence of 12.40 per 100,000 and 11.27 per 100,000 respectively.[3]

West Pasaman District is a filariasis-endemic area which has 49 filariasis cases with the highest prevalence of filariasis in West Sumatra that is 12.40 in 2014 and followed by Agam district that is 11.27.[3]

West Pasaman District declared as filariasis-endemic area in West Sumatra since the finding of chronic filariasis patients containing microfilariae in the blood tests clinically finger. People with filariasis distribution were found in five subdistricts of West Pasaman District, such as Kinali Subdistrict, Okanagan Melintang Subdistrict, Pasisia Sasak Subdistrict, Sei. Aur Subdistrict and Batahan Subdistrict. The population of West Pasaman in 2013 is as many as 395,098 inhabitants spreading across 11 districts with the environment of mountains, beaches, swamps, plantations and rice fields. Most of the residents livelihoods are agriculture, farming, fishing, and trade. There are several habits of the population, such as watching television together outside the house, sitting in the stalls along the night.[4]

Based on the report by Agam District Health Office in 2014, there were 58 cases of filariasis in Agam district District. The case was spread across seven districts, namely the Tanjung Mutiara Subdistrict (34 persons), Lubuk Basung Subdistrict (12 persons), IV Nagari Subdistrict (6 persons), Palembayan Subdistrict (1 person), Malalak Subdistrict (1 person), Palupuh Subdistrict (1 person), and Tilkam Subdistrict (3 persons).[4]

There are some people's behaviors there, such as some local decision makers have not realized the economic losses due to filariasis and not prioritized activities of mass intervention. The notion of some people that the disease is caused by curse, so they do not need to be treated by health workers but people turn to shamans; lack of community participation in the examination and blood sampling at night; side effects of intervention that the community does not want to continue intervention completely; lack of community participation in preventing filariasis, for example by avoiding themselves from mosquito bites, eliminating mosquito breeding places and going to the health care if any signs of filariasis; the distance where people living far from the clinic so it requires people to come to the clinic by transportation with a quite expensive cost.[3]

There are many risk factors that could cause filariasis. These factors may come from host (host/human), agent (filaria worms) and the environment (environment). One of the trigger factors derived from hosts is individual habits in maintaining animal reservoir which mediates the spread of filariasis and the habit of going out of the house at night. Environmental factors are also the risk factor for the work and activities of individuals that cannot be separated from their interaction with the surrounding environment. The environment is around individuals both inside and outside the home of individuals, such as physical environment inside and outside the home and surrounding biological environment in individual homes. The physical environment including the use of wire netting, temperature, presence of swamps, ponds, rice fields, and bushes. Biological environment consists of the existence of aquatic plants such as water hyacinth and the existence of predator animals that are enemies namely mosquitoes, tilapia fish, catfish, fish heads and tin.[2]

Mapping the distribution of the disease epidemiologically is important, especially mapping the spread of infectious diseases. Using spatial analysis is not only to determine the pattern of disease distribution, high-risk areas and risk factors in terms of area, but to find the cause or source of disease transmission, so that efforts to control the disease and the termination of the chain can be done properly. However, unfortunately, filariasis study with study spatial analysis has not been done, especially in Indonesia. Distribution of the existence of the location and the patterns of spread of filariasis in West Sumatra Province was not known certainly, therefore authors are interested to conduct further study by using spatial analysis (Geographic Information System/GIS) on risk factors of filariasis in West Sumatra Province.[5]

The purpose of this study was to determine the risk factors associated with the prevalence of filariasis and implement the use of GIS for mapping the vulnerability

of the area in West Sumatra Province.

Method

The study design was case control study. The study location of study is in West Pasaman District and Agam Districts. The population in this study was patients with filariasis and positive microfilaria in the blood of a finger based on examination results and clinical symptoms of the data of Padang City Health Office. This study used a sample of 74 cases (Agam district with 36 cases and West Pasaman District with 38 cases) and 74 controls (Agam District with 36 controls and West Pasaman District with 38 controls) with a total of 148 samples, matched by age and sex. This study applied simple random sampling technique for the case and purposive random sampling for control. Data analysis used were univariate, bivariate, and multivariate analysis of the vulnerability of the area with spatial.

Results

Based on the results in Agam District, relation between filariasis and the level of knowledge obtained p value = 0.004 (OR = 4.25, 95% CI: 1.43-12.63), plantations with p value = 0,002 (OR = 4.00, 95% CI: 1.50-10.65), paddy with p value = 0.003 (OR = 4.25, 95% CI: 1.59-11.31), and the ceiling of the house with p value = 0.001 (OR = 4.75, 95% CI: 1.62-13.96). The most dominant risk factor was knowledge with p value = 0.001 (OR 8.74 95% CI: 2.24-34.03).

The study results in West Pasaman District showed the use of mosquito nets with p value = 0.033 (OR = 2.667, 95% CI: 1.04-6.81), the habit of dressing with p value = 0.019 (OR = 3, 5, 95% CI: 1.15-10.63), marshes with p value = 0.003 (OR = 11.00 95% CI: 1.42-85.20), and the ceiling of the house with p value = 0.035 (OR = 3.67, 95% CI: 1.02-13.14). The most dominant risk factor was home ceiling with p value = 0.021 (OR = 5.12, 95% CI: 1.27-20.47).

Discussion

Study in Agam District found a significant association between level of education and the prevalence of filariasis in Agam District (p value = 0.013). The statistical calculation of 4:52 obtained odds ratio (95% CI 1:17-21:08). It can be concluded that the respondents with low education levels were at risk of infection with filariasis 4:52 times than respondents with higher levels of education. The level of education was a risk factor for the prevalence of filariasis in Agam District.

Results of interviews on the ground prove that most respondents were elderly, and if traced, these respondents did not complete primary school and some of them never went to school (36.11%) due to geographical and environmental factors, economic constraints, and the inequal development of schools in each area, so the distance between a residence with a school is so far away. In accordance with the concept of health education stating that education is also a learning process at the individual, group or community of those who do not know about the health values become aware, who are not able to over-

Table 1. Distribution of Frequency in Agam District

Variable	Category	Case		Control		Total	
		f	%	f	%	f	%
Socioeconomic factors							
Education	Low	29	78	25	67	54	74
	High	7	22	11	33	18	26
Knowledge	Low	30	83.33	27	75	57	79.17
	High	6	16.67	9	25	15	20.83
Community behavioral factors							
The habit of going out at night	Yes	28	77.78	27	75	55	76.39
	No	8	22.22	9	25	17	23.61
The use of mosquito nets	Not use	21	58.33	19	52.78	40	55.56
	Use	15	41.67	17	47.22	32	44.44
The use of mosquito repellent	Not use	21	58.33	20	55.56	41	56.94
	Use	15	41.67	16	44.44	31	43.06
The maintenance of animal reservoir	Yes	27	75	25	69.44	52	72.22
	No	9	25	11	30.56	20	27.78
Environmental factors							
The rice fields	≤ 500 meter	14	38.89	16	44.44	30	41.67
	> 500 meter	22	61.11	20	55.56	42	58.33
The rivers	≤ 500 meter	28	77.78	14	38.89	42	58.33
	> 500 meter	8	22.22	22	61.11	30	41.67
The plantation	≤ 500 meter	26	72.22	5	13.89	31	43.06
	> 500 meter	10	27.78	31	86.11	41	56.94
The beach	≤ 500 meter	12	33.33	8	22.22	20	27.78
	> 500 meter	24	66.67	28	77.78	62	72.22

Tabel 2. Distribution of Frequency in West Sumatra

Variable	Category	Case		Control		Total	
		f	%	f	%	f	%
Socioeconomic factors							
Education	Low	37	97.37	35	92.11	72	94.74
	High	1	2.63	3	7.89	4	5.26
Knowledge	Low	20	52.63	19	50.00	39	51.32
	High	18	47.37	19	50.00	37	48.68b
Community behavioral factors							
The habit of going out at night	Yes	30	78.95	30	78.95	60	78.95
	No	8	21.05	8	21.05	16	21.05
The use of mosquito nets	Not use	27	71.05	17	44.74	44	57.89
	Use	11	28.95	21	55.26	32	42.11
The use of mosquito repellent	Not use	13	34.21	12	31.58	25	32.89
	Use	25	65.79	26	68.42	51	67.11
The maintenance of animal reservoir	Yes	21	55.26	19	50.00	40	52.63
	No	17	44.74	19	50.00	36	47.37
Environmental factors							
The rice fields	≤ 500 meter	10	26.32	9	23.68	19	25.00
	> 500 meter	28	73.68	29	76.32	57	75.00
The rivers	≤ 500 meter	26	68.42	25	65.79	51	67.11
	> 500 meter	12	31.58	13	34.21	25	32.89
The plantation	≤ 500 meter	22	57.89	20	52.63	42	55.26
	> 500 meter	16	42.11	18	47.37	34	44.74
The beach	≤ 500 meter	8	21.05	7	18.42	15	19.74
	> 500 meter	30	78.95	31	81.58	61	80.26

Table 3. Statistical Test Results of Bivariate Analysis

Variable	Category	OR		(95 % CI)	
		Agam	West Pasaman	Agam	West Pasaman
Socioeconomic factors	Education	4.52	3	1.17 – 21.08	0.31 – 28.48
	Knowledge	4.14	1.09	1.30 – 13.94	0.48 – 2.47
Community behavioral factors	The habits of going out at night	3.75	1.00	1.24 – 11.62	0.33 – 3.11
	The use of mosquito nets	1.17	2.667	0.34 – 4.04	1.04 – 6.81
	The use of mosquito repellent	0.49	1.13	0.17 – 1.43	0.43 – 2.94
	The maintenance of animal reservoir	3.57	1.18	1.22 – 10.66	0.53 – 2,64
Environmental factors	The rice fields	0.21	2.00	0.07 – 0.65	0.18 – 22.06
	The rivers	1.13	1.33	0.39 – 3.26	0.30 – 5.96
	The plantation	19.46	3.00	4.51 – 112.71	0.31 – 28.84
	The beach	-	2.00	3.92 - 18.35	0.18 – 22.05

come their health problems become capable, etc. The level of a person's education will influence the type of work and health behaviors for preventive action against the transmission of filariasis.

Results of statistical analysis to the variable level of knowledge acquired p value = 0.007, which means there was a significant relation between the level of knowledge and the prevalence of filariasis in Agam District. Statistical test results found the value of 4:14 odds ratio (95% CI: 1.30 - 13.94), thus it can be concluded that respondents with a low level of knowledge were at risk of infection with filariasis 4:14 times than respondents with higher level of knowledge. The level of knowledge is a risk factor of filariasis prevalence in Agam District.

Ardias *et al,*[5] found different results where there was no significant relation between the level of knowledge and the prevalence of filariasis in Sambas District, while Uloli,[6] found a significant relation between the levels of knowledge and the prevalence of filariasis in Bone Bolango District. Filariasis transmission are linked to socio-cultural aspects, including knowledge, beliefs, attitudes, and habits of the people.

Knowledge is the result of knowing what happens after someone did sensing to a particular object. Sensing occurs through human senses the senses of sight, hearing, smell, taste, and touch. However, most of the dominant sensory functions are the eyes and ears, or cognitive domain knowledge is very important in shaping a person's actions and behavior. Thus the knowledge of someone will affect on their behavior in daily life.[7]

The results of statistical tests found that the level of knowledge in West Pasaman District obtained p value >

0.05 (p value = 0.084), which means there was no significant relation between knowledge and the prevalence of filariasis in West Pasaman District. This is not in accordance with the results obtained in Agam District stating that there was a significant relation between the levels of knowledge and the prevalence of filariasis.

It was observed during the study that a lack of knowledge of respondents did not escape from the low education level of respondents who generally were elderly. Despite having low level of knowledge, respondent were not infected by filariasis because influenced by environmental factors or other measures, such as using wire/netting and their home away from marshes. This resulted in no significant correlation between the levels of knowledge and the prevalence of filariasis premises.

The results of interviews with respondents showed that respondents who had a low level of knowledge about the disease filariasis do not know, how it is transmitted, causes, clinical symptoms, prevention and intervention of the disease filariasis. Information about filariasis rarely received by the public through print and electronic media or health worker. Knowledge of the vectors of filariasis is very important as supporting the successful efforts of the transmission chain termination and eradication of filariasis.[8]

Statistical test results for the behavior of respondents going out at night note that there was a significant relation between the habit of respondents going out at night with the prevalence of filariasis in Agam District (p value = 0.008). By the unknown value odds ratio of 3.75 (95% CI 1:24 - 11.62), it can be concluded that the respondents with the habit of going out at night the risk of infection with filariasis 3.75 times compared to respondents who did not have a habit of going out at night. Habit of going out at night there was a risk factor for the prevalence of filariasis in Agam District. Habits of respondents to go out of the house at night will increase the risk of prevalence of filariasis where the same time mosquitoes are also active search for prey. Based on biting time, it is known that some types of mosquitoes such as *Anopheles*, *Culex sp* and *Mansonia sp* has biting activity in the early evening, after sunset until sunrise, except for *Aedes sp* that have a habit of biting (biting behavior) at noon.

This is in accordance with the conditions of the people in the field which mostly have jobs as farmers, oil palm plantation workers and fishermen who require long night. The habit to be outside the home until late night, in which the vectors are exophillic and exophagic, will make it easier to get mosquito bites.[6,9]

The results showed that the majority of respondents in both groups together have habit of going out at night, which was a tradition in the community. This resulted in no significant correlation between such habit with the prevalence of filariasis.

The use of mosquito nets while sleeping is one of the preventive measures to prevent contact with mosquitoes that have a habit of biting or sucking the blood in the house (Endophagik). The impact of some diseases that are transmitted through mosquito vectors such as filariasis, malaria, and dengue hemorrhagic fever (DHF) can be minimized through the use of mosquito nets while sleeping so it can reduce the prevalence/morbidity.[8] Study in Agam District found that no significant relation exists between the habit of wearing a mosquito net and the prevalence of filariasis in Agam District (p value = 0.781).

Results of the study found by Nasrin,[10] that there is no significant relation between the habits of wearing a mosquito net with the prevalence of filariasis (p value > 0.05). Behavior or habits of respondents did not use mosquito nets while sleeping due to various reasons such as feeling sick (hot) and not practical. Besides, the behavior of habit occurred due to economic reasons in which the poor cannot afford to buy insecticide-treated mosquito nets. Meanwhile, local governments and related agencies have not run a program to provide insecticide-treated nets, especially for people in endemic areas with low economic class. Insecticide-treated nets (long-lasting insecticide nets) is a mosquito net that has been coated with anti-mosquito netting by the manufacturer. Mosquito nets are not harmful to human health because of the anti-mosquito nets attached cannot poison people. Insecticide-treated nets aim to protect the public, especially infants, toddlers and pregnant women are particularly vulnerable to diseases resulting from mosquito bites transmitters.[10]

Results of statistical test bed nets in West Pasaman District obtained p value <0.05 (p value = 0.033), meaning that there was a significant association between the use of mosquito nets bedtime with the prevalence of filariasis. The use of mosquito nets is an attempt to prevent contact with mosquitoes. Mosquito net of any type that is used by the respondent at the time of sleep remain an important effort in order to prevent transmission of disease filariasis, but the use of mosquito nets would be meaningless if it is not followed by the regular use by a person.

The use of mosquito repellent is one safeguard to avoid mosquito bites. Anti-mosquito chemical is used to repel mosquitoes (repellent) as a topical medication anti-mosquito and kills mosquitoes as mosquito coils, electric and spray. The use of mosquito repellent in the morning and evening can prevent mosquito bites as filariasis vectors. Based on the statistical test, there was no significant relation between the habit of using anti-mosquito with the prevalence of filariasis in Agam District (p value = 0.147) odds ratio of 12.49 (95% CI: 0.17-1.43).

Statistical test results in West Pasaman District also obtained p value > 0.05 (p value = 0.808), which means there was no significant relation between the habit of using mosquito repellent with the prevalence of filariasis. Thus it can be concluded that the respondents who had a habit of using mosquito repellent were infected by filariasis 0.49 times riskier than respondents who did not have the habit of using mosquito repellent. Study conducted by Nasrin,[10] found different results where there was a significant correlation between the habit of using repellent and the prevalence of filariasis (p value < 0.05).

In general, respondents had already used mosquito repellent, but keep in mind the level of resistance of the mosquito vector-borne diseases such as filariasis. In addition to the habits of the people with frequent activity at night, the use of mosquito would be useless because the chances of getting mosquito bites remain.

The statistical test found that there was a significant relation between the habit of keeping animal reservoir with the prevalence of filariasis in Agam District (p value = 0.009) and the value of 3.57 odds ratio (95% CI: 1.22 - 10.66). Thus it can be concluded that the respondents who had a habit of keeping animals at risk of infection reservoir filariasis were 3.57 times than respondents who did not have the habit of keeping animals reservoir. Keeping an animal reservoir habits is risk factor for the prevalence of filariasis in Agam district District. This is because the people living around the plantation area have a habit of keeping cats and dogs as pets to keep plantations from pests such as wild pigs and rats. Thus the pets are likely to already get infected with filariasis because they often get in contact with mosquitoes and can be suspected as an animal reservoir for transmission of filariasis. Uloli states that the custom cats had a significant relation to the occurrence of filariasis while study by Son expressed a different result.[9]

The existence of breeding place (mosquito breeding places) such as rice fields, rivers, and coastal plantation is a cause of transmission of filariasis for the environment as it is very suitable for living place of mosquitoes. Statistical test results found that there was a significant correlation between the presence of the field and the prevalence of filariasis in Agam District (p value = 0.002). From the statistical calculation obtained odds ratio of 12:21 (95% CI 0.7 - 0.65), it can be concluded that the respondents living near the fields (≤ 200 meters) had risk of infection with filariasis 0:21 times than respondents not living near the fields. The existence of the fields near (≤ 200 meters) where the respondent live was a protective factor for the prevalence of filariasis in Agam District. Maryen,[11] states that the residential neighborhood within ≤ 200 meters from the fields signi-ficantly related to the prevalence of filariasis in Manokwari (p value = 0.004). Variables with plantations obtained p value = 0.000 which means there was a significant correlation between the existence of plantations with the prevalence of filariasis in Agam District. Based on the results of statistical tests found value odds ratio of 19:46 (95% CI: 4:51 - 112.71), thus it can be concluded that the respondents living near the source (≤ 200 meters) risk of infection with filariasis 19:46 times than respondents not li-ving close to plantation. Similar results were found by Sulistiowati with plantations as mosquito-breeding sites in the prevalence of malaria.[12]

The results of statistical tests in West Pasaman District obtained of p value > 0.05 (p value = 0.375), meaning that there is no significant correlation between the presence of gardens ≤ 500 meters with the prevalence of filariasis. Most gardens cultivated by people in the study area are forest in the hills around the house residents. These conditions should lead to a high potential for contact between mosquitoes as vectors of filariasis with the community, but this is not entirely the case study areas.

Based on observations, most gardens are oil palm plantation belonging to a company that is always cleaned, so that mosquitoes are not so much resting and breeding in the garden. People who have house near the botanic garden also use wire netting while sleeping. This resulted in no significant correlation between the existence of plantations and the prevalence of filariasis.

The existence of garden near (≤ 200 meters) to the residence of respondents was the risk factor for the prevalence of filariasis in Agam District. Most cases of filariasis were in the neighborhood palm oil, since it relates to the respondents working as farmers and oil palm plantation workers that are managed by private parties. So that, people who reside in the oil palm plantations in the transmission of filariasis, especially vulnerable people with a habit to be outside the home until late night, in which the vectors are exophillic and exophagic, will easily get a mosquito bites.

Variable in which the beach obtained p value < 0.05 means that there was a significant correlation between the presence of the beach and the prevalence of filariasis in Agam District. Based on the results of statistical tests, odds ratio cannot be found for the control group, nothing was close to the beach, so there was no comparison between the case group and control group to get a high risk.

Statistical test results obtained p value > 0.05 (p value = 0.625), meaning that there was no significant correlation between the presence of shore ≤ 500 meters and the prevalence of filariasis in West Pasaman District. Residents who used to work as fishermen chose to build house near the beach. During the study, there were many people who had residence close to the beach, but not infected by filariasis as influenced by environmental factors

or other measures, such as using chicken wire and their home away from marshes. This resulted in no significant correlation between the presence of the beach and the prevalence of filariasis.[13]

Based on conditional logistic regression analysis, the variables that have a major influence (p value <0.05) in the prevalence of filariasis in Agam District was existence of plantations (p value < 0.05, OR = 19:46). Variables with plantations in the final multivariate model obtained p value < 0.05, OR = 19:46 and regression coefficient = 2.97. This means that the statistic showed that there was a significant association between the presence of plantations and the prevalence of filariasis in Agam District. Thus it can be concluded that the respondents living near the source (≤ 200 meters) had risk of infection with filariasis 19:46 times than respondents who did not live near the source.

Multivariate analysis in West Pasaman District found a significant independent variable contributing to the prevalence of filariasis, namely ceiling of the house with p value of 0.021. The statistical test calculations obtained OR = 5.12 (95% CI: 1.279 - 20.470). This means that respondents who did not have the ceiling of the house would be at risk of filariasis by 5.12 times compared to respondents who had the ceiling of the house. Thus the most dominant factor at risk to the prevalence of filariasis in West Pasaman District in 2014 was ceiling of the house.

Geographic Information System can help in determining the level of vulnerability of the region and identify the clustering of filariasis incidence. Determination of the vulnerability zone filariasis aims to identify areas of high risk and do intervene proactively on risk factors, such as the environmental and behavioral interventions. This is pursued through a strategy-based communicable disease control area by eliminating a source of transmission of the disease and the treatment of those already infected.[5, 14, 15]

The vulnerability zone information was obtained from the use of GIS to map the land use overlay techniques and topographic maps of Agam District. Overlay of spatial yield information about zones or areas that have vulnerabilities among which Districts of Tanjung Mutiara, Lubuk Cone, IV Nagari, Palembayan, Palupuh, Baso and IV Koto. Thus the areas that has the vulnerability are expected to get more attention from the parties involved in efforts to control and terminate of the chain of transmission of filariasis.

Spatially in West Pasaman District, it is known that the distribution of filariasis prevalence contained in 9 out of 11 districts. The spread of filariasis prevalence was generally found in the river, in the bush, plantations, swamps. Most artifacts showed the spread of filariasis in Sungai Aur.

Risk factors of filariasis in Agam District was the level of knowledge, while in West Pasaman District was the use ceiling of the house. Grouping (clustering) of filariasis prevalence in Agam District was in areas of Subang-Subang and Muaro Putuih, and grouping of cases that was in area of Sungai Aur, namely Nagari Nagari Air Haji and Binjai, as well as parts of the Valley Crossing.

Conclusion

The dominant risk factor of filarias incidence in Agam District is the level of knowledge, while in West Pasaman District it is the use of the house ceiling. Grouping (clustering) of filariasis incidence in Agam District is in areas of Subang-Subang and Muaro Putuih, and grouping of cases is in the area of Sungai Aur, namely Nagari Air Haji and Binjai, as well as parts of the Valley Crossing. Education about filariasis vector control program and an integrated environment need to be implemented and improved.

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Maternal Energy Intake at the Sixth Month as Dominant Factor of Exclusive Breastfeeding Success

Konsumsi Energi Ibu Bulan Keenam sebagai Faktor Dominan Keberhasilan ASI Eksklusif

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Abstract

Breastfeeding mothers needed adequate energy intake to provide 6-month exclusive breastfeeding that is necessary for infant growth and development. This study aimed to investigate real intake at the first and sixth month of breastfeeding and determine the dominant factor affecting 6-month exclusive breastfeeding provision. The design of this study was cross-sectional conducted in March-April 2015 among 109 mothers with 6-12-month-old infant living and registered at integrated health care in Kalangan Primary Health Care area. Data were collected through interview using questionnaires. Breastfeeding mothers' intake was asked using Semi-Quantitative Food Frequency Questionnaire. The study found that 6-month exclusive breastfeeding proportion was 22.9%. Mean energy intake of breastfeeding mothers declined from 2551 kcal/day in the first month of breastfeeding to 1718 kcal/day in the sixth month of breastfeeding. After controlled by other variables, energy intake in the sixth month of breastfeeding was found to be the most dominant factor affecting 6-month exclusive breastfeeding provision. Mothers with low energy intake at the sixth month of breastfeeding period were likely 9 times more to fail in providing 6-month exclusive breastfeeding compared to those with adequate energy intake.

Keywords: Exclusive breastfeeding, energy intake

Abstrak

Ibu menyusui memerlukan konsumsi energi yang cukup selama menyusui untuk bisa memberikan ASI eksklusif 6 bulan yang dibutuhkan untuk pertumbuhan dan perkembangan bayi. Penelitian ini bertujuan mengetahui besar konsumsi energi ibu menyusui pada bulan pertama dan bulan keenam menyusui serta faktor dominan yang berhubungan dengan pemberian ASI eksklusif 6 bulan. Penelitian dengan desain potong lintang ini dilaksanakan Maret-April 2015 pada 109 ibu yang memiliki bayi berusia 6-12 bulan yang terdaftar di posyandu dan bermukim di wilayah kerja Puskesmas Kalangan. Data dikumpulkan melalui wawancara langsung dengan menggunakan kuesioner. Data konsumsi energi ibu menyusui diperoleh menggunakan *Food Frequency Questionnaire* semi kuantitatif. Persentase pemberian ASI eksklusif di wilayah kerja Puskesmas Kalangan sebesar 22,9%. Rata-rata konsumsi energi ibu menyusui menurun dari 2551 kkal/hari pada bulan pertama menjadi 1718 kkal/hari pada bulan keenam. Konsumsi energi bulan keenam merupakan faktor dominan pemberian ASI eksklusif 6 bulan (OR=8,9) setelah dikontrol variabel lainnya. Artinya, ibu dengan konsumsi energi rendah pada bulan keenam memiliki risiko 9 kali lebih besar tidak dapat memberikan ASI eksklusif 6 bulan dibandingkan dengan ibu yang konsumsi energinya cukup pada bulan keenam.

Kata kunci: ASI eksklusif, konsumsi energi

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Introduction

In the world, out of 136 million infants born every year, 92 million infants do not receive breast milk optimally. World Health Organization and United Nation Children's Fund recommend the optimum breastfeeding i.e. first, early initiation of breastfeeding within one hour of birth; second, exclusive breastfeeding within the first six months of life (6-month exclusive breastfeeding); third, appropriate timing for complementary feeding after 6 months of age; fourth, continued breastfeeding up to two years of age.[1,2]

Survey shows that in Indonesia, coverage of 6-month exclusive breastfeeding is still under the determined target (50%).[3] Reports of Provincial Health Office all over Indonesia show that North Sumatera is at bottom five group in achievement of exclusive breastfeeding 0-6 months, only at 41.3%.[5] According to Health Profile of North Sumatera Province in 2012, the achievement of exclusive breastfeeding since 2004-2012 tend to significantly decrease. The achievement of exclusive breastfeeding coverage in 2012 was the lowest achievement by 20.3%. Furthermore, 8 of 33 districts/cities in North Sumatera achieve exclusive breastfeeding by 0% and one of them is Central Tapanuli District.[5]

Nutrition of breastfeeding mothers closely related to breast milk production. Breastfeeding mothers need balanced and adequate nutritional intake to meet the needs of energy, protein, fat, and other nutrients as well as water. Nutrition recommendation for breastfeeding mothers is larger than for pregnant mothers.[6] Recently, most pregnant mothers already have the awareness of the importance of maintaining healthy pregnancy by completing nutritional needs. However, after giving birth, there are many mothers who immediately reduce and even limit food, so the nutritional intake is decreasing if compared to the time of pregnancy.[7]

Most mothers still often ignore the energy intake during breastfeeding, so energy consumption of breastfeeding mothers becomes lower than energy consumption of pregnant mothers. A study among groups of vegetarian and non-vegetarian mothers in five big cities in Indonesia showed that the energy intake of mothers during breastfeeding is lower significantly than during pregnancy.[8] The low energy intake of vegetarian mothers affects the lower weight of mothers significantly in six months after exclusive breastfeeding compared to the non-vegetarian mothers, yet it does not affect their infants.[9] Study reported that breastfeeding mothers require higher energy consumption, since the amount of energy consumption affects quality and quantity of breastmilk production.[10]

A qualitative study in Jakarta and Depok reported that causes of the low energy intake of breastfeeding mothers including the lack of knowledge and attitude regarding the high nutritional needs during breastfeeding, bustle of mothers about taking care of their infants so mothers feel tired to cook and eat, a reduction in milk and supplement consumptions, avoided food, and minimum information from health officers regarding nutritional needs for breastfeeding mothers.[11] In Africa, the success of exclusive breastfeeding related to the number of family members. Extended families were found to be more successful in exclusive breastfeeding.[12] Moreover, any difficulties occur in early period of breastfeeding. A study also shows that energy intake of mothers decreases during breastfeeding period as shown by significant differences between maternal energy intake in the first month and in the sixth month.[8,13]

This study aimed to determine proportion of 6-month exclusive breastfeeding, the amount of energy intake of breastfeeding mothers in the early exclusive breastfeeding (the first month) and the late exclusive breastfeeding (the sixth month), and the dominant factor related to 6-month exclusive breastfeeding in the working area of Kalangan Primary Health Care, Central Tapanuli District, North Sumatera Province. Exclusive breastfeeding achievement of North Sumatra Province since 2004-2012 tends to decline significantly and the lowest achievement of exclusive breastfeeding is in 2012 at 20.33%. Kalangan Primary Health Care in Central Tapanuli District is one of the district's area with 0% exclusive breastfeeding achievements in 2012.

Method

Study with cross-sectional design was conducted in March-April 2015 in the working area of Kalangan Primary Health Care, Central Tapanuli District, North Sumatera Province. The population was all mothers who had infants aged older than 6-12 months were registered in integrated health care and living in working area of Kalangan Primary Health Care. The sample were 109 mothers-infants. Data were collected through direct interview to respondents by questionnaire. There were two data collectors from Kalangan Primary Health Care.

The dependent variable in this study was provision of exclusive breastfeeding to six months, while the main independent variable was the energy intake of breastfeeding mothers. The operational definition of exclusive breastfeeding to six months is that infants receive only breast milk for six months, no other foods or drinks were given, except medicines.[1,14] Meanwhile, predominant breastfeeding means breast milk as the major source of infant's food, but in addition to breast milk, the infant also receives water and water-based drinks (sweet and natural taste, tea, infusion, etc), fruit juice; oral rehydration solutions (ORS), drops and syrups (vitamin, mineral and medicines), and ritual fluids in limited amount.[1] In this area, 6-month exclusive breastfeeding, as defined by WHO, is very difficult to find because of unsupportive lo-

Table 1. Variable Distribution of Exclusive Breastfeeding, Energy Intake, and Confounding Variables

Variable	Category	n	%
Exclusive breastfeeding	No	84	77.1
	Yes	25	22.9
Energy intake of the first month of breastfeeding	Less (<2100 kcal)	50	45.9
	Enough (≥2100 kcal)	59	54.1
Energy intake of the sixth month of breasfeeding	Less (<2100 kcal)	83	76.1
	Enough (≥2100 kcal)	26	23.9
Mothers'education level	Low (primary and junior high)	66	60.6
	High (senior high and university)	43	39.4
Parity	Primiparous	20	18.3
	Multiparous	89	81.7
Mothers' occupation	Working	24	22.0
	Not working	85	78.0
Knowledge of breastfeeding	Low (< 75% correct answer)	87	79.8
	High (>75% correct answer)	22	20.2
Attitude	Negative (≤ mean)	10	9.2
	Positive (> mean)	99	90.8
ANC status	Not according to ANC standard ANC	51	46.8
	ANC standard	58	53.2
IMD status	No IMD	109	100.0
	IMD	0	0.0
Exposed samples of formula	Yes	3	2.8
	No	106	97.2
Skill of breasfeeding technique	Difficult breastfeeding	71	65.1
	Good breastfeeding	38	34.9
Husband's support	Not support	71	65.1
	Support	38	34.9
Health workers' support	Not support	61	56.0
	Support	48	44.0

Notes:
n= Number of sample

cal culture, such as the culture of providing prelacteal feeds. Study shows that predominant breastfeeding is not different with exclusive breastfeeding in relation to risk of infant death.[15]

Data of breastfeeding mothers' energy intake were obtained from direct interview by using FFQ semi-quantitative to breastfeeding mothers. Data were obtained by measuring breastfeeding mother once in the first month and once in the sixth month post-partum. The energy intake of breastfeeding mothers was classified into two categories, namely less energy intake (< 2100 kcal) and sufficient energy intake (≥ 2100 kcal).[8] The obtained data used univariate, bivariate, and multivariate analysis. Bivariate analysis used chi-square analyisis and multivariate analysis used multiple logistic regression test.

Results

Proportion of exclusive breastfeeding in working area of Kalangan Primary Health Care, Central Tapanuli District in 2015 was only 22.9%. Proportion of sufficient energy intake in the first month was 54.1% and the sufficient energy intake in the sixth month decreased to 23.9% (Table 1). Breastfeeding mother respondents generally had low level of education (elementary and junior high school) (60.6%), poor knowledge (79.8%), unemployed (78.0%) and had more than one child (81.7%).

Table 2. The Average of Energy Intake

Periode of Intake	n	Mean	SD	Min-max	p Value
First month	109	2551	1247.5	633-6779	0.000
Sixth month		1718	936.8	375-5207	

Notes:
SD = Standard Deviation

None of the mothers took early initiation of breastfeeding, also supports from husbands and health officers were relatively low (less than 50%). However, most mothers had a positive attitude (90.8%) and mothers almost never got exposed to formula milk advertising (97.2%) (Table 1).

The average energy intake of breastfeeding mothers in the first month was 2551 kcal and 1718 kcal in the sixth month. The difference of mean value between the first and the sixth month was quite large at 833 kcal. The result of statistical test showed that there was significant difference of breastfeeding mothers' energy intake in the first and in the sixth month (Table 2).

The results of multivariate analysis showed that the dominant variable significantly related to 6-month exclusive breastfeeding was energy intake in the sixth month after controlled with other variables. Odds ratio value of energy intake of breastfeeding mothers in the sixth month

Table 3. Multivariate Analysis Result

Variable	β	SE	p Value	OR	95% CI
Energy intake of the first month	-1.219	0.717	0.089	0.30	0.07-1.21
Energy Intake of the sixth month	2.197	0.726	0.002	9.00	2.17-37.35
Education level	-1.734	0.752	0.021	0.18	0.04-0.77
Knowledge	2.017	0.783	0.010	7.51	1.62-34.85
Husband support	0.672	0.651	0.302	1.96	0.55-7.02
Occupotional	-0.737	0.644	0.252	0.48	0.14-1.69
Health workers support	1.106	0.569	0.052	3.02	0.99-9.21

Notes:
SE= Standard Error; OR= Odds Ratio

was 9.0 (95% CI: 2.2 – 37.4) which means that breastfeeding mothers who received less energy intake in the sixth month were 9 times higher at risk not to breastfeed exclusively to six months compared to breastfeeding mothers who received sufficient energy intake in the sixth month (Table 3).

Discussion

In accordance with data on the extent of exclusive breastfeeding from the Health Profile of North Sumatera Province, this study showed that exclusive breastfeeding prevalence in the working area of Kalangan Primary Health Care, Central Tapanuli District was low, only at 22.9%. Most mothers did not breastfeed exclusively. Low exclusive breastfeeding in this area may be caused by low education, knowledge, socio-economic status and less support from family and community. Inappropriate marketing of formula milk is considered detrimental to mothers' perception of exclusive breastfeeding and so it would be expected to decrease rates of exclusive breastfeeding to six months.

This study found that the average energy intake of breastfeeding mothers decreased from 2551 kcal/day in the first month to 1718 kcal/day in the sixth month. This result was in line with a previous study which showed that energy intake of breastfeeding mothers decreased continuously throughout the breastfeeding period.[8,13] These levels did not fully meet the recommendation from the Nutrient Adequacy Ratio in Indonesia that energy intake of breastfeeding mothers should increase from +330 kcal/day for the first six months of life to +400 kcal/day for the next six months though in the first month is adequate. The intake in the first month is adequate but not for the sixth months' intake.

It is important that mothers provide sufficient breastmilk to support the rapid growth of infants. Reduced energy intake may decrease the ability of mothers to breast-feed exclusively.[13] In less developed areas, many mothers suffer from chronic energy deficiency of exclusive breastfeeding with inadequate quantity and quality of breast milk, which affects the infant's nutritional status.[16] Mohammad, Sunehag & Haymond,[17] reported that studies in breastfeeding women from the United States and Sweden concluded that women can successfully breastfeed their infants if they have been provided calorie intakes of 1800–2200 kcal/day.[17] Fikawati,[8] found that mothers that consumed ≥2100 kcal/day were more able to breastfeed exclusively for six months compared to mothers who consumed less energy.

This study used multivariate analysis to determine dominant factors in continuation of exclusive breastfeedingto six months. Energy intake in the sixth month was the dominant factor for exclusive breastfeeding to six months. Mothers with decreased energy intake had a 9-times higher chance of not exclusively breastfeeding for 6 months than those with a higher energy intake. This is concordant with a study conducted in Bekasi by Syafiq, Fikawati and Widiastuti,[13] which found that average energy intake decreased through the breastfeeding period and that mothers with low energy intake had a 4-times higher chance of early cessation of breastfeeding. Fikawati, Syafiq and Mardatillah,[18] also found that exclusive breastfeeding to six months correlated significantly with a higher energy intake.

This study showed that the main cause for failure of exclusive breastfeeding before six months was low energy intake of the mother during breastfeeding period. Reasons that mothers consume less calories than recommended may include mothers not consuming sufficient calories since the beginning of pregnancy, striving to return to pre-pregnancy body weight, not having access to sufficient food especially early in breastfeeding period, limited knowledge and motivation about high nutritional needs while breastfeeding, mother foregoing meals due to fatigue from caring for infant, decrease of supplement intake and infant's milk consumption, dietary restrictions, insufficient information about intake requirements from health workers, and mothers' failure to account for daily increases in energy requirements.[11,18]

Gonzales, Habicht, Rasmussen, and Delgado,[19] found that mothers with higher energy intake had higher rates of exclusive breastfeeding to 20 weeks after giving birth

compared to those with a low energy intake. Syafiq, Fikawati & Widiastuti,[13] reported that mothers with low energy consumption during breastfeeding had 4 times higher risk of short duration of breastfeeding. Expectant mothers may gain 1-2 kg of fat during pregnancy which can subsequently be utilized during breastfeeding.

However, other studies have suggested that energy intake of mothers is important from the start of breastfeeding. One such study found that insufficient energy intake from the beginning of breastfeeding leads to insufficient fat stores to support breastfeeding after the fourth month.[17] Insufficient milk production may lead to anxiety of the mother about whether to continue exclusive breastfeeding orprovide formula milk to supplement or replace breast-milk (weanling's dilemma).[20]

Olson,[21] showed that mothers who are successful in breastfeeding usually have a balanced diet. To support milk production and prevent malnutrition in mothers, breastfeeding women must increase their energy intake above the general recommended level for adult women.[22] In addition to supporting successful milk production, added calories are utilized for post-birthing recovery. Balanced food intake while breastfeeding is a very important component in attaining optimal health for mothers and infants.[23]

Mothers with insufficient fat reserves, commonly with low socio-economic status, may be forced to breastfeed exclusively leading to catabolization of the tissues of the mother to support milk-production leading to malnourishment of the mother.[9] It may be considered that physiology prioritizes support of the infant as significant tissue catabolism will occur before milk-production is affected.[24]

In Indonesia, the availability of information regarding the high nutrition and energy requirements while breastfeeding is poor.[8] A study in Bogor of 220 breastfeeding mothers found that average energy and protein intake was 70% lower than recommend levels and intake of Fe, Ca, Zn, vitamin A and vitamin C were 77% lower than recommended levels.[25] However, that study also found that vegetable intake doubled compared to before pregnancy intake as mothers considered that it would improve their breastfeeding performance.[25] This is consistent with information provided for breastfeeding mothers, such as suggestions to eat diverse foods; increase fruit, vegetable and water consumption; and good breastfeeding tips. However, advice is not given regarding the high-energy requirements for breastfeeding mothers.

Conclusion

The prevalence of six-month exclusive breastfeeding is low at 22.9%. The average energy intake of breastfeeding mothers in the first month is sufficient at 2551 kcal/day, however, this figure continuously decreases to only 1718 kcal/day in the sixth month. Energy intake in the sixth month is the most significant contributing factor to six-month exclusive breastfeeding, after controlling for the variables energy intake in first month, education, knowledge, support from husband, occupation, and support from health workers, with OR = 9.0 (95% CI: 2.17-37.35). This means that mothers with low energy intake at the sixth month of breastfeeding period would have 9 times higher chance to fail providing 6-month exclusive breastfeeding compared to those with adequate energy intake.

Recommendation

To achieve the target of 6-month exclusive breastfeeding, attention must be paid to achieving sufficient nutrition for breastfeeding mothers from the first to the sixth month of breastfeeding. It is suggested for government to plan supplementation program for breastfeeding mothers especially in the second three months. Another study should be conducted to explore the reason of declining energy intake during breastfeeding.

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Equity Level of Health Insurance Ownership in Indonesia

Tingkat Ekuitas Kepemilikan Jaminan Asuransi Kesehatan di Indonesia

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Abstract

Social health insurance from government program are expected to be able to reduce inequalities access to health services in the middle of rising of health care cost, while private health insurance is still limited for up and middle class population. This study aimed to analyze the equity level of health insurance ownership including social and private health insurance in Indonesia. This study examined the condition of Indonesia in the middle of entering National Health Insurance (NHI) era. This study used data of Indonesian Socio-Economic Survey 2012. Data were analyzed by using econometric approach through multinomial logit analysis. The results showed that the concentration index of social health insurance ownership was 0.615, which is smaller than private health insurance ownership (0.972). It means that Indonesia social health insurace ownership will be able to increase equity access to the health services especially for poor people (pro poor). Social health insurance ownership increases the use of the health services by people.

Keywords: Concentration index, equity, health insurance, multinomial logit

Abstrak

Jaminan kesehatan sosial dari program pemerintah diharapkan dapat mengurangi ketidakmerataan akses pelayanan kesehatan di tengah meningkatnya biaya kesehatan, sementara jaminan kesehatan swasta masih terbatas untuk populasi kelas menengah dan atas. Penelitian ini bertujuan untuk menganalisis tingkat ekuitas kepemilikan jaminan asuransi kesehatan sosial maupun swasta di Indonesia. Penelitian ini mengkaji hasil lanjutan penelitian tersebut di tengah memasuki era Jaminan Kesehatan Nasional. Data penelitian menggunakan data Survei Sosial Ekonomi Nasional tahun 2012 dengan pendekatan secara ekonometri melalui analisis multinomial logit. Hasil menunjukkan indeks konsentrasi kepemilikan jaminan asuransi kesehatan sosial sebesar 0,615 memiliki nilai lebih kecil dari kepemilikan jaminan asuransi kesehatan swasta sebesar 0,972. Secara empiris, temuan ini membuktikan bahwa kepemilikan jaminan asuransi kesehatan sosial membuka pintu gerbang lebar terhadap akses ekuitas ke pelayanan kesehatan yang bersifat *pro poor*. Impelementasinya, kepemilikan jaminan asuransi kesehatan sosial meningkatkan penggunaan pelayanan kesehatan oleh masyarakat.

Kata kunci: Indeks konsentrasi, ekuitas, asuransi kesehatan, multinomial logit

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Introduction

Health care costs continue to increase. Examples of cases occur in the United States of America, the cost spent for Per Capita Expenditure (PCE) for health care goods and services in 1999-2012 is higher than the PCE for all goods and services.[1] Inflation from health sector also happens on other continents, such as in Asia increased by 4.2% per year, Africa 6.6% per year, and Europe with the situation fairly controlled at 1.6% per year.[2] Based on this rising inflation, rich and poor people require to protect financial risks due to illness conditions, one of which is through the principle of risk transfer from health insurance for all.[3] This protection is needed especially in developing countries in order to avoid "Sadikin" (poor after sick).[4]

Efforts in prevention of "Sadikin" after getting sick and utilization of hospital now increasingly get international attention. The World Health Organization (WHO) since 2000 has encouraged countries the establishment of Universal Health Coverage (UHC). UHC is actualized through extended to non-coverage users, reduced fees and sharing, including other services.[5] UHC is as the embodiment of social health insurance.[6] UHC is expected to focus not only on curative care, but also have adequate focus on health promotion and disease prevention.[7]

The Indonesian government makes a real embodiment of UHC through the implementation of Law No. 40 of 2004 on National Social Security System (*Sistem Jaminan Sosial Nasional/SJSN*). This Social Security Law mandated the Indonesian people to have social protection through *Jaminan Kesehatan Nasional* or National Health Insurance (NHI).[8] The policy mandates to the Social Security Agency *(BPJS Kesehatan*) as a program organizer of Indonesia NHI. In sum, the nation's public health insurance programs such as NHI have many important in short and long term poverty reducing benefits for low-income families with children.[9]

BPJS Kesehatan is a merging body from *PT Askes, JPK Jamsostek, Jamkesmas*, and *Jamkesda*. *PT Askes* initially only provided health coverage for governing body and civil servants. With reference to Act No. 24 of 2011 on *BPJS, PT Askes, JPK Jamsostek, Jamkesmas*, and *Jamkesda*, then it transformed into *BPJS Kesehatan*.[10] These agencies transform to manage health insurance for entire population of Indonesia.

Various factors influence demand for health insurance. Kirigia *et al*,[11] explained that demographic factors such as age, sex, income, occupation, area of residence, and the risk of certain illness influence the demand for health insurance. In addition, Jin and Hou,[21] have concluded that individual characteristics tend to have a social health insurance, private health insurance, or have social and private health insurance in terms of a series of demographic characteristics.[12] These results showed that the people in urban areas tend to choose to have a private health assurance. This will result in health insurance as a luxurious or inferior product.

In Indonesia, based on results of study by Hidayat,[13] the ownership of social health insurance (*Askes* and *Jamsostek*) opens the gate to reduce inequalities in access to health services compared to private health insurance ownership. Moreover, the near-poor population in Indonesia is until 37.42% and 0.01% of the population is below the poverty line.[14] Supposedly, vision of UHC conducted through National Health Insurance (NHI) program in Indonesia through social health insurance ownership will be able to reduce disparities.

Health insurance is required as a financial safeguard in the event of illness, especially from burden of cost. Private insurance companies have been seen as a business development opportunities to target buyers from the middle income up to the top level.[15] Based on data from the Indonesia National Socio-Economic Survey 2012, approximately, as much as 9% of Indonesia's population have private health insurance. Also, based on the report of the Indonesian Life Insurance Association (AAJI), there are more than 40 life insurance companies with more than 450 marketer agents that are ready for market life and private health insurance products in Indonesia.[16] Meanwhile, these conditions potentially create market failures and do not necessarily guarantee the creation of equity conditions.

The concept of equity in health care is the equality for the population to get access to health services regardless their socio-economic status through health insurance ownership.[17] The presence of Indonesia NHI program allegedly expands the access to health care insurance policy on all elements of society (rich and poor). This study tried to analyze and prove this statement. This study was conducted in order to embody the equity access of health services to realize the five principles (Pancasila) of the Republic of Indonesia that stated social justice for all people.

Method

This cross-sectional study was used secondary data, namely Indonesian National Socio-Economic Survey in 2012, which represents an overview of socio-economic situation of Indonesia in 2012. Indonesian National Socio-Economic Survey is done every year with consisting of two sets of questionnaires that are the Kor questionnaire (VSEN12-M-PNL) and housing and health questionnaire module (VSEN12-K-PNL). The sample used in this study was the individual from household as many as 279,581 people from 33 provinces.

Dependent variable was health insurance ownership that were categorized into more than two groups. These categories had no insurance, had social health insurance,

private health insurance, and double insurance from social and private insurance. Social health insurance ownership as an Indonesia NHI variable is formed from membership of *PT Askes, JPK Jamsostek, JAMKESMAS*, and *Jamkesda.*[18]

The independent variables of this study were taken from the theories discussed before. These variables include sociodemographic conditions, education level, employment, illness condition, and outpatients' visit to the health services. Besides, measurements of economic status is as a proxy variable from income as a home ownership status, house floor, electrical installation, computer ownership, poverty, per capita expenditure, and food expenditure. Measurement was held to analyze the nature of ownership of health insurance coverage that is either more pro-rich or pro-poor.

Univariate analysis displays the number of observations (N), the average of each variable which is in categorical data average values represent the proportion from amount of mean of variables. In addition, there is a standard deviation (SD), minimum and maximum values of each variable. The bivariate analysis was done to determine the differences between groups conducted by displaying the number and average (mean) of each category.

Study used econometric modeling with multinomial logit analysis. Multinomial logit analysis calculation produced coefficient beta and relative risk ratio (RRR) for all independent variables. This study study explored the relation between a set of independent variables that explain the possibility of individuals who choose one of the categories of health insurance compared to the other categories. In this model, NHI was selected as comparator category (base outcome) with the other groups. This study also assessed the assumption of independence of irrelevant alternatives (IIA) test. The analysis results support the IIA and the odds of each category of health insurance ownership.

The level of fairness (equity) were presented in graphical form, known as the concentration curves and consentration index. [17,19] Concentration curve presented the cumulative distribution of health insurance ownership that located on the Y axis, and the cumulative distribution of the number of people that were sorted based on average household consumption expenditure per capita on the X axis. A 45-degree line that divided diagonally between the two axes (X and Y) is the line of equity. This line indicates the level of fairness in access of entire group of people to the health services.

Range value the measurement of concentration index is from -1 to +1.[19] Score of concentration index which is positive index indicates a gap in access to the health services that lead to richer groups (pro-rich). Otherwise, negative index indicates that the easier access to the health services lead to poorer groups (pro-poor).

Results

Table 1 illustrates the demographic characteristics of ownership of health insurance demand. In the Table 1, the number of sample is 279,581. There are categorical and numerical variables. The average Per Capita Consumption (PCE) is 600,000.

Based on Table 1, the characteristics associated with equity like the proportion of people who ever be outpa-

Table 1. Demographic Characteristic of Insurance Ownership Demand

Variable	Mean	SD	Min	Max
Urban	0.428	0.494	0	1
HH member	2.858	1.725	1	22
Female	0.498	0.500	0	1
Age	29.06	19.92	0	98
Married	0.470	0.499	0	1
Years education	5.430	4.313	0	22
Work status	0.452	0.498	0	1
Own house	0.829	0.376	0	1
Floor tile	0.276	0.447	0	1
Using lighting	0.904	0.295	0	1
PC Desktop ownership	0.0622	0.242	0	1
Outpatient	0.133	0.339	0	1
Morbidity	0.198	0.398	0	1
Car ownership	0.0826	0.275	0	1
Poor	0.131	0.338	0	1
Per capita consumption	623,370	187,863	67,075	75,300,000
Food consumption	1,437,000	912,269	77,143	22,130,000
Healthcare distance	25.25	19.23	1.594	102.8
Health insurance type	0.448	0.570	0	3

Notes:
SD = Standard Deviation

tients was 13.3%. People with sick condition were 19.8% and poor economic status (13.1%). Based on asset ownership, 82.9% people had own home, but only 8.2% had own car. The characteristics of health insurance ownership are presented in the Figure 1.

Figure 1 describes health insurance ownership in percentage in 2012. There were 58.7% people still unregistered as a membership of NHI. NHI in that year was still not implemented yet. Therefore, this enrollment is created through the proxy and estimation from enrollment of *PT Askes Persero, Jamsostek, Jamkesmas,* and *Jamkesda*. There were 38.23% proportion of NHI member. This figure also describes the enrollment proportion of private insurance that was 2.68%.

Table 2 illustrates the determinants of health insurance ownership by type of health insurance. This table describes the amount or proportion of socio-demographic conditions compared to the health insurance ownership. The maximum observation number is still for uninsured people.

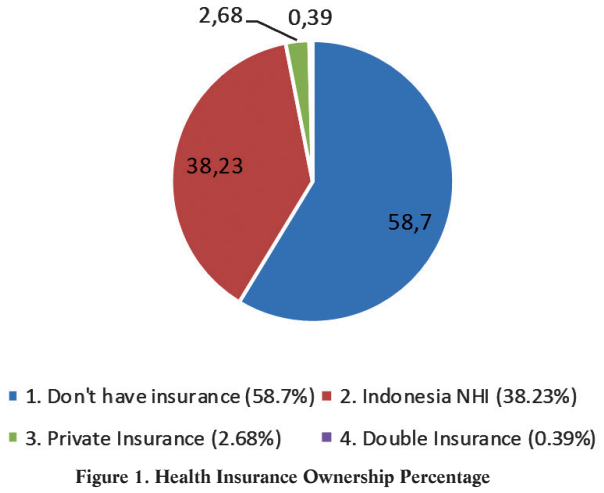

Figure 1. Health Insurance Ownership Percentage

Based on Table 2, outpatients' visits were mostly accessed by double insurance ownership as much as 14% of these participants. However, private and double insurance ownership were characteristically from rich economic status, which was seen from house ownership, tile floors and desktop PC ownership that had higher proportion than uninsured and NHI insurance. While uninsured people had a smaller proportion of outpatients' visits to the health services than people member of NHI. This indicates that people who had private health insurance had easy access to the health services. Moreover, people who did not have health insurance had more difficult access to the health services than people who had NHI. Then, Table 3 shows the multivariate analysis.

Table 3 shows that the determinant of health insurance ownership was influenced by significant factors and RRR value. In this case, the uninsured was a baseline outcome. People with poor status tend to be NHI participants 1.31 times compared to be uninsured. Besides, the increasing person of household member tend to be a NHI participant 1.04 times compared to become uninsured. People who had asset of desktop PC tend to be have private health insurance 2.14 times compared to become uninsured. People with ill condition tend to have double health insurance 1.29 times compared to become uninsured.

Table 2. Socio-demographic Conditions Based on Ownership of Health Insurance

Variables	Uninsured (N=164,121)		Indonesia NHI (N=106,871)		Private Insurance (N=7,489)		Double Insurance (N=1,100)	
	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Urban	0.582	1	0.592	1	0.210	1	0.329	1
HH member	2.857	22	2.855	18	3.001	14	2.249	9
Female sex	0.493	1	0.503	1	0.475	1	1	1
Age	28.93	98	29.33	98	27.10	98	36.70	81
Marital status	0.477	1	0.457	1	0.442	1	0.994	1
Years of education	5.283	22	5.486	22	7.195	22	9.776	22
Work Status	0.471	1	0.421	1	0.445	1	0.586	1
Own house	0.826	1	0.842	1	0.744	1	0.754	1
Floor tile	0.276	1	0.248	1	0.626	1	0.547	1
Using lighting	0.910	1	0.888	1	0.985	1	0.977	1
PC desktop ownership	0.0478	1	0.0678	1	0.274	1	0.225	1
Outpatient	0.117	1	0.157	1	0.144	1	0.140	1
Illness experience	0.186	1	0.214	1	0.222	1	0.185	1
Car ownership	0.0731	1	0.0777	1	0.338	1	0.232	1
Poor status	0.124	1	0.151	1	0.0294	1	0.0400	1
Per capita consumption	594,850	7.530e+07	612,143	7.530e+07	1.335e+06	4.741e+07	1.124e+06	7.530e+07
Food consumption	1.401e+06	2.213e+07	1.426e+06	1.275e+07	2.283e+06	1.131e+07	2.169e+06	1.131e+07
Healthcare distance	25.11	102.8	25.72	102.8	22.22	93.48	21.85	98.88

Note:
N = Number of Sample

Table 3. Multivariate Analysis of Health Insurance Ownership Determinant

Variable	Category	Health Insurance Ownership (n=279,581 and Pseudo R-2=0.0426)					
		NHI		Private Insurance		Double Insurance	
		p Value	RRR (95% CI)	p Value	RRR (95% CI)	p Value	RRR (95% CI)
Urban	Urban	<0.01	0.96 (0.95-0.96)		0.98 (0.97-0.99)	<0.01	0.79 (0.76-0.82)
	Rural		1		1		1
Sex	Female		0.99 (0.98-1.01)	<0.01	0.92 (0.90-0.95)		5.98 (-3.96-3.97)
	Male		1		1		1
House ownership	Own house	<0.01	1.12 (1.11-1.13)	<0.01	0.61 (0.59-0.63)	<0.01	0.78 (0.72-0.84)
	Otherwise		1		1		1
Car ownership	Own car		0.97 (0.95-0.99)	<0.01	1.95 (1.89-2.01)		1.03 (0.94-1.12)
	Otherwise		1		1		1
Floor tile	Floor tile	<0.01	0.80 (0.79-0.80)	<0.01	1.88 (1.82-1.93)	<0.01	1.52 (1.41-1.63)
	Otherwise		1		1		1
Have PC desktop	Own PC desktop	<0.01	1.47 (1.44-1.50)	<0.01	2.14 (2.07-2.21)	<0.01	2.09 (1.90-2.27)
	Otherwise		1		1		1
Marital status	Married	<0.01	0.88 (0.87-0.89)	<0.1	0.94 (0.90-0.97)	<0.01	164.5 (100.7-228.2)
	Single		1		1		1
Employment status	Work	<0.01	0.71 (0.39-0.71)	<0.05	0.92 (0.89-0.95)		0.97 (0.90- 1.03)
	Otherwise		1		1		1
Using lighting	Lighting	<0.01	0.79 (0.78-0.81)	<0.01	1.65 (1.48-1.81)		1.40 (1.10-1.71)
	Otherwise		1		1		1
Outpatient	Outpatient		1.36 (1.34-1.38)	<0.01	1.19 (1.24-1.15)		1.13 (1.24-1.03)
	Otherwise		1		1		1
Illness experience	Morbid	<0.01	1.07 (1.06-1.09)	<0.01	1.16 (1.14-1.20)	<0.01	1.29 (1.18-1.40)
	Otherwise		1		1		1
Poor status	Poor	<0.01	1.31 (1.29-1.33)	<0.01	0.61 (0.56-0.65)		0.93 (0.78-1.08)
	Otherwise		1				1
Age	Years	<0.01	1.04 (1.03-1.04)	<0.01	0.94 (0.93-0.95)	<0.01	0.95 (0.91-0.98)
HH member	Person	<0.01	1.04 (1.03-1.05)	<0.01	0.42 (0.41-0.44)	<0.01	0.73 (0.67-0.78)
Per capita consumption	Rupiah	<0.05	1	<0.01	1	<0.05	1
Healthcare distance	km		1		1.001 (1.000-1.001)	<0.05	0.96 (0.94-0.97)
Food consumption	Rupiah	<0.01	1	<0.01	1	<0.01	1
Years of education	Years	<0.01	1.02 (1.02-1.03)	<0.01	1.02 (1.02-1.03)	<0.01	1.09 (1.08-1.09)
Constant		<0.01		<0.01	0.05 (0.04-0.06)		

Notes:
RRR = Relative Risk Ratio; NHI= National Health Insurance

Goodnes of Fit (GOF) test showed fistat prob > LR 0.00. It means that this test was fit. More result of the equity level calculation is done by using consentration curve that can be seen in Figure 2.

Based on Figure 2, NHI health insurance ownership which also includes insurance for poor (*Jamkesmas* and *Jamkesda*) had a closer distance to the equity line compared to the ownership of double and private insurance. The result calculation of concentration index of Indonesia NHI ownership was 0.615 which had closer value of 0 (equity line) than private health insurance ownership that was 0.972. The concentration index of double health insurance ownership was 0.968. It means that NHI ownership had a higher level of the equity compared to the pivate insurance ownership.

Discussion

People's choice to participate in the health insurance membership depends on the risk management of each individual. Characteristics risk averse under ideal conditions, preferring to pay a premium in a certain amount to shift the risk of illnes.[20] Unfortunately, these ideal conditions never occur in the real world. Various determinants of health insurance ownership are as a demand. These determinants have vary in various countries depending on socio-demographic conditions of a country. Africa's racial factors also determine the ownership of health insurance.[11] In China, alcohol drinkers prefer to own the member of health insurance.[12] While in the USA, cancer patients from disadvantaged communities get most benefits from health insurance, and there is a reduction in disparities in outcome.[21]

The results of this study is an agregate representative of Indonesia, as a determinant of ownership health insurance that is dwelling in urban areas, the number of family members, female sex, age, house ownership, marital status, education level, employment status, ever outpatient visits to health services, having morbid experience, and increasing per capita spending. The results are in line with studies of the determinants of PT Askes par-

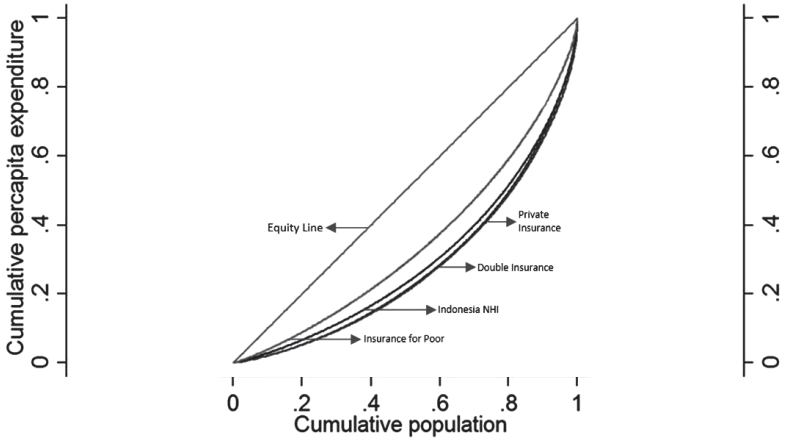

Figure 2. Consentration Curve Based on Health Insurance Ownership

ticipation for civil servants that have the same result with this study.[22]

In particular, the ownership of private health insurance covers the higher expenses for meals, has assets of car, house floor tiled, having a computer, higher education level, using lighting in the house, ever made outpatients visits to health care, having illness experience, increased spending per capita. This proves that the ownership of private health insurance in Indonesia is concluding as an inverior goods. In Ireland, the government subsidizes the purchase of private health insurance through measures including tax relief on premiums and not charging the full economic cost for private beds in public hospitals, so this insurance is to be owned.[23]

On the other side, the determinants of Indonesia NHI ownership types include the number of family members, increasing age, higher educational level, ever outpatients' visits to health services, illness experience, poor status, nearer distance to health facilities. Based on these determinants, ownership of Indonesia NHI reduce disparities of health insurance as a superior goods. Among of them, there is an increasing population with a poor status for NHI registered as participants. It supports the WHO's vision for creating UHC where all the registered population coverage of the health insurance regardless their economic status.[5] A global landscape of UHC evolution implies that orchestrated international efforts should regard these nations as one of the pillars of any responsible policy in aim to protect the world's poor from health-related risks.[24]

Some of the challenges of *BPJS Kesehatan* are about encouraging all Indonesian people to participate in the program of Indonesia NHI that reaches the coverage for informal worker sector and encouraging top level managers at private companies to be participants of Indonesia NHI. [25] One of the causes comes from the individual level of manager and higher that only buy private health insurance and a reluctance to pay double dues. The ownership of private health insurance is increasing participant satisfaction compared to ownership of social health insurance.[26]

Based on the results of the study, the determinants of ownership of double insurance covers is a younger age, asset ownership of car, house floor tiled, computer ownership, marital status, the higher the level of education, and never get sick. These pro-rich characteristics can easily access combine both facilities, primary health care and hospital visit, which make wider inequity significantly.[27]

Reflecting this result, young individuals with sufficient financial conditions have to be encouraged to be participants of Indonesia NHI than to purchase private health insurance. In the early stages, *BPJS Kesehatan* should appeal to those characteristics at manager level and higher to be encouraged to be NHI program participants.

Calculations by using the curve and consentration index indicate that the program NHI opens the gate of equity compared to the ownership of private health insurance. Likewise, having double health insurance ownership also opens the access to the equity compared to only having private health insurance. Unfortunately, the mechanism of Coordination of Benefits (COB) between private health insurance package and NHI package is still being debated. Until 2014, there are only 51 private health insurance companies that signed contracts with *BPJS Kesehatan* to do COB.[28] In 2016, *BPJS Kesehatan* makes a technical regulation in the form of COB Regulation of BPJS No. 4 Year 2016 on technical guidelines of COB.[29] This adoption is expected to complete the COB polemic to improve the equity level of health insurance ownership in Indonesia.

Conclusion

The results of this study prove that NHI program as

the social health insurance in Indonesia widely opens the gate of the equity access for poor people (pro-poor) to access the health services. Ownership of health insurance that initially as an inferior product will be accessible to the people through implementation of NHI. The study findings provide suggestion to the government to expand coverage of social health insurance ownership in Indonesia. The government should encourage more individuals in the upper level manager to be incorporated in NHI participants.

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