Spearman’s rank correlation analysis on public perception toward health partnership projects between Indonesia and Australia in East Nusa Tenggara Province

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Abstract. The mean of this paper is to analyze community perceptions towards implementation and impacts on the health partnership projects between the government of Indonesia and Australia in East Nusa Tenggara (ENT) province by employing Spearman rank correlation analysis. The paper processes both primary and secondary data taken from Public Hospitals, Health Department and the public community of the three districts (Ngada, East Flores and North Central Timor) in the ENT region. There were 225 respondents selected using purposive sampling method. The result shows that most people in the area perceive positively on the projects implementation and impacts on the community. More than 80% people believe that the health partnership projects were important for the community particularly for the maternal and neonatal health. The analysis employing a Spearman Rank coefficient shows strong connection between the implementation and impacts of the projects with the value of \( r_s = 0.554 \). The analysis was also carried out through different stakeholders with the value of \( r_s = 0.605 \) and 0.460 for public community and hospital staff respectively. These indicate that the positive perception on project implementation relates strongly to the positive perception on the impact of the program.

1. Introduction
The Government of Indonesia through its local government in East Nusa Tenggara (ENT) province and the government of Australia have assigned a memorandum of understanding (MoU) and a memorandum of actions (MoA) in undertaking collaborative projects to overcome problems in aspects such as health and education. One of the critical health issues in the region is the low quality of the maternal health. This can be seen by the number of mothers died in the birthing process that is higher than that in the national level. National survey in 2004 showed that the number of mothers died was 554 compared to only 307 in the national level in 100,000 births. Health basic survey conducted in 2007 showed the number reduction into 306 but it was still much higher than the national level which was only 228. Similar to the number of mothers, babies mortality follows the same path where there was 57 death of babies in ENT compared to only 36 in the national level.

Even though the results of the research conducted by Kleden [1] in 2009 and Lobo [2] concluded that the shortage of medic and paramedic staff was the main cause of the problem, some other problems may have also contributed to the cause. Therefore the two government started to construct partnership projects in health aspect to overcome this problem. The project was initially to cover about...
six districts in the area which were Ngada, East Flores (Flotim), Sikka, North Central Timor (TTU), South West Sumba (Sumba Barat Daya), East Sumba (Sumba Timur) and Alor. The project has been implemented since 2010.

The success of any collaborative project can be viewed differently in the eyes of each party [3-6] whether they are executors, officials or general public. Community perception is one of the dominant factors to see whether a project is truly beneficial. Public perception on the existence, application and benefits of the health projects throughout the region can be analysed to assess how well the variables relate or associate each other. Spearman’s correlation analysis is one of the methods that can be employed to test the strength of perceptions data which is in ordinal form [3,4].

Rank Spearman correlation is calculated by applying the formula

\[ \rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)} \]

with

\[ \rho = \text{Spearman rank correlation value} \]
\[ d = \text{margin of each pair value} \]
\[ n = \text{Spearman rank pair values}. \]

2. Procedures

In the field of health, the partnership programs concentrate on how to reduce the number of mothers and newborns die which serve the participation of the Health Departments and Public Hospitals in provincial and districts level. Public perception towards the partnership project in three different groups is the main aim of the research. They are Health Department staffs, Public Hospital Staffs and Local Communities in the region.

To analyze public perception towards health collaborative projects, data was collected from the community throughout the region. Three districts namely Ngada, East Flores and North Central Timor were selected as samples. The sample selection was conducted as the three areas were among the six districts in the region that were granted the project.

The population of the research is the people of ENT. Communities were categorized in three different parties; hospitals, health affairs and general public. Primary data was collected using questionnaires and depth interview.

The collected data was then analyzed qualitatively starting from reduction, presentation and conclusion. Likert scale [3,4] was applied to obtain public’s perception. The scale ranges from 1 to 5 with the category starts from strongly disagree, partly disagree, neutral, agree and strongly agree consecutively. Descriptive method was applied to group the public perception. The level of public perception on Likert scale basis can be seen in Table 1.

| No | Response Value Interval | Perception Level |
|----|-------------------------|------------------|
| 1  | 4.2 – 5.0               | Very Good        |
| 2  | 3.0 - 4.2               | Good             |
| 3  | 2.6 – 3.4               | Medium/Normal    |
| 4  | 1.8 – 2.6               | Bad              |
| 5  | 1.0 – 1.8               | Very Bad         |
To examine the relation between partnership program implementation and impact, Spearman correlation analysis was employed. The sign of the Spearman correlation indicates the relation of the analysed variables. The positive sign indicates that the increase of one unit of the independent variable will affect the increase of other variable. The test then is followed by correlation coefficient signficancy as stated in Dendukuri and Reinhold [7] and Powers and Xie [8]

3. Results and discussion

3.1 Results
In this section, some findings regarding partnership health projects are presented. The main projects are Australia Indonesia Partnership for Maternal and Neonatal Health (AIPMNH) and Australia Indonesia Partnership for Health System Strengthening (AIPHSS). Both projects aim at reducing the number of death of women and children particularly newborn babies in the region and serve the participation of public hospitals and health departments both in provincial and district government. The projects have been implemented since 2010 in Ngada, 2011 in TTU and four other districts.

The projects concentrate on the reference system between the local health centers and the public hospitals that require improvement in the quality of services where in turn will need qualified medical as well as paramedic staffs. The perception of three different groups in the region towards the implementation and impact of the partnership projects between the two governments using Likert Scale is displayed on the following Table 2 and Table 3.

| No | Community Group    | Criteria          | Percentage (%) |
|----|--------------------|-------------------|----------------|
| 1  | Health Affair Staff| Very good         | 26.7           |
|    |                    | Good              | 40.0           |
|    |                    | Normal/Medium     | 13.3           |
|    |                    | Bad               | 13.3           |
|    |                    | Very Bad          | 6.7            |
| 2  | Public Hospitals   | Very good         | 21.7           |
|    | Staff              | Good              | 25.0           |
|    |                    | Normal/Medium     | 30.0           |
|    |                    | Bad               | 13.3           |
|    |                    | Very Bad          | 10.0           |
| 3  | Local Community    | Very good         | 25.3           |
|    |                    | Good              | 24.7           |
|    |                    | Normal/Medium     | 37.3           |
|    |                    | Bad               | 9.3            |
|    |                    | Very Bad          | 3.4            |

| No | Community Group    | Criteria          | Percentage (%) |
|----|--------------------|-------------------|----------------|
| 1  | Health Affair Staff| Very good         | 13.3           |
|    |                    | Good              | 80.0           |
|    |                    | Normal/Medium     | 6.7            |
|    |                    | Bad               | 0.0            |
|    |                    | Very Bad          | 0.0            |
| 2  | Public Hospitals   | Very good         | 18.3           |
|    | Staff              | Good              | 71.7           |
Data analysis that covered 225 respondents shows that the calculation of the Spearman Coefficient ($r_s$) was 0.554. As the $H_0$: $\rho = 0$, shows there is no correlation and $H_1$: $\rho \neq 0$, shows that there is a correlation between the implementation and the impact of the health partnership program. The obtained result of the Spearman Coefficient ($r_s$) shows that there is a positive correlation. The probability Sig (2-tailed) is 0.000 which is less than the $\alpha$ 5% value, therefore the rejection of $H_0$ [4, 9]. The analysis is shown in Table 4.

**Table 4.** Correlation between program implementation and impact among whole community

| Program   | Correlation Coefficient | Sig. (2-tailed) | N  |
|-----------|-------------------------|----------------|----|
| Impact    | Correlation Coefficient | .554**         | .000 |
|           | Sig. (2-tailed)         | .              | .225 |
|           | N                       | 225            | 225 |

**. Correlation is significant at the 0.01 level (2-tailed).

The calculation of the relation between the implementation and impact of the health partnership project between Indonesia and Australia in ENT among the hospital staff respondents is displayed in Table 5. The results shows that the Spearman coefficient ($r_s$)=0.460 for 60 samples. This means the positive correlation. The test of relation significancy shows that probability Sig. (2-tailed) is 0.000. This implies that the hospital staff believe that there is a significant positive relation between the implementation and the impact of the program to the community.

**Table 5.** Correlation between program implementation and impact in health projects among hospital staff

| Program   | Correlation Coefficient | Sig. (2-tailed) | N  |
|-----------|-------------------------|----------------|----|
| Impact    | Correlation Coefficient | .460**         | .000 |
|           | Sig. (2-tailed)         | .              | .60 |
|           | N                       | 60             | 60 |

**. Correlation is significant at the 0.01 level (2-tailed).

The calculation of the relation between the implementation and impact of the partnership Health Project between Indonesia and Australia in ENT among the general public is presented in Table 6.
The results shows that the Spearman coefficient \((r_s) = 0.605\) for 150 samples. This means the positive correlation between the variables. The test of relation significance shows that probability Sig. (2-tailed) is 0.000. Similar to the results above, the common public think that there is a significant positive relation between the implementation and the effect of the health partnership program to the community in the ENT province.

**Table 6.** Correlation between program implementation and impact in health project among general public

| Program Implementation | Correlation Coefficient | Impact |
|-------------------------|--------------------------|--------|
|                         | 1.000                    | .605** |
| Sig. (2-tailed)         | .                       | .000   |
| N                       | 150                      | 150    |
| Spearman's rho          | Correlation Coefficient  |        |
|                         | .605**                   | 1.000  |
| Sig. (2-tailed)         | .000                     | .      |
| N                       | 150                      | 150    |

**. Correlation is significant at the 0.01 level (2-tailed).

3.2 Discussion

General description

Health partnership projects that were successfully identifien in the region were *Australia Indonesia Partnership for Maternal and Neonatal Health* (AIPMNH) and *Australia Indonesia for Health Strengthening System* (AIPHSS). Result of the study shows that in general most people in the region believe that the partnership health projects were implemented accordingly and give positive impacts on them. These were reflected by about 80% of the Health affair staffs perceive the projects as good enough to very good and only about 20% perceived it as bad to very bad. Similar trend happens also to the hospital staffs and local community with the percentage of good and bad perception of the project was about 77% versus 23% and 87% versus 13% respectively.

The relatively high percentage of the Health Affair staffs comments on the project was probably due to the given grants have forced the associated government to allocate some fund as cost sharing for the project. District of Ngada for example has allocated about four million rupiahs for the project each year and it seems to continuously occur for years to come [10]. Similarly, the local government of other districts in the region such as East Flores and TTU have also acted in the same manner in terms of allocating some fund for the partnership project. TTU for example pays about Rp. 15 millions for the salary of the medical doctors in the sister hospital program. Likewise, this also occurs to the hospitals staffs and local people. The project has improved their service quality as well as their health level. Midwives and nurses in particular have privilege in enjoying long distance education in how to manage normal birthing process as well as to monitor expectant mothers. New mothers have their health level improves as all the local government staffs, nurses and midwives have cut some unnecessary administrative work and raised their services. The project has been capable of reducing the number of mortality of mothers in birthing process from 14 in 2009 to only 6 in 2012 even though the death of newborn babies remained high which was 45 in 2009 and 48 in 2013.

The correlation between project implementation and impacts

The Spearman rank correlation analysis is used to assess the strength relation between two different variables [11-14]. The correlation of project implementation and impacts was evaluated through 225 respondents. The results shows that the Spearman coefficient \((r_s)=0.460\) for 60 samples. This means the positive correlation. The test of relation significance shows that probability Sig. (2-tailed) is 0.000. to the results above, the hospital staff think that there is a significant positive relation between the implementation and the effect of the health partnership program to the community. This also indicates
that the more trained nurses and midwives in number the better the quality of the services in community health centres and hospitals in ENT.

The results shows that the Spearman coefficient ($r_s$) = 0.605 for 150 samples. This means the positive correlation. The test of relation significance shows that probability Sig. (2-tailed) is 0.000. Similar to the results above, the common public think that there is a significant positive relation between the implementation and the effect of the health partnership program to the community in the ENT province.

As the number of sample for the health department was only 15 people, the correlation of their perception on implementation and impact of the problem was not carried out. The test was undertaken for the whole 225 samples which produced that the calculation of the Spearman Coefficient ($r_s$) was 0.554. Therefore there is a strong correlation between the implementation and the impact of the health partnership projects between Indonesia and Australia in ENT in the eyes of the stakeholders.

4. Conclusion

A Spearman correlation coefficient is used to asses the strength of the implementation and impacts variables of the health partnership project in East Nusa Tenggara Province. The results shows that the correlation between the two variables was relatively strong with $r_s$ equals to 0.554. When the test was carried out through different group of stakeholders, it produced different values of ($r_s$) which were 0.605 and 0.460 for public community and hospital staff respectively. Both values shows strong correlation between variables for all stake holders.

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