MEDIA KESEHATAN
MASYARAKAT INDONESIA
The Indonesian Journal of Public Health

Editorial
Hidup Sehat,
Perwujudan Manfaat Keseimbangan Sepanjang Masa

Tinjauan Pustaka
Spatial Analysis of Infectious Disease

Efektifitas Program Supplementasi Tablet Besi Pada Ibu Hamil
Pengunjung Anc Klinik di Nam Phong Khon Kaen, Thailand

Analisis Model Komunikasi Dengan Rantai A-B-C
Dalam Perilaku Pengasuhan Anak Baduta
di Kelurahan Gambesi Kota Ternate, Maluku Utara

Risiko Merokok Terhadap Kejadian Kanker Leher Rahim

Faktor Risiko yang Berhubungan dengan Tingkat Keparahan
Penyakit Periodontal Pada Penderita Diabetes Mellitus
di Rumah Sakit Dr. Wahidin Sudirohusodo Makassar Tahun 2002-2003

Peta Pengetahuan Tiga Suku Bangsa
di Sulawesi Selatan Dalam Pemanfaatan Pengobatan Alternatif
Sengatan Lebah (Bee Venom Therapy)

Assessment of Public Private Partnership
for Solid Waste: Pilot Project of Boot Composting Technology
In Tamangapa Site, City of Makassar

Gambaran Umum Kemampuan dan Kemauan Membayar
Masyarakat (ATP & WTP) Terhadap Pelayanan Kesehatan
di Kec. Makale dan Rantepao Kabupaten Tana Toraja
Media Kesehatan Masyarakat Indonesia
ISSN: 0216-2482

Media Kesehatan Masyarakat Indonesia FKM Unhas adalah publikasi ilmiah yang menerima setiap tulisan ilmiah di bidang kesehatan, baik laporan penelitian (Original article/research paper), makalah ilmiah (review paper) maupun laporan kasus (case report) dalam bahasa Indonesia atau Inggris.

Pelindung
Prof.Dr.ir. Radji A. Gunj (Rektor Universitas Hasanuddin)

Penanggung Jawab
Prof.Dr.dr. A. Razak Thaha, M.Sc. (Dekan Fakultas Kesehatan Masyarakat Universitas Hasanuddin)

Pimpinan Redaksi
dr. Veni Hadju, Ph.D.

Redaksi Pelaksana
Ida Leida, SKM, MKM
Riana Dewi Nugrahanli, SKM, MPH

Editor
Prof.Dr.dr. A. Razak Thaha, M.Sc; Prof.Dr.ir. Nur Naury Noor, M.Sc; Prof.Dr. dr. Nuryati Noor, MPH; Prof.Dr. dr. Rahmi Fajriansyah, MM; Prof.Dr. dr. Adi Kusno, M.Si; Dr. dr. Alimuddin; MPH; dr. Djuyodi M. Djamal, MS; Dr. Satria Patmu, MS, Dr. dr. Arunog Aris, M.Kes; dr. M. Furrad Naimi, M.Sc; dr. Hasibuan Ishak, Ph.D; dr. Arifin Seweng, MPH; Ridwan SKM, M.Kes.

Nitra Bestari (Peer Reviewer)
Dr. Fransisca S. Sy, MPH (University of South Carolina)
Prof. Dr. dr. Does Saptooyo, MPH (Universitas Indonesia)
Prof. Dr. Hadi Pratomo, MPH (Universitas Indonesia)
Prof. Haryoto R, MPH (Universitas Indonesia)
Prof. Dr. Purnawan Junadi, MPH (Universitas Indonesia)
Prof. Dr. dr. Kunto, MPH (Universitas Airlangga)
Dr. Widodo, S.P., M.Kes; MPH, Dr. PH (Universitas Airlangga)
Prof. Dr. Halim, Nur Naury Noor, MPH (Universitas Hasanuddin)
Prof. Dr. dr. H. A. Razak Thaha, M.Sc (Universitas Hasanuddin)
Dr. Asiah Hamzah, Dia.MA (Universitas Hasanuddin)
Dr. Ridwan Thaha, M.Sc (Universitas Hasanuddin)
Dr. Hasanuddin Ishak, Ph.D (Universitas Hasanuddin)

Sekretaris Redaksi
Ansari, SKM, M.Si

Produksi/Distribusi
Sukri, SKM, M.Kes; Yahya Thamrin, SKM, M.Kes; Ruslan, SKM

Pelaksana Tata Usaha
Nurwana Yaskia, SKM
Ir. Seto Wirawan, ST.

Desain dan Media
Muhary Wahyu Nurba

Penerbit
Jurnal ini diterbitkan oleh Fakultas Kesehatan Masyarakat Universitas Hasanuddin 4 kali setahun (Tahunan).

Surat menyurat menyangkup sasaran, langganan dan sebagainya dapat disampaikan ke:

Sekretariat Redaksi Jurnal Media Kesehatan Masyarakat Indonesia
d/a Ruang PD IV FKM Unhas Il. 2 Kampus Unhas – Tanjung area 90245
Telp. (0411) 535 658, Fax. (0411) 536 013
E-mal. MKMK_fkm@unhas.ac.id
<table>
<thead>
<tr>
<th>Daftar Isi:</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDITORIAL</td>
</tr>
<tr>
<td>H. Muhammad Rusli Ngatimin</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>TINJAUAN PUSTAKA</td>
</tr>
<tr>
<td>Ansariadi</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Rahayu Indriasari</td>
</tr>
<tr>
<td>San Thida Aung</td>
</tr>
<tr>
<td>Alfred Mashandich Boyo</td>
</tr>
<tr>
<td>Kathryn Leadbeater</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Sani Silwana</td>
</tr>
<tr>
<td>Aliwa Assagaf</td>
</tr>
<tr>
<td>A. Razak Thaha</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Buraerah, H. Abd. Hakim</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Nurhayati Habib</td>
</tr>
<tr>
<td>A. Arsunan Arsin</td>
</tr>
<tr>
<td>Rasdi Nawi</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Suriah Wahab</td>
</tr>
<tr>
<td>Tri Krianto</td>
</tr>
<tr>
<td>Rina A. Anggorodi</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Anwar</td>
</tr>
<tr>
<td>Anwar Daud</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Almin Maidin</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
| Hidup Sehat, Perwujudan Manfaat Keseimbangan
  Sepanjang Masa                     | 137  |
| Spatial Analysis of Infectious Disease                           | 139  |
| Efektifitas Program Suplementasi Tablet Besi Pada Ibu Hamil
  Pengunjung Anc Klinik di Nam Phong Khon Kaen, Thailand               | 143  |
| Analisis Model Komunikasi Dengan Rantai A-B-C Dalam Perilaku
  Pengasuhan Anak Baduta di Kelurahan Gambesi Kota Temate,
  Maluku Utara                                                        | 153  |
| Risiko Merokok Terhadap Kejadian Kanker Leher Rahim                   | 161  |
| Faktor Risiko yang Berhubungan dengan Tingkat Keparahan Ponyakit
  Periodontal Pada Penderita Diabetes Melitus di Rumah Sakit Dr. Wahidin
  Sudirohusodo Makassar Tahun 2002-2003                                | 165  |
| Peta Pengetahuan Tiga Suku Bangsa di Sulawesi Selatan Dalam
  Pemanfaatan Pengobatan Alternatif Sengatan Lebah (Bee Venom Therapy) | 171  |
| Assessment of Public Private Partnership for Solid Waste: Pilot Project of
  Boot Composting Technology in Tamangapa Site, City of Makassar       | 183  |
| Gambaran Umum Kemampuan dan Kemauan Membayar Masyarakat
  (ATP & WTP) Terhadap Pelayanan Kesahalan di Kec. Makale dan
  Rantepao Kabupaten Tana Toraja                                        | 193  |
SPATIAL ANALYSIS OF INFECTIOUS DISEASE

Ansariadi

* Department of Epidemiology, School of Public Health, Hasanuddin University

I. INTRODUCTION
The use of spatial analysis in public health, particularly in study of infectious diseases epidemiology increased during the last decade. This paper will present the definition of spatial analysis, historical background, the application of spatial analysis in public health. Finally, the advantages and limitation of spatial analysis is located in the last section.

II. DEFINITION
After identifying where particular diseases are prevalent, the first step is combating them. For this, spatial analysis of diseases is important. A Geographic information system (GIS) assists in identifying spatial analysis of diseases pattern. GIS has been defined as “an automated system for the capture, storage, retrieval, analysis and display of spatial data”. Moreover, according to Clarke, “spatial means space related to around us, in which we live and function”. Spatial analysis of disease concerns the analysis of the spatial pattern or geographical variations of the incidence of diseases. Epidemiological investigations compare disease incidence among a population and investigate factors behind the differences. Hence, spatial epidemiology focuses on the use and interpretation of maps and the location of diseases and factors that are associated with those locations. The application of GIS in public health has been recognized for a wide range of uses such as demography and environmental epidemiology, surveillance and demographic analysis. Furthermore, it allows decision makers to identify areas, which have a high incidence of particular health problems, and allocate resources as needed.

III. HISTORICAL PERSPECTIVE
The first study using a classical spatial analysis in public health was done by John Snow during cholera epidemic in 1854 in London. John Snow provided a map to investigate the patterns of cholera epidemic. Through locating the cholera sufferers on the map, Snow found that the cholera cases were concentrated mainly in Broad Street, London. Further investigation of water supply networks, enabled Snow to conclude that the cholera epidemic was associated with water contamination.

Snow’s investigation showed that spatial analysis is a very helpful tool for understanding public health problems. Spatial analysis succeeds in investigating factors that are associated with the spatial pattern of cholera even though the microbiology of cholera, as *Vibrio cholera* was only found around 50 years later.

IV. THE APPLICATION OF SPATIAL ANALYSIS IN PUBLIC HEALTH
Spatia analysis of diseases is an important tool in epidemiological investigation. It is a helpful tool to investigate the aetiology of diseases or environmental hazards. English categorised studies of geographical variation in disease frequency into three categories. The first category, a simple spatial analysis, is visualized by the distribution of diseases on a map. The second type of geographical epidemiology looks at the relationship between the characteristics of diseases and their geographical characteristics, specifically biophysical and socio-demographic characteristics. This method is commonly called an ecological study. The third category is a study of population movement, as a study of the association between migration and risk of specific disease. Stated that other than mapping and ecological analysis, disease clusters are also a part of spatial analysis. Carpenter suggested that disease clustering can assist in three ways namely by identifying cluster epidemics quickly, identifying confounding factors, and developing hypotheses.

Shaw et al. differentiate the causes of the geographical variations as “context” and “composition.” The variation among areas may be due to differences between the areas in the resident population such as age, diet, socioeconomic status and named compositional factors. Contextual factors, on the other hand, refer to the differences due to the different exposure in those areas such as rural and urban areas. Furthermore, they pointed out that these two terms should be considered when analysing the geographical variation because the approaches to solve the problems are different.

Spatial analysis of water borne diseases such as cholera, diarrhoea and typhoid has been investigated by various researchers. They are similar in that they provide maps
to look at spatial patterns of particular diseases. However, they are different in that they used different types of maps to show the spatial pattern of diseases. King et al.\textsuperscript{12} analysed the spatial pattern of typhoid fever in a rural township, in Taiwan. This study provided scattered spots of typhoid in Chu-Tung Township. The map showed that typhoid cases were distributed mainly in the town. However, the methods of geocoding of the cases were less clear whether geocoding was done manually or automatically using GIS.

Another spatial analysis of water borne diseases was conducted by Dangendorf et al.\textsuperscript{11}. This study analysed the spatial pattern of diarrhoeal disease and its association with water supply in the Rhine-Berg District, Germany, at sub-district level. The data for gastrointestinal cases were collected from the Local Health Department in 1988-1999. According to this study, it was estimated that approximately 10% of cases were reported by the local health department. The data was presented in a choropleth map. This study found that the central and southern authority unit had 60 and 140 cases 100,000 inhabitants per year respectively, while the northern part had only 30 cases per 100,000 per year. Dangendorf et al.'s investigation also found a statistically significant relationship between the incidence of gastroenteritis and the number of people who had water supply from ground water. Some confounders were considered by the researcher such as population movement, number of physicians in each district, and private wells.

Kistemann et al.\textsuperscript{13} in Germany also conducted a spatial analysis of tuberculosis. This study used subdistrict level as the lowest level of administrative boundary. He found that TB among young people was concentrated in inner-urban areas while TB among elderly spread throughout the city. A similar analysis was conducted by Palm (1890), cited by English\textsuperscript{7}, which identified the geographic variations in rickets prevalence among some regions. This analysis hypothesized that low exposure to sunlight may lead to rickets. Lanchester (1956), cited by English\textsuperscript{7}, on the other hand, with similar methods, found that high exposure to sunlight might be associated with melanoma. These studies show that spatial analysis in public health can help to understand the risk factors of pattern differences.

V. ADVANTAGES AND LIMITATION OF SPATIAL ANALYSIS

There are several advantages of doing spatial analysis that is visualized in the form of a map. Firstly, maps provide answer to questions about location\textsuperscript{7}. Maps are easy to understand. They can provide spatial information that would be less clear in tables. Furthermore, they provide information about the areas, which are at high risks in specific health problem and detailed investigation. Studies can be expanded at individual level to investigate the causal relationship. Secondly, spatial analysis assists to identify areas in need of specific attention\textsuperscript{14}. Finally, Atkinson and Molesworth\textsuperscript{15} argue that for acute diseases, spatial analysis assists to identify how a disease spreads in the community because the diseases are sometimes reported shortly after discharge. Conversely, chronic diseases such as tuberculosis or HIV/AIDS are less easy to interpret\textsuperscript{16}. Several factors might influence this distribution. Migration, for instance, is the strongest influence on chronic diseases reporting. It is an acute disease. Therefore, mapping the TF will help to understand its spreading as it is less affected by migration.

Atkinson and Molesworth\textsuperscript{16} also identify some problems related to communicable diseases mapping. The first problem is that diseases and their risks tend to cluster. When disease is mapped in choropleth model, diseases are assumed to be distributed evenly in that area. In fact, the actual distribution of the cases could be heterogeneous. The second problem is that the population differs among areas. Therefore, standardisation is needed before inferring the association between risk factors and disease. The third problem is visualisation. Some areas will have a large number of cases while others have no cases. These problems might also appear in this study. Using disease incidence rates is one of the solutions to overcome the second problem.

Using an area approach, which focuses on group level rather than at individual level, would lead to the criticism of "ecological fallacy"\textsuperscript{17}. According to MacRae\textsuperscript{18} ecological fallacy happens when two variables are correlated in which the group is used as the unit of analysis. This correlation may be quite different from the correlation between those two variables when individual people are used as the unit of analysis. Another problem with ecological studies is the inability to control for confounding factors. Richardson and Monfort\textsuperscript{19} identified genetic characteristics, dietary habits as confounders. Similarly, socioeconomic status is another potential confounder which commonly occurs in ecological studies\textsuperscript{20,21}.

REFERENCES:


