Indian Journal of Public Health Research & Development
An International Journal

SCOPUS IJPHRD CITATION SCORE
Indian Journal of Public Health Research and Development
Scopus coverage years: from 2010 to 2017 Publisher: R.K. Sharma, Institute of Medico-Legal Publications
ISSN: 0976-0245 E-ISSN: 0976-5506 Subject area: Medicine: Public Health, Environmental and Occupational Health
CiteScore 2015- 0.02
SJR 2015- 0.105
SNIP 2015- 0.034
Indian Journal of Public Health Research & Development

EXECUTIVE EDITOR
Prof. Vidya Surwade
Prof. Dept of Community Medicine SIMS, Hapur

INTERNATIONAL EDITORIAL ADVISORY BOARD
1. Dr. Abdul Rashid Khan (Associate Professor) Department of Public Health Medicine, Penang Medical College, Penang, Malaysia
2. Dr. V Kumar (Consulting Physician) Mount View Hospital, Las Vegas, USA
3. Basheer A. Al-Sum, Botany and Microbiology Deptt, College of Science, King Saud University, Riyadh, Saudi Arabia
4. Dr. Ch Vijay Kumar (Associate Professor) Public Health and Community Medicine, University of Buraimi, Oman
5. Dr. VMC Ramaswamy (Senior Lecturer) Department of Pathology, International Medical University, Bukit Jalil, Kuala Lumpur
6. Kartavya J. Vyas (Clinical Researcher) Department of Deployment Health Research, Naval Health Research Center, San Diego, CA (USA)
7. Prof. PK Pokharel (Community Medicine) BP Koirala Institute of Health Sciences, Nepal

NATIONAL SCIENTIFIC COMMITTEE
1. Dr. Anju Ade (Associate Professor) Navodaya Medical College, Raichur, Karnataka
2. Dr. E. Venkata Rao (Associate Professor) Community Medicine, Institute of Medical Sciences & SUM Hospital, Bhubaneswar, Orissa
3. Dr. Amit K. Singh (Associate Professor) Community Medicine, VCSG Govt. Medical College, Sirsa – Garhwal, Uttarpradesh
4. Dr. R G Vivek (Associate Professor) Community Medicine, Belagum Institute of Medical Sciences, Belgaum
5. Dr. Santosh Kumar Mulga (Assistant Professor) Anatomy, Raichur Institute of Medical Sciences Raichur (RIMS), Karnataka
6. Dr. Gouri Ku. Padthy (Associate Professor) Community and Family Medicine, All India Institute of Medical Sciences, Raipur
7. Dr. Ritu Goyal (Associate Professor) Anaesthesiology, Saraswati Institute of Medical Sciences, Panchsheel Nagar
8. Dr. Anand Kalaskar (Associate Professor) Microbiology, Prathima Institute of Medical Sciences, AP
9. Dr. Md. Amirul Hassan (Associate Professor) Community Medicine, Government Medical College, Ambedkar Nagar, UP
10. Dr. N. Girish (Associate Professor) Microbiology, VIM&SRC, Bangalore
11. Dr. BR Hungund (Associate Professor) Pathology, JNMC, Belgaum
12. Dr. Sartaj Ahmad (Assistant Professor), Medical Sociology, Department of Community Medicine, Swami Vivekananda Subharti University, Meerut, Uttar Pradesh, India
13. Dr. Sumeeta Soni (Associate Professor), Microbiology Department, B.J. Medical College, Ahmedabad, Gujarat, India

NATIONAL EDITORIAL ADVISORY BOARD
5. Prof. Samarendra Mahapatro (Pediatrician) Hi-Tech Medical College, Burla, Orissa
6. Dr. Abhiruchi Gaihota (Additional Professor) Community and Family Medicine, All India Institute of Medical Sciences, Raipur
7. Prof. Deepthi Pruthvi (Pathologist) SS Institute of Medical Sciences & Research Center, Davangere, Karnataka
8. Prof. G S Meena (Director Professor) Maulana Azad Medical College, New Delhi
9. Prof. Pradeep Khanna (Community Medicine) Post Graduate Institute of Medical Sciences, Rohtak, Haryana
10. Dr. Sunil Mehra (Paediatrician & Executive Director) NANDA Health Institute of Mother & Child, New Delhi
11. Dr. Shailendra Handu, Associate Professor, Pharna, DM (Pharma, PG, Chandigarh)
12. Dr. A.C. Dharwad: Directorate of National Vector Borne Disease Control Programme, Dte. DGHS, Ministry of Health Services, Govt. of India, Delhi

Print-ISSN: 0976-0245-Electronic-ISSN: 0976-5506, Frequency: Quarterly (Four issues per volume)

Indian Journal of Public Health Research & Development is a double-blind peer reviewed international journal. It deals with all aspects of Public Health including Community Medicine, Public Health, Epidemiology, Occupational Health, Environmental Hazards, Clinical Research, and Public Health Laws and covers all medical specialties concerned with research and development for the masses. The journal strongly encourages reports of research carried out within Indian continent and South East Asia.

The journal has been assigned International Standards Serial Number (ISSN) and is indexed with Index Copernicus (Poland). It is also brought to notice that the journal is being covered by many international databases. The journal is covered by EBSCO (USA), Embase, EMCare & Scopus database. The journal is now part of DST, CSIR, and UGC consortia.

Website: www.ijphrd.com

©All right reserved. The views and opinions expressed are those of the authors and not of the Indian Journal of Public Health Research & Development. The journal does not guarantee directly or indirectly the quality or efficacy of any product or service featured in the advertisement in the journal, which are purely commercial.

Editor
Dr. R.K. Sharma
Institute of Medico-legal Publications
501, Manisha Building, 75-76, Nehru Place, New Delhi-110019

Printed, published and owned by
Dr. R.K. Sharma
Institute of Medico-legal Publications
501, Manisha Building, 75-76, Nehru Place, New Delhi-110019

Published at
Institute of Medico-legal Publications
501, Manisha Building, 75-76, Nehru Place, New Delhi-110019
## Contents

**Volume 9, Number 2  
April-June 2018**

1. A Study of Perception and Motives Towards Participation in Clinical Research in India ........................................... 1  
   *Amit Marwah, Neyaz Ahmed, Nidhi, Rajesh Ranjan, Mitasha Singh, Ranabir Pal*

2. Assessment of Knowledge Regarding Post Exposure Prophylaxis Following Needle Stick Injury among B. Sc. Nursing Students ................................................................. 6  
   *Anjana A. P., Gisha Joseph, Revathy A. Valsan*

3. Effect of Body Mass Index and Age on Visual Reaction Time in Recreational Badminton Players. A Cross-Sectional Study ..................................................................................... 11  
   *Rrutu Rajkumar Singhal, Ashish Prabhakar, Shyam Krishna k, Gopala Krishna Alaparthi*

4. Cytomegalovirus Pneumonia in Critically Ill Patients ................................................................................... 16  
   *Gurmeet Singh*

5. Knowledge, Attitude and Risk Perception for Diabetes among Pregnant Women with Gestational Diabetes Mellitus ................................................................................................. 19  
   *Judith A Noronha, Sushmitha R Karkada, Anusuya Prabhu, Shobha, Sonia RB D’Souza, Sweety J Fernandes, Pratibha Kamath*

6. Study to Assess the Seizure Severity, Depression and Quality of Life among Patients with Epilepsy at AIMS, Kochi .................................................................................. 25  
   *Antony T, Kanmani J, Anjana A.P*

7. Factors Influencing Non-use of Family Planning among Rural Adolescent Girls in Malawi  
   *Kennedy Machira, Beston B. Maonga*......................................................... 30

8. Performance Evaluation of Adtree, Functional Tree and LMT Classifiers with CFS Subset Evaluatator for Intelligent Heart Disease Prediction .................................................................................. 37  
   *Lakshmi Devasena C*

9. Assess the Level of Stress among Antenatal Mothers .................................................................................. 43  
   *Linda Varghese, Aswathy Krishnan, Anitha Joseph, Dimna Davis*

10. Development and Statistic Analysis of Psychology-Numerology Module for Character Building in Malaysia .................................................................................................................. 48  
    *Mohammad Aziz Shah Mohamed Arip, Nadratul Shima Salim, Bazlan Mustafa, Fauziah Sa’ad*

11. Establishing Internal Consistency of the Attitudes to Back Pain Scale (ABS-mp) in Indian Physiotherapists .......................................................................................................................... 54  
    *Nitesh Bansal, Puja Chhabra Sharma, Raju K Parasher*

12. Knowledge, Attitude and Practice of Tobacco use among Children in a School, Pune: A Cross Sectional Survey .................................................................................................................. 59  
    *Aditi Mahalle, Mamatha G.S Reddy, Srushti Putta, Nitin Gupta, Supriya Kheur*
13. Reproductive Health Problems Associated with Thyroid Disorders among Health Science Students
   Nitin Joseph, Aditya Reddy GR, Vishakha Patel, Divya Joy, Pooja Santhosh, Shatarupa Das,
   K. Siddharth Reddy

14. Effectiveness of Short Message Service (SMS) Intervention for Promoting Safe Sex among
   Army Conscripts in a Province in Thailand
   P. Eaimkhong, U. Perngparn

15. Work Life Balance among IT Industry-An Empirical Study
   R. Amutha

16. Effectiveness of Gooseberry Juice with Honey and Guava Juice with Honey Compared with Control
   on Physiological Parameters among Adolescent Girls Studying in Selected Schools
   R. Reeta, R. Vijayaraghavan, Rajeswari Vaidyanathan

17. A Study on Knowledge, Attitude and Practice on the Usage of Edible Salt among the
   Population in an Urban Area
   A Revanth Kumar, N Partha Sarathy, Chandrasekhar Reddy B, M. Ravikiran

18. A Prospective Study of Clinical Profile and Role of Fiber Optic Bronchoscopy in Patients with
   Sputum Negative for AFB with Undiagnosed Lung Lesions in Chest X-Ray
   Rajesh B P, Saroja C Kamatar, Vijay Kumar

19. Randomized Control Study of Foley Bulb and Vaginal Misoprostol Compared with Vaginal
   Misoprostol alone in Induction of Labour
   Ashwini M N, Saroja C Kamatar, Deepika Mann

20. Iodine Deficiency Disorder in Rural Population: A Community Based Observational Study on
    Prevalence in Coastal Area of Tamil Nadu State, South India
    Senthilvel Vasudevan, Priyankaraj CK, Sumathi Senthilvel, Jayanthi Sureshbabu

21. The Study of the Relationship between Normative and Informative Identity Styles with
    Differentiation of Self and Psychological Well-being of the Students
    Parvin Ghader, Fatemeh Moradi

22. Study of Management Programmes in “Benign Paroxysmal Positional Vertigo”
    Shilpi Jindal, Rajendra Sharma

23. Knowledge and Attitude about Internet Resources among Physiotherapy students in Mangalore
    Vijay Kumar K, Shreekanth D. Karnad

24. Study of Correlates of Infertility among Females Attending Infertility Clinic in Tertiary Care Centre
    Shweta N. Salphale, Vinod D. Mundada, Ganesh S. Lokhande, B. M. Kuril, Mohan K. Doibale

25. Depression and it’s Risk Factors among Patients Waiting for Solid Organ Transplantation
    Attending Selected Units of a Tertiary Hospital, Kochi
    Sreedevi PA, Shinee William, Shania Mathew, Sandhya P Sudhakar

26. Exploratory Study on Experience of Domestic Violence among Women
    Raveesh Kaimal, Sreedevi P. A., Febu Elizabeth joy

27. Effect of Quality of Antenatal Care and Perinatal and Postnatal Outcomes among Women Availing
    Routine Antenatal Services in a Primary Health Care Setting in a Rural Area of South India
    Avita Rose Johnson, Surekha A, Suguna A, Twinke Agrawal, Naveen Ramesh, Sulekha Thimmaiah

28. Noncompliance and its Contributing Factors among Patients with Tuberculosis
    Thanu K. M., Maya M. S., Nimmi Francis
29. The Determinants of Safety Behavior in Hospital ................................................................. 147
   Tri Martiana, Suarnianti

30. Relationship Between Nutrition, Socioeconomic Status and Fitness in Elementary School Children:
    A Review of the Literature .................................................................................................. 154
   Kshitija Patki, Barkha Bhatnagar, Raju K. Parasher

31. A Study of Coffee Addiction in the Medical College, Engineering Students and in
    General Population of in and around Pondicherry ......................................................... 160
   E.Prabhakar Reddy, R.Senthil Kumar, S.Arun, R.Srikumar, R.Chidambaram

32. Biological War and Chemical Warfare-Status of AIDS ..................................................... 165
   T. Mohana Lakshmi, B. Sai Ravi Kiran, E Prabhakar Reddy

33. Evaluation of Total and Conjugate Bilirubin Levels Before and After Phototherapy .......... 170
   E. Prabhakar Reddy, B. Muthukumaraswamy, S. Paneerselvam, B. Sai Ravi Kiran

34. Macronutrient Status in Children Aged 1-6 Years in and around Pondicherry .......... 174
    E. Prabhakar Reddy, R. Geetharani, K. M. Roop Kumar, T. Mohana Lakshmi, Rajini

35. Evaluation of Vitamin A and E Levels in Chronic Renal Failure ........................................ 179
    Salma Mahaboob, R. Geetharani, T. Mohana Lakshmi, E. Prabhakar Reddy

36. Tender Coconut Water Uses, Health Benefits, Good Nutritive Value and Antioxidant Capacity .......... 184
    E. Prabhakar Reddy, K. M. Roop Kumar, T. Mohana Lakshmi, Sai Ravi Kiran

37. The Strategy in Improving Quality of Health Services for Patient Satisfaction in
    Community Health Clinic (Puskesmas) North Jayapura, Jayapura City .............................. 189
    Vince Tebay

38. Effect of Nutrition Peer Counseling and Breastfeeding the Improvement in Exclusive Breastfeeding
    and Infant Nutrition Status in Sub LubukPakam and TanjungMorawa, Deli Serdang .......... 194
    Mahdiah, Albiner Siagian, Evawany Y Aritonang, Namora Lumongga Lubis

39. Relationship of Employee Ethnic Background in Validation of Situational Leadership Theory ........ 200
    Fitriani, Philipus Betaubun, Ermelinda A.G. Pure, Dedy Tikson, Edoardus E. Maturbongs, Theresia
    Widi asih Cahyanti, Ruloff Fabian Waas

40. The New Species Anopheles aitkeni as the Threat of Malaria in Indonesia .......................... 206
    Mursid R, Yusniar HD, Praba G

41. Self-Care Activity Determination of Diabetes Mellitus Type-2 Patient in Labuang Baji Hospital .......... 211
    Ida Leida Maria, Natalia Paskawati Adimunja, Ridwan Thaha, Nurhaedar Jafar, Anwar Mallongi

42. The Keiki Formation and the Flowering of Pseudobulb of Dendrobium johannis Rchb. f. .............. 216
    Ni Luh Sri Suryaningsih, La Hisa, Amelia Agustina Limbongan, Anwar Mallongi

43. Risk Analysis of Dengue Fever Occurrence in Bone Province Sulawesi South Using
    Temporal Spatial Geostatistical Model .............................................................................. 221
    Stang Abdul Rahman, Amran Rahim, Anwar Mallongi

44. Analysis of Risk on the Incidence of Scabies Personal Hygiene in Boarding School
    Darul Arqam Gombara Makassar ..................................................................................... 227
    Anwar Mallongi, Ayu Puspitasari, Muhammad Ikhtiar, Arman, Arsunan, A. A.
45. Feasibility Analysis of Facilities and Hygiene Workers and Firms in UPTD Cattle Slaughter of Kendari City in 2017 ............................................................... 232
   Yusuf Sabilu, Jafriati, Farit rezal, Andi Faisal Fachlevy, Fifi Nirmala, La Ode Ahmad Saktiansyah, Syawal Kamiluddin Saptaputra

46. Behavior of Tuberculosis Pulmonary Disease Prevention in South Sulawesi, Indonesia ......................... 238
   Herman, Edi Sukamto, Syahida Djasang

47. Evaluation of Irrigation Performance in Semangga, Merauke Regency, Indonesia .............................. 243
   Yosehi Mekiuw, Diana Sri Susanti, Jayadi, Anwar Mallongi

48. Effectiveness of Non Pharmacologic Therapy through Surveillance Approach to Blood Pressure Degradation in Primary Hypertension Patients, Indonesia .............................................. 249
   Masriadi, Rahmawati Azis, Eha Sumantri, Anwar Mallongi

49. Expression of Foxp3 mrna on Preeclampsia with Adaptation Theory ............................................. 256
   Yudit Patiku, Rosdiana Natzir, Mochammad Hatta, Ariyanti Saleh, Elly Syattar, Yusmina Hala, Salmah Arafah

50. Lived Experiences of Patients with Chronic Obstructive Pulmonary Diseases (COPD)-Qualitative Review 262
   Flavia Castelino, Mukhyaprantha Prabhu, Mamatha Shivananda Pai, Asha Kamath, Aswini K Mohapatra, Elsa Sanatombi Devi

51. Worker Personality as a Predictor in Compliance Model on Work Safety Regulations .......................... 266
   Hadi Prayitno, Heru Santoso Wahito Nugroho

52. Effectiveness of Mindfulness Based Cognitive Therapy (MBCT) on Self-Efficacy Enhancement of the War Wounded ................................................................. 271
   Mohammad Ebrahim Hokmabadi, Abbas Kalantar, Mohammad Javad Asghari Ebrahimabad, Sepideh Rezapoor Lakani, Hossren Khosroshahi, Shamim Razaghi Kashani, Seyed Mohammad Mahdi Moshirian Farahi

53. Age Related Changes in Proximal Femoral Morphometry: A Cross Sectional Study on Estern Odisha Population ............................................................................. 277
   Lopamudra Nayak, Pratima Baisakh, Susmita Senapati, Prafulla Kumar Chinara

54. Effectiveness of an Awareness Programme on Exclusive Breastfeeding for the ASHA Workers of Udupi District .............................................................................................................. 282
   Shashidhara YN, Ansuya, Celastin, Anice George

55. Increasing Inpatient Service Quality of Using Quality Function Deployment Method in Nene Mallomo Hospital of Sidrap Regency, Indonesia ......................................................... 287
   Darmawansyah, Muhaminah Said, Rahmatia Yunus, Sukri Palutturi

56. Determination of Birth Weight from Placental Morphometry .................................................................. 292
   Senapati Susmita, Shashi Shankar behera, Lopamudra Nayak, Prafulla kumar chinara

57. Testing the Level of Awareness on Testicular Cancer among the UAE Residents ................................. 296
   Elizabeth Topolskaya, Iqra Ghani, Jessica D'Silva, Abdulrahman Abdulwahab, Siraj AlAbayechi, Rami El Khatib

   Renjulal Yesodharan, Vishnu Renjith, Tessy Treesa Jose

59. A Three Year Review of Uterine Rupture in Tertiary Hospital: Lessons for Obstetric Care ............... 307
   Parveen Rajora, Amanjot Rajpal
60. Sensory Motor Stimulation and Weight Gain among Preterm Newborns ....................................................... 312
   Maheswari.G., N. Ganapathy, Radha Kumar

61. Is Really Prefeeding Sensory Motor Stimulations had Significant Impact on Feeding Parameters in Premature Infants?–An Evidence Based Report ................................................................. 315
   Maheswari.G., N. Ganapathy, Radha Kumar

62. A Study to Assess Functional Assessment and Lived Experiences of Cervical Cancer Patients Admitted to a Tertiary Level Hospital of Udupi District, Karnataka-a Mixed Method Protocol ........ 321
   Sonia R.B D’Souza, Ranjani P, Sweety Fernandes, Pratibha, Judith Noronha, Sushmitha Karkada, Shoba Kamath

63. Influence Perceived Benefit and Perceived Self Efficacy with Intention of Adolescent Girls in Consuming FE Tablet ........................................................................................................... 326
   Faradina Nur Annisa, Ira Nurmala

64. The Level of Environmental Sanitation and the Incidence of Tuberculosis in Jember and Situbondo, Indonesia .................................................................................................................. 330
   Isa Ma’rufi, Abu Khorir, Khaidar Ali, Heru Santosoo Wahito Nugroho

65. Analysis of Interest in the First Health Facility to Refer Patients to Jombang General Hospital as Advance Health Facility and the Influence Factors ............................................................................. 336
   Sandu Siyoto, Rosa Indrawati
The Level of Environmental Sanitation and the Incidence of Tuberculosis in Jember and Situbondo, Indonesia

Isa Ma’rufi¹, Abu Khorir¹, Khaidar Ali¹, Heru Santoso Wahito Nugroho²

¹School of Public Health, University of Jember; ²Health Polytechnic of Ministry of Health at Surabaya, Indonesia

ABSTRACT

Tuberculosis is an important public health problem in worldwide, which World Health Organization (WHO) declares tuberculosis (TB) as “Global Emergency” in 1992. The aim of this study was to describe the hygiene and environmental sanitation conditions, and to determine the association between hygiene and environmental sanitation and Tuberculosis incident in Indonesia. The design of the study was cross sectional. The sample of the study was selected using simple random sampling. Data was analyzed using coefficient contingency test. The result of coefficient contingency test was 0.7. The most of TB patients have low hygiene and environmental sanitation, and environmental sanitation level and TB patients have strong association.

Keywords: Tuberculosis, Hygiene, Sanitation, Environment

INTRODUCTION

WHO reports in 2018 noted that tuberculosis is one of the top 10 causes of death worldwide. In 2016, 10.4 million people fell ill with TB and 1.7 million died from the disease[1]. Furthermore, an estimated 1 million children became ill with TB and 250,000 children died of TB in 2016. Most of the estimated number of incident cases in 2016 occurred in the South-East Asia (45%), Africa (25%) and Western Pacific (17%), and then the smaller proportions of cases occurred on Eastern Mediterranean (7%), Europe (3%) and America (3%)[2].

Indonesia is one of countries that has high cases of TB. Indonesia has tropical climate, and this circumstance make Indonesia as one of the TB endemic countries. Tuberculosis is the third leading cause of death in Indonesia after cardiovascular disease and respiratory disease, then the first causes on infectious disease[3]. Based on WHO report, Indonesia has the highest TB cases in the world after India. In 2016, 351,893 cases were found in Indonesia, and the highest TB cases were reported in province with high population density, such as West Java, East Java and Central Java, respectively[4].

Tuberculosis is caused by members of the Mycobacterium tuberculosis complex; usually the human tubercle bacillus, M. tuberculosis, but occasionally by the bovine tubercle bacillus, M. bovis, or by M. africanum[5]. The main cause of tuberculosis is: Poverty on community in development country, TB treatment failing (inadequate commitments of political and funding aspect, inadequate TB service organization, inadequate case management, misperception of benefits and effectiveness of Bacillus Calmette-Guerin, BCG), Demographic changes due to both the increasing of world population and the changing of age structure, The impact of pandemic[3]. Indonesian Health office also noted TB is often associated with low sanitation level and limited access of healthy living behavior in community[6]. Environmental plays a role in disease development such as humidity and number of people living in the house, then adult crowding, increased family size, use of biofuels, overcrowded housing and poor ventilation increase both the likelihood of exposure to Mycobacterium tuberculosis and progression to disease[7],[8]. Furthermore, indoor air pollution and tobacco smoke play a significant role at both the individual and population level related with tuberculosis incident[9]. Therefore hygiene and environmental sanitation aspects have important role on Tuberculosis incident.

Corresponding Author:
Heru Santoso Wahito Nugroho
Health Polytechnic of Ministry of Health at Surabaya, Indonesia
Pucang Jajar Tengah Street 56 Surabaya, Indonesia
Email: heruswn@gmail.com
The aim of this study was to describe the hygiene and environmental sanitation conditions among Pulmonary TB patient and to determine the association between hygiene and environmental sanitation and Tuberculosis incident in Situbondo and Jember Regency, Indonesia.

**MATERIAL AND METHOD**

Jember Regency area is a land area of 3,294.34 km², which has 31 sub-districts, 248 villages and 49 Public Health Center[10]. Furthermore, Situbondo Regency is a land area of 1,638.5 km² with a position in between 7035’-7044 at the South Latitude and 113030’-114042’ at the East Longitude. Situbondo Regency has 17 sub-districts, 132 villages, and 17 Public Health Center[11]. The study was held on 22 February 2013 until 23 September 2013.

Population is a generalization of region consisting of object or subject that have certain qualities and characteristics set by the researcher to be studied and drawn conclusions[12]. The population of the study was all new positif patient of pulmonary TB that perform treatment at primarily health office in Jember and Situbondo Regency. Population size was 2,733 new pulmonary TB patients, which the proportion of pulmonary TB patients both in Jember Regency and in Situbondo Regency were 2,176 patients and 557 patients, respectively. Sample selected using simple random sampling[13]. Sample size was 183. However, the author taken 190 pulmonary TB patients as sample to get both valid and heterogenous data. The inclusion criteria of sample was the age of respondent ≥15 years old.

The type of the study was observational analytic. Observational analytic is a research to explore how and why health phenomena occur and to analyze the dynamic correlation between risk factors[14]. The design of the study was cross sectional. The hygiene and environmental sanitation variable was consist of housing, clean water source, toilet, sewerage system, bedroom condition, mosque and bathroom, which the total score of each variable was 52, 63, 51, 28, 57, 5, 32, 16, 44.5, respectively. Therefore, the total score of hygiene and environmental sanitation was 344.

The classification of the level of hygiene and environmental sanitation of this study were high and low levels. The high sanitation level criterion was shall above 80% from total score. Therefore, to determine the high level, the total score of hygiene and environmental sanitation was multiplied by 80%, thus the high sanitation level was 275.2. Data analyzed using coefficient contingency test.

**FINDINGS**

<table>
<thead>
<tr>
<th>Table 1: Housing and Environmental Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>Wall</td>
</tr>
<tr>
<td>Brick</td>
</tr>
<tr>
<td>Wood</td>
</tr>
<tr>
<td>Bamboo</td>
</tr>
<tr>
<td>Floor</td>
</tr>
<tr>
<td>Tile</td>
</tr>
<tr>
<td>Ceramics</td>
</tr>
<tr>
<td>Soil</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>Roof</td>
</tr>
<tr>
<td>Tin/zinc</td>
</tr>
<tr>
<td>Asbestos</td>
</tr>
<tr>
<td>Dried clay</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>Clean Water Source</td>
</tr>
<tr>
<td>Protected Water Source</td>
</tr>
<tr>
<td>Seller</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>Toilet</td>
</tr>
<tr>
<td>Private</td>
</tr>
<tr>
<td>Public</td>
</tr>
<tr>
<td>River</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>Feces Storage</td>
</tr>
<tr>
<td>Saptictank (&lt;7m)</td>
</tr>
<tr>
<td>Saptictank (&gt;7m)</td>
</tr>
<tr>
<td>Digged-hole soil</td>
</tr>
<tr>
<td>Through dam</td>
</tr>
<tr>
<td>Through river</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>House waste Placement</td>
</tr>
<tr>
<td>Not specific</td>
</tr>
<tr>
<td>Tank</td>
</tr>
<tr>
<td>Digged-hole soil</td>
</tr>
<tr>
<td>Others</td>
</tr>
</tbody>
</table>

The most of house used brick as wall, ceramics as floor, clay as roof. The most of respondents used well water as clean water source, used private toilet and used...
The availability of environmental facility was provided by local government. The garbage placement, public toilet, and clean water source was provided by local government. Furthermore, 54.7% of respondent claim that waste placement was not provided by local government.

### Table 3: Hygiene and Environmental Sanitation Level

<table>
<thead>
<tr>
<th>Hygiene and Environmental Sanitation Level</th>
<th>Frequency</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Location</td>
<td>190</td>
<td>190 (100)</td>
</tr>
<tr>
<td>Clean Water</td>
<td>191</td>
<td>191 (100)</td>
</tr>
<tr>
<td>Toilet</td>
<td>192</td>
<td>192 (100)</td>
</tr>
<tr>
<td>Sewerage System</td>
<td>193</td>
<td>193 (100)</td>
</tr>
<tr>
<td>Waste Management</td>
<td>194</td>
<td>194 (100)</td>
</tr>
<tr>
<td>Bedroom</td>
<td>195</td>
<td>195 (100)</td>
</tr>
<tr>
<td>Mosque</td>
<td>196</td>
<td>196 (100)</td>
</tr>
<tr>
<td>Bathroom</td>
<td>197</td>
<td>197 (100)</td>
</tr>
</tbody>
</table>

The hygiene and environmental sanitation per aspect of respondent. The aspects of hygiene and environmental sanitation are housing location, clean water, toilet, sewerage system, waste management, the condition of bedroom, mosque and bathroom of respondent. The aspect of housing location, clean water, toilet, mosque and bathroom has high level. However, the aspect of sewerage system, waste management, and bedroom condition of respondent has lower level.

### Table 4: Cross tabulation between TB Patients and Environmental Sanitation Level

<table>
<thead>
<tr>
<th>Environmental Sanitation Level</th>
<th>High (%)</th>
<th>Low (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB Patients</td>
<td>54 (28.4)</td>
<td>136 (71.6)</td>
<td>190 (100)</td>
</tr>
</tbody>
</table>

The statistical test value is 0.7 with approx. Sig 0.475.

Table 4 showed the cross tabulation between TB patient and environmental sanitation level, which 71.6% of TB patient has low environmental sanitation level. Besides, based on coefficient contingency assessment, the value of TB patients and sanitation level was 0.7.

### DISCUSSION

Environment is one of the main factors that affect the morbidity level among society. It is described by H. Blum that environment, heredity, lifestyle, and health care service are factors that affect morbidity level[15]. WHO describes that the determinant factors of health include: social and economic environment, physical environment, and the individual characteristic[16]. Therefore, environment is the important factor of health.

There are several diseases that relate with environmental factor, such as diarrhea, dysentery, dengue fever, tuberculosis and so on[17,22]. Tuberculosis is caused by bacteria that most often affect the lungs[3]. Smoker, household crowding, history of household exposure to a known TB case, and absence of a ceiling in the house are affecting TB incidence[23]. Coker describes the main risk factors for tuberculosis were low accumulated wealth, financial insecurity, consumption of unpasteurized milk, diabetes living with a relative with tuberculosis, living in crowded conditions, illicit drug use, and a history of incarceration in both pretrial detention centers and prison[24]. Pulmonary TB incident is associated with environmental aspect, which environment is risk factor of TB incident among community.

The aspects of housing and environmental are wall, floor, roof, clean water source, toilet, feces storage, house waste placement. Based on the results, the proportion of respondent used brick as wall material is high. Brick is...
ideal material for wall because brick is strong material. Therefore, it prevents the hazard condition among inhabitant. The proportion of respondent used ceramics as floor and dried clay is high. Both waterproof floor and easy to clean is used to prevent the bacteria to grow, whereas dried clay as roof material is used to decrease the temperature in house.

Generally, respondent get the clean water from well as source, and the proportion of respondent used private toilet is high. Most of respondent used saptic tank as feces storage, although the distance is >7m from clean water resource. Water is essential element for human, which daily water-need both male and female is 3.7L and 2.7L, respectively. Therefore, human cannot separate with clean water source to improve their quality of life.

There are several clean water source found in Indonesia, such as well, artesian, PDAM (water provider institution), etc. However, the proportion of respondent used well is high. Budiarti Agnes on Assessment of The Quality of Well Water showed that well water quality in Gubug Grobogan based on physical parameter have appropriated with standard but well near the Gubug village river have not appropriated with color standard, while based on microbiological parameter Coliform total have not appropriated with standard. The potential components can contaminate well water is liquid waste penetrate of organic and inorganic fertilizer, domestic waste, and the distance of making the well with septic tank. Based on The Regulation of Health Ministry of Indonesia, safe water to drink must fulfill the physics, microbiological, chemistry, and radioactive parameter.

The proportion of respondent used digged-hole soil as house waste placement is high. The ideal form of house waste placement is waterproof tank and has cover to prevent vector growing, such as cockroach, mosquitos, fleas, etc. WHO noted that vector-borne disease account for more than 17% of all infectious diseases, causing more than 70,000 deaths annually.

Garbage placement, public toilet, and clean water source are provided by local government. However, waste placement facility is not provided. Generally, the availability of environmental facility is important in communities, because it can improve the environmental sanitation level. The availability of clean water source, garbage placement, public toilet, and sewerage system is necessary to prevent disease in community. Based on Health Office of East Java Indonesia, sanitation access related with Open Defecation Free (ODF) has reached 82.88%, and then villages with ODF status has reached 2005 villages (25.96%) by 7724 village in East Java, Indonesia.

The hygiene and environmental sanitation level of housing location, clean water, mosque and bathroom is classified as high categories, while sewerage system, waste management, and bedroom aspects are classified as low categories. One of several aspects of bedroom condition is the density of inhabitant, which there are several research mention that pulmonary TB has correlation with high density level.

Respondents who has pulmonary TB are classified low level of environmental sanitation. This result is similar with Lienhardt’s study that environmental factors may have an impact on the incident of tuberculosis in a given population as a result of their effect on both the risk of infection and the risk of disease once a person is infected, and physical condition of the house is a risk factor for pulmonary tuberculosis. The environmental sanitation level and TB patients has strong association.

CONCLUSION

Based on coefficient contingency, the environmental sanitation level and TB patients has strong association. Therefore, most of TB patients have low hygiene and environmental sanitation.

Conflict of Interest: The authors state that there is no conflict of interest in this study.

Source of Funding: All funds of this study comes from the researchers.

Ethical Clearance: This research has passed in ethical assessment at University of Jember.

REFERENCES


26. Budiarti A, et al. Study of Well Water Quality as a Drinking Water Source in Gubug Village, Gubug Sub-district, Grobongan District (Kajian Kualitas Air Sumur Sebagai Sumber Air Minum


31. Lienhardt C. From Exposure to Disease: The Role of Environmental Factors in Susceptibility to and Development of Tuberculosis. Epidemiologic Review. 2000;23(2):288-301