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The Council of Rector of Indonesian State University (CRISU)
and The Council of University President of Thailand (CUPT)

“EXPLORING RESEARCH POTENTIALS”

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SRIWIJAYA UNIVERSITY
PALEMBANG, INDONESIA, 20-22 OCTOBER 2011

FOREWORD

Dear special guests:

Minister for National Education, Ambassadors of Thailand for Indonesia, Ambassadors of Indonesia for Thailand, all delegates from The Council of Rector of Indonesian State University (CRISU) and The Council of University President of Thailand (CUPT), Government of South Sumatra and Palembang City, and all The 6th CRISU-CUPT Conference, International Seminar and Exhibition participants

On behalf of the Sriwijaya University as Host University, I would like to extend my warmest welcome to all of the participant of The 6th CRISU-CUPT Conference, International Seminar and Exhibition, held on 20th-22nd October 2011 at Sriwijaya University Palembang with the join theme "Exploring Research Potentials".

There will be many challenges and opportunities in higher education in the Asean Community in the next decade. This is, therefore, considerable significant will arise from the The 6th CRISU-CUPT Conference, International Seminar and Exhibition. The previous five CRISU-CUPT conferences have been sigificantly deepening the relationships and come up with very fruitfull discussion in various subjects of collaboration and cooperation, for example, global warming, global mobility, academic interaction and cross-fertilization. The 5th conference was held in Chiang Mai, Thailand on July 7th-9th 2010 and appointed Sriwijaya University as a host for the 6th conference.

The 6th CRISU-CUPT conference will include many agenda, with not only include the meeting of the President Forum, the Dean Forum, and the Student Forum, but also will include international Seminar and Exhibition. This conference, therefore, might come up with more fruitfull conclusion and deepest commitment among participants.

With regard to considerable conference agenda, we greatly appreciate any support and sponshorship derived from any govermental as well as private institutions for the success of the conference. Great appreciation is also handed to organizing committe of the conference for any voluntarily effort that bring to the succes of the conference.

The 6th CRISU-CUPT Conference, International Seminar and Exhibition is being attended by about 600 participants. I hope you enjoy the beauty of Palembang City as one of the oldest city in Indonesia which is 1318 years old, established during the glory of the vast Sriwijaya Kingdom. The city also have variety of interesting culture and places.

Palembang, October 2011
Chairperson,



Prof. Dr. Badia Perizade, M.B.A
Rector of Sriwijaya University

TABLE OF CONTENTS

Foreword	i
Table of Contents	i
Papers of Keynote Speakers:	
1. Mental Illness In Australia (Dr. Melanie Bournnell, University of Newcastle Australia)	i
2. Chemical Toxicology towards humans health and EHIA (Environmental Health Impact Assessment) in Thailand (Prof.Kraichat Tantrakarnapa, Faculty of Public Health, Mahidol University, Thailand)	x
3. Nutrition transition in Indonesia (DR. Ir. Judhiastuty Februhartanty, M.Sc, SEAMEO RECFON Indonesia, Indonesia University)	x
4. Cancer : Genetic And Environmental Causes And Risk Factors (Prof Dato' Dr. M.S. Lye, University Putra Malaysia)	
5. Accelerating Diversification In Food Consumption Based on Indigenous Resources as An Alternative Action To Support Food Security In Indonesia (Prof. Dr.Rindit Pambayun, M.P, Sriwijaya University, Indonesia)	
Papers of Presenters:	
A. Food Security	
1. Diversity, Domination, and Distribution Of Rice Stem Borer Species and it Interaction with Egg Parasitoids in Various Land Typology in Jambi (Wilyus ¹ , Siti Herlinda ² , Chandra Irsan ² , Yulia Pujiastuti ² : Agriculture Faculty of Jambi University, Faculty of Agriculture, Sriwijaya University)	
2. Land Suitability for <i>Elaeis Guineensis</i> Jacq Plantation in South Sumatra, Indonesia (M. Edi Armanto* ^{1,2} , M.A. Adzemi ² , Elisa Wildayana ¹ , M.S. Imanudin ¹ , S.J. Priatna ¹ and Gianto ³ : ¹ Faculty of Agriculture, Sriwijaya University, South Sumatra, Indonesia, ² Faculty of Agrotechnology and Food Science (FASM), UMT Terengganu, Malaysia, ³ Forestry Delineation Agency, Department of Forestry, Indonesia)	1
3. From Economic Valuation to Policy Making in Forest Conversion for <i>Elaeis Guineensis</i> Jacq Plantation (Elisa Wildayana* ¹ , M. Edi Armanto ¹ and M.A. Adzemi ² : ¹ Faculty of Agriculture, Sriwijaya University, Indonesia, ² Faculty of Agrotechnology and Food Science (FASM), UMT Terengganu, Malaysia)	1
4. Floating Agriculture Model from Bamboo for Rice Cultivation on Swamp Land At South Sumatra (Siti Masreah Bernas, Siti Nurul A.F. and Agung Maulana : Soil Science Program Study and Low Land Management Field, Agricultural Faculty, Sriwijaya University)	2
5. The Responsiveness of Jambi Rice Acreage to Price and Production Costs (Edison: Faculty of Agriculture, Jambi University, Indonesia)	3

6. Wage Rigidity Analysis as an Indicator of Agricultural and Non Agricultural Labor Market Distortions In Indonesia: Error Correction Model (ECM) Approach (Dessy Adriani², Andy Mulyana³, Amruzi Minha³, Nurlina Tarmizi³: Faculty of Agriculture, Sriwijaya University, Indonesia) 40
7. Predator *Aphis gossypii* on Vegetable at Low Land areas in South Sumatera (Khodijah, Haperidah Nunilahwati, Dewi Medalima : Faculty of Agriculture, Sriwijaya University, Indonesia) 49
8. Population and Attack of *Liriomyza Sativae* (Diptera : Agromyzidae) and Its Interaction with Parasitoid on Tomato Cropping in Lowland of South Sumatra (Siti Herlinda, M. Yunus Umar, Yulia Pujiastuti, and Rosdah Thalib, Chandra Irsan : Plant Pest and Disease Department, Faculty of Agriculture, Sriwijaya University) 56
9. Integration of Palm Fruit Plantation And Cattle; Potential System to Improve Cattle Production (Armina Fariani, Arfan Abrar and Gatot Muslim : Animal Science Department, Faculty of Agriculture, Sriwijaya University) 66
10. Application of *Penicillium* spp. Produced in Waste Materials to Control Neck Root Rot Diseases Caused by *Sclerotium rolfsii* Sacc. on Chili (A. Muslim; Sari Eka Permata; Harman Hamidson : Program Study Agroecotechnology, Faculty of Agriculture, Sriwijaya University) 70
11. Purification and Characterization Collagenase from *Bacillus licheniformis* F11.4 (Ace Baehaki¹, Maggy T.Suhartono², Sukarno², Dahrul Syah², Azis B.Sitanggang², Siswa Setyahadi³ and Friedhelm Meinhardt⁴ : ¹Departement of Fisheries Product Technology, Faculty of Agriculture Sriwijaya University, ²Faculty of Agricultural Technology Bogor Agricultural University, ³Agency for the Assessment and Application of Technology, Republic of Indonesia, ⁴Institute for Molecular Microbiology and Biotechnology, University of Munster Germany) 75
12. Biological Reproduction *Menochilus Sexmaculatus* (F.) Predator Chili (*Aphis Gossypii* Glover) From Central Vegetable At Low Land Areas In South Sumatera (Haperidah Nunilahwati, Dewi Meidalima, dan Khodijah : Agriculture Faculty of Sriwijaya University, Indonesia) 84
13. Competitiveness and Minimum Regional Price of Arenga Palm Sugar ; Case Study of Small Palm Sugar Industries in Rejang Lebong Regency, Bengkulu Province (Ketut Sukiyono, Bambang Sumantri, Nusril And Evanila Silvia : Department of agricultural socio – economics, Faculty of Agriculture, Bengkulu University) 91
14. Plant Clinic: Driving Farmers Profit Partners (Chandra Irsan, Suwandi, A. Muslim, Siti Herlinda : Department of Plant Pests and Diseases, Faculty of Agriculture, Sriwijaya University) 98
15. The Role of Biotechnology In Overcoming the World Food Crisis (Suranto : Department of Biology, Faculty of Natural Sciences and Mathematic-UNS-Solo) 104
16. The Impact of Innovation Acceleration of Paddy Commodities at Irrigation Agroecosystem In Musi Rawas Regency (Yanter Hutapea and Tumarlan Thamrin : South Sumatra Assessment Institute for Agricultural Technology, Indonesia) 110

17. Performance of Several High Lines of Tolerant Rice to Iron Toxicity in Tidal Swamp Area in South Sumatra 116
(**Tumarlan Thamrin, Rudy Soehendi, Waluyo dan Syahri** : *South Sumatra Assessment Institute for Agricultural Technology, Indonesia*)
18. Performance of Submergence Tolerant Rice in South Sumatra to Anticipate the Impact of Climate Change 122
(**Tumarlan Thamrin, Imelda SM, Waluyo dan Syahri** : *South Sumatra Assessment Institute for Agricultural Technology, Indonesia*)
19. The Dynamics of Iron (Fe) Solubility As a Result of Sulphate Acid Soil Reclamation and the Way to Control 128
(**NP. Sri Ratmini¹, dan Arifin Fahmi** : *South Sumatera Assessment Institute for Agricultural Technology, Indonesia*)
20. Increasing Income Through Implementation of Integrated Farming System in Tidal Swamp Area 137
(**NP. Sri Ratmini dan Herwenita** : *South Sumatera Assessment Institute for Agricultural Technology, Indonesia*)
21. Study of Erosion on Different Types of Land Use in the Region Upstream Watershed Area (Das) Komerling South Sumatra 144
(**Satria Jaya Priatna¹, M.Edi Armanto¹, Dinar DA. Putranto², Edward Saleh¹, Robiyanto HS¹, Niken Suhesti¹ and S.N Aidil Fitri¹** : ¹*Faculty of Agriculture, Sriwijaya University, South Sumatra, ²Faculty of Engineering, Sriwijaya University, South Sumatra, Indonesia*)

B. Environmental and Climate Change

22. Study of Palm Empty Fruit Bunches Processing Technology As Saccharide Source For Friendly Environment Surfactant (**Joni Karman** : *Assessment Institute for Agricultural Technology in South Sumatera*) 151
23. Assessment of Pb Content of Motor Vehicle Emissions of Origin On Soil And Plant In Island Village Semambu Km 22 Highways Indralaya – Palembang 161
(**A. Napoleon, Dwi Probowati S, Marji Putranto** : *Faculty of Agriculture Sriwijaya University*)
24. Using The Forest Zone Through The Low Carbon Development for The Welfare of the Orround Forest Society (Using the Forest Zone through the Low Carbon Development for the Welfare of the Orround Forest Society) 168
(**Najib Asmani** : *Agriculture Faculty and Graduate Post Program Sriwijaya University, Palembang, Indonesia*)
25. Run off, Erosion, and Yield of the Sweet Corn (*Zea mays* var. *saccharata*) as result of Sheep Manure Application and Terracing 174
(**Ruarita Ramadhalina Kawaty** : *Faculty Agriculture Tridinanti University, Indonesia*)
26. Stilbenes from The Heartwood of *Morus Nigra* and their Cytotoxicity 179
(**Ferlinahayati¹, Euis H. Hakim², Yana M. Syah², Lia D. Juliawaty², Jalifah Latip** ; ¹*Department of Chemistry, Faculty of Mathematics and Natural Sciences, Sriwijaya University, ²Natural Product Research Group, Department of Chemistry, Institut Teknologi Bandung, ³School of Chemical Science & Food Technology,*

- 116 27. *Faculty of Science and Technology, Malaysia)*
Responses of Several Tropical Plant Species to Polluted Air Condition in the City 184
(**E.S. Halimi and Dian Agustina** : *Department of Agroecotechnology Faculty of Agriculture Sriwijaya University*)
- 122 28. Freshwater Fish Diversity in Pulokerto Musi River, Palembang-South Sumatra: A 189
Preliminary Results
(**Hilda Zulkifli, Doni Setiawan and Indra Yustian** : *Department of Biology, Faculty of Science, Sriwijaya University*)
- 128 29. Vegetational Structure and Composition in Pulokerto Island, Musi River- 195
Palembang, South Sumatra
(**Indra Yustian dan Hilda Zulkifli** : *Department of Biology, Faculty of Science, Sriwijaya University*)
- 137 30. Climate Change, Environment and Plant Diseases Development 200
(**Nurhayati** : *Department of Plant Pest and Disease, Agriculture Faculty, Sriwijaya University*)
- 144 31. Biophysical Characteristics of Tailings Deposition Area and Its Contribution to 206
Vegetation Growth
(**Yuanita Windusari¹, Robiyanto Hendro Susanto², Zulkifli Dahlan², Wisnu Susetyo³, And Indra Yustian²** : *Doctoral student of Environmental Science and Lecture of Mathematic and Sciences Faculty of Sriwijaya University, ²Lecture of Environmental Sciences Programme, Sriwijaya University and Supervisor commission, ³Senior Advisor PT Freeport Indonesia and Supervisor commission*)
- 151 32. Biodegradation of Petroleum Hydrocarbon by Single and Consortium of 212
Hydrocarbonoclastic Bacteria From Petroleum Polluted Mangrove Areas
(**Hary Widjajanti¹, Iswandi Anas², Nuni Gofar³, Moh.Rasyid Ridho** : *¹Agricultural Science of the Graduate Program of Sriwijaya University*)
- C. Energy, Education and Others**
- 61 33. Temperature and Relative Humidity Gains of "Teko Bersayap" Model Solar Dryer 221
(a Research Note)
(**Yuwana, Bosman Sidebang and Evanila Silvia** : *Department of Agricultural Technology, Faculty of Agriculture, University of Bengkulu*)
- 68 34. Proposes of Implementation of Sustainable Subgrade on Highway Construction in 228
South Sumatera By Using Coal Combustion Products (CCPs) as Stabilizer
(**Achmad Fauzi^{1*}, Usama Juniansyah Fauzi², Wan Mohd Nazmi³** : *^{1*,3}The Faculty of Civil Engineering and Earth Resources, University Malaysia Pahang, Malaysia. ²Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung, Indonesia*)
- 74 35. Green Pavement by Using High Density Polyethylene Modified Asphalt as 236
Aggregate Replacement by, Faculty of Civil Engineering and Earth Resources,
University Malaysia Pahang
(**Wan Mohd Nazmi and Wan Abdul Rahman Wan Rohaya Wan Idris, and Achmad Fauzi Abdul Wahab** : *Faculty of Civil Engineering and Earth Resources, Universiti Malaysia Pahang, Lebuhraya Tun Razak, Gambang, Kuantan, Pahang, Malaysia*)

36. Social Benefit of Coal Mining Activity (Syafudin Zakir¹ and Restu Juniah²) 242
¹Dept. Public Administration Faculty Social and Political Sciences, Sriwijaya University, ²Environmental Science Program University of Indonesia
37. Behavior of Connection Rotations Composite Steel Beam with Partial Strength Using Trapezoid Web Profiled 250
 (Anis Saggaff¹, Mahmood Md. Tahir², And Arizu Sulaiman³ : Civil Engineering Department, Faculty of Engineering, Sriwijaya University, ²Steel Technology Centre, Faculty of Civil Engineering, University Teknologi Malaysia, ³ Faculty Of Civil Engineering, Universiti Teknologi Malaysia.
38. Chemical Compound from Endophytic Fungi of Medicinal Plant Used in Treatment Of Gout (Elfita^{1*}, Muharni¹, Munawar : Faculty of Mathematics and Natural Sciences , Sriwijaya University) 258
39. 3-OXO Friedelin Compound from the Stem Bark of Manggu Leuweung (Garcinia cornea) 265
 (Muharni¹, Elfita, Handi : Department of Chemistry, Faculty of Mathematics and Natural Science, Sriwijaya University, Indralaya,, South Sumatera, Indonesia)
40. Antioxidant Flavonoids from Tunjuk Langit (*Helminthostacys Zaylanica*) 271
 (Fitrya^{1*}, Muharni¹ dan Eliza : Department of Chemistry, University of Sriwijaya)
41. The Industry Characteristic and Managers View: their Influence On Employment Relations In The Indonesian Hospitality Industry (Explorations From Three Case Studies) 276
 (Hendragunawan S¹. Thayf, John Lewer : Hasanuddin University, Indonesia)
42. Competitiveness of Management State-Owned Enterprises (Soes) Telecommunications 289
 (Kesi Widjajanti : Faculty of Economic Semarang University, Semarang, Indonesia)
43. Prospects and Challenges of The Introduction of Open Educational Resources in Indonesia (Daryono, Udan Kusmawan, Olivia Idrus) 299
44. Research Collaboration on Quality Assurance for Open and Distance Learning in Asia (Endang Nugraheni, Aminudin Zuhairi : Universitas Terbuka, Indonesia) 306
45. Fast Ship Serving Makassar, South Sulawesi to Majene, West Sulawesi 313
 (Muhammad Alham Djabbar and Andi Haris Muhammad : Ocean Engineering Study program, Department of Naval Architecture, Faculty of Engineering, Hasanuddin University, Makassar, Indonesia)
- D. Public Health and Medical Science**
46. Pesticides Exposure and Liver Dysfunction on Childbearing-Age Women in Kersana Sub District, Brebes Regency 316
 (Arum Siwiendrayanti , Public Health Department, Sport Science Faculty, Semarang State University)

- 242 47. Factors Related to The Occurrence of Low Back Pain Complaints On Employee Section of Corporate Customer Care Center (C4), PT Telekomunikasi Indonesia, Tbk Year 2010 325
(**Yuli Amran, M. Farid Hamzens, Juniar Tri Syafitri**, *State Islamic University Syarif Hidayatullah Jakarta*)
- 250 48. Relation of Work Risk Factors with Musculoskeletal Disorders (MSDs) Complaints of Gold Miner Workers In Subdistrict Cilograng-Banten on 2010 334
(**Yuli Amran, Raihana Nadra Alkaff, Endang Bukhori**, *State Islamic University Syarif Hidayatullah Jakarta*)
- 259 49. Effect of Rehydration Solutions on Fatigue Among Women Workers 343
(**Mardiana**, *Public Health Departement, Sport Science Faculty, Semarang State University*)
- 265 50. The Association between Risk Factors, RULA Score, and Musculoskeletal Symptom among Workers in a Printing Manufacturing Company, Malaysia 349
(**MC Foong, A Mohd Yusof, B Mohd Rafee, and AA Ahmad**
¹Department of Community Health, Faculty Medicine and Health Sciences, University Putra Malaysia,))
- 271 51. Productive Work Time Lost Because Of Employee Smoking Behaviour in Wood Industry in Jepara District Central Java 356
(**Nurjanah¹, Zahroh Shaluhiah², Bagoes Widjanarko²** : *¹Master Student of Health Promotion Program of Diponegoro University, lecturer of Health Faculty of Dian Nuswantoro University, Semarang. ²Lecturer of Health Promotion Program of Diponegoro University, Semarang*)
- 276 52. Water Quality and Water Borne Disease at The Lowland Ecosystem in Banyuasin 366
(**Dianita Ekawati¹, Tan Malaka², Robiyanto³, M.T. Kamaluddin², Dwi Setiawan³, Amar Muntaha¹**
*¹Department of Public Health, STIK Bina Husada, Palembang 30131, Indonesia
²Medicine Faculty of Sriwijaya University
³Agriculture Faculty of Sriwijaya University*)
- 289 53. Measuring *Escherichia Coli* in Foods And Beverages Towards Certification of Cafeteria In Campus 381
(**Dewi Susanna¹, Yvonne M. Indrawan¹, Zakianis¹, Tris Eryando¹, Lassie Fitria¹, Kartika A Dimarsetio¹, Aria Kusuma²**
¹Faculty of Puelic Health, Indonesia University, ²Doctoral Student of Public Health Science, Indonesia University, Indonesia)
- 299 54. Pesticide, Adverse, and Safe Handling to Woman of Child Bearing Age (WCA) in Agriculture Area 385
(**Imelda Gernauli Purba** : *Faculty of Public Health, Sriwijaya University, Indonesia*)
- 306 55. Comparative Analysis of Occupational Safety and Helath Risk Management Program at University of Indonesia and National University of Singapore 396
(**Anita Camelia**, *Faculty of Public Health, University of Sriwijaya, Indonesia*)
- 313 56. Analysis of levels of lead (Pb) in semen and sperm motility at the Laboratory of Medical Biology Faculty of Medicine, University of Sriwijaya Palembang 406
(**Nani Sari Murni¹, Tan Malaka², dan M. Zulkarnain²** : *STIK Bina Husada, ²Faculty Medicine Of Sriwijaya University*)

57. The Correlation of the Use of PPE(Personal Protective Equipment With Respiratory Disorders of Wood Furniture Workers In Kecamatan Indralaya and Kecamatan Indralaya Utara 2011
(**Herliawati, Christine Sihaloho** : *Nursing Science Study Program, Faculty Medicine, Sriwijaya University, Indonesia*) 43
58. Value of Children as Determinants Parenting Nutrition on The Environment Vulnerable Sociocultural Nutrition (Village Pecuk, District Mijen, Demak Regency, Central Java)
(**Oktia Woro Kasmini H.** *Department of Public Health Sciences FIK UNNES Semarang*) 43
59. Analysis of Rhodamine B in Cookie of Traditional Food Type (Study at Pasar Tanjung of Jember Regency)
(**Khoiron, Astri Rizky Vitantina, Rahayu Sri Pujiati**, *Departement of Environmental Health and Occupational Health & Safety Faculty of Public Health, University of Jember*) 44
60. Determinant Factor of Anemia Status Among Vegetarian Female Adolescent In Badung District of Bali Province
(**Putu Widarini**, *School of Public Health Udayana University*) 45
61. Diet, nutrition and the prevention of cervical cancer
(**Ciptaningtyas, R.** *State Islamic University Syarif Hidayatullah Jakarta*) 45
62. The Correlation Between Macro Nutrient Consumption and Physical Activities With Overweight Among Children In Elementary School
(Study at Al-Furqan Elementary School, Jember Regency)
(**Leersia Yusi Ratnawati, Sulistiyani, Dwindia Prianton**, *Public Health Faculty, Jember University*) 47
63. Correlation of family participant with nutrition status of children under five years old in peguyangan village work area puskesmas iii of north denpasar
(**Ni Ketut Sutiari, Ni Luh Sudiasih, I Gusti Agung Ayu Mahayuningsih**, *School of Public Health, Faculty of Medicine, Udayana University*) 47
64. Does Birthweight Related With Chronic Diseases In Adult Life?
(**Suci Destriatania** : *Faculty of Public Health, University of Sriwijaya, Indonesia*) 48
65. Experience Breastfeeding Mother On Teens At Work Area Health Center Payaraman Year 2011
(**Bina Melvia Girsang**, *Faculty of Medicine, Nursing Science Study Program UNSRI*) 49
66. The Effect of Maternal Nutrition Anemia towards Low Birth Weight
(**Rini Mutahar, Misnaniarti, Fatmalina Febry** : *Faculty of Public Health, Sriwijaya University, Indonesia*) 50
67. Relationship Unhealthy Snack Habits with Diarrhea Incidence In Elementary School Children
(**Fatmalina Febry, Najmah, Indah Purnama Sari** : *Faculty of Public Health, Sriwijaya University, Indonesia*) 50

- 432 68. Relationship Between Age and Lifestyle with prevalence Hypertension in Poly medicine Moehammad Hoesin Hospital Palembang of the Year 2011 513
(**Nikson Sitorus, Desti Widiastuti**, *Health Polytechnic of Palembang Nursing Program*)
- 438 69. Determinants Pulmonary Tuberculosis Incident in District Banyuasin Multilevel Modelling Approach 519
(**Rismala Kesuma, Kamaluddin, Ngudiantoro, Ibrahim Eddy, Tjek Yan Suryadi**, *Departement of Public Health, STIKES Darul Ma'arif Al Insan Baturaja, Indonesia*)
- 445 70. Enabling Factors of Doing Pap Smear/Iva Test among Women at Age ≥ 35 Years in Denpasar Who Diagnosed Cervical Cancer At Sanglah Hospital 2011 524
(**Ni Luh Putu Suariyani, Regina Chrysantie Weking** : *School of Public Health, Faculty of Medicine, Udayana University*)
- 53 71. The Difference of Urinary Excretion Iodine (UEI) Increase between Primary School Children With and Without Ascariasis After Administration of Oral Iodized Capsule 531
(**Galuh Nita Prameswari**, *Public Health Departement, Sport Science Faculty, Semarang State University*)
- 59 72. Analysis of Determinants of Tuberculosis In The Workers at PT. Perkebunan Nusantara XII (Persero) of Jember Regency 541
(**Anita Dewi Prahastuti Sujoso, Ria Nuri Estu Karisma, Irma Prasetyowati**, *Departement of Environmental Health and Occupational Safety Health, Faculty of Public Health, University of Jember*)
- 72 73. Risk Factors of Lymphoma at dr. Soebandi Hospital of Jember District- East 549
(**Ni'mal Baroya, Pudjo Wahjudi, Annisa Reykaningrum**, *Public Health Faculty, Jember University, Jember*)
- 77 74. Hip Structure Associated with Hip Fracture in Women: Data From the Geelong Osteoporosis Study (GOS) Data Analysis- Geelong, Australia 560
(**Margaret Henry¹, Najmah², L. Gurrin³, J.Pasco¹**
¹ *Department of Clinical and Biomedical Sciences, The University of Melbourne, Australia.* ² *Faculty of Public Health, Sriwijaya University, Kampus Unsri Indralaya, Ogan Ilir, Sumatera Selatan, Indonesia.* ³ *School of Population Health, The University of Melbourne, Australia*)
- 8 75. The Study of Diabetes Mellitus Risk Factors in Bangka Belitung 569
(**Titi Sari Renowati, Anisyah, Amar Muntaha, Dianita Ekawati, Vera Susanti**, *Environmental Health Laboratory Agency and Disease Control, Palembang, Indonesia*)
- 2 76. Association of Knowledge, Perception, and Source of Information about Hiv Aids With Attitudes From Indonesian People To People Living With Hiv Aids (PLHA) 580
(Analysis Of SDKI 2007), Indonesia, 2010
(**Yeni, Najmah, Rini Mutahar** : *Faculty of Public Health, Sriwijaya University, Indonesia*)
- 8 77. Identification of Covert Patients With Filariasis and Epidemiologic Study of Filariasis in Sub-District of Tangkuno, Muna Regency, Province of Southeastern Sulawesi in 2009 593
(**Ramadhan Tosepu , Devi Savitri Effendy** : *Public Health Department of*

- Mathematics and Natural Sciences Faculty of Hahuoleo University, Kendari)*
78. Characteristics among Injecting Drug Users Accessing and Not Accessing Needle And Syringe Program In Palembang, South Sumatera 599
(**Najmah** Faculty of Public Health, Sriwijaya University, Indonesia)
79. The Use of Salivary A-Amylase And Stress-Related Symptoms Questionnaires as Indicator For Psychological Distress Among Breast Cancer Survivors 605
(**Yong, H.W., Zubaidah, J.O., Saidi, M., Zalilah, M.S., Yong, H.Y. and Zailina, H** : Universiti Putra Malaysia, Selangor, Malaysia)
80. Self-Concept in Sexual Behavior of Campus Chicken's (*Ayam Kampus*) In Semarang 619
(**Eti Rimawati**, Health Faculty Universitas Dian Nuswantoro)
81. The Sexual Relation Scripts of Premarital Sexual Intercourse among University Students In Bandar Lampung 626
(**Roro Rukmi Windi Perdana** : Faculty of Medicine, University of Lampung, Lampung Province, Indonesia)
82. Development of Posyandu Information System for Supporting Surveillance of Maternal and Child Health (Case Study at Manisrejo Urban Village Taman District in Madiun City, East Java Province) 635
(**Abu Khoiri**, Public Health Faculty, University of Jember)
83. Health Financing Reform as a Result of Decentralization Policy in Bali 641
(**Putu Ayu Indrayathi**, Pande Putu Januraga, School of Public Health Medicine Faculti of Udayana University)
84. The Relationship between Marketing Mix and University Student Interest in Choosing Public Health Science Study Program Faculty of Medicine Andalas University 2011 647
(**Isniati, Syahrial, Vonicha Regia**, Faculty of Medicine, Andalas University)
85. Healthy Behavior-Based Development Model to a Free Larvae Aedes Aegypti by Environmental Health Education In The Eastern District Padang 658
(**Nizwardi Azkha, Rizanda Machmud** : Faculty of Medicine, Universitas Andalas, Padang, Indonesia)
86. Health Care Seeking Behaviour of Community and Tb Patients, And Capability of Nonformal Health Services Provider In Tanjung Bintang Subdistrict, Indonesia 670
(**Nurul Islamy¹, Agus Setyo Widodo², Darman Zayadan³, Ferizal Masra³, Haris Kadarusman³, Bacht Alisjahbana⁴**
¹Faculty of Medicine Lampung University, ²Health Office Lampung Province
³Health Institute Umitra Lampung, ⁴Faculty of Medicine Padjajaran University)
87. Influence of Life Skills on Sexual Behavior in Adolescent at Seberang Ulu Area of Palembang 677
(**Iche Andriyani Liberty, Nur Alam Fajar, Elvi Sunarsih** : Faculty of Public Health, Sriwijaya University, Indonesia)

599	88. Policy Review: Implementation Of The Development 'Desa Siaga' (Kepmenkes No 564/MENKES/SK/VIII/2006) (Iwan Stia Budi <i>Faculty of Public Health, Sriwijaya University, Indonesia</i>)	684
05	89. The Development Study of 'Desa Siaga' In Ogan Ilir District (Misnaniarti, Asmaripa Ainy, Nur Alam Fajar : <i>Faculty of Public Health, Sriwijaya University, Indonesia</i>)	690
19	90. Injection Drug Users (IDU) Behavior Toward Methadone Maintenance Therapy Program At Ernaldi Bahar Hospital 2010 (Tri Novia Kumalasari <i>Faculty of Public Health, Sriwijaya University, Indonesia</i>)	697
26	91. The Experience of Parents Who Have Temper Tantrums Toddler (Arie Kusumaningrum, Chodijah Abdul Qudus, Eka Yulia Fitri : <i>School of Nursing Science, Faculty of Medicine, Sriwijaya University, Indonesia</i>)	705
5	92. Factors that Influence the Behavior of Male Adolescence Smokers at Junior High School Kramat Jakarta (Cicilia Nony, Budi Sulistyowati, Wuryastuti : <i>School of Health Science, Sint Carolus</i>)	714
1	93. Stratification of Public Health Services For Elderly at Urban and Rural Areas in Indonesia (Ari Istiany, Rusilanti and Sachriani : <i>Home Economics Department, Jakarta State University, Indonesia</i>)	718
7	Summary Seminar	723
8	Name and Adress of Presenter International Seminar	726

ANALYSIS OF DETERMINANTS OF TUBERCULOSIS IN THE WORKERS AT PT. PERKEBUNAN NUSANTARA XII (PERSERO) OF JEMBER REGENCY

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ABSTRACT

Background and aims : Tuberculosis is one of the world's leading causes of illness and death. Tuberculosis spells wreck and ruins not only to individuals and families but also to societies and nations, seriously affecting work productivity, family cohesiveness, and greatly weakening national economies. This study analyze the determinants that are correlated with tuberculosis in workers. This research was an case control study with quantitative approach.

Methods: Based on the period of conduct, this research was a case control study. The variables studied were the workplace (ventilation, work time, lighting, and job history), the contact history in workplace and in the house, environmental health of house (ventilation, house temperature, lighting, humidity, and habitant density). Data were collected using questionnaire and observation sheets with sample of 52 workers, 13 were the case samples, and 39 were the control samples.

Result : Based on the statistical analysis logistic regression with provision of α (0,05), it was found that 2 factors of environmental health of house including: home ventilation ($p= 0.013$, OR= 0.022) and house temperature ($p= 0.016$, OR= 0.061) were protective factors of tuberculosis in the workers. Meanwhile, another variabel was not significant with tuberculosis in the workers.

Conclusion : Based on the facts that influenced tuberculosis above, it is suggested that the related departments socialize more and regulate better the preventive program of tuberculosis in the workplace, so that all of the elements such as workplace, stakeholders, workers/labour organization and all of the community members are able to work together to solve this problem in the workplace.

Keyword : tuberculosis, workplace, tuberculosis in the workplace

INTRODUCTION

Tuberculosis is a chronic infectious disease that remains a public health problem in the world, including Indonesia (global epidemic). Throughout the world, there were approximately 9.2 million new cases of tuberculosis and approximately 1.7 million deaths due to tuberculosis in 2006. The estimated incidences were 9.2 million new cases of tuberculosis and 1.7 million people (100.000) died because of tuberculosis in 2006, including those who also had HIV infections. India, China and Indonesia contribute more than 50% of all tuberculosis cases occurring in 22 countries with heavy burden of tuberculosis in Indonesia ranks third after India and China (Wardunas, 2008).

One of infectious diseases that still becomes a health problem in Jember Regency is tuberculosis disease in which the number of sufferers is increasing every year. Tuberculosis Patients in Jember in 2007 were 1676 people, in 2008 as many as 1889 people, and in 2009 as many as 1813 people.

Based on data obtained from each medical clinic in each plantation at PT. Perkebunan Nusantara XII Jember, the highest infectious disease that occurred in workers was disease of

tuberculosis. Tuberculosis disease is very dangerous for the workers because this disease is an airborne infection that is easily contagious among workers due to poor working conditions. Therefore, it is necessary to study factors that led to the incidence of tuberculosis disease.

The research on tuberculosis infection in workers is more focused on the health sector, considering the high number of incidences of nosocomial infections in workers in the health sectors, not many researches have been conducted on tuberculosis in workers. It is necessary to identify whether non-Health Service workplaces also contribute to the incidence of tuberculosis among employees as well as workers at the Hospital. For this reason, researchers wanted to conduct research on "Analysis of Determinants of Tuberculosis Incidence in Workers at PT. Perkebunan Nusantara XII (Persero) of Jember Regency". In this study, the researchers wanted to know if there was a relationship between work conditions and workers' housing conditions with the incidence of tuberculosis in workers.

Research objectives

1. Assessing the work environment factor including ventilation, lighting, work environment history; contact history factor, and neighborhood factor covering: size of house, house temperature, house lighting, air humidity and density of occupants in the workers housing area PT. Perkebunan Nusantara XII (Persero) of Jember Regency
2. Analyzing the effect of work environment factor, including ventilation, lighting, work environment and work history with the incidence of tuberculosis in workers of PT. Perkebunan Nusantara XII (Persero) of Jember Regency.
3. Analyzing the effect of factor of contact history with the incidence of tuberculosis in workers of PT. Perkebunan Nusantara XII (Persero) of Jember Regency.
4. Analyzing the effect of environmental factor of the worker's housing area covering: house ventilation, house temperature, house lighting, air humidity and density of occupants with the incidence of tuberculosis in workers of PT. Perkebunan Nusantara XII (Persero) of Jember Regency.

RESEARCH METHODS

Based on the conduct time of research, this research belonged to case control research. Based on secondary data from PT. Perkebunan Nusantara XII (Persero) of Jember Regency, it is known that the number of employees who lived in workers housing area was 600 people. The sample size of control group used in this research was 52 people. Control sampling was carried out by proportional random sampling. For instance, from Kota Blitar plantation, 4 samples were 4 people, then the control samples taken from the garden were 13 samples and 12 samples of 12 employees who lived in employee housing area in the plantation. In other plantations, the determination of the control sample was also based on a ratio of 1:3 between case samples, so totally the number of case samples was 13 people and the number of control samples obtained was 39 respondents, making the total sample size of 52.

Dependent variable is a variable which is dependent on or as a result of the independent variable. Dependent variable in this study was the incidence of Tuberculosis in workers of PT. Perkebunan Nusantara XII (Persero) of Jember Regency. Independent variable is a variable that can affect or be the cause of the dependent variable. The independent variables in this research were:

- 1) Conditions of work environment, including: ventilation in the workplace, lighting in the workplace, work hour and job history.

Conditions of the Environment of workers housing area, covering: size of house ventilation, house temperature, house lighting, house humidity, and resident density.

History of contact in the workplace and in respondents' house environment.

Technique of data collection are interview by questionnaires to the data of respondent characteristics, and than observation and measurement of work environment : humidity and air temperature with thermohygrometer, extensive air ventilation with rolemeter, lighting with meter.

RESULTS AND DISCUSSION

Work environment factor including ventilation, lighting, temperature, humidity, density

Based on the analysis of work environment factor, the size of ventilation in the respondent workplace was mostly not eligible or under the standard in three plantations. Natural lighting in the workplace had met the standard. The work hours of respondents spread almost the same, that is in morning and in the evening. Most of the respondents stated that they had no job history which is a risk of tuberculosis. Based on the analysis of history of contact factor, the majority of respondents had never had a history of contact with tuberculosis sufferers both in the workplace and residential area. Based on the analysis of residential environment factor, most respondents had the size of house ventilation, house temperature, house lighting, and the density of residents That had met the standard, while the house humidity of most of the respondents did not meet health standard.

Table 1. Distribution of Samples Based on Work Environment Factor in Case and Control Groups

Respondent Characteristics	Case		Control		Total		Sig.
	n	%	N	%	N	%	
Size of ventilation at Workplace							
Meeting Standard ($\geq 25\%$)	4	30.77	12	30.77	16	30.77	1.00
Not meeting standard ($< 25\%$)	9	69.23	27	69.23	36	69.23	
Total	13	100	39	100	52	100	
Natural Lighting							
Eligible (≥ 100 lux)	13	100	39	100	52	100	-
Total	13	100	39	100	52	100	
Work hours							
08.00-14.00	10	76.92	15	38.46	25	48.08	0.398
08.00-09.00	3	23.08	24	61.54	27	51.92	
Total	13	100	39	100	52	100	
Job History							
Risky	1	7.69	3	7.69	4	7.69	1.00
Not Risky	12	92.31	36	92.31	48	92.31	
Total	13	100	39	100	52	100	

Work Environment Variables Influence Factors of Tuberculosis incidence

a. Ventilation in the Workplace

The results of analysis of the effect of ventilation variables at workplace on the incidence of tuberculosis in workers were obtained through bivariate analysis with chi square test. Since $p\text{-value} > 0.25$, the variable of ventilation in the workplace was not further analyzed in multivariate analysis. The results of the analysis indicated that the variable of ventilation in the workplace did not significantly affect the incidence of tuberculosis in workers. Poor ventilation and lighting are factors that could make workers easily suffer from Tuberculosis. However, in this study, it is shown that ventilation in the workplace provided no effect on the incidence of tuberculosis in workers.

b. Natural Lighting in the Workplace

From the results of measurement of natural lighting in the workplace it was found that 100% of the respondents' workplaces had lightings in line with health requirement, i.e. 100% in the case group and the control group. It can be concluded that the variable of natural lighting in the workplace did not significantly influence the incidence of tuberculosis in workers.

c. Working Time

The results of multiple logistic regression analysis of the effect of working time on the incidence of tuberculosis in workers obtained ($p = 0.398$). The results of the analysis indicated that the variable of work time did not significantly affect the incidence of tuberculosis in workers because $p\text{-value} > 0.05$.

d. Job History

The results of bivariate analysis of the effect of job history variable on the incidence of tuberculosis in workers obtained ($p = 1.00$). Since $p\text{-value} > 0.25$, the analysis was not further analyzed at the multivariate level. The result of analysis indicated that the job history variable did not significantly affect the incidence of tuberculosis in workers. Job history might be a factor that could influence the incidence of tuberculosis in workers.

Factor of Workers Residential Area Environment on the Tuberculosis Incidence in Workers of PT. Perkebunan Nusantara XII Jember.

Table 2. Distribution of Samples Based on Factor of Residential Area Environment in Case and Control Groups

Respondent Characteristics	Case		Control		Total		Sig.
	n	%	N	%	N	%	
Size of Ventilation							
Eligible (≥ 10 %)	9	69.23	6	15.38	15	28.85	0.013
Not eligible (< 10 %)	4	30.77	33	84.62	37	71.15	
Total	13	100	39	100	52	100	
House Temperature							
Eligible ($18-30^{\circ}\text{C}$)	2	15.38	27	69.23	29	55.77	0.016
Not eligible ($< 18^{\circ}\text{C}$ or $> 30^{\circ}\text{C}$)	11	84.62	12	30.77	23	44.23	
Total	13	100	39	100	52	100	
House Lighting							
Not Eligible (< 60 lux)	7	53.85	10	25.65	17	32.69	0.141
Eligible ≥ 60 lux	6	46.15	29	74.35	35	67.31	
Total	13	100	39	100	52	100	
Humidity							
Eligible (40-70%)	6	46.15	11	28.21	17	32.69	0.501
Not eligible ($< 40\%$ or $> 70\%$)	7	53.85	28	71.79	35	67.31	
Total	13	100	39	100	52	100	
Resident Density							
Eligible (< 10 m ² /individual)	6	46.15	13	33.33	19	36.54	0.406
Not eligible (≥ 10 m ² /individual)	7	53.85	26	66.67	33	63.46	
Total	13	100	39	100	52	100	

Size of Ventilation

The result of multiple logistic regression analysis of the effect of size of house ventilation variable on the incidence of tuberculosis in workers obtained ($p = 0.013$) with Odd Ratio (OR) of 0.2 and the lower and upper Confidence Interval of 0.001 and 0.466. The result of analysis indicated that the size of house ventilation variable significantly affected the incidence of tuberculosis in workers because p -value < 0.05 .

House Temperature

The result of multiple logistic regression analysis of the effect of house temperature variable on the incidence of tuberculosis in workers obtained ($p = 0.016$) with Odd Ratio (OR) of 0.51 and the lower and upper Confidence Interval of 0.006 and 0.592. The result of analysis indicated that the house temperature variable significantly affected the incidence of tuberculosis in workers because p -value < 0.05 . Variable of house temperature was not a risk factor, but it was a protective factor because the value of CI < 1 , i.e. 0.592.

House Lighting

The result of multiple logistic regression analysis of the effect of house lighting variable on the incidence of tuberculosis in workers obtained ($p = 0.141$) with Odd Ratio (OR) of 10.747 and lower and upper Confidence Interval of 0.455 and 254.094. The result of analysis showed that

the variable of house lighting did not significantly affect the incidence of tuberculosis because $p\text{-value} > 0.05$.

d. Humidity

From the results of cross tabulation, respondent house humidity in the control group was less than good. In the case group, there were seven respondents (13.04%) whose houses had poor humidity, that is $> 70\%$, whereas in the case group there were 20 respondents (71.79), whose house humidity was more than standard. The result of multiple logistic regression analysis of the effect of house humidity variable on the incidence of tuberculosis in workers obtained ($p = 0.501$). The result of analysis indicated that the house humidity variable did not significantly affect the incidence of tuberculosis in workers because $p\text{-value} > 0.05$.

e. Occupant Density

The result of house occupant density measurements showed that in the control group the density of occupants for each house was mostly $\geq 10\text{m}^2/\text{individual}$, that is 26 respondents (53.85%), while in the case group, most of the respondents i.e. 33 people (63.46%) whose houses met the standard of occupant density, that is 26 people (66.67%). Bivariate logistic regression analysis of the effect of occupant density variable on the incidence of tuberculosis in workers obtained ($p = 0.25$). Since $p\text{-value} > 0.25$, the occupant density variable was not taken to multivariate analysis. The result of analysis showed that occupant density variable did not significantly affect the incidence of tuberculosis in workers.

Contact History and Its Effect on Tuberculosis Incidence in Workers

Table 3. Distribution of Samples Based on Contact History In Case and Control Group

Respondent Characteristics	Case		Control		Total		p-value
	n	%	N	%	N	%	
Contact History at Workplace							
Ever	1	7.69	1	2.56	2	3.85	0.001
Never	12	92.31	38	97.44	50	96.15	
Total	13	100	39	100	52	100	
Contact History at Residential Area							
Ever	4	30.77	3	7.70	7	13.46	0.001
Never	9	69.23	36	92.30	45	86.54	
Total	13	100	39	100	52	100	

Based on the research data obtained, it was found that the variable of contact history was not significant with the incidence of tuberculosis in workers. This was caused by several reasons including that the respondent might have limitations in memorizing whether he had contact with a tuberculosis sufferer, or this was also possibly because the respondents had contact but did not occur in the workplace or with family members.

CONCLUSIONS AND SUGGESTIONS

Based on the results of research and discussion of the research on Analysis of Determinants of the Incidence of Tuberculosis in Workers at PT. Perkebunan Nusantara XII (Persero) of Jember Regency, it can be summed up as follows:

Based on the analysis of work environment factor, the size of ventilation in the respondent workplace was mostly not eligible or under the standard in three plantations. Natural lighting in the workplace had met the standard. The work hours of respondents spread almost the same, that is in the morning and in the evening. Most of the respondents stated that they had no job history which had a risk of tuberculosis. Based on the analysis of history of contact factor, the majority of respondents had never had a history of contact with tuberculosis sufferers both in the workplace and in residential area. Based on the analysis of residential environment factor, most respondents had the size of house ventilation, house temperature, house lighting, and the density of residents that had met the standard, while the house humidity of most of the respondents did not meet health standard.

There was no effect between variables of work environment, including size of ventilation in the workplace, lighting in the workplace, work time and job history, with the incidence of tuberculosis in workers of PT. Perkebunan Nusantara XII (Persero) of Jember Regency.

There was no effect between the variables of contact history in the workplace and in the residential area with the incidence of tuberculosis in workers of PT. Perkebunan Nusantara XII (Persero) of Jember Regency.

Variables of workers residential area that affected tuberculosis incidence in workers at PT. Perkebunan Nusantara XII (Persero) of Jember Regency were house temperature and size of house ventilation.

Suggestions

For the PTPN, more attention should be given on employees work environment, especially regarding the problem of ventilation that does not meet the standards; this can be overcome by adding ventilation up to meeting the requirement, that is equal to 1/10 of the floor size or 1/6 of the floor size, so air circulation system in the workplace can be better. It is also expected to pay more attention to aspect of the occupant density in employee housing area.

For employees, more attention should be paid to the condition of house ventilation, by always opening the windows in the morning, and not closing them permanently, so sunlight can get into the house and the air circulation inside the house becomes better.

For the concerned departments, including Department of Manpower and Transmigration and Department of Health, it is expected that they socialize and regulate better Tuberculosis control program in the workplace, so that all elements, among others, workplace, labor inspectors, workers association and communities, can work together in overcoming the problems of disease tuberculosis in the workplace.

For further researchers, researches on conditions of house temperature, humidity, and lighting should be done at the same time on each house. This is to avoid bias in the results obtained.

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