



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 2018 Publisher:
R.K. Sharma, Institute of Medico-Legal Publications
ISSN:0976-0245E-ISSN: 0976-5506 Subject area: Medicine:
Public Health, Environmental and Occupational Health

Cite Score 2017- 0.03

SJR 2017- 0.108

SNIP 2017- 0.047



Website:

www.ijphrd.com

Indian Journal of Public Health Research & Development

EXECUTIVE EDITOR

Prof Vidya Surwade

Associate Professor, Dr Baba Saheb Ambedkar, Medical College & Hospital, Rohinee, Delhi

INTERNATIONAL EDITORIAL ADVISORY BOARD

1. **Dr. Abdul Rashid Khan** B. Md Jagar Din, (*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, Srinagar – Garhwal, Uttarakhand
4. **Dr. R G Viveki** (*Professor & Head*) Community Medicine,
Belgaum Institute of Medical Sciences, Belgaum, Karnataka
5. **Dr. Santosh Kumar Mulage** (*Assistant Professor*)
Anatomy, Raichur Institute of Medical Sciences Raichur (RIMS), Karnataka
6. **Dr. Gouri Ku. Padhy** (*Associate Professor*) Community and Family
Medicine, All India Institute of Medical Sciences, Raipur
7. **Dr. Ritu Goyal** (*Associate Professor*)
Anaesthesia, Sarswathi 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, VIMS&RC, 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

1. **Prof. Sushanta Kumar Mishra** (Community Medicine)
GSL Medical College – Rajahmundry, Karnataka
2. **Prof. D.K. Srivastava** (*Medical Biochemistry*)
Jamia Hamdard Medical College, New Delhi
3. **Prof. M Sriharibabu** (*General Medicine*) GSL Medical College, Rajahmundry,
Andhra Pradesh
4. **Prof. Pankaj Datta** (*Principal & Prosthodontist*)
Indraprastha Dental College, Ghaziabad

NATIONAL EDITORIAL ADVISORY BOARD

5. **Prof. Samarendra Mahapatro** (*Pediatrician*)
Hi-Tech Medical College, Bhubaneswar, Orissa
6. **Dr. Abhiruchi Galhotra** (*Additional Professor*) Community and Family
Medicine, All India Institute of Medical Sciences, Raipur
7. **Prof. Deepti 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*)
MAMTA Health Institute of Mother & Child, New Delhi
11. **Dr Shailendra Handu**, *Associate Professor*, Phrma, DM (Pharma, PGI
Chandigarh)
12. **Dr. A.C. Dhariwal**: *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 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
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)

Printed, published and owned by

Dr. R.K. Sharma

Institute of Medico-legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)

Published at

Institute of Medico-legal Publications

Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)



Indian Journal of Public Health Research & Development

www.ijphrd.com

Contents

Volume 10, Number 1

January 2019

1. A study to Assess the Knowledge Regarding the Care of Patients on Mechanical Ventilation and Prevention of VAP among Nursing Students of a Selected Nursing College 1
A S Saritha
2. A Study on Job Satisfaction among Employees in Quick Service Restaurants 5
A. Arun, J. Yuvaraj, A. Wilfred Lawrence
3. Comparative Evaluation of the Fluoride Release and Rechargability of Chitosan Modified Glass Ionomer Cement and a Glass Ionomer Cement–An in Vitro Study 9
Binsy Mathew, Abi M Thomas, Rajesh kumar
4. A Study on Determinants of Agricultural Productivity in Tamilnadu 14
C. K. Gomathi, S. N. Sugumar
5. Susceptibility of Gender Entrepreneurship Gap in India–A Preview 18
Chandrachud. S, S. N. Sugumar, S. Thangamayan, S. Sudha
6. Analysis of Medical Tourism and its Economic Impact 21
MS. J. Revathi, S. Jansi Rani
7. Occurrence of Menstrual Irregularities among Adolescent Girls in Selected Area, Dehradun, Uttarakhand 27
Jyoti Kandpal, Mugdha Devi Sharan Sharma, Upma George
8. Mother’s Knowledge on Nutrition and Incidence of Malnutrition 32
Kalpana Sawane, Sheetal Barde
9. Mortality Pattern amongst Patient Admitted in Tertiary Health Care Center, Rajnandgaon (C.G.) 35
Harshal Mendhe, Kiran Makade, Dhiraj Bhawnani, Daneshwar Singh
10. Effectiveness of Self-Instructional Module on Knowledge Regarding Post-Partum Psychiatric Disorders 41
Leeja Bonny Thomas, Anusha Pradhan
11. A Study to Evaluate the Effectiveness of Structured Teaching Programme on Obesity & its Consequences among Adolescents in Selected Private High Schools in Pune 47
Mangesh V. Jabade, Manu Acha Roy
12. Assessment of the Awareness about Effects of Cell Phone Radiations amongst Students at Symbiosis International (Deemed University) Hill Base Campus 51
Anshika Nikita Singh, Neeti Sharma, Abhay Saraf, Samir Barve, Yatin Pimple
13. A Study to Estimate the Level of Physical Activity and Perceived Benefits and Barriers to Exercise among Women in Coastal Karnataka 57
Sneha Deepak Mallya, Pawan Kumar, Sravan Kumar Reddy T, Beulah Sarah James, Asha Kamath

14. Effect of Dispositional Mindfulness on Perceived Stress Scores of Engineering Students: An Empirical Study	63
<i>Ranju Lal, Pramod Pathak, K. R. Chaturvedi, Payel Talukdar</i>	
15. Confocal LASER Scanning Microscopy (CLSM) for Evaluation of Endodontic Microflora-A Review ...	69
<i>Laxmish Mallya, Kundabala M, Vinod Jathanna</i>	
16. Effective Recruitment and Selection System for the IT Software Industry in India	74
<i>Ramkumar A., Rajini G.</i>	
17. A Study on Innovative Recruitment Techniques and It's Impact on Job Seekers	79
<i>Ramkumar A., Rajini G.</i>	
18. Emotional Intelligence and Performance of Manager in Manufacturing Industries (With special reference to Automobile Industry)	85
<i>S. Chandrachud, M. Thaiyalnayaki</i>	
19. Mechanically Induced Stump Dermatoses: High Prevalence Concern and Measures of Prevention	88
<i>Salman Shaikh, Akshay Malhotra</i>	
20. A Study on Universal Precautions and Needle Stick Injuries among Nursing Staff in a Tertiary Care Hospital, Davangere	93
<i>Sandhya Rani Javalkar, Sanjana S N</i>	
21. Pattern of Employment and Consumption Expenditure in India	98
<i>S. Jansirani, S. Sudha</i>	
22. A Study on Women Domestic Workers in M.g.r.nagar in Kanchipuram District	103
<i>S. Jansirani, S. Janifar Vinnarasi</i>	
23. Influence of Emotional Intelligence on Employee Performance among Selected Restaurants, Chennai ..	106
<i>V. Krishna Priya</i>	
24. Preferences and Problems of Agri-Based Enterprises of Guntur (A.P., India): An Empirical Study of Farmers Advisory Committees Under Atma	111
<i>Vineet Pandey, Fate Bahadur Singh</i>	
25. Effects of Strength Training Exercises on Physical Parameters and Quality of Life among Older Adults in Selected Geriatric Homes in Kerala, India	116
<i>Nisha B S, Dhanyamol K S, Devika Shaji, Rebecca Seguin</i>	
26. Study of MRSA and ESBL Organisms Isolated from Infected Wounds	121
<i>Suresh P, V. Sreenivasulu Reddy, V. Praveen Kumar, P. Vamsimuni Krishna</i>	
27. Prevalence of Angles Malocclusion Traits in 7-16-Year-old School Children of Mewar Region, India ..	125
<i>Pradeep Vishnoi, Tarulatha R Shyagali, Prabhuraj Kambalyal, Deepak P Bhayya, Rutvik Trivedi, Jyoti Jingar</i>	
28. A Study on Marketing Prospects in Promoting Cultural Tourism in Tamil Nadu	131
<i>A. Arun, J. Yuvaraj, A. Wilfred Lawrence, Chittaranjan Srivastava</i>	
29. An Objective and Subjective Evaluation of Dental Implant Impressions using Vinylsiloxanether and Polyether Impression Materials—An <i>in Vivo</i> Study	135
<i>Divya Raigangar, Mahesh Mundathaje, Puneeth Hegde, Umesh Pai, Thilak Shetty, Sharon Saldanha, Shobha J Rodrigues</i>	

30. Comparison of Serum Calcium Levels in Euthyroid, Subclinical and Overt Hypothyroid Women in the Tribal Belt of West Midnapore, West Bengal	139
<i>Sanjay Vashisth, Alpana Chhetri</i>	
31. Role of Whistle Blowers in Health Care Industry: An Empirical Study	142
<i>Aseervatham Achary, Amit Kumar Pandey, Suneel Mago, Jaya Yadav, Sanjeev Bansal</i>	
32. Management of Talons Cusp in a Primary Maxillary Central Incisor: A Rare Case Report	147
<i>Ellana Jermiah Joseph, Anupama Nayak P, Arathi Rao</i>	
33. Two Way Analysis of GST : With Reference to Healthcare and Pharma Sector	151
<i>Arun Gautam, Saurabh Sharma</i>	
34. Comparison of Serological Tests in the Diagnosis of Leptospirosis in a Tertiary Care Hospital at Chidambaram, Tamilnadu, India	156
<i>Balamuruganvelu Singaravelu, Sreenivasalu Reddy V, Saleel V. Maulingkar, Geethavani Babu, S. Kamala kannan</i>	
35. Traditional Use of Medicinal Plants in Puducherry for Treatment of Urinary Tract Disorders	160
<i>C. Kishore Kumar, R. Vijaya Kumar, R. Sridharan</i>	
36. Awareness of Cervical Cancer among HIV Positive Women in Southern India	165
<i>Deepak Madi, Parul Gupta</i>	
37. Correlates of Hope and Depression among People Living with Human Immunodeficiency Virus in Chhattisgarh State	170
<i>Bansh Gopal Singh, Deepak Pandey</i>	
38. Vitamin C Intake Improve the Anthropometric Measurements, Lipid Profile and Atherogenic Indices in Obese and Non Obese Females	177
<i>Ganesh H. Ghanwat, Ajit V. Sontakke</i>	
39. Effect of Vitamin C Supplementation on Insulin Resistance, β -cell Function and Insulin Sensitivity in Obese and Non Obese Individuals	183
<i>Ganesh H. Ghanwat, Ajit V. Sontakke</i>	
40. Serum VEGF and TNF- α Correlate Bacterial Burden in Pulmonary Tuberculosis	189
<i>Harish Bhat, Jeevan G Ambekar, Anand Kumar Harwalkar, Nilima Dongre, Kusal K Das</i>	
41. Online Sales Promotions of Herbal Products and Its Effectiveness towards Tanisha.com	195
<i>M.Anbarasi, S. Praveen Kumar</i>	
42. Effects of Strength Training Exercises on Physical Parameters and Quality of Life among Older Adults in Selected Geriatric Homes in Kerala, India	201
<i>Nisha B S, Dhanyamol K S, Devika Shaji, Rebecca Seguin</i>	
43. Impact of Quality of Work Life Dimensions on Organizational Performance: With reference to Jute Industry in Andhra Pradesh and West Bengal, India	206
<i>K. Hymavathi, K. S. Sekhara Rao</i>	
44. A Study on Customer Preferences on Green Marketing	211
<i>S. Sayeeda Jabeen, M. Kavitha</i>	

45. Why Physician's Keep Coming Back to Telemedicine: Predicting Using Unsupervised Learning 216
Preeti Y Shadangi, Manoranjan Dash, Sunil Kar
46. Practicing the Strategies of Interpersonal Conflicts Management in Business Organisations to
Accede Development and Effectiveness in Personal Health 222
Mitashree Tripathy, Itishri Sarangi
47. Comparative Performance Analysis of Selected Large Cap Mutual Funds in India 227
Mohammed Mujahed Ali
48. Study of Morbidity Pattern among Women Beedi Rollers Residing in Urban Area of Mangalore 233
Nanjesh Kumar S, Sanjeev Badiger, Avin B. R. Alva, Pavan Kumar, Rahul Hedge
49. Perception, Attitude and Practices Regarding Climate Change among College Students in
Coastal South India 236
*Rekha Thapar, Bhaskaran Unnikrishnan, Nithin Kumar, Prasanna Mithra, Vaman Kulkarni, Ramesh
Holla, Darshan Bhagawan*
50. Evaluation of Thyroid Hormone Levels Before and After Thyroidectomy 242
Arunachala D Edukondalu, Chakradhar. S, Yamuna devi V. R., Prabhakar Reddy E.
51. Impact of Ambidextrous Leadership on Firm Performance: A Study on IT Sector in Hyderabad, India . 247
Sahyaja Ch., K. S. Sekhara Rao
52. Prevalence of Halitosis among Preclinical Medical and Dental Students 253
Runki Saran, Saurabh Kumar, Bharath Rao K, Arul Amalan
53. The Effectiveness of Information, Education and Communication on Knowledge, Attitude, Practice
Regarding Obesity among Adolescents at Selected Government Schools in Kancheepuram District 257
Shanthy M., C. Kanniammal, Jaideep Mahendra, G. Valli
54. Various Online Marketing and Promotions Strategies to Improve the Validation Towards the
Organic Products in the Pharmaceutical Sectors 263
M. Anbarasi, S. Praveen Kumar
55. Effect of Bidirectional Dyadic Association on Anxiety and Self Esteem among
Patients Undergoing Mastectomy 270
Sruthi. M, Sr. Nirmala FCC
56. An Empirical Study to Improve the Service Quality for Geriatric Patients in a Tertiary Care Hospital .. 276
Swathi T M, Khyathi G V
57. Effects of Nudge and Purchase Intention in Online Purchasing of Electronic Products 282
A. Binu Christeena, S. Preetha
58. Discharge Planning Model with Approach of Method in Improving Patients' Readiness for
Discharge in Hospitals 288
Nurul Jannah, Tintin Sukartini, Abdul Aziz Alimul Hidayat
59. Study of Model Climate Maps Using Geographic Information System (G.I.S) 293
Ali Karim Mohamed, Mahmoud Mohammed Al-Shammari, Ali Jabbar Abdullah
60. Impact of Terrorism Act on Child Psychology and Post-Traumatic Stress Disorder 298
Afkar Fadhil Kareem Al-zzawi

61. The Sociopragmatics of Preaching in an American Christian Sermon	303
<i>Ahmed Sahib Mubarak, Hawraa Jabbar Rahi</i>	
62. The Effectiveness of Extract <i>Klika Streculiapopulifolia</i> Cream on the Collagen of Albino Mice against Ultraviolet B Radiation	309
<i>Nur Khairi, Suryani As'ad, Khairuddin Djawad, Gemini Alam</i>	
63. Polymerase Chain Reaction (PCR) Method for Identification Gene <i>Escherichia coli</i> and Officer Depot Behavior in Drinking Water Refill	315
<i>Alfina Baharuddin</i>	
64. Assessment of Eu-152 Nuclide Contaminated from Radioactive lightning Rods in Soil Samples at Kasra and Atash in Baghdad	321
<i>Suha Hadi Kadhim, Inass Abdulah Zgair, Rukia Jaber Dosh, Leith Hani Rasheed, Ali Abid Abojassim</i>	
65. Increased Expression of Interleukin 13 in Iraqi Patients Suffer from Ulcerative Colitis	326
<i>Ali J. Eidan, Haider M. Haloob, Kalid N. Alazawy, Ali M. Hasan</i>	
66. The Protective Role of Hydatid Cyst against Colorectal Cancers	332
<i>Asmaa Murtadha Mohammed, Dhamiaa Makki Hamza, Sabah Neamah Mohammed</i>	
67. Pulp Response Capped by Brain Derived Neurotrophic Factor (BDNF)	337
<i>Athraa Y. Al-Hijazi, Mukhaled L Ali, Dhuha M Hasan, Abdulla MW Al-shamma</i>	
68. Quality of Food Bacteria in School Snacks and Canteens in East Jakarta Health Office Working Area in 2017	341
<i>Bukroanah Amir Makkau, I Made Djaja, Budi Hartono</i>	
69. Borax Content in Foods Sold in a Campus and Its Trader Characteristics	346
<i>Fany Saymona Fauzi, Dewi Susanna</i>	
70. The Condition of Sanitation Facilities with <i>Escherichia coli</i> Contamination on Food at University Cafeteria 2015	350
<i>Bellini Simangunsong, Dewi Susanna</i>	
71. Method and Frequency of Stethoscope Cleaning among Respiratory Therapists in Intensive Care Units at KAMC, Riyadh	354
<i>Fayz S. Al-Shahry, Fahad Holil Al-Enazi, Nawaf Abdul-alkarim Al-Naam, Saleh Aloraibi</i>	
72. Hepatoprotectie Effect of Bromelain against Gentamicin-Induced Hepatic Damage in Rats	358
<i>Hawraa M. Murad, Jawad Kadhim Faris, Hawraa H. Naji, Firas Hussein Kadhim al-bawi, Nadya Jamal Ibrahim</i>	
73. Acute Appendicitis Versus Ruptured Ovarian Cyst in Female Patients Presented as Acute Abdomen Pain	364
<i>Wisam Mahmood Aziz, Hayder Adnan Fawzi</i>	
74. Effects of Health Promotion Behavior, Self-Esteem and Social Participation Activities on Life Satisfaction of Elderly Men	368
<i>A Reum Lee, Hee Kyung Kim</i>	
75. Change of Brief Psychiatric Rating Scale (BPRS) Value with Spiritual Qur'anic Emotional Freedom Technique (SQEFT) Therapy on Mental Disorder Patient	374
<i>Lilin Rosyanti, Indriono Hadi, Jayalangkara Tanra, Asadul Islam, Rosdiana Natzir, Muhammad Nasrum Massi, Faizal idrus, Burhanuddin Bahar</i>	

76. An Empirical Analysis Research on the Characteristics of Elderly Welfare Organizations on Job Fit and Contextual Performance	379
<i>Il-Hyun Yun</i>	
77. A Study on the Effect of Job Performance on Emotional Labor, Career Turnover Intention, Job Stress, Growth Need	385
<i>Il-Hyun Yun</i>	
78. Application of Digital Rubbing Massage in Pain Level, Comfort, and Duration of Labor Phase	391
<i>Sudirman, Sumarni, Hartati, Hendra M., Ismi Rajiani</i>	
79. Using Propensity Score Bootstrapping on Determining the Model of the HIV/AIDS Patients' Assistance	396
<i>Mahdalena, Mahpolah, Ismi Rajiani</i>	
80. ARCS Module (<i>Attention, Relevance, Confidence, Satisfaction</i>) to Increase Classroom Motivation for Pregnant Women at Public Health Center	401
<i>Agustine Ramie, Mahdalena, Hammad, Ismi Rajiani</i>	
81. Interprofessional Education Module in Achieving Ethics/Values, Roles, Responsibilities, Professional Communication Competencies, and Team Collaboration among the College of Health Students	406
<i>Neny Triana, Ismi Rajiani</i>	
82. Anxiety Level of Dental Care among Adolescents in Kepulauan Selayar District	409
<i>Lilies Anggarwati Astuti, Nurnaeni, Faiqah Umar, Hasanuddin Tahir, Asmawati Amin</i>	
83. Baby Massage With Common Cold Massage Oil on Temperature Change, Pulse Rate, Frequency of Breath, Sleep Quality and Number of Streptococcus Bacteria in Toddlers with Acute Respiratory Infection	413
<i>Melyana Nurul W, Fatatu Malikhah, Kusmini Suprihatin, Sutarmi</i>	
84. Risk Factors Affecting Attention Deficit Hyperactivity Disorder among Early Childhood in the Agricultural Area in Indonesia	417
<i>Istiklaili F, Suwandono A., Suhartono S., Widyorini E., Saputro D.</i>	
85. Maternal and Neonatal Outcomes of Elective and Emergency Cesarean Sections	422
<i>Esraa Abdulkareem Mohammed</i>	
86. Comorbidities of Phototherapy Used in Neonatal Jaundice in Diyala Governorate, Iraq	428
<i>Saif Hakeem Tofiq, Kareem Assi Obaid, Mazin Razooqi Mohammed</i>	
87. Effect of Thyroid Disorder on Liver Function and Some Immunological Parameters	433
<i>Jamela Jouda, Majida G. Maghtoof, Alia Essam Mahmood Alubadi, Youns Atiyah Kamil</i>	
88. The Presence of Pathogenic <i>Leptospira sp.</i> in Water Bodies in Klaten District	439
<i>Novia Tri Astuti, Mateus Sakundarno Adi, Yuliani Setyaningsih, Martini, Lintang Dian Saraswati</i>	
89. Dialectic Unity between Threat and Division Sociological Study	444
<i>Majida Shaker Mahdi</i>	
90. Job Demands, Low Back Pain, and Job Crafting Behaviors: A Proposed Framework	449
<i>Malek Ahmad Al-Natour, Nor Azimah Chew Abdullah</i>	
91. "Educational-Staff Knowledge and Attitude towards Antibiotic Use in Technical Institute of Karbala"	455
<i>Maytham Salim AL-Nasrawii, Ali abd Al-Latif. G. Mohammed, Mohammad Abdul Baqi Abdul Mohsin, Mohammed A.Merzah</i>	

92. Intervention of Sexual Abuse Prevention for Mother of Children with Mental Retardation in Payakumbuh Indonesia 2016	461
<i>Meri Neherta, Esthika Ariany Maisa, Yulvika Sari</i>	
93. Prenatal Tobacco Exposure and Neonate Birth Weight	467
<i>Mery Ramadani, Budi Utomo</i>	
94. Influence of Firm's Intangible Assets Intensity on Stock Prices Volatility: Evidence from Emerging Market of Pakistan	472
<i>Muhammad Ramzan Mehar, Huda Tahir, Mariam Nazeer</i>	
95. Perception of Job Characteristics and Internal Motivation in Medical Records Staff	478
<i>Khadije Sadeghi, Roxana Sharifian, Zahra Mahmoodzade Sagheb, Nasrin Shokrpour</i>	
96. Influencing Factors and Microbial Agents Which Contribute to Acne among Students from Pathological Analysis Department/Kufa Technical Institute\Al- Najaf Government	484
<i>Noor Ismeal Nasser, Ahmed Abdul Hasan Mohsin, Thuraya Aamer Habeeb, Maysoon Khudair Al-Hadrawi</i>	
97. Analysis of Factors on Reward System in the Hospital	490
<i>Nursalam Nursalam, Berlian Yuli Saputri, Yanis Kartini, Tintin Sukartini</i>	
98. Model Development of Nursing Service Loyalty	495
<i>Ahsan Ahsan, Pratiwi Y, Nursalam Nursalam, Ferry Efendi</i>	
99. Occupational Health Issues Faced by Women in Spinners	500
<i>R. Vettriselman, Antony Jesu Rajan FSA., Arunkumar N.</i>	
100. Association of HLA-DRB1 Alleles with Allergic Asthma and Total Serum IgE Levels in Iraqi Adults Patients	505
<i>Ali J. Eidan, Raad A. AL-Harmoosh, Zainab J. Hadi</i>	
101. The Role of Serum and Follicular IL-1Beta in Predicting the ICSI Outcome in Infertile Women	511
<i>Rihab Abbas Ali, Sahib Yahya Hasan Al-Murshidi, Dalal Mahdi Al-jarah</i>	
102. Factors Related to the Satisfaction of BPJS Participants on Outpatient Services in the Regional General Hospital Dr. H. Moch Ansari Saleh Banjarmasin	517
<i>Risa Fariyana, Roselina Panghiyangani, Bahrul Ilmi, Husaini, Meitria Syahadatina Noor</i>	
103. Increasing of Nutrition Status of Pregnant Women after Supplementation of Moringa Leaf Extract (<i>Moringa Oliefera</i>) in the Coastal Area of Makassar, Indonesia	521
<i>Nadimin, Venni Hadju, Suryani As'ad, Agussalim Buchari, Irmawati Haruna, Rudy Hartono</i>	
104. Assessment of the Effect of Diyala River upon the Quality of Tigris River in Baghdad Province by National Sanitation Water-Quality Index (NFS-WQI)	526
<i>Luma H. Alazawii</i>	
105. Determination of the Radiation of Alpha Particles in the Air of Primary School Buildings in the City of Karbala	531
<i>Abdalsattar Kareem Hashim, Sara Salih Nayif</i>	
106. The Influence of Organizational Pride on the Performance of Lecturers in Health at the Nahdlatul Ulama University in Surabaya	538
<i>Ima Nadatien, Seger Handoyo, Widodo J. Pudjirahardjo, Yusti Probawati</i>	

107. The Effectiveness of Using Direct Composite Veneer Template System in Restoring Anterior Teeth 543
Sri Wahyuni, Saluna Deynilisa, Ismalayani
108. A Study on Breast Cancer Awareness in Female Students of Begum Rokeya University, Rangpur:
A Cross-Sectional Study 547
Sukanta Das, Mst. Sirajum Munira, BK Chakravorti
109. Failure of Speed oligo Mycobacteria to diagnose *Mycobacterium tuberculosis* Complex
Directly from Sputum Samples 553
*Tarig MS Alnour, Faisel Abuduhier, Eltayib H Ahmed Abakur, Fahad MA Albalawi, Khalid AS Alffi,
Bernard C. Silvala*
110. Body Fat Composition as a Determinan of Cognition Functions in Elementary School Students 557
Tria Wahyuningrum, Lida Khalimatus Sakdiyah, Rina Mardiyana
111. Factors Associated with the Knowledge and Attitude Towards Breastfeeding in Thai Grandmothers of
Pregnant Adolescents 560
Wilasinee Bootsri, Surasak Taneepanichskul
112. Cross-Sector Collaboration Indicators Development of HIV-AIDS Prevention Program in Indonesia ... 566
Balqis, Hasbullah Thabrany, Kemal N Siregar
113. The Relationship between Ventilation with Excess Cancer Risk (ECR) of Benzene at the Shoe
Home Industry in Romokalisari Surabaya 572
Bachtiar Chahyadhi, Abdul Rohim Tualeka
114. The Prevalence of Oral Manifestation in Transgenders with HIV/AIDS in Surabaya, East Java, Indonesia 577
Bagus Soebadi, Adiasuti Endah Parmadiati, Hening Tuti Hendarti, Desiana Radithia, Diah Savitri Ernawati
115. Evaluation of the Health Policy Implementation of Indonesian Social Insurance Administration
Organization in Primary Health Care Facilities 581
Supriyana, Edy Susanto, Irmawati, Bernadus Rudy Sunindya, Asep Tata Gunawan, Ismi Rajiani
116. The Relationship between Environmental Sanitation to the Incidence of Hepatitis A in Rural
Areas of Central Java, Indonesia 585
Teguh Widyanto, Marsum, M. Choerul Anwar, Subinarto, Ahmad Fikri, Asep Tata G, Ismi Rajiani
117. The Correlation between Green Open Space with Carcinogen Toxicity Score of Benzene in Shoes
Home Industry Surabaya 589
Nima Eka Nur Rahmania, Abdul Rohim Tualeka
118. Frequency of Cardiac Troponin T (TNNT2) Polymorphism, a Dilated Cardiomyopathy Gene in
Tabuk Population 594
Muhammad Tariq, Khalid Fandi, Rashid Mir, Yassir Birema, FM Abuduhier
119. SLC2A2 Gene (Glucose Transporter 2) Variation is Associated with an Increased Risk of Developing
T2d in an Ethnic Population of Saudi Arabia 600
Fahad M Almutairi, Rashid Mir, Faisal Abu-Duhier, Roaid Khan, Khalid Harby, Imadeldin Elfaki
120. A Content Analysis of Original Research Articles on Public Health Published in an International Journal:
The Case Study of Thailand 606
Sunanta Wongchalee, Orapin Laosee, Ratana Somrongthong

226. Identification of Hazard and Risk Occupational Health in Lumu-Lumu Island Fisheries 1193
Lalu Muhammad Saleh, Syamsiar S Russeng, Andi Wahyuni, Muhammad Rum Rahim, Iva Hardiyanti
227. Analysis of Ordinal Logistic Regression Model on Breast Cancer Diagnosis by Birads Mammography 1199
M. Nadjib Bustan, M. Arif Tiro, Suwardi Annas, Adiatma
228. Coping Mechanism of Students Facing the Competency Exams Reviewed from the Factors Influence in Surya Mitra Husada Health College Kediri 1204
Byba Melda Suhita, Sutrisno, Mayta Sari Dwianggimawati, Heri Saputro, Prima Dewi Kusumawati, Lingga Kusuma Wardani
229. Correlation between Pulmonary Tuberculosis (TB) Patient's Characteristics and Role of Supervisor of Drugs Swallowing (PMO) with the Risk of Transmission in Medan City 2017 1209
Sorimuda Sarumpaet, Syarifah
230. Determinants of Occupational Health and Safety Problems among Seaweed Workers in Takalar Regency 1214
Yahya Thamrin, Atjo Wahyu, Masyita Muis, Syamsiar S. Russeng, Agus Bintara Birawida, Hasnawati Amqam, Andi Hardianti
231. Risk Prediction Model of Lung Tuberculosis Using Spatial Approach in the Coastal Area of Makassar City 1220
Stang Abdul Rahman, A. Ummu Salmah, Indra Dwinata, Anwar Mallongi
232. Analysis of Management System of Healthy Aisle Program in Makassar City 1225
Indar, Alwy Arifin, Nurhayani
233. Prevention of Delay of Decision Making as Efforts to Improve The Mother Health in Polewali Mandar, West Sulawesi Indonesia 1230
Apik Indarty Moedjiono, Awaluddin, Healthy Hidayanty, Tahir Abdullah
234. Criminal Liability of Illegal Drug Traffickers in Makassar City 1237
Indar, Lisar Wirailham, Slamet Sampurno, Nur Azisa, Alwy Arifin
235. Climate Risks and Environmental Determinants on Dengue transmission 1242
Fazidah A Siregar, Tri Makmur
236. Efforts to Improve Knowledge of Dental and Oral of Sangging in Mepandes Ceremony in Kerambitan District Bali Province, Indonesia 1248
Sagung Agung Putri Dwiastuti, Dewi Supariani, Ida Ayu Dewi Kumala Ratih, Anwar Mallongi
237. Relationship of Rainfall, Population Density, and Human Behavior with DHF Incidence in Makassar City 1253
Hasanuddin Ishak, Jum Dewi Sartika, Darmawansyah
238. Ineffective Regulation of Narcotics Crime Prevention (Criminology Perspective) 1259
Amir Ilyas, Rini Anggraeni, Yuyun Widaningsih
239. Influence of Assertiveness Training in Preventing Sexual Harassment in Nigerian Universities as Perceived by Counsellors in Kwara State 1264
David Obafemi Adebayo, Mohd Tajudin Ninggal
240. The Development of Post Traumatic Stress Disorder among Secondary School Students in Borno State Nigeria: A Systematic Review 1270
Zainudin Abu Bakar, Darma Kabiru Rabiu

Analysis of Ordinal Logistic Regression Model on Breast Cancer Diagnosis by Birads Mammography

M. Nadjib Bustan¹, M. Arif Tiro¹, Suwardi Annas¹, Adiatma¹

¹Department of Statistics, Faculty of Mathematic and Natural Science, Universitas Negeri Makassar, Indonesia

ABSTRACT

The right diagnosis is needed for appropriate therapy. The diagnosis of breast cancer is quite ambiguous and requires high accuracy. Mammography is a method of diagnosing breast cancer using BIRADS (Breast Imaging-Reporting and Data System) assessment. This study aimed to assess the accuracy of BIRADS classification in the diagnosis of breast cancer and predictors that influence it through a logistic regression model test. The research method was cross sectional study by collecting data from the results of mammography examinations obtained from Medical Record documents, SIRS (Hospital Information Systems), and the radiologist's expertise of mammography. The data came from 47 hospital breast cancer patients that contained information on potential predictors of breast cancer namely tumor location, metastases, age, weight, and education. Logistic regression model analysis was performed to find the best statistical test model for breast cancer diagnosis classification based on BIRADS assessment. The diagnosis classification of BIRADS was consisting of normal, benign, and malignant grades. For this reason, hypothesis testing was conducted with G test for simultaneous model testing. Then, a development of an appropriate logit model by using a partial test. Followed by conducting a suitability and feasibility test model with the Goodness of Fit using the Hosmer-Lemeshow Test. The results of the analysis revealed that the ordinal logistic regression was the best model of BIRADS classification diagnosis with an accuracy value of 52.5%. The result of ordinal logistic regression model for malignant breast cancer:

$$\hat{\pi}_1(x) = \frac{\exp(-19,436 + 1,538 \text{age} - 5,725 \text{education} - 16,313 \text{occupation} + 2,549 \text{location})}{1 + \exp(-19,436 + 1,538 \text{age} - 5,725 \text{education} - 16,313 \text{occupation} + 2,549 \text{location})}$$

The result for benign cancer:

$$\hat{\pi}_2(x) = \frac{\exp(-17,696 + 1,538 \text{age} - 5,725 \text{education} - 16,313 \text{occupation} + 2,549 \text{location})}{1 + \exp(-17,696 + 1,538 \text{age} - 5,725 \text{education} - 16,313 \text{occupation} + 2,549 \text{location})} - \frac{\exp(-19,436 + 1,538 \text{age} - 5,725 \text{education} - 16,313 \text{occupation} + 2,549 \text{location})}{1 + \exp(-19,436 + 1,538 \text{age} - 5,725 \text{education} - 16,313 \text{occupation} + 2,549 \text{location})}$$

A significant predictor factors were the location of the tumor, age, education, and the work of cancer patients. The conclusion of the diagnosis classification of breast cancer using BIRADS of mammography is quite accurate and assessment of diagnosis classification BIRADS should pay attention to tumor location factors, age, education, and work of breast cancer patients.

Keywords: Ordinal logistic regression, BIRADS, mammography, breast cancer diagnosis

INTRODUCTION

Every disease requires an accurate diagnosis so that doctors can provide appropriate treatment. The diagnosis of breast cancer is quite ambiguous but still requires a high accuracy of diagnosis.^{1, 2}

Diagnosis of breast cancer requires several types of testing, namely physical or clinical examination,

Corresponding Author:

M. Nadjib Bustan
Department of Statistics,
Faculty of Mathematic and Natural Science,
Universitas Negeri Makassar, Indonesia
Email: mnbustan@unm.ac.id

radiological examination, histopathological examination, genetic examination, and immunology.³

Radiological examinations for the diagnosis of breast cancer using mammography were assessed for the malignancy levels by using BIRADS (Breast Imaging-Reporting and Data System) developed by the American College of Radiology (ACR) and carried out by radiologists. BIRADS assessment is scoring from 1 to 6 with the meaning that 1 is negative, 2 is benign, 3 is probably benign, 4 is suspicious for malignancy, 5 is highly suggestive of malignancy, 6 = known biopsy malignancy.^{4,5}

For developing the model and assessing the accuracy of the mammography examination results, a statistical approach could applying the Ordinal Regression Logistics.⁶

The results of the model analysis will find the best model, the accuracy of the selected model, and determine the predictor factors that influence the presence of breast cancer.⁷

Ordinal Regression Logistics is one of the statistical methods for analyzing ordinal scale of response variables consisting of three or more categories. Predictor variables used in this model in the form of category data or quantitative data.⁸

Ordinal Regression Logistic Model for ordinal data response variables are often referred to as cumulative logistic models. The response variable in the cumulative logistic regression model is in the form of multilevel data represented by numbers 1, 2, 3, ..., k. With k is the number of categorical response variables. The cumulative logistic regression model will compare cumulative opportunities, ie opportunities less than or equal to the jth response category on p predictor variables expressed in vector of the x_i . $P(Y \leq j | x_i)$, with opportunities greater than the response category j, x_i , $P(Y > j | x_i)$.⁹

Cumulative opportunity forms are defined as follows:

$$\pi_k(x_k) = P(Y \leq j | x_i) = \frac{\exp[g_j(x_k)]}{1 + \exp[g_j(x_k)]} = \left(\frac{\exp(\beta_{0j} + \sum_{k=1}^r \beta_k x_k)}{1 + \exp(\beta_{0j} + \sum_{k=1}^r \beta_k x_k)} \right);$$

dengan $k = 1, 2, \dots, j, \dots, r$

$$\pi_k(x_k) = P(Y \leq j | x_i) = p_1 + p_2 + \dots + \pi_r$$

The formula for general logistic distribution function is: $F(x) = \frac{1}{1 + e^{-x}} = \frac{1}{1 + e^x}$

If $P(Y \leq j)$ is compared with the probability of a respons variabel on category $(j+1)$ until category r, the result is:

$$\frac{P(Y \leq j)}{P(Y > j)} = \frac{P(Y \leq j)}{1 - P(Y \leq j)} = \frac{\frac{\exp(\beta_{0j} + \sum_{k=1}^r \beta_k x_k)}{1 + \exp(\beta_{0j} + \sum_{k=1}^r \beta_k x_k)}}{\frac{1}{1 + \exp(\beta_{0j} + \sum_{k=1}^r \beta_k x_k)}} = \exp\left(\beta_{0j} + \sum_{k=1}^r \beta_k x_k\right)$$

$$\frac{P(Y \leq j)}{P(Y > j)} = \frac{P(Y \leq j)}{1 - P(Y \leq j)} = \frac{\pi_1 + \pi_2 + \dots + \pi_j}{\pi_{j+1} + \pi_{j+2} + \dots + \pi_r}$$

Next, execute logistic transformation to be logit model of ordinal regression logistic:

$$\text{Logit } [P(Y \leq j)] = \log \frac{P(Y \leq j)}{1 - P(Y \leq j)} = \log \frac{\pi_1 + \pi_2 + \dots + \pi_j}{\pi_{j+1} + \pi_{j+2} + \dots + \pi_r}$$

$$\text{Logit } [P(Y \leq j)] = \beta_{0j} + \sum_{k=1}^r \beta_k x_k$$

with the value of β_k , for $k = 1, 2, \dots, r$ to each of ordinal regression logistic is the same.

MATERIALS AND METHOD

To conduct a model analysis, data on breast cancer patients was needed. The source of data collection came from medical records documents, SIRS (Hospital Information System), and mammography images. Data containing information about patient identity and potential determinants in the term of age, tumor location, metastases, education, employment, and supplemented by the results of reading mammography expertise. The BIRADS assessment results are converted to ordinal data where 1 was normal, 2-3 were benign, 4-5-6 were malignant. The study design was a cross sectional study that collected data on breast cancer patients who were treated and registered at one Makassar hospital, Indonesia. The collected data was analyzed to find the best model. The analytical steps taken include: - estimating parameters; - testing logit model parameters

with simultaneous testing, partial test and logistic analysis; - and testing the suitability and accuracy of the model with the Goodness of Fit (GOF) test and the Hosmer-Lemeshow test.⁹

RESULTS

Parameter estimation was conducted by using simultaneous test of ordinal regression logistic by G test

with the formula
$$G = -2 \ln \frac{\left(\frac{n_1}{n}\right)^{n_1} \left(\frac{n_0}{n}\right)^{n_0}}{\prod_{i=1}^n \hat{\pi}_i^{y_i} (1 - \hat{\pi}_i)^{(1-y_i)}}$$

where $n_1 = \sum_{i=1}^n y_i$, $n_0 = \sum_{i=1}^n (1 - y_i)$, $n = n_1 + n_0$.

Rejection area Ho if $G > \chi^2_{(v,\alpha)}$ with v degree of freedom is equal with the number of parameters in the model without β_0 .

Simultaneous testing obtained a calculated value of -2log-likelihood model of 61,146. Because p-value is equal 0,001 is smaller than $\alpha = 0.01$, then Ho is rejected, which means that at least one predictive variable has a significant effect on the classification of breast cancer BIRADS. In this case the variables of age, education, occupation, and tumor location significantly influence the classification of breast cancer BIRADS.

Table 1: Statistical Output of G Test of Ordinal Regression Logistic

Model	-2 Log Likelihood	Chi-Square	df	P-Value
Intercept Only	89,529			
Final	61,146	28,382	9	0,001

To identify the role of each variable, partial test is conducted with the result as the follows:

Table 2: Statistical Outputs of Partial Test of Ordinal Regression Logistic

	Estimation	Std. Error	Wald	P-Value
BIRADS Malignant	-19,436	4,222	21,192	0,000
BIRADS Benign	-17,696	4,230	17,505	0,000
Age	1,538	0,740	4,326	0,038
Education	-0,069	0,022	10,152	0,001
Occupation	-16,313	1,516	115,797	0,000
Location of tumor	2,549	1,086	5,510	0,019

From the results of the parameter estimation above, it is found that there are four predictor variables that have a significant effect on the variable level of malignancy BIRADS namely, age, tumor location, education and occupation.

The logit model of its statistical outputs are:

$$g_1 \text{ (malignant)} = - 19,436 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location}$$

$$g_2 \text{ (benign)} = - 17,696 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location}$$

Based on the three logit functions above, logit 1 is a logit function for malignant BIRADS and logit 2 is a logit function for benign BIRADS. Furthermore, from

the two logit functions, the probability function of each category is obtained.

The logit model formula could be used to calculate the probability formulation for each response variable. The probability formula for malignant breast cancer BIRADS is as follows.

$$\hat{\pi}_1 \text{ (ganas)} = \frac{\exp(g_1(x))}{1 + \exp(g_1(x))}$$

Formulation of probability BIRADS benign breast cancer is:

$$\hat{\pi}_2(x) = \frac{\exp(g_2(x))}{1 + \exp(g_2(x))} - \frac{\exp(g_1(x))}{1 + \exp(g_1(x))}$$

So:

For Y=1 (BIRADS malignant)

$$\hat{\pi}_1(x) = \frac{\exp(-19,436 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location})}{1 + \exp(-19,436 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location})}$$

For Y=2 (BIRADS benign)

$$\hat{\pi}_2(x) = \frac{\exp(-17,696 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location})}{1 + \exp(-17,696 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location})} - \frac{\exp(-19,436 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location})}{1 + \exp(-19,436 + 1,538 \text{ age} - 5,725 \text{ education} - 16,313 \text{ occupation} + 2,549 \text{ location})}$$

To determine the model formed from the above predictor variables is appropriate or not in accordance with the data, the suitability model of Goodness of Fit is used by using Hosmer-Lemeshow test:

$$\hat{C}(\text{Hosmer} - \text{Lemeshow}) = \sum_{k=1}^g \frac{(o_k - n_k \cdot \bar{\pi}_k)^2}{n_k \cdot \bar{\pi}_k (1 - \bar{\pi}_k)}$$

Rejection area $H_0: \hat{C} > \chi^2_{(\alpha, g-2)}$ or $p\text{-value} < \alpha = 0.01$

Table 3: Goodness of Fit Test of Ordinal Regression Logistic Model

	Chi-Square	Df	Sig.
Pearson	58,427	73	0,893
Deviance	56,987	73	0,916

The p-value results for Pearson and Deviance are more than $\alpha > 0.01$, with values of 0.893 and 0.916, respectively. H_0 is not rejected, which means that the model obtained is in accordance with the data or there is no significant difference between the results of the observation with the possible predictions of the model.

Thus, variables that significantly influence the increase in breast cancer BIRADS are variables of age, education, occupation, and location of the tumor.

To find out the model that is formed is feasible, it can be seen from the R2 value.

Table 4: Pseudo R-Square of Ordinal Regression Logistic Model

Cox and Snell	0,453
Nagelkerke	0,525
McFadden	0,303

Based on the table “Pseudo R-Square” the value of Nagelkerke R Square is 0.525. In other words, the resulting model with five predictor variables, the variables of age, education, occupation and location that have a significant effect while body weight variables did not significantly influence the increase risk in breast cancer BIRADS. In addition, the model was also able to explain the variation of breast cancer BIRADS classification.

In addition, the model was also able to explain the variation of breast cancer BIRADS classification amounting of 30.3%.

DISCUSSION

The accuracy test of diagnosis can be done using logistic regression models. There are three main types of logistic regression known, namely binary logistic regression, multi-nominal logistic regression and ordinal logistic regression.¹⁰

The selection of logistic regression types depends on the measurement scale of dependent variable data. Because the diagnosis of breast cancer BIRADS is categorical and ordinal (normal, benign, malignant), ordinal logistic regression is chosen.^{11,12} The results of the model analysis show that the Ordinal Regression Logistic model along with six predictors are only able to explain the variation of breast cancer BIRADS classification by 30.3

This happens because this model data still requires some important potential predictors such as marital status, age of menarche, menopausal status, and others.^{13,14}

CONCLUSION

The conclusion of the diagnosis of classification of breast cancer using BIRADS of Mammography is quite

accurate, and assessment of classification diagnosis BIRADS should pay attention to tumor location factor, age, education, and work of breast cancer patients.

Ethical Clearance: Obtained from the university committee

Conflict of Interest: None

Source of Funding: Universitas Negeri Makassar, Indonesia

REFERENCES

1. John Hopkins University. Staging & Grade - Breast Cancer | Johns Hopkins Pathology [Internet]. JHU Medicine. 2018 [cited 2018 Sep 20]. Available from: <https://pathology.jhu.edu/breast/my-results/staging-grade>
2. Ministry Health. Guide to Management of Breast Cancer. Jakarta: National Cancer Mitigation Committee; 2015
3. Johns Hopkins. Overview of the Breast - Breast Cancer | Johns Hopkins Pathology [Internet]. JH Medicine Pathology. 2018 [cited 2018 Oct 14]. Available from: <https://pathology.jhu.edu/breast/basics/overview>
4. ACR. ACR BI-RADS® ATLAS — MAMMOGRAPHY.
5. Balleyguier C, Ayadi S, Van Nguyen K, Vanel D, Dromain C, Sigal R. BIRADS™ classification in mammography. *Eur J Radiol*. 2007 Feb;61(2):192–4.
6. Hosmer DW, Lemeshow S, Sturdivant RX. Applied logistic regression.
7. Agresti A. Categorical data analysis. Wiley-Interscience; 2013. 714 p.
8. Sharma B, Abhimanyu A, Anuradha A, Gigras Y. Logistic Regression for Breast Cancer Analysis. *Data Min Knowl Eng*. 2017;9(6):109–13.
9. Hosmer DW, Lemeshow S. Applied logistic regression. Wiley; 2000. 373 p.
10. Kitbumrungrat K. Comparison Logistic Regression and Discriminant Analysis in classification groups for Breast Cancer. *IJCSNS*. 2012;12(5).
11. Yusuff H, Mohamad N, Ngah UK, Yahaya AS. BREAST CANCER ANALYSIS USING LOGISTIC REGRESSION. *IJRRAS*. 2012;10(1).
12. Chhatwal J, Alagoz O, Lindstrom MJ, Kahn CE, Shaffer KA, Burnside ES. A Logistic Regression Model Based on the National Mammography Database Format to Aid Breast Cancer Diagnosis. *Am J Roentgenol*. 2009 Apr;192(4):1117–27.
13. Bustan MN, Coker AL, Addy CL, Macera CA, Greene F, Sampoerno D. Oral contraceptive use and breast cancer in Indonesia. *Contraception*. 1993 Mar 1;47(3):241–9.
14. Kamińska M, Ciszewski T, Łopacka-Szatan K, Miotła P, Starosławska E. Breast cancer risk factors. *Prz menopauzalny . Menopause Rev*. 2015 Sep;14(3):196–202.