



Source details

Malaysian Journal of Public Health Medicine

Open Access ⓘ

Scopus coverage years: 2007, from 2012 to 2021

Publisher: Malaysian Public Health Physicians' Association

ISSN: 1675-0306

Subject area: Medicine: Public Health, Environmental and Occupational Health

Source type: Journal

CiteScore 2021

0.6 ⓘ

SJR 2021

0.163 ⓘ

SNIP 2021

0.235 ⓘ

[View all documents >](#)

[Set document alert](#)

[Save to source list](#)

[CiteScore](#) [CiteScore rank & trend](#) [Scopus content coverage](#)

i Improved CiteScore methodology ⓘ

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. [Learn more >](#)

CiteScore 2021 ▾

$$0.6 = \frac{224 \text{ Citations } 2018 - 2021}{349 \text{ Documents } 2018 - 2021}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022 ⓘ

$$0.6 = \frac{171 \text{ Citations to date}}{275 \text{ Documents to date}}$$

Last updated on 06 June, 2022 • Updated monthly

CiteScore rank 2021 ⓘ

Category	Rank	Percentile
Medicine		
Public Health, Environmental and Occupational Health	#472/562	16th

[View CiteScore methodology >](#) [CiteScore FAQ >](#) [Add CiteScore to your site ↗](#)



Apa itu Genome Sequencing?

Menyediakan Layanan Sequencing

GSI lab & Oxford Nanopore Technologies untuk mengedepankan sistem sequencing di Indonesia.

gsilab.id

OPEN

Malaysian Journal of Public Health Medicine


<p>COUNTRY</p> <p>Malaysia</p> <p> Universities and research institutions in Malaysia</p>	<p>SUBJECT AREA AND CATEGORY</p> <p>Medicine └ Public Health, Environmental and Occupational Health</p>	<p>PUBLISHER</p> <p>Malaysian Public Health Physicians' Association</p>	<p>H-INDEX</p> <p>11</p>
<p>PUBLICATION TYPE</p> <p>Journals</p>	<p>ISSN</p> <p>16750306</p>	<p>COVERAGE</p> <p>2007, 2012-2021</p>	<p>INFORMATION</p> <p>Homepage</p> <p>How to publish in this journal</p> <p>editor@mjphm.or.g.my</p>

Ads by Google

Stop seeing this ad

Why this ad?

Malaysian Journal of Public Health Medicine (MJPHM) is the official Journal of Malaysian Public Health Physicians' Association. This is an Open-Access and peer-reviewed Journal founded in 2001 with the main objective of providing a platform for publication of scientific articles in the areas of public health medicine. . The Journal is published in two volumes per year. Contributors are welcome to send their articles in all sub-discipline of public health including epidemiology, biostatistics, nutrition, family health, infectious diseases, health services research, gerontology, child health, adolescent health, behavioral medicine, rural health, chronic diseases, health promotion, public health policy and management, health economics, occupational health and environmental health.

 Join the conversation about this journal

←

Ads by Google

Stop seeing this ad Why this ad? ⓘ

↕ Quartiles

☰

←

Ads by Google

Stop seeing this ad Why this ad? ⓘ

FIND SIMILAR JOURNALS ?

1 2 3 4

←

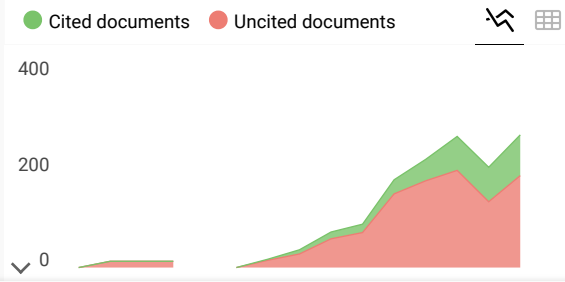
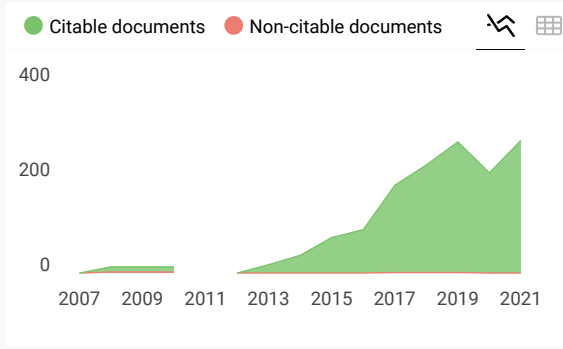
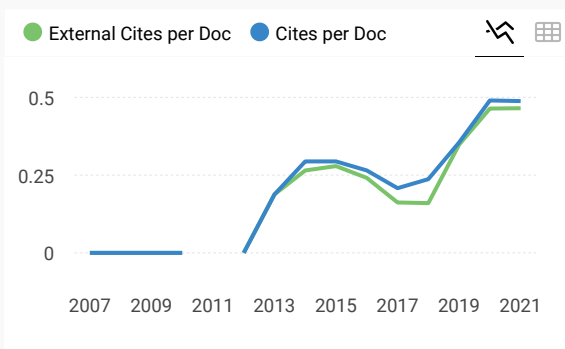
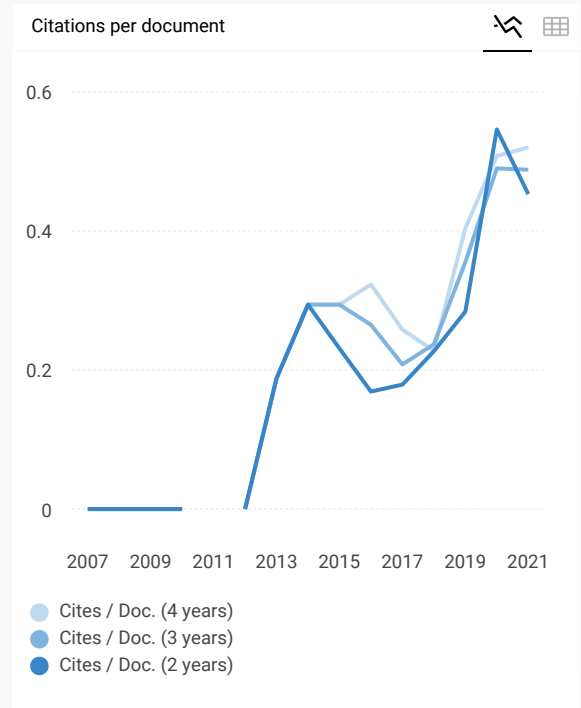
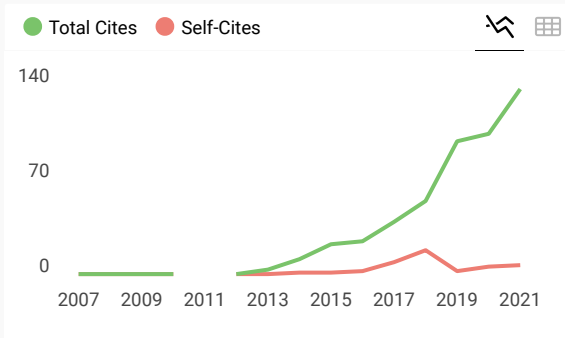
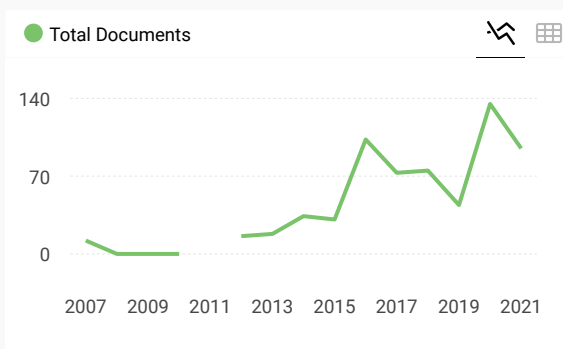
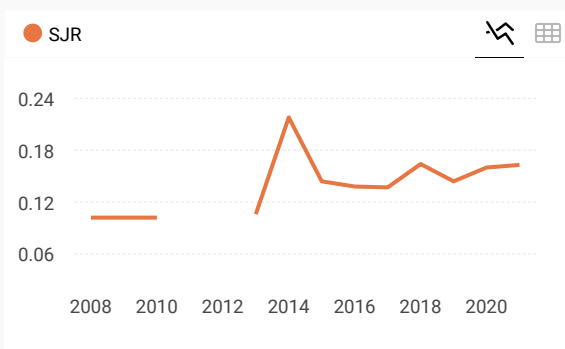
Ads by Google

Stop seeing this ad Why this ad? ⓘ

similarity

similarity

similarity



← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimagoj.com/journalsearch.php?q=21100211350&tip=sid&clean=0" style="background-color: #f0f0f0; padding: 5px; border: 1px solid #ccc;">
  Malaysian Journal of Public Health Medicine
    

  Q4 Public Health, Environmental and Occupational... best quartile
    

  SJR 2021 0.16
    

  powered by scimagojr.com

```

Ads by Google

Stop seeing this ad Why this ad? ⓘ

MALAYSIAN JOURNAL OF **PUBLIC HEALTH MEDICINE**



e-ISSN: 2590-3829

ISSN: 1675-0306

Volume 21 No 1 2021

Official Publication of the

MALAYSIAN PUBLIC HEALTH PHYSICIANS' ASSOCIATION

DOI: <https://doi.org/10.37268/mjphm/vol.21/no.1>

Published: 2021-04-24

Articles

GADGET ADDICTION AND THE EFFECT OF SLEEP HABIT, STRESS, PHYSICAL ACTIVITY TO OBESITY

Oktia Woro Kasmini Handayani, Ari Yuniastuti, Komaria Ode Abudu, Efa Nugroho

1-8

[PDF](#)

THE EFFECT OF WORKING ENVIRONMENT ON SPECIALIST PHYSICIANS' PERFORMANCE AT MEDAN TEACHING HOSPITAL

Gerry Silaban, Zulfendri, Arfah Mardiana Lubis, Putri Nasution

9-20

[PDF](#)

THE CORRELATION BETWEEN AWARENESS AND ATTITUDE DOMAINS ON URINARY TRACT INFECTION (UTI) AMONG BURAPHA UNIVERSITY STUDENTS IN CHONBURI, THAILAND

Neni Widiasmoro Selamat, Kenneth Paul, Gaiyathre, Titinun

21-28

[PDF](#)

KNOWLEDGE AND PREVENTION PRACTICES OF HAND, FOOT AND MOUTH DISEASE AMONG PARENTS AND CAREGIVERS IN BANDAR PUNCAK ALAM, SELANGOR, MALAYSIA

Nik Nur Hidayah Mansor, Azwandi Ahmad

29-36

[PDF](#)

ANALYSIS OF SEXUAL AND REPRODUCTIVE HEALTH RISK PREFERENCES OF ZIMBABWE UNIVERSITY STUDENTS

Lazarus Muchabaiwa, Josue Mbonigaba

37-45

[PDF](#)

The THE RISK FACTORS OF DENGUE HEMORRHAGIC FEVER (DHF) CASES IN PEKANBARU

herlina Susmaneli, Dedi Afandi, Zahtamal, Rasoel Hamidy, Zulfan Saam

46-52

[PDF](#)

FACTORS PREDICTING BACK PAIN AND DISABILITY IN PATIENTS WITH NON-SPECIFIC LOW BACK PAIN

Amornrat Sangsaikaew, Apinya Koontala, Khunphitha Junsevg, Arunrat Utaisang

53-60

[pdf](#)

MODELLING OF MITIGATING DIARRHOEA IN THE WETLAND AREA OF BANYUASIN DISTRICT, INDONESIA: A CROSS-SECTIONAL STUDY

Hermansyah, Irfannuddin, novrikasari, Hakim MM

61-71

[PDF](#)

SPATIAL ANALYSIS OF PROSTATE CANCER INCIDENCE IN IRAQ DURING 2000-2015

Muzahem Mohammed Al-Hashimi

72-80

[PDF](#)

THE MENOPAUSAL, DEPRESSIVE SYMPTOMS AND RELIGIOSITY AMONG WOMEN ATTENDING THE GYNAECOLOGY CLINIC IN A PUBLIC HOSPITAL

Rosida Jelani, Siti Khuzaimah Ahmad Sharoni

81-89

[pdf](#)

COVID-19: COMPARISON OF SITUATIONAL FACTORS BETWEEN HEALTHCARE WORKERS AND NON-HEALTHCARE WORKERS IN EAST MALAYSIA

Phee Kheng Cheah, Phaik Kin Cheah, Darlene Ongkili, Anne Osterrieder , Tassawan Poomchaichote , Naomi Waithira, Mavuto Mukaka, Phaik Yeong Cheah

90-95

[pdf](#)

ENTOMOLOGICAL PARAMETERS AND CHARACTERIZATION OF INSECTICIDE RESISTANCE IN DENGUE VECTOR Aedes Aegypti Larvae from Bengkulu City, Indonesia

Dessy Triana, Fitaloca N Siregar, Eka Purnama Wulan , Tatik Suteky , Swandito Wicaksono

96-102

[PDF](#)

CROSS-SECTIONAL STUDY ABOUT KNOWLEDGE ON WARNING SIGNS AND RISK FACTORS OF COLON CANCER AMONG THE SUBURBAN POPULATION OF MALAYSIA

Barani Karikalan, Sakthi Shathi Selvanathan, Tai May Hun, Sangeeta Kaur

103-111

[PDF](#)

HEALTH-RELATED QUALITY OF LIFE AND SLEEP QUALITY AMONG COPD PATENTS IN MALAYSIA

Sugunesvaran Parasuraman, Tan Chung Keat, Nurhayati Binti Mohd Marzuki

112-120

[PDF](#)

THE PROBLEMS OF INFORMAL CAREGIVERS ON LONG-TERM CAREGIVING OF THE ELDERLIES

Suridah Ali, Rahimah Abdul Aziz, Mimi Hanida Abdul Mutalib

121-126

[PDF](#)

THE INCUBATION PERIOD OF CORONAVIRUS DISEASE 2019 (COVID-19) IN PETALING DISTRICT, MALAYSIA

Ainul Nadziha Mohd Hanafiah, Lee Soo Cheng , Lim Kuang Kuay , Waramlah Ramlan, Diana Raj, Shiehafiel Fieqri Hussin, Ridwan Sanaudi, Roslinda Abu Sapian, Nurul Syarbani Eliana Musa, Mohamed Paid Yusoff

127-133

[PDF](#)

FACTORS ASSOCIATED WITH THALASSAEMIA CARRIER AMONG FORM FOUR STUDENTS IN KEDAH, MALAYSIA

Rosidah Omar, Norizan Ahmad, Ngee Wen Sze

134-140

[pdf](#)

THE STUDY ANALYSIS OF IRON DEFICIENCY ANEMIA FOR FEMALE STUDENTS OF STATE SENIOR HIGH SCHOOL

Putri Permatasari, Anjang Priliantini, Sheila Rizkia Anjani

141-147

[PDF](#)

DIETARY INTAKE, NUTRITIONAL STATUS AND COGNITIVE PERFORMANCE AMONG FISHERMEN'S CHILDREN: A REVIEW

Atiah Munirah Meli, Asma' Ali

148-159

[PDF](#)

RISK FACTORS OF INFERTILITY CASES AMONG SHALLOT FARMERS

Sri Winarni, Hanifa M. Denny, Dharminto, Fahmi Arifan, Ari Suwondo, Apoina Kartini, Hardhono Susanto

160-168

[pdf](#)

MANAGING PULMONARY TUBERCULOSIS IN A PATIENT WITH POST OP OROPHARYNGEAL CANCER - CHALLENGES FOR FAMILY PHYSICIAN

Mohd Shaiful Ehsan Shalihin, Zulkifli Harun

169-174

[PDF](#)

CONSTRUCT VALIDITY OF INDONESIAN LANGUAGE VERSION OF CHILDHOOD AUTISM RATING SCALE™ SECOND EDITION

Dian Dwi Sary, Irwanto, Ahmad Suryawan, Mira Irmawati, Nining Febriyana, Neni Widiasmoro 175-180

[PDF](#)

PHYSICIANS' ATTITUDE TOWARDS ARTIFICIAL INTELLIGENCE IN MEDICINE, THEIR EXPECTATIONS AND CONCERNS: AN ONLINE MOBILE SURVEY

Muhammad alimin Mat reffien, Ellyana Mohamad Selamat, Hanani Nabilah Mohd Sobri, Mohd Fathulzhafran 181-189
Mohamed Hanan, Mohd Ihsanuddin Abas, Muhammad Faiz Mohd Ishak, Noor Atika Azit, Noor Dalila Inche Zainal Abidin, Nor Hazmi Noor Hassim, Norain Ahmad, Sharifah Ain Shameera Syed Rusli, Sharifah Fazlinda Syed Nor, Aniza ismail

[PDF](#)

ASSOCIATION BETWEEN PREVENTIVE BEHAVIOUR ON COLORECTAL CANCER AND HEALTH LITERACY AMONG THE ADULT POPULATION IN SARAWAK, MALAYSIA

Drend Jores, Abdul Rahim Abdullah, Md Mizanur Rahman 190-197

[pdf](#)

PERCEIVED BODY IMAGE AND ITS RELATIONSHIP WITH BODY MASS INDEX, SELF-ESTEEM, BODY CHANGE STRATEGY, AND SOCIAL NETWORK USAGE AMONG RURAL ADOLESCENTS IN SARAWAK, MALAYSIA

WON LIANG TUNG 198-207

[PDF](#)

ENZYME-LINKED IMMUNOSORBENT ASSAY DETECTION FOR MALIGNANCY USING ANTI-P53 ANTIBODIES

MUHANNA ALSHAIBANI, Radin Maya Saphira Radin Mohamed, Ishak Mat, Adel AlGheethi, Jacinta Santhanam 208-215

[pdf](#)

RISK FACTORS OF SHORT-FAT STATUS NUTRITION AMONG CHILDREN AGED 12-23 MONTHS IN INDONESIA

Imtihanatun Najahah, Linda Meliati, Mutiara Rahmawati Suseno 216-222

[pdf](#)

PRICE ELASTICITY OF DEMAND AND THE IMPACT OF TAXING SUGAR-SWEETENED BEVERAGES IN MALAYSIA

Norashidah Mohamed Nor, Wency Bui Kher Thinng, J. Lennert Veerman, Nazli Suhardi Ibrahim, Fatimah Zurina 223-229

Mohamad , Saifuzzaman Ibrahim

[PDF](#)

UNIVERSAL SCREENING FOR GESTATIONAL DIABETES MELLITUS IN ANTENATAL MOTHERS IMPROVES ANTENATAL MANAGEMENT AND OUTCOMES – SINGLE CENTRE EXPERIENCE

Nicholas Lee Wen Sheng, Daniel Wong Bang Lung, Safurah Jaafar, Sangeetha, Tiffany Grace Wong, Salmiah Md Sharif 230-238

[pdf](#)

UNSAFE SEXUAL BEHAVIOUR AMONG HIV-POSITIVE MSM PARTICIPATING IN COMMUNITY-BASED TREATMENT ADHERENCE PEER SUPPORT PROGRAM

Safirah Jaan Jaafar, Khamisah Awang Lukman, Nazarudin Safian, Than Myint , Swe, Mohd Rohaizat Hassan, Rosnah Sutan, Wong Chin Mun , Mohammad Saffree Jeffree 239-243

[PDF](#)

KNOWLEDGE AND AWARENESS LEVEL OF THE SOCIETY ABOUT COVID-19 IN TURKEY: A CROSS SECTIONAL RESEARCH

Ramazan Kiraç, Dogancan Cavmak, Sait Soyler 244-252

[PDF](#)

PREVALENCE AND RISK FACTORS OF DEPRESSIVE SYMPTOMS AMONG INSTITUTIONALIZED ELDERLY IN SABAH, MALAYSIA BORNEO

Helmy Sajali, Syed Sharizman Syed Abdul Rahim, Afidah Abidin, Premala Subramaniam, Mohd Fazeli Sazali, Mohammad Saffree Jeffree, Mazlinda Musa, Nicholas Tze Ping Pang, Azizan Omar, Mohd Faizal Madrim, Khalid Mokti, Abdul Rahman Ramdzan, Zulkhairul Naim Sidek Ahmad, Azman Atil, Muhammad Aklil Abd Rahim, Mohd Rohaizat Hassan 253-259

[PDF](#)

THE COVID-19 PANDEMIC AND MENTAL HEALTH IN MALAYSIA: CURRENT TREATMENT AND FUTURE RECOMMENDATIONS

Amoneeta Beckstein, Balan Rathakrishnan, Paul B. Hutchings, Noor Hassline Mohamed 260-267

[PDF](#)

RUBELLA OUTBREAK AMONG TRAINEES OF NATIONAL SERVICE PROGRAM IN PASIR MAS, KELANTAN, MALAYSIA

Hasniza Abdullah, Mohammad Saffree Jeffree, Azman Atil, Syed Sharizman Syed Abdul Rahim, Mohd Rohaizat Hassan, Khamisah Awang Lukman, Kamrudin Ahmed 268-273

[PDF](#)

VALIDATION OF THE MALAY VERSION OF THE CANCER THERAPY SATISFACTION QUESTIONNAIRE AMONG MALAYSIAN CANCER PATIENTS

Norhaliza Abd Hamid, Nur Amirah Hamdan, Nizuwan Azman, Mohammad Farris Iman Leong Bin Abdullah 274-285

[PDF](#)

DEVELOPMENT AND VALIDATION OF AN EDUCATIONAL HEARING CONSERVATION PROGRAMME FOR MALAYSIAN YOUTH: Bisinglah BEB!

KAMARUL AKMAL ISHAK, NORAI DAH ISMAIL, SARAH RAHMAT 286-296

[PDF](#)

THE RENAL FUNCTION STATUS OF METAL ELECTROPLATING WORKERS EXPOSED TO CHROMIUM VI

Yuliani Setyaningsih, Ida Wahyuni, Ekawati, Praba Ginandjar 297-302

[pdf](#)

MAPPING OF LABORATORY SAFETY RESEARCH: A BIBLIOMETRIC REVIEW

Khairul Hafezad Abdullah, Fadzli Shah Abd Aziz 303-310

[PDF](#)

MANAGEMENT OF COMMUNITY ELDERLY CLUBS FOR IMPROVING WELL-BEING OF THE THAI ELDERLY: A QUALITATIVE STUDY

Kunwadee Rojpaisarnkit, Yuvadee Rodjarkpai 311-316

[PDF](#)

OCCUPATIONAL BURNOUT AMONG PUBLIC MEDICAL OFFICERS DURING THE EARLY STAGE OF COVID-19 PANDEMIC IN KOTA KINABALU, SABAH

Ahmad Hazim Mohammad, Shamsul Bahari Shamsudin , Nornazirah Ahmad Kamarudin, Lim Mei Ching, Ahmad Syukri Radzran, Muhamad Hanif Mohd Deris, Mohamad Hafiz Mukhsam 317-326

[PDF](#)

SLEEP QUALITY AND ITS ASSOCIATION WITH BODY WEIGHT AMONG ADULTS: AN EPIDEMIOLOGICAL STUDY

Alaa Ahmed Abdallah, Eman Mohamad Mahfouz, Eman Sameh Mohammed, Shimaa Anwer Emam, Tarek Ahmed Abd-El Rahman 327-335

[PDF](#)

PREDICTORS OF CLINICAL BREAST EXAMINATION AND MAMMOGRAPHY SCREENING UPTAKE AMONG WOMEN AGED 20-79 YEARS IN MALE' REGION, MALDIVES

Aishath Niyaf, Mohammed Abdalqader, Sairah AK

336-346

[PDF](#)

ABILITY TO PAY AND WILLINGNESS TO PAY FOR COVID-19 VACCINATION: ARE WE READY?

Amirah Azzeri, Nur Amina Abdul Laziz, Muslimah Ithnin, Hafiz Jaafar

347-355

[PDF](#)

FACTORS ASSOCIATED WITH ATTENDANCE TO EARLY CHIDHOOD EDUCATION PROGRAMS IN MALAYSIA: RESULTS FROM THE NATIONAL HEALTH AND MORBIDITY SURVEY (MATERNAL AND CHILD HEALTH) 2016

Rajini Sooryanarayana, Shubash Shander Ganapathy, Rosliza Abdul Manaf, Nik Mazlina Mohammad, Norazizah Ibrahim Wong, Noor Ani Ahmad, Chan Ying Ying, Norhafizah Sahril, Nor'Ain Abd Wahab, Nik Adilah Nik Shahein, Tahir Aris

356-366

[PDF](#)

STIGMA, ANXIETY, RELIGIOSITY, AND ECONOMIC ON COVID-19 PREVENTIVE EFFORTS

Cucu Herawati, Awis Hamid Dani, Herlinawati, Syaeful Bakhri, Lilis Banowati, Nuniek Tri Wahyuni, R. Nur Abdurakhman

367-373

[PDF](#)

Indexed By

Scopus®



ASEAN
CITATION
INDEX



Crossref

"This is an Open Access Journal"



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

Malaysian Journal of Public Health Medicine

[Current](#)[Archives](#)[About](#) ▾[Authors Guidelines](#)[Ethics Statement](#)[Contact](#)[Home](#) / [Editorial Team](#)

Chief Editor:

Professor Dato' Dr. Syed Mohamed Aljunid
National University of Malaysia

Deputy Chief Editor:

Professor Dr. Mohamed Rusli Abdullah
Perdana University - Royal College of Surgeons in Ireland

Editorial Board Members:

Professor Datuk Dr. Lokman Hakim Sulaiman
International Medical University

Professor Dr. Retneswari Masilamani
Universiti Tunku Abdul Rahman Malaysia

Professor Dr. Saperi Sulong
National University of Malaysia

Assistant Professor Dr. Amrizal Muhd Nur
Kuwait University

Professor Dr. Maznah Dahlui
University of Malaya

Dr. Roslan Johari
Ministry of Health Malaysia

Dr. Othman Warijo
Ministry of Health Malaysia

Dr. Amin Sah bin Ahmad
Ministry of Health Malaysia

Dr. Ghazali bin Chik
Ministry of Health Malaysia

Dr. Sabrina binti Che Abd Rahman
Ministry of Health Malaysia

Dr. Mariam binti Mohamad
Universiti Teknologi MARA (UiTM)

Dr. Tahir bin Aris
Ministry of Health Malaysia

Dr. Mahanim Md. Yusof
Ministry of Health Malaysia

Dr. Mohd Azahadi bin Omar
Ministry of Health Malaysia

Professor Dr. Jamalludin Ab Rahman
International Islamic University Malaysia

Indexed By

Scopus[®]

Malaysian Journal of Public Health Medicine

[Current](#)[Archives](#)[About](#) ▾[Authors Guidelines](#)[Ethics Statement](#)[Contact](#)[Search](#)

International Editorial Board Members

Professor Dr. Supasit Pannarunothai (Thailand)

Faculty of Medicine
Naresuan University
Phitsanulok, Thailand

Professor Dr. John Deen (United State of America)

Professor of Veterinary Epidemiology
College of Veterinary Medicine
University of Minnesota, United State of America

Dr. Harleen Kaur (India)

Hamdard University
New Delhi, India

Professor Dr. David Baguma (Uganda)

African Rural University
Kampala, Uganda

Professor Dr. Atsuro Tsutsumi (Japan)

Kanazawa University, Japan

Assistant Professor Dr. Amrizal Muhd Nur (Kuwait)

Kuwait University

Dr. Syed Emdadul Haque (Bangladesh)

Biological Sciences, The University of Chicago, USA
UChicago Research Bangladesh (URB)
Bangladesh

Assistant Professor Dr. Nimetcan Mehmet (Turkey)

Public Health Department, Faculty of Medicine,
Ankara Yildirim Beyazit University,
Turkey

Associate Professor Dr. Janvier Gasana (Kuwait)

Chairperson
Department of Environmental & Occupational Health
Faculty of Public Health
Kuwait University
Kuwait

Associate Professor Dr. Eleni L. Tolma (Kuwait)

Dept. of Social and Behavioral Sciences
Faculty of Public Health
Kuwait University
Kuwait

Indexed By

Scopus®



ORIGINAL ARTICLE

CONSTRUCT VALIDITY OF INDONESIAN LANGUAGE VERSION OF CHILDHOOD AUTISM RATING SCALE™ SECOND EDITION

Dian Dwi Sary¹, Irwanto¹, **Ahmad Suryawan¹**, Mira Irmawati¹, Nining Febriyana², Neni Widiasmoro³¹Department of Child Health, Faculty of Medicine, Universitas Airlangga,²Departement of Pschiatry, Faculty of Medicine, Universitas Airlangga,³Faculty of Health & Life Science, Management & Science University, Malaysia

Corresponding author: Irwanto

Email: irwanto.idris@gmail.com

ABSTRACT

Combination of The Childhood Autism Rating Scale™ Second Edition - Standard Clinical Tool (CARS2-ST) with criteria for autism spectrum disorder (ASD) based on Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) is thought to improve diagnostic process. To meet diagnostic needs, localized, Indonesian-translated version of CARS2-ST is developed. Therefore, assessment of construct validity of the Indonesian-language translated CARS2-ST must be performed. A cross-sectional study was conducted in Child Development Center in Surabaya, Indonesia from August to December 2019. Diagnosis of ASD then performed by using CARS2-ST and DSM-5 criteria. To assess construct validity, principal components analysis and Kaiser-varimax rotation was performed for CARS2-ST in order to determine factors. DSM-5 criteria for ASD was used to compare scale. There were 201 children aged 2 - 6 years old with reported speech and behavior problems. Sixty-six children were diagnosed for ASD. Factor analysis using Kaiser-varimax rotation indicates a significant two factors: social communication and interaction factor and restrictive stereotyped behaviors and sensory factor sensitivities. The factors satisfyingly reflects the criteria for ASD in DSM-5. Construct validity of Indonesian-translated version of CARS2-ST is confirmed, as shown by its correspondence with DSM-5 criteria for diagnosing. This study supports the continued relevance of the Indonesian CARS2-ST in ASD assessment.

Keywords: ASD assessment, Diagnostic criteria, DSM-5

INTRODUCTION

Autism spectrum disorder (ASD) is a group of neurodevelopmental disorders characterized by a deficit of social communication and interaction and the presence of limited or repetitive behaviors or interests.¹ According Center for Disease Control and Prevention (CDC), the incidence of autism continues to increase over the last few decades. In 2014, it was found that the prevalence rate of ASD had risen to 1 per 59 children.² Diagnosis of ASD in childhood is often challenging due to the lack of gold measurement standard and various aspects that must be assessed.³ Moreover, lack of research on the validation of tools for screening and diagnosis in low- and middle-income countries creates problems for the development of evidence-based diagnostic tools according to local community conditions.⁴ Some other factors that influences this undervaluation are inaccessible health facilities, the inability of diagnosis by health workers, and inadequate diagnostic instruments.⁵

Childhood Autism Rating Scale (CARS) was developed for the differential diagnosis of autism from other developmental disorders. In 2010, Schopler released the CARS, Second Edition (CARS2), which includes a Standard version as clinical tool for diagnosis (CARS2-ST). CARS2-ST is used for children aged 2-6 years or with an IQ score of less than 80.⁶ CARS2-ST has several

advantages over other instruments, including being easy to use, having broad diagnostic criteria; including communication disorders and social interactions, maladaptive behavior, applicable to children aged 2-6 years, uses objective and measurable scores, and is a standard instrument which is accepted globally. These advantages make CARS2-ST has a good psychometric value.⁶⁻⁹ In the other hand, DSM-5 uses criterion for diagnosing mental disorder in childhood based on statistically available evidence. Although it is a common method for clinical diagnosis, DSM-5 is lacking cut-off scale, which in turn making diagnosis difficult, especially in young children and early ASD case.¹⁰ The use of DSM-5 is more challenging for diagnosing mild ASD cases, and it have been suggested that there is a decrease in the number of cases when diagnosis is using DSM-5 compared to DSM-4.¹¹ When using the CARS as a diagnostic instrument in a clinically referred sample, a cut-off for ASD is known to improve diagnostic agreement among the CARS and clinical judgment for both 2-year-old and 4-year-old samples. The use of simple instruments will simplify the diagnostic process and may increase the accuracy of the diagnosis.^{12,13}

The original CARS2-ST is available in English language. Several validated translation of CARS2-ST are already exists in countries such as Japan, India, Brazil and Sweden.^{7,8,14,15} Studies have

noted that translated version of psychological instruments are being used for various studies worldwide with questionable reliability and validity.¹⁶ The fact that study of construct validity of Indonesian version of CARS2-ST is still scarce made it necessary to investigate further.

METHODS

Study Design

A cross-sectional study was conducted in Child Development Centre in Surabaya, Indonesia from August 1 to December 30, 2019. Total-sampling method was used to enroll participants. Participants inclusion criteria for this study are children aged between 2 and 6 years old with speech and behavior complaints and having parents or guardians who agreed to sign for informed consent. To diagnose ASD, criteria for code 299.0 in Diagnosis Statistical Manual (DSM-5) was used. CARS2-ST protocols were administered twice consecutively by psychologists and pediatricians. Items were scored based on direct observations, caregiver report, and chart review. This study was approved by Ethics Committee Universitas Airlangga Institutional Review Board (170/EC/KEPK/FKUS/2019).

DSM-5 Criteria for Diagnosing ASD

In DSM-5, five criteria are used to diagnose ASD; A) Persistent deficits in social communication and social interaction across multiple contexts, currently or by history, and B) Restricted, repetitive patterns of behavior, interests, or activities, currently or by history. The remaining DSM-5 criteria for diagnosing ASD were outside of CARS2-ST items, which are C) Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities or may be masked by learned strategies in later life). D) Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning. E) Disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay, because the frequent co-occurrence Intellectual disability and ASD; to make comorbid diagnoses of ASD and intellectual disability, social communication should be below that expected for general developmental level.¹

The Childhood Autism Rating Scale 2- Standard Indonesian Language Version

The Childhood Autism Rating Scale 2- Standard Version (CARS2-ST) is a 15-item observation-based rating scale designed to accurately differentiate children with autism from those with developmental delays without features of autism. Original CARS2-ST is available in English version. To make it available in Indonesian language, the CARS2-ST is translated by experts in Pusat Bahasa Universitas Airlangga. Forward and backward translation is performed to maintain question context. Preliminary pilot test simulation then performed to the translated version to assess the

expectable validity and reliability. As a part to assess the overall validity, construct validity is assessed in this study using principal component analysis and varimax rotation to assess whether the translated version have same variable load compared to the original version. All process of translation follows the guideline for psychiatric instruments suggested by Gudmundsson.¹⁶

Using the instrument, examiners rate the frequency, intensity, duration, and atypicality of the specified behavior while considering the chronological age of the child. Each of the 15 items is rated on a seven-point scale (1, 1.5, 2, 2.5, 3, 3.5 and 4). Higher scale indicates more severe abnormality based on observed children age. A total score is determined by summing the ratings on all 15 items. CARS total scores ranged from as low as 15 (within normal limits on all items) to as high as 60 (severely abnormal on all items). Results are categorized into three category based on score: 1) no ASD symptom (total score < 30), 2) mild-moderate ASD symptoms (total score = 30 - 36.5), and severe symptoms (total score \geq 37)⁶ The usage of the CARS2-ST in this study is authorized by Western Psychological Service (WPS) Rights and Permission with License No. WPS-001447.

Data Analysis

Factor analysis with principal component analysis (PCA) and varimax rotation were performed to identify the number of components of the scale and the variance. Factor analysis were done to assess CARS2-ST items that are hypothesized to fit with DSM-5 ASD criteria. Hence, we hypothesized that translated CARS2-ST items must correspond with the first two dimensions of ASD in DSM-5 ("deficits in social communication and social interaction" and "restrictive repetitive behavior and sensory sensitivities"). Because of its construction in two dimensions, it was expected that ASD could be explained by two factors. In this study, factor loading > 0.4 are considered significant. Higher factor loading are considered to correlate more with corresponding factor.

RESULTS

Two hundred and one children enrolled in the study were those who met the inclusion criteria. There are more male subjects than women, both in subjects whose DSM-5-based examination results are under ASD (77.3%) or not ASD (74.1%). There were no differences in the age range in both ASD (25-72 months) and non-ASD (24-72 months) subjects. Nearly half are first-born (48.5% in ASD children and 48.9% in non-ASD children). Most of them are only children or only have one sibling. Table 1 presents the sample demographic data. Data from 201 respondents were analysed by PCA. We extracted two factors that explained 51.73% of item variance (eigenvalue >1.0). The effect of additional factors was negligible. Table 2 gives the factor loadings of the Varimax-rotated two-factor solution. The responses to items in the

suggested domains are generally appropriately associated with the factors. The two factors explained 44.59% and 7.14% of the item variance respectively. The constructed domains are based on suggested criteria in DSM-5, which matched with that of the underlying factors found by the factor analysis. The first factor can be grouped in “social communication and interaction”, accounted for 44.59% of the variance, The first factor content includes relating to people, imitation, body use, object use, visual response, fear and nervousness, verbal communication, non-verbal communication, and general impressions. The second factor can be grouped in “restrictive repetitive behavior and sensory sensitivities”, accounted for 7.14% of the variance. The second factor consists of emotional

responses, adaptation to change, listening response, taste, smell, touch response and use, activity level, and consistency and level of intellectual response. Table 2 presents the principal component analysis result with varimax rotation of factors extracted according to the Kaiser Normalization.

We found that two of loading factors which hypothesized to best fit in “restrictive repetitive behavior and sensory sensitivities” factor were found to be fit better in the “social communication interaction” factor. These loading factors are “general impressions.” and “visual responses”.

Table 1: Characteristic of the sample

Variable	ASD (+)* n = 66	ASD (-)* n = 135
Gender, n (%)		
Male	51 (77.27)	100 (4.07)
Female	15 (22.73)	35 (25.93)
Age (months), median (min-max)	56 (25-72)	51 (24-72)
Age of complaints (months), median (min-max)	24 (12-60)	26 (10-72)
Birth order, n (%)		
First	32 (48.48)	66 (48.88)
Second	19 (28.78)	45 (33.33)
Third	15 (22.74)	24 (17.79)
Number of siblings, n (%)		
none	27 (40.90)	56 (41.48)
One	22 (33.33)	53 (39.25)
Two	14 (21.21)	20 (14.81)
Three and more	3 (4.6)	6 (4.46)
CARS2-ST Score and Interpretation		
< 30 (None-minimal ASD symptom)	9 (4.48)	133 (66.17)
30 - 36.5 (Mild-moderate ASD symptoms)	44 (21.89)	2 (0.99)
≥ 37 (Severe ASD symptoms)	13 (6.47)	0

*Diagnosis is based on DSM-5 criteria for ASD

DISCUSSION

Appearance of two unidimensional factors which correspond to the assignments of CARS2-ST items to our hypothesized domains is considered as evidence for the construct validity of the Indonesian version of CARS2-ST. Prior to this study, factor analysis has been done for the original, English version of CARS2-ST. Based on recent report, in the original study it was found that a two-factor solution best fits the loading factors. The study identified two factors that were highly similar to those identified here (“social communication and interaction” and “restrictive and repetitive behavior”), with some differences in specific item loadings.¹⁷ Another

study also with similar methodology also found two-factor solutions. The study identifies two domain that hypothesized to correlate with the two factors, named “social communication and sensory issues” and “emotional issues”.⁶ Other factor analysis using Promax (oblique) rotation based on DSM-4 showed three-factor methods instead, which divided into “social communication”, “emotional reactivity”, and “stereotyped behaviors and sensory sensitivities”.¹⁸ This showed that, based on DSM of any version, the original version and Indonesian version of CARS2-ST are able to help diagnose stereotyped behaviors and sensory sensitivities.

Table 2: Factor Analysis of Childhood Autism Rating Scale 2-Standard Version

CARS2-ST item	Two-Factor Solution	
	1	2
Imitation	0.82	
Relating to people	0.77	
Nonverbal communication	0.69	
General impression	0.67	0.47
Objects use	0.67	0.42
Verbal communication	0.66	
Visual response	0.62	0.44
Fear or nervousness	0.57	
Body use	0.51	0.48
Activity level		0.74
Taste, smell, touch response and use		0.62
Emotional response		0.62
Listening response		0.57
Level and consistency of intellectual response		0.50
Adaption to change		0.42

* Extraction Method: Principal Component Analysis. Rotation method: Varimax with Kaiser normalization, only factor loadings ≥ 0.4 that are reported. Two hypothesized DSM-5 domains matched with the underlying factors found by the factor analysis. Value in bold represents CARS2-item with two possible factor solution; highest value is selected for solution grouping.

Construct validity assessment is crucial for a psychological instruments because it tests whether a psychological instruments relate to measures of other constructs as specified by theory.¹⁹ Due to this reason, it is important that translated version of a psychological instruments must have construct validity as similar as possible with their updated original version. Although full publications are scarce, study showed that factor analysis has also been performed in translated versions of CARS2-ST. In Turkish version, a one-factor solution is obtained by comparing the scale with Autism Behavior Checklist and Clinical Global Impression-Severity of Illness.²⁰ In the Indian version, five-factor solution were obtained by comparing the scale with the International Classification of Disease, Tenth edition (ICD-10), Binet Kamat Scale of intelligence - an Indian adaptation of the Stanford-Binet Scale of Intelligence; and Gesell's Developmental Schedule.⁸ Here is obvious that currently available factor solution of CARS2-ST is bound to the specifically-compared ASD diagnostic instruments, suggesting that validated local versions of CARST2-ST still comply with ASD basic diagnostic theories. However, the lack of comparison similar to development of original version suggest that construct validity of translated CARS2-ST is still questionable, although their internal validity is reported to be satisfying.

In this study, we found that at least four aspects correspond to both factors. Two of them, "general impression" and "visual response", are first originally hypothesized to be best explained as observable signs for "restrictive repetitive behavior and sensory sensitivities". The result showed that both loading factors are better fit for "social communication interaction". This deviation from our hypothesis can be explained through possibility that at observer's

perspective, both items are often seen as individual stereotypic behavior rather than communication quality. Some clinicians may rate this item based on the quality of a child's eye contact.² In contrast, others may rate it based on a stereotyped behavior or sensory sensitivity (i.e., atypical visual sensory seeking).^{22,23} In fact, in the original CARS2-ST, "visual response" is included in social communication and interaction factors. Data on recent study showed that visual response This finding prompt as reminding for the future CARS2-ST users that in order to scale "general impression" and "visual response", child behavior during communication and interaction should be observed carefully, not only by judging child when doing lone activities.

Our study also faced several limitations during its conduction. First, although we are able to observe more than a couple hundred of children, the prevalence of children with ASD is still less than half compared to non-ASD children. This is the problem with short period cross-sectional study design, hence the need to do this study in longer period of time. Secondly, while this study successfully explained the construct validity of Indonesian version of CARS2-ST through a two-factor solution based on DSM-5 criteria, this study result still can not justify the severity of ASD based on DSM-5 criteria. This means we still can not conclude whether ASD severity is actually tied to worse Indonesian version of CARS2-ST result. Further study is needed to clarify this correlation. Finally, while this study is able to show that CARS2-ST items are able to reflect the first two criteria for ASD based on DSM-5, it still can not be used as a basis to correspond with the remaining three of DSM-5 criteria for ASD. This is mainly due to the lack of comparison method for assessing child intelligence, validating child developmental history, and eliminating possible global or focal

developmental disorder, which must be satisfied to diagnose ASD according to DSM-5 criteria. Hence, making Indonesian version of CARS2-ST currently should not be used alone as a modality to diagnose ASD.

CONCLUSION

We confirmed the construct validity of Indonesian version of CARS2-ST, as shown by correspondence of items that reflects ASD symptoms with the first two criteria of ASD in DSM-5. This study supports the continued use relevance of the CARS2-ST for childhood ASD as supplementary diagnostic tool, accompanying the DSM-5 criteria.

Conflict of interest

The authors declare no potential conflict of interest.

ACKNOWLEDGEMENT

CARS2-ST is a trademarked and copyrighted product of Western Psychological Services. The authors would also like to acknowledge to all respondent of this research for their cooperation and support. The authors also would like to say thank to all the people who help this research.

REFERENCES

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington, VA: American Psychiatric Association; 2013:50-9.
2. Baio J, Wiggins L, Christensen DL, et al. Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years – Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. *MMWR Surveill Summ* 2018;67(No. SS-6):1-23.
3. Steiner AM, Goldsmith TR, Snow AV, et al. Practitioner's guide to assessment of autism spectrum disorders in infants and toddlers. *J Autism Dev Disord* 2012;42(6):1183-96.
4. Durkin SM, Elsabbagh M, Barbaro J, et al. Autism screening and diagnosis in low resource settings: challenges and opportunities to enhance research and services worldwide. *Autism Res* 2015;8(5):473-6.
5. Akoury-Dirani L, Alameddin M, Salamun M. Validation of the Lebanese childhood autism rating scale-second edition-standard version. *Res Autism Spectr Disord* 2013;7:1097-1103.
6. Schopler E, Van Bourgandien M, Wellman J, et al. Love S. Childhood autism rating scale-second edition (CARS2): manual. Western Psychological Services; 2010. <https://www.wpspublish.com/cars-2-childhood-autism-rating-scale-second-edition>
7. Pereira A, Riesgo RS, Wagner MB. Childhood autism: translation and validation of the childhood autism rating scale for use in brazil. *J Pediatr (Rio J)* 2008; 84(6):487-94.
8. Russell P SS, Daniel A, Russel S, et al. Diagnostic accuracy, reliability and validity of childhood autism rating scale in India. *World J Pediatr* 2010; 6(2):141-7.
9. Vaughan CA. Test review. *J Psychoeduc Assess* 2011; 29(5):489-93.
10. Ashwood KL, Buitelaar J, Murphy D, et al. European clinical network: autism spectrum disorder assessments and patient characterisation. *Eur Child Adolesc Psychiatry* 2014; 24(8):985-95.
11. Kulage K, Goldberg J, Usseglio J, et al. How has DSM-5 Affected Autism Diagnosis? A 5-Year Follow-Up Systematic Literature Review and Meta-analysis. *J Autism Dev Disord* 2019; 50(6):2102-27.
12. Chlebowski C, Green J, Barton ML, et al. Using the childhood autism rating scale to diagnose autism spectrum disorders. *J Autism Dev Disord* 2010; 40(7):787-99.
13. Risi S, Lord C, Gotham K, et al. Combining information from multiple sources in the diagnosis of autism spectrum disorders. *J Am Acad Child Adolesc Psychiatry* 2006; 45:1094-1103.
14. Kurita H, Miyake Y, Katsuno K. Reliability and validity of the Childhood Autism Rating Scale-Tokyo version (CARS-TV). *J Autism Dev Disord* 1989; 19(3):389-96.
15. Nordin V, Gillberg C, Nyden A, The swedish version of the childhood autism rating scale in a clinical setting. *J Autism Dev Disord* 1998; 28:69-75.

16. Gudmundsson E. Guidelines for translating and adapting psychological instruments. *Nordic Psychology* 2009; 61(2):29-45.
17. Park EY, Kim J. Factor structure of the Childhood Autism Rating Scale as per DSM-5. *Acta Paediatr Jpn* 2016; 58:139-45.
18. Moulton E, Bradbury K, Barton M, et al. Factor Analysis of the Childhood Autism Rating Scale in a sample of two-year olds with an Autism Spectrum Disorder. *J Autism Dev Disord* 2016; 49(7):2733-46.
19. Strauss ME, Smith GT. Construct Validity: Advances in Theory and Methodology. *Annu Rev Clin Psychol* 2009; 5:1-25.
20. Gassaloğlu SI, Baykara B, Avcil S, et al. Validity and Reliability Analysis of Turkish Version of Childhood Autism Rating Scale. *Turk Psikiyatri Derg* 2016; 27(4):266-74.
21. Madipakkam AR, Rothkirch M, Dziobek I, et al. Unconscious avoidance of eye contact in autism spectrum disorder. *Sci Rep* 2017; 7(1):13378.
22. Marco EJ, Hinkley LBN, Hill SS, et al. Sensory processing in autism: a review of neurophysiologic findings. *Pediatr Res* 2011; 69(5 Pt 2):48R-54R.
23. Matsushima K, Kato T. Social Interaction and Atypical Sensory Processing in Children with Autism Spectrum Disorders. *Hong Kong J OCCUP TH* 2013; 23(2):89-96.

Lampiran 8 Kelaikan etik



**KOMITE ETIK PENELITIAN KESEHATAN
FAKULTAS KEDOKTERAN UNIVERSITAS AIRLANGGA
SURABAYA**

**KETERANGAN KELAIKAN ETIK
("ETHICAL CLEARANCE")**

No. 170/EC/KEPK/FKUA/2019

KOMITE ETIK PENELITIAN KESEHATAN FAKULTAS KEDOKTERAN UNIVERSITAS AIRLANGGA SURABAYA, TELAH MEMPELAJARI SECARA SEKSAMA RANCANGAN PENELITIAN YANG DIUSULKAN, MAKA DENGAN INI MENYATAKAN BAHWA PENELITIAN BERJUDUL :

VALIDITAS DAN RELIABILITAS *CHILDHOOD AUTISM RATING SCALE, SECOND EDITION STANDARD VERSION*- VERSI INDONESIA SEBAGAI ALAT DIAGNOSTIK PADA ANAK *AUTISM SPECTRUM DISORDER* USIA 2-6 TAHUN

PENELITI UTAMA :

dr. Dian Dwi Sary, Sp.A

UNIT / LEMBAGA / TEMPAT PENELITIAN :

**Pusat Layanan Disabilitas Kota Surabaya, Poliklinik Kesehatan Jiwa Anak dan Remaja
Rumah Sakit Jiwa Menur Surabaya, Autism Centre UPTD ABK Kabupaten Sidoarjo**

DINYATAKAN LAIK ETIK.

Surabaya, 10 Juni 2019

Prof. Dr. H. Eddy Bagus Wasito, dr, MS., Sp.MK (K)