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Editorial Board

Natalie Pafitis, Senior Editor

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Natalie joined BMC after having completed an MSc in Environmental Health at the Cyprus International Institute, in Association with the Harvard School of Public Health, USA where she completed courses including global climate change, environmental epidemiology, sustainable development and exposure assessment. Prior to this, she gained her BSc in Environmental Science at the University of Indianapolis, USA. Natalie has been Editor of *BMC Public Health* since 2007, also having worked on several biology and medical journals since this time. She has a keen interest in the use of research evidence to underpin public health policy and to advance the Sustainable Development Agenda. She is an Editor of the BMC Series blog and an ambassador of the Sustainable Development Goals for the BMC Series journals.

Lorena Verduci, Associate Editor

Lorena has a master's degree in Biomolecular Sciences and Technologies (University of Pisa, Pisa, Italy) and a PhD in Innovative Strategies in Biomedical Research (Scuola Superiore Sant'Anna, Pisa, Italy). After her PhD she worked in research institutes,

universities and life science companies in Italy and in the UK, including the Italian National Cancer Institute "Regina Elena" in Rome, "Sapienza" Università di Roma, Rome, Italy, and the University of Cambridge, Cambridge, UK. Her research focused on cardiovascular regeneration, role of microRNAs and circRNAs in cancer, assessment of new cancer drug *in vitro* and *in vivo*, and development of new technologies. Before joining *BMC Public Health* in September 2022, Lorena was an Associate Editor at *PLOS ONE* in the Public Health and Medicine Team.

Senior Editorial Board Members

Chris I. Ardern

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Chris I. Ardern is an Associate Dean of Research and Innovation in the Faculty of Health at York University (Toronto, Canada) and Associate Professor in the School of Kinesiology and Health Science. Chris' primary interest is in the epidemiology of obesity and 24-hour movement behaviors (sleep, sedentary time, and physical activity) in relation to cardiometabolic risk, microvascular dysfunction, and dementia. Most recently, his work has focused on the health risks associated with weight stigma, and the use of risk algorithms and behavioral profiling for the identification of high-risk subgroups of the population. This work incorporates both social and physical determinants, drawing on large scale open data infrastructure, national surveys, and administrative healthcare data to conduct time-to-event and geospatial analyses, to move knowledge into action with collaborating healthcare groups. He holds a Research Scientist position at Southlake Regional Health Centre, is member of the York University Centre for Aging Research and Education (YU-CARE), and is active in obesity organizations at the local to national level. Professor Ardern joined the Editorial Board of *BMC Public Health* in 2017, and has been a Senior Editor since 2019.

Noriko Cable

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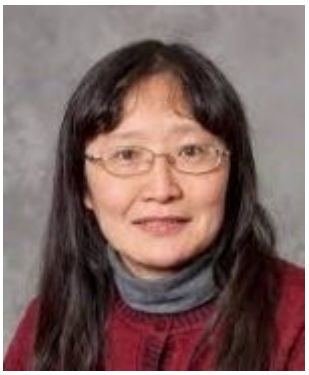

Noriko is a Senior Research Fellow at the Department of Epidemiology and Public Health, University College London. She works on social relationships, alcohol use and mental health from childhood to late adulthood as well as on cross-national examinations of mental health. Her work appears in the booklets Life gets under your skin and Never too early, never too late published by her research group, the International Centre for Lifecourse Studies in Society and Health (ICLS). She currently works on her ESRC funded project, UK-Japan Social relationships and well-being across ageing nations (UK-Japan SWAN) to establish early career researchers' networks between the UK and Japan. Dr. Cable joined the Editorial Board of *BMC Public Health* as Section Editor in 2019.

Jennifer Emond

Jennifer is Associate Professor in the Departments of Biomedical Data Science and Pediatrics at the Geisel School of Medicine at Dartmouth College and co-Director of the Media & Health Behaviors Laboratory at Dartmouth College. Jennifer's research focuses on the development of health behaviors during early childhood including dietary behaviors, physical activity and sleep. Jennifer's research also examines the role of child-directed food marketing on shaping children's dietary behaviors. She is actively involved in teaching in the Quantitative Biomedical Sciences graduate program at Dartmouth College and greatly enjoys mentoring others within statistical methodology.

Youcheng Liu

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Youcheng is currently an Associate Professor at Wayne State University School of Medicine. He trained in medicine and public health with specialties in industrial hygiene, environmental health, occupational health and epidemiology. His research focuses on assessing occupational and environmental exposures to chemical hazards and biological agents, evaluating the resultant health outcomes (asthma, COPD, cardiovascular diseases

and diabetes) and identifying effective and feasible measures and strategies to reduce exposures and prevent diseases. Current research projects include dermal exposure to nicotine in migrant tobacco farm workers in Kentucky and the development of a barrier cream and other intervention methods to reduce exposure and green tobacco sickness, isocyanate exposure in neonates and the identification of user barriers of Powered Air-Purifying Respirators (PAPRs) in health care workers. He joined the Editorial Board of *BMC Public Health* in 2010.

Carol Maher

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Carol is a Research Professor and Deputy Director of the Alliance for Research in Exercise, Nutrition and Activity (ARENA) at the University of South Australia. Her research focuses on the links between lifestyle behaviors (particularly physical activity, sedentary behavior and sleep) and health and obesity in children and adults. She is particularly interested in technology-based approaches for measuring and improving health behaviors, including wearables, smart devices, apps and online social media. Professor Maher joined the Editorial Board of *BMC Public Health* in May of 2014.

Monica Malta

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Dr. Monica Malta is a researcher at the Centre for Addiction and Mental Health (CAMH) and a professor at the University of Toronto. She has been engaged in global health research focusing on social and structural factors influencing health inequalities and the impact of gender-based violence among female-identified persons from Latin America. Her work contributed to change local legislations and informed several interventions protecting the rights of people living with HIV, survivors of gender-based violence and the LGBTQ2S community.

Isabelle Niedhammer

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Isabelle is a Research Director at the French National Institute for Health and Medical Research (INSERM, France). She is currently working at the Research Institute for Environmental and Occupational Health (IRSET-INSERM U1085). Her background is in occupational health epidemiology. Her research topics are related to occupational and social epidemiology and she is particularly interested in job stress, psychosocial work exposures and workplace violence, and their impact on health, as well as in the contribution of these occupational exposures to social inequalities in health. She is the author of more than 100 publications in international peer-reviewed journals and participated in the writing of 8 books. She joined the Editorial Board of *BMC Public Health* in 2011.

Patrick Palmieri

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Dr. Patrick Palmieri is a global health expert and research methodologist with more than 20 years work experience in academia and industry. Dr. Palmieri leads two research centers based in South America including the EBHC South America: A JBI Affiliated Group and the South American Center for Qualitative Research. He is a full professor and senior research scientist at the Universidad Norbert Wiener (Peru), where he previously served as Vice Chancellor for Research and Dean of the School of Nursing. In addition, Dr. Palmieri is an adjunct professor in doctoral programs at A.T. Still University and Texas Woman's University. Previously in Peru, he co-led a $300+ million project resulting in the largest private vertically integrated health delivery system and led the first successful international hospital accreditation. His research interests include generating evidence to guide clinical practice through scoping and systematic reviews, applied psychometrics for cross-cultural research, quality improvement projects, and qualitative inquiry. Dr. Palmieri is certified as a senior researcher by the Peruvian National Committee for Science,

Technology, and Innovation, and he is a fellow of the American Academy of Nurses and the Royal College of Surgeons in Ireland.

Louisa Peralta

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Louisa is a Senior Lecturer in the Sydney School of Education and Social Work at the University of Sydney, Australia. With a background in health and physical education, her research focuses on the design, implementation, and evaluation of school- and community-based health promoting programs (particularly focusing on physical activity) in children, adolescents and postpartum women. She is particularly interested in the implementation processes, including technology platforms, and the impact of these interventions on a range of health knowledge, capabilities, and behaviours. Dr Peralta joined the Editorial Board of *BMC Public Health* in 2018.

David Rehkopf

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David is an Assistant Professor of Medicine at Stanford University, in the Division of Primary Care and Population Health, with an appointment in Health Research and Policy, and affiliations with the Stanford Center on Poverty and Inequality and the Stanford Center for Population Health. He received his Masters in Public Health in Epidemiology and Biostatistics from the University of California, Berkeley, and his doctorate at the Harvard School of Public Health in the Department of Health and Social Behavior. He was a Robert Wood Johnson Health and Society Scholar at the University of California, Berkeley and the University of California, San Francisco. His research focus is on understanding the health effects of income and work policy on health, as well as understanding the biological pathways through which the social and economic environment impacts disease and death. He joined the Editorial Board of *BMC Public Health* in 2016.

Akira Shibanuma

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Akira is a Lecturer at the Department of Community and Global Health, Graduate School of Medicine, the University of Tokyo. As a social scientist, he has been involved in community health research studies in low- and middle-income countries and Japan. His research mainly focuses on health and healthcare service-seeking behaviors, social determinants of health, and inequity in health in the field of reproductive, maternal, newborn, child, and adolescent health as well as migration and health. He currently works on research projects regarding discrimination and wellbeing and the quality of healthcare service provisions. He joined the Editorial Board of *BMC Public Health* in 2020.

Henri Tilga

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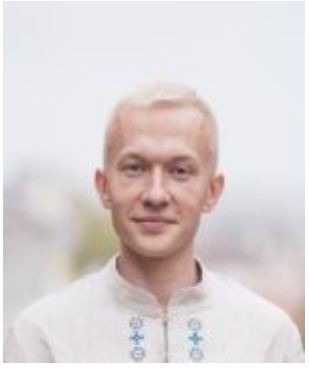

Henri is a Research Fellow of Sports Sciences in the Institute of Sport Sciences and Physiotherapy, University of Tartu. The theoretical background of his work is based mainly on the self-determination theory. More specifically, he works on the topic of teachers' multidimensional autonomy-supportive and controlling behaviours, students' psychological need satisfaction and frustration, and students' autonomous and controlled forms of motivation in the context of physical education. He has also developed and tested the effectiveness of several intervention programs with the aim to improve psychological need satisfaction and autonomous forms of motivation among students in the context of physical education. He joined the Editorial Board of *BMC Public Health* in 2021.

Shankar Viswanathan

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Shankar is an Assistant Professor of Biostatistics at the Albert Einstein College of Medicine, in the Department of Epidemiology and Population Health. He received his

doctoral degree in Biostatistics from the University of North Carolina at Chapel Hill. His methods research focuses on multivariate survival analysis, longitudinal data, and missing data analysis. His applied area focusses on Global Health, Injury Epidemiology, and Chronic Disease Epidemiology. He joined the Editorial Board of *BMC Public Health* in 2018.

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What motivated men to start PrEP? A cross-section of men starting PrEP in Buffalo city municipality, South Africa

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Hypertension is the second leading risk factor for death in South Africa, and rates have steadily increased since the end of Apartheid. Research on the determinants of hypertension in South Africa has received...

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High variability of COVID-19 case fatality rate in Germany

During the first wave of the COVID-19 pandemic a high case fatality rate (CFR) was noticed worldwide including also Germany where the first European cases have been observed. The WHO recommended immediate intu...

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Social desirability bias is one of the oldest forms of response bias studied in social sciences. While individuals may feel the need to fake good or bad answers in response to sensitive or intrusive questions,...

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Cohort Profile: evaluation of the targeted individual promotion in german preschools using the revised Dortmund Developmental Screening for Preschools DESK 3–6 R (project "GIF MV")

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Digital technologies have been used to support mental health services for two decades, but the COVID-19 pandemic created a particular opportunity for greater utilization and

more data-driven assessment of thes...

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A study on the quality evaluation index system of smart home care for older adults in the community ——based on Delphi and AHP

In the context of the “silver wave” and “technology wave”, smart home care for older adults in the community provide new ways for China and other countries to support ageing in place. Yet, only very few studie...

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Racial/ethnic differences in social determinants of health and health outcomes among adolescents and youth ages 10–24 years old: a scoping review

With the recent emergence of the Healthy People 2030 goals there is a need to understand the role of SDOH on health inequalities from an upstream perspective. This review summarizes the recent body of evidence...

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Community Advisory Boards (CABs) have been frequently used to engage diverse partners to inform research projects. Yet, evaluating the quality of engagement has not been routine. We describe a multi-method eth...

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Local government provides Cultural, Environmental, and Planning (CEP) services, such as parks, libraries, and waste collection, that are vital for promoting health and wellbeing. There have been significant ch...

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The global dynamic transmissibility of COVID-19 and its influencing factors: an analysis of control measures from 176 countries

To summarise the dynamic characteristics of COVID-19 transmissibility; To analyse and quantify the effect of control measures on controlling the transmissibility of COVID-19; To predict and compare the effecti...

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Young people's explanations for the decline in youth drinking in England

Youth alcohol consumption has fallen markedly over the last twenty years in England. This paper explores the drivers of the decline from the perspectives of young people.

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Associations between socioeconomic status and risk of obesity and overweight among Chinese children and adolescents

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Lifesaving skills training in schools – A qualitative study to explore students, teachers, and parent's perceived opportunities and challenges

The objective of this study is to explore the perception of teachers, parents and students' regarding implementation of a school-based lifesaving skills program and help predict potential barriers and solutions.

Natasha Shaukat, Daniyal Mansoor Ali, Mehtab Jaffer, Zeerak Jarrar, Naela Ashraf, Sheza Hassan, Ali Azim Daudpota, Muskaan Abdul Qadir, Aly Hamza Khowaja and Junaid Razzak

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Ethnic disparities in COVID-19 outcomes: a multinational cohort study of 20 million individuals from England and Canada

Heterogeneous studies have demonstrated ethnic inequalities in the risk of SARS-CoV-2 infection and adverse COVID-19 outcomes. This study evaluates the association between ethnicity and COVID-19 outcomes in tw...

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Experiences of Every Mind Matters, Public Health England's adult mental health literacy campaign: a qualitative interview study

Every Mind Matters (EMM) is a publicly funded health campaign, launched in England in 2019, to equip adults to look after their mental health, and that of others, by offering online information about common pr...

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Climate change and health risks in Mukuru informal settlement in Nairobi, Kenya – knowledge, attitudes and practices among residents

Residents of informal settlements in Sub-Sahara Africa (SSA) are vulnerable to the health impacts of climate change. Little is known about the knowledge, attitudes and practices

(KAP) of inhabitants of informa...

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Sociodemographic differences in Covid-19 vaccine uptake in Denmark: a nationwide register-based cohort study

Covid-19 vaccination is the main strategy to reduce SARS-CoV-2 transmission, mortality and morbidity. This study aimed to examine sociodemographic differences in Covid-19 vaccine uptake among all individuals i...

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Undernutrition among the children below five years of age in Uganda: a spatial analysis approach

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Validity and reliability of the Chinese version of the Health Literacy Scale Short-Form in the Chinese population

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Association between children living with obesity and Mental Health problems: a data analysis of the Welsh Health Survey, UK

Obesity and mental health problems in children are both significant and growing public health issues. There is mixed evidence on the relationship between obesity and mental health in children. This study exami...

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Siobhan Botwright, Jiratorn Sutawong, Pritaporn Kingkaew, Thunyarat Anothaisintawee, Saudamini Vishwanath Dabak, Chotika Suwanpanich, Nattiwat Promchit, Roongnapa Kampang and Wanrudee Isaranuwatchai

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Socioeconomic inequality in informal payments for health services among Iranian households: a national pooled study

There is limited evidence on the prevalence and socioeconomic inequality in informal payments (IP) of households in the Iranian health system. This study was conducted to investigate the prevalence of IP and r...

Jafar Yahyavi Dizaj, Maryam Khoramrooz, Vajihe Ramezani-Doroh, Satar Rezaei, Reza Hashempour, Kamran Irandoust, Shahin Soltani and Ali Kazemi-Karyani

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The coronavirus disease 2019 (COVID-19) pandemic had a huge impact on daily life, even in countries such as Sweden where the restrictions were relatively mild. This paper assesses the effects of the COVID-19 p...

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Precipitation anomalies are associated with a number of poor health outcomes. One potential consequence of precipitation extremes is human geographic mobility. We evaluated the associations between precipitati...

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Cross-sectional study of factors affecting the receipt of mental health education in older migrants in China

Population migration in China has increasingly included middle-aged and older populations. Relatedly, the lack of mental health education among China's older migrants is still an important but neglected proble...

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The value of the Nutrition and Obesity Policy Research and Evaluation Network in advancing the evidence base for effective nutrition and obesity policy: assessment using the Consolidated Framework for Collaborative Research

Addressing nutrition disparities and preventing obesity require multi-level interventions, including policies that address the nutrition environment and other social determinants of health. The Nutrition and O...

Taylor Vasquez, Ronli Levi, Melissa Akers, Amy Lowry-Warnock, Heidi M. Blanck and Hilary Seligman

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Predictors of national health insurance membership among the poor with different education levels in Indonesia

Indonesia has made significant progress in expanding universal health coverage (UHC) through its National Health Insurance (NHI) mechanism. However, in the context of NHI implementation in Indonesia, socioecon...

Nuzulul Kusuma Putri, Agung Dwi Laksono and Nikmatur Rohmah

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RESEARCH

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Predictors of national health insurance membership among the poor with different education levels in Indonesia

Nuzulul Kusuma Putri[1,2*], Agung Dwi Laksono[2,3] and Nikmatur Rohmah[4]

Abstract

Background Indonesia has made significant progress in expanding universal health coverage (UHC) through its National Health Insurance (NHI) mechanism. However, in the context of NHI implementation in Indonesia, socioeconomic disparities caused its subpopulations to have different literacy of NHI concepts and procedures, increasing the risk of healthcare access inequities. Hence, the study aimed to analyse the predictors of NHI membership among the poor with different education levels in Indonesia.

Methods This study used the secondary dataset of the nationwide survey "Abilities and Willingness to Pay, Fee, and Participant Satisfaction in implementing National Health Insurance in Indonesia in 2019" by The Ministry of Health of the Republic of Indonesia. The study population was the poor population in Indonesia and included a weighted sample of 18,514 poor people. The study used NHI membership as a dependent variable. Meanwhile, the study analysed seven independent variables: wealth, residence, age, gender, education, employment, and marital status. In the final step of the analysis, the study used binary logistic regression.

Results The results show that the NHI membership among the poor population tends to be higher among those who have higher education, live in urban areas, are older than 17 years old, are married and are wealthier. The poor population with higher education levels is more likely to become NHI members than those with lower education. Their residence, age, gender, employment, marital status, and wealth also predicted their NHI membership. Poor people with primary education are 1.454 times more likely to be NHI members than those without education (AOR 1.454; 95% CI 1.331–1.588). Meanwhile, those with secondary education are 1.478 times more likely to be NHI members than those with no education (AOR 1.478; 95% CI 1.309–1.668). Moreover, higher education is 1.724 times more likely to result in being an NHI member than no education (AOR 1.724; 95% CI 1.356–2.192).

Conclusion Education level, residence, age, gender, employment, marital status, and wealth predict NHI membership among the poor population. Since significant differences exist in all of those predictors among the poor population with different education levels, our findings highlighted the importance of government investment in NHI, which must be supported with investment in the poor population's education.

Keywords Education, National Health Insurance, Universal health coverage, Disparity, Social security

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Introduction

Poverty is a state of being unable to meet basic needs such as food and non-food [1–3]. A population is categorised as poor if it has an average monthly per capita expenditure below the poverty line [1]. Economic conditions negatively influence poverty; the better the economy, the lower the poverty will be [4]. Poverty increases the risk of death and disability due to non-communicable diseases (NCDs) [5]. On the other hand, NCDs also increase the risk of falling into poverty [6]. Illness also causes heavy expenses along with the experience of physical and mental suffering. Usually, in countries without social health insurance, an unbearable amount of medical costs is incurred to improve or maintain the patient's health condition. As a result, heavy financial burdens tend to push households from a comfortable or secure life, or even from bad to worse, to the possibility of becoming poor [7]. Poor people are vulnerable people. Without health insurance, they fall into deeper poverty once they become sick.

In Indonesia, the National Health Insurance (NHI) is a form of government's commitment to achieving universal health coverage (UHC). NHI was first established based on the 2004 National Social Security System (NSSS) Law and was first implemented in 2014. Before NHI implementation, Indonesian citizens financed their healthcare costs through out-of-pocket payments, and only citizens listed as poor in the government database were covered by their home district health insurance. The local government financed this district health insurance with different health benefits based on their fiscal capacity. The poor who were not listed in the database or lived in a district where the local government did not provide health insurance had to pay their own healthcare cost. For that reason, NHI is expected to help low-income individuals to cover their out-of-pocket healthcare cost, which is often difficult to predict and usually entails very high prices.

The 2004 NSSS Law states that everyone living in Indonesia must have coverage under the NHI regardless of being poor [8]. All citizens must contribute to NHI by paying a monthly fixed premium to cover the cost of health services that may arise when they are sick [9]. Under the NHI, all existing district health insurance and other social assistance to pay for the poor's healthcare were merged and used to pay the NHI premium. Hence, the poor covered by the NHI are called Contribution Assistance Recipients (CAR). NHI is expected to cover all Indonesian people equally, supporting health equity for the poor and near-poor in Indonesia [10].

Even though NHI targeted membership coverage of 95% by the end of 2019, it only achieved 85.3% [8]. The poor population is more likely to enroll in the NHI than other members who must pay the NHI premium [11, 12]. Studies in Ghana and Benin that also used national health insurance and exemptions for the poor in paying NHI premiums revealed that the core poor are excluded from the NHI because this population does not understand that they have the right to be funded and does not know the procedures to acquire their privilege as the poor in NHI [13–15]. In Indonesia, individuals unable to understand and fulfil the registration procedure tend not to have a membership, while individuals with better access to information have more benefits in understanding the NHI [16–18]. Studies found that the poor living in an urban area, where the NHI information is easily accessed, are reportedly more likely to be enrolled [11, 19] as were the poor who accessed the internet [20–22].

In addition, education is significantly essential in determining individual membership in the NHI. Previous national data studies prove that education relates to community participation status in the NHI [11, 23]. Studies also support that in the regions with different characteristics, such as the far inland of Singkil, the urban setting in Manado, and the rural setting in Bojonegoro, education is crucial in predicting NHI membership [17, 24]. The low-education population tends not to understand the eligibility and requirement to be registered as CAR [16]. It explained why many citizens included in the poverty indicators, according to Indonesia Statistics, had not yet registered as CAR [25, 26]. The education level is also related to community participation in independent NHI, intended for citizens working in informal sectors [27, 28]. Low education has become a barrier for informal workers to understand the self-registered mechanism, the NHI benefits package, and how to use NHI [17, 27]. Based on the background research, the study aimed to analyse the predictors of NHI membership among the poor with different education levels.

Materials and methods

Data source

The study used secondary data from a nationwide survey, "Abilities and Willingness to Pay, Fee, and Participant Satisfaction in implementing National Health Insurance in Indonesia in 2019," performed by The Ministry of Health of the Republic of Indonesia. The study population is poor people in Indonesia. The Ministry of Health does not publicly publish the data and final report on its website, but the public can access it based on request.

The survey used the wealth index formula to determine wealth status. The wealth index is a weighted measure of the total spending of a household. Meanwhile, the survey calculated the wealth index using primary data on household spending on health insurance, food, accommodation, and other items. Furthermore, the pool divided the income index into five quintiles in the poll: quintile 1 (the poorest), quintile 2 (poorer), quintile 3 (middle), quintile

4 (richer), and quintile 5 (the richest) [29, 30]. In this study, the poor are quintiles 1 and 2. The study described 18,514 weighted poor people as research respondents through stratification and multistage random sampling. This nationwide study involved 715 districts, 1430 villages, and 14,300 households in all Indonesian provinces (34 provinces).

The data were collected through an offline survey from March to December 2019. The study used household and individual instruments to assess participant characteristics, health insurance ownership, and NHI membership.

Outcome variable

The outcome variable in the study was participation in the National Health Insurance (NHI) membership. NHI membership refers to the respondent's involvement in the NHI, whether as an individual member, a required member (civil servant, police officer, or army), borne by the company, or a Contribution Assistance Recipient (CAR). NHI membership comes in two varieties: non-member and member.

Exposure variable

The study utilised seven factors as exposure variables: education level, type of residence, age group, gender, employment status, marital status, and wealth status. We divided the education level into four categories: none, primary, secondary, and higher. Furthermore, there are two options for housing: urban and rural. The age comprises 17 or less, 18–64, and 65 or more. The study divided gender into two categories: male and female. Employment status includes unemployed and employed. Furthermore, marital status contains three types: never married, married, and divorced/widowed. The study splits wealth status into the poorest and poorer.

Data analysis

As for comparing other exposure variables at the education level, the authors performed a bivariate comparison by the Chi-square test in the initial step. Furthermore, a collinearity test was used in the study to guarantee that there was no strong correlation between independent variables in the final regression model. The authors applied a binary logistic regression in the study's last point. This test was performed as part of the survey to investigate the multivariate connection between all independent variables and NHI membership as the dependent variable. The authors employed the IBM SPSS 26 application for statistical analysis.

On the other hand, using the same data, the study employed ArcGIS 10.3 (ESRI Inc., Redlands, CA, USA) to map the distribution of NHI membership among the poor in Indonesia. The Indonesian Bureau of Statistics provided a shapefile of administrative border polygons for the study.

Results

The study found that the average NHI membership among the poor in Indonesia was 65.1%. Meanwhile, the distribution of education levels for the poor in Indonesia is as follows: no education (16.9%), primary education (64.1%), secondary education (16.9%), and higher education (2.2%). Figure 1 shows the trend of the highest proportion of NHI membership among the poor at the western and eastern ends. Moreover, Table 1 displays descriptive statistics of NHI membership among the poor in Indonesia.

Single-factor analysis was used to investigate the influence of education level on the other observed predictors of NHI membership. Table 1 shows the distribution of the poor by residence, age, gender, employment, marital status, and wealth differed in education levels ($p<0.0000$). Therefore, significant differences exist in NHI membership predictors among poor people with different education levels.

Table 1 acknowledges a difference between NHI members in their education levels. The higher the level of education, the higher the proportion of the poor who are NHI members. According to the type of residence, the higher the level of education, the lower the proportion of the poor living in rural areas. Based on age group, the higher the level of education, the lower the proportion of the poor in the ≥65. Based on gender, females dominated all education levels, except in secondary education, where males headed the group. Regarding employment status, the employed lead in all education categories, except no education, and the unemployed lead in the class. Meanwhile, according to marital status, married led all education groups, except no education among those who never married. Moreover, based on wealth status, the poorer dominated in all education categories except primary education, which the poorest led.

The study performed a collinearity test in the following analysis. The research findings show no strong relationship between the independent variables. The tolerance value for all variables is more significant than 0.10, and the variance inflation factor (VIF) value for all variables is less than 10.00. The study can state that there are no indicators of multicollinearity in the regression model.

Table 2 shows the result of the binary logistic regression of NHI membership in Indonesia. Based on education level, those having primary education are 1.454 times more likely to be an NHI member than those with no education (AOR 1.454; 95% CI 1.331–1.588). Meanwhile, those having secondary education are 1.478 times more likely to be NHI member than those with no education (AOR 1.478; 95% CI 1.309–1.668). Moreover, those

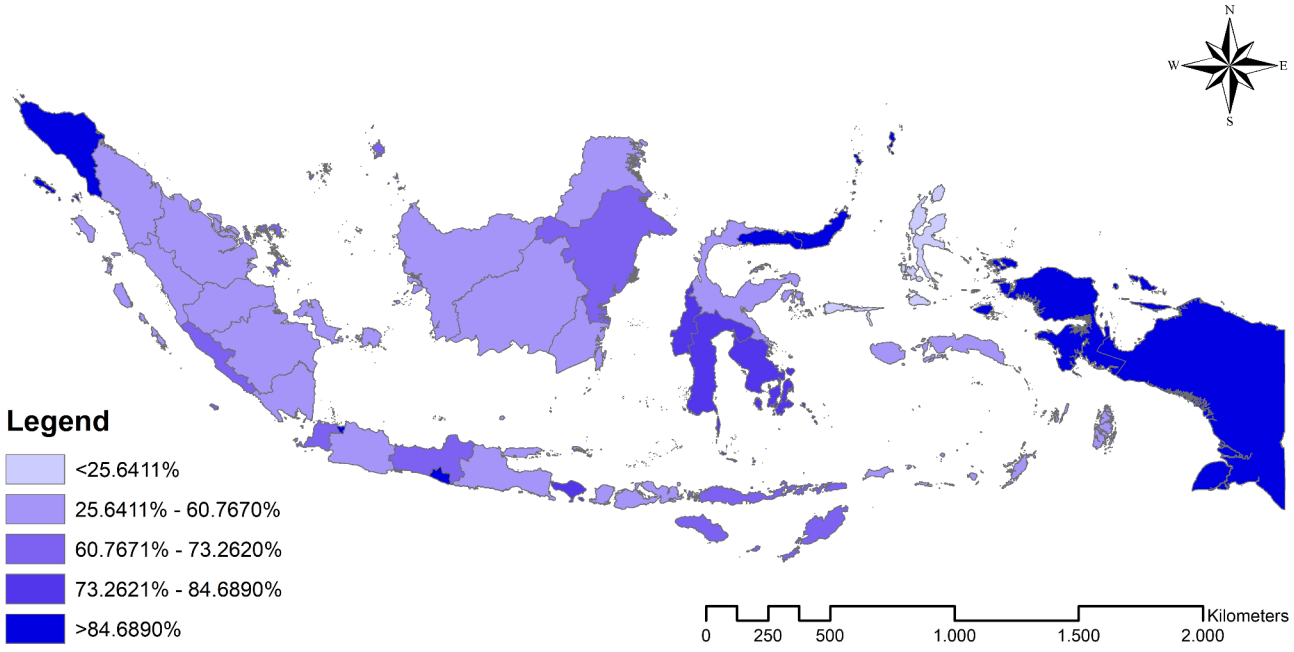

Fig. 1 The Distribution Map of NHI membership among the poor in Indonesia

having higher education are 1.724 times more likely to be an NHI member than those having no education (AOR 1.724; 95% CI 1.356–2.192). The results indicate that the better the education level, the higher possibility of being an NHI member among the poor in Indonesia.

In addition to education level, the study also found four exposure variables related to NHI membership among the poor in Indonesia. Regarding the type of residence, the poor in rural areas are 0.733 times less likely to be NHI members than those in urban areas (AOR 0.733; 95% CI 0.673–0.798). According to age groups, all groups are more likely than those 17 or less to be members of NHI. Regarding marital status, the married poor are 0.877 times less likely to become an NHI member than those who never married (AOR 0.877; 95% CI 0.793–0.969). Furthermore, based on wealth status, Table 2 informs that the poorer are 1.199 times more likely to be an NHI member than the poorest (AOR 1.199; 95% CI 1.126–1.277).

Discussion

Embracing government decentralisation, the central government pays for the poor's contribution to the NHI. The Ministry of Social Welfare updates its list of poor people nationwide annually, and only people on that list will be eligible to become CAR. When any population cannot be considered as the CAR the central government funds, they still have the opportunity to be funded under the local government's budget. The local government will enlist them as NHI participants based on the individual's self-report that they are poor and need financial aid to access healthcare services. This self-reported procedure involves complex steps of verification and document requirements by several local government offices.

The formal education level among the poor in our study predicts the poor's enrolment in NHI. It shows that even in a compulsory social health insurance scheme like the NHI, where the government determines the poor's enlistment for eligibility, health insurance literacy is still significantly critical. Our study found that the better the formal education level, the higher possibility of being an NHI member among the poor in Indonesia. The poor people's identification to be a CAR needs a bureaucratic procedure that not only requires the poor to fulfil legal documents and meet the authorised offices but also needs an understanding of how the system works. People with low education levels will find this more complicated than those with higher education levels. The poor with low education level are not only vulnerable to not being covered by the NHI, but those who are already enrolled have low hospital utilisation since they do not understand how to use the NHI to access the hospital [19, 31]. This finding is consistent with other studies in other low-middle-income countries. In Chad and Ghana, those who never had a formal education are less likely to be covered by health insurance even though their countries provide a social health insurance scheme (15). Formal education level is often associated with literacy [20, 32]. Health insurance literacy, the ability to understand what health insurance is, is a prominent factor in health insurance participation [18]. A proper understanding of

Table 1 Descriptive statistics of NHI membership among the poor in Indonesia (n = 18,514)

Characteristics	Education Level				p-value
	No education (n = 3,157)	Primary (n = 11,782)	Secondary (n = 3,187)	Higher (n = 388)	
NHI membership					< 0.001
Non-member	45.2%	33.5%	30.8%	27.2%	
Member	54.8%	66.5%	69.2%	72.8%	
Type of residence					< 0.001
Urban	13.9%	15.6%	26.2%	26.2%	
Rural	86.1%	84.4%	73.8%	73.8%	
Age group					< 0.001
≤ 17	64.6%	20.6%	2.1%	0.0%	
18–64	22.7%	67.6%	94.7%	93.0%	
≥ 65	12.8%	11.8%	3.2%	7.0%	
Gender					< 0.001
Male	46.8%	48.2%	55.8%	42.4%	
Female	53.2%	51.8%	44.2%	57.6%	
Employment status					< 0.001
Unemployed	76.8%	46.8%	37.8%	24.2%	
Employed	23.2%	53.2%	62.2%	75.8%	
Marital status					< 0.001
Never married	67.0%	29.9%	41.9%	36.3%	
Married	22.1%	59.1%	51.7%	54.7%	
Divorced/Widowed	10.9%	11.0%	6.4%	9.0%	
Wealth status					< 0.001
Poorest	49.7%	52.0%	44.6%	38.2%	
Poorer	50.3%	48.0%	55.4%	61.8%	

Table 2 The result of binary logistic regression of NHI membership among the poor in Indonesia (n = 18,514)

Predictor	Member of NHI	
	AOR (95% CI)	p-value
Education: No Education (Ref.)		
Education: Primary	1.454 (1.331–1.588)	*<0.001
Education: Secondary	1.478 (1.309–1.668)	*<0.001
Education: Higher	1.724 (1.356–2.192)	*<0.001
Residence: Urban (Ref.)		
Residence: Rural	0.733 (0.673–0.798)	*<0.001
Age group: ≤ 17 (Ref.)		
Age group: 18–64	1.538 (1.360–1.738)	*<0.001
Age group: ≥ 65	1.827 (1.557–2.144)	*<0.001
Gender: Male (Ref.)		
Gender: Female	1.011 (0.945–1.082)	0.756
Employment: Unemployed (Ref.)		
Employment: Employed	0.941 (0.868–1.019)	0.135
Marital: Never married (Ref.)		
Marital: Married	0.877 (0.793–0.969)	**0.010
Marital: Divorced/Widowed	1.078 (0.932–1.247)	0.314
Wealth: Poorest (Ref.)		
Wealth: Poorer	1.199 (1.126–1.277)	*<0.001

Note: AOR: Adjusted Odds Ratio; CI: confidence interval; *p < 0.001; **p < 0.050

health insurance will lead to a higher acceptance rate for participating in health insurance [20].

Before the NHI, Indonesia funded its poor population through different social health insurance scenarios that varied between districts. Those social health insurance scenarios merged into the NHI, disrupting how poor people can be covered with health insurance. Before the NHI was first implemented in 2014, the poor covered by the district health insurance were not automatically changed into NHI members. The districts were still calculating to enrol all their poor citizens in the NHI based on their fiscal capacity. Hence, this dynamic change triggered uncertainty among the poor. The lower education population could have difficulty understanding the abrupt and complex change in the NHI mechanism [11, 16, 32]. Higher education and adequate information are two things that are always related to higher health insurance literacy [16, 18, 32]. Thus, it is not surprising that, in several studies, people's exposure to information sources, such as mass media, is also reported to increase the probability of people with no education background enrolling in a health insurance coverage [15, 33]. A lack of accurate information about the NHI and the ability to understand that information may cause more of the poor population to fail to realise what the NHI's benefit is and how they can be enlisted as NHI participants [16].

Our study informs that the poor in rural areas are less likely to be NHI members than those in urban areas. The population in a rural area in Indonesia is commonly referred to as a subpopulation with limited information access because of the limited internet infrastructure but also its expensive connection [34]. In respect that Indonesia is an archipelago with more than a thousand inhabited islands, its dispersed geographic condition not only becomes a significant problem in the doctors' distribution [35] but also leads to unequal distribution of health information [36]. On the other hand, the internet plays a vital role in persuading people to participate in the NHI [22]. It shares updated information on the NHI and its interaction among the population, influencing others to decide their participation in the NHI [22, 37]. Compared to the poor people in the urban area, even though they acknowledged that the procedures for accessing social health insurance provided by the government are complicated, they have more possibility to access health information so that they know how to be able to enlist in the CAR [38].

Age is likely a barrier to becoming an NHI member in Indonesia. Even though other studies reported different age groups that correlate with low participation rates in the NHI [11, 16, 23, 27], most studies consistently report that younger people have less probability of being enlisted as NHI participants. Our study shows that all groups are likelier than those seventeen years old or younger to be members of NHI. Other studies report that the elderly (≥65 years old) have the highest likelihood of NHI membership among all age groups [11, 23]. Willingness to pay is mainly used to explain how the age group could become a predictor of health insurance coverage [39–41]. However, since our study focuses on the poor, for whom the government pays their contribution to the NHI, willingness to pay could not be used to explain why the younger population has a lower likelihood of being an NHI member. We argue that it is related to health insurance literacy among the poor. In the NHI, the member enrolment must be submitted as a household unit, meaning that the head of household must report all of their family members to become eligible for CAR. The education of the household head is significantly associated with their family members' enrolment in health insurance. Household heads with higher secondary education or above have a higher probability of insurance coverage than household heads with no formal education [33].

Our study also found that the married poor are less likely to become NHI members than those who never married. A single, never-married population does not have family members who need to be enrolled as NHI participants [32, 39]. It indicates that NHI membership could not merely be associated with the population's willingness to pay. At this point, the education level could become a prominent predictor. Considering that the never-married group is mainly at a productive young age, many studies claim that the low health insurance membership among the never-married population is highly related to their perception of health-related risk [11, 23, 32, 39]. Younger people commonly think they are healthy enough, so they do not have any urgency to be covered by health insurance. Health-related risk perception is essential in motivating health behaviour change [42]. Insufficient risk communication about the importance of health insurance reportedly leads to low demand for health insurance since people do not have any encouragement to manage health risks by enrolling in a health insurance scheme (43).

Lastly, we also find that the poorer in our study are more likely to be NHI members than the poorest. Wealthier populations are likely to use private health facilities due to the healthcare quality provided because they have greater ability to pay for the insurance premium [15, 33]. However, since our study focuses only on the poor population in a social health insurance scheme, the same reason cannot explain why the poorest have a lower probability of being enrolled in the NHI than the poorer. As the lowest quintile of the wealthy population, the poorest suffer from various wealth-related inequalities. Observed disparities in education, media exposure, and the geographical location of their residence as the wealth-related inequality in our study explain why the poorest are less likely to become NHI members than the poorer. Further, several studies in the Indonesian context reported that low education levels are attributed to the poor population, which then makes the poor not have sufficient health insurance literacy [11, 23]. Our findings strengthen other studies which reported that low- and middle-income countries, which generally use NHI as their primary strategy to achieve UHC, fail to protect their underserved populations and predominantly support better-off population groups [44].

Study limitation

This study has the advantage of using big data as an analysis material, allowing the conclusions to be extrapolated to the national level. On the other hand, the analysis in this study is based on secondary data. The variables considered are limited to those provided by the Republic of Indonesia's Ministry of Health. Several other variables previously known to influence health insurance ownership could not be investigated. These variables include cognitive capacity, prior commercial insurance ownership, having children, and family size [45–47].

Conclusion

This study concluded that NHI membership among the poor population could be predicted based on their education level, residence, age, gender, employment, marital status, and wealth. All those predictors are different between the education levels of poor people. The better the education level, the higher possibility of being an NHI member among the poor in Indonesia. The education disparities in this study explain unequal opportunities and access, which hinder the poor population covered by health insurance using government aid. The education level of the poor predicts their health insurance literacy, which determines their ability to claim their right to become a CAR.

Based on the conclusions, the authors recommend that the government ensure social inclusion in their mechanism, enlisting the poor eligible to be CAR. It must meet the needs of the poor who do not have enough ability to understand complex procedures in accessing the NHI. In addition, the NHI promotion message must be able to explain the procedures and health-related risks to initiate the poor's willingness to claim their right to be funded by the government. Hence, it is expected that government aid can and does provide direct benefits to the poor

and promotes their health and well-being. Our findings highlighted the importance of government investment in NHI, which must be supported with investment in the poor population's education.

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Author Contribution
NKP and NR wrote the main manuscript text. ADL prepared Tables 1 and 2. NKP and ADL critically revised the manuscript for intellectual content. All authors read and approved the final manuscript. NKP is the guarantor of the paper.

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Data Availability
The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethical approval and consent to participate
The authors declare that all study procedures were undertaken in compliance with the ethical standards of the relevant national and institutional committees on human experimentation and with the tenets of the Declaration of Helsinki (1964) and its later amendments until 2013. The National Ethics Committee has approved the Ethical clearance of the survey "Abilities and Willingness to Pay, Fee, and Participant Satisfaction in the Implementation of NHI in Indonesia in 2019" (Number: LB.0201/2/KE.340/2019). The secondary dataset used in this study is anonymized. The ethical committee from the National Institute of Health Research and Development (NHIRD) Indonesia regulatory does not require prior informed consent nor ethical approval by the institutional review board for using these secondary data.

Consent for publication
Not applicable .

Competing Interests
The authors declared no potential conflicts of interest concerning this article's research, authorship, and publication.

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References

1. BPS. Kemiskinan dan Ketimpangan. 2021.
2. Azahari R. Pengaruh Kemiskinan Dan Pendidikan Terhadap Kesehatan Masyarakat. Equity J Ekon. 2020;8(1):56–63.
3. Athadena ED. Analisis Pengaruh Tingkat Pendidikan, Kesehatan dan Pengangguran terhadap Kemiskinan di Provinsi Sumatera Barat Periode 2011–2020. J Ilm Mhs FEB Univ Brawijaya. 2021;9(2):24–5.
4. Zahra A, Fatin AA, Afuwu H, Auliyah RR. Struktur Kemiskinan Indonesia: Berapa Besar Pengaruh Kesehatan, Pendidikan dan Kelayakan Hunian? J Inov Ekon. 2019;4(02):67–74.
5. Ngaruiya C, Bernstein R, Leff R, Wallace L, Agrawal P, Selvam A et al. Systematic review on chronic non-communicable disease in disaster settings. BMC Public Health [Internet]. 2022;22(1). Available from: https://doi.org/10.1186/s12889-022-13399-z
6. Howard B, Benham B. Poverty Increases Risk of Non-Communicable Diseases in Lower Income Countries. Media contacts for the Johns Hopkins Bloomberg School of Public Health. 2018. p. 1.
7. Jayathilaka R, Joachim S, Mallikarachchi V, Perera N, Ranawaka D. Do chronic illnesses and poverty go hand in hand? PLoS ONE. 2020;15(10):1–19.
8. Oldistra F, Machdum SV. Analisis Perencanaan Kebijakan Jaminan Kesehatan Nasional Dari Aspek Kepesertaan Di Kementerian Ppn/Bappenas. J Ilmu Kesejaht Sos. 2020;21(1):63–86.
9. Setiyono B. Perlunya Revitalisasi Kebijakan Jaminan Kesehatan Di Indonesia. Polit J Ilmu Polit. 2018;9(2):38.
10. Nurrahmah B, Mawesti D, Afrina E, Muntafa F, Suriyanto F, Lauranti M. Ekuitas Kesehatan Bagi Masyarakat Miskin. 1st ed. Ekuitas Kesehatan Bagi Masyarakat Miskin dan Hampir Miskin di Indonesia. Jakarta Indonesia: Perkumpulan Prakarsa; 2017. 174 p.
11. Laksono AD, Nantabah ZK, Wulandari RD, Khoiri A, Tahangnacca M. Barriers to Expanding the National Health Insurance Membership in Indonesia: Who Should the Target?J Prim Care Community Heal. 2022;13.
12. Laksono AD, Wulandari RD, Zuardin Z, Nopianto N. The disparities in health insurance ownership of hospital-based birth deliveries in eastern Indonesia. BMC Health Serv Res. 2021;21(1):1–8.
13. Kotoh AM, Van Der Geest S. Why are the poor less covered in Ghana's national health insurance? A critical analysis of policy and practice. Int J Equity Health [Internet]. 2016;15(1):1–11. Available from: https://doi.org/10.1186/s12939-016-0320-1
14. Houeninvo H, Bello K, Hounkpatin H, Dossou J-P. Developing and Implementing National Health Insurance: learnings from the first try in Benin.BMJ Glob Heal. 2022;1–12.
15. Amu H, Seidu AA, Agbaglo E, Dowou RK, Ameyaw EK, Ahinkorah BO et al. Mixed effects analysis of factors associated with health insurance coverage among women in sub-Saharan Africa. PLoS One [Internet]. 2021;16(3 March):1–15. Available from: https://doi.org/10.1371/journal.pone.0248411
16. Nisa' C, Sari IN. Social Health insurance literacy: lesson learned from Social Insurance for Maternity Care by National Health Insurance Programme. J Adm Kesehat Indones. 2019;7(1):25.
17. Kurniawati W, Rachmayanti RD. Identifikasi Penyebab Rendahnya Kepesertaan JKN pada Pekerja Sektor Informal di Kawasan Pedesaan. J Adm Kesehat Indones. 2018;6(1):33.
18. Muhlis ANA. Determinants of the National Health Insurance Uptake in Indonesia. J Adm Kesehat Indones. 2022;10(1):111–21.
19. Wulandari RD, Laksono AD, Mubasyiroh R, Rachmalina R, Ipa M, Rohmah N. Hospital utilization among urban poor in Indonesia in 2018: is government-run insurance effective? BMC Public Health [Internet]. 2023;23(1):92. Available from: https://doi.org/10.1186/s12889-023-15017-y
20. Dartanto T, Rezki JF, Siregar CH, Usman U, Bintara H. Participation of Informal Sector Workers in Indonesia's National Health Insurance System. Southeast Asian Econ. 2016;33(3):317–42.
21. Rosidah LK, Asdary RN. National Health Insurance Membership and Economic Status as Determinants of accessibility of Antenatal Care Service. J Matern Child Heal. 2021;6(4):507–15.
22. Putri NK, Ernawaty E. Viral Marketing Content for Universal Health Coverage Campaign in Indonesia.Int J Pharm Heal Mark. 2019
23. Laksono AD, Nugraheni WP, Rohmah N, Wulandari RD. Health insurance ownership among female workers in Indonesia: does socioeconomic status matter? BMC Public Health [Internet]. 2022;22(1):1–10. Available from: https://doi.org/10.1186/s12889-022-14189-3
24. Niha MR, Korompis GEC, Mandagi CKF. Hubungan Karakteristik Individu Dan Pengetahuan Tentang Jaminan Kesehatan Nasional-Kartu Indonesia Sehat (Jkn-Kis) Dengan Status Kepesertaan Masyarakat Dalam Program Jkn-Kis Di Kecamatan Singkil Kota Manado. J Kesmas. 2018;7(5):1–9.
25. Nurgahayu UN. Kesesuaian anggota BPJS PBI dengan indikator kemiskinan di Kecamatan Malua Kabupaten Enrekang. Wind Public Heal J. 2020;01(03):220–31.
26. Meman RB, Aripa L, Kartini. The implementation of Health Services BPJS Kesehatan Registered in the Premium Assistance Program in Mamajang Health Center. J Promot Prev. 2021;4(1):29–38.
27. Darmayanti LD, Raharjo BB. Keikutsertaan Masyarakat dalam Jaminan Kesehatan Nasional Mandiri. Higeia J Public Heal Res Dev. 2020;4(Special 4):824–34.
28. Putri SS, Suryati C, Nandini N. The implementation of National Health Insurance on the aspect of participation to achieve Universal Health Coverage. J Sains dan Kesehat. 2022;4(2):222–30.

29. Laksono AD, Paramita A, Wulandari RD. Socioeconomic disparities of facility-based childbirth in Indonesia. Int Med J. 2020;25(1):291–8.
30. Wulandari RD, Qomarrudin MB, Supriyanto S, Laksono AD, Qomaruddin B, Laksono AD. Socioeconomic disparities in Hospital utilization among Elderly People in Indonesia. Indian J Public Heal Res Dev. 2019;10(11):1800–4.
31. Laksono AD, Megatsari H, Senewe FP, Latifah L, Ashar H. Policy to expand hospital utilization in disadvantaged areas in Indonesia: who should be the target? BMC Public Health [Internet]. 2023;23(1):12. Available from: https://doi.org/10.1186/s12889-022-14656-x
32. Dartanto T, Rezki JF, Pramono W, Siregar CH, Bintara H. Why are workers in the Informal Sector reluctant to join the National Health Insurance System in Indonesia ? J Southeast Asian Econ. 2016;33(3):320–48.
33. Bhusal UP, Sapkota VP. Predictors of health insurance enrolment and wealth-related inequality in Nepal: evidence from multiple Indicator Cluster Survey (MICS) 2019. BMJ Open. 2021;11(11):1–12.
34. APJII. Penetrasi & perilaku pengguna internet indonesia. Jakarta; 2017.
35. Laksono AD, Ridlo IA, Ernawaty E. Distribution Analysis of Doctors in Indonesia. J Adm Kesehat Indones [Internet]. 2019;8(1):24–34. Available from: https://doi.org/10.31227/osf.io/df6ns
36. Putri NK. From reproductive health to unprepared health system structure: remembering why we start the digital health. J Adm dan Kebijak Kesehat. 2020;8(1):1–4.
37. Indiraswari T, Supriyanto S, Ernawaty E, Putri NK. Health insurance literacy: discussion and reaction of facebook users' towards the national health insurance in Indonesia. J Public health Res. 2020;9(2):205–8.
38. Putri NK, Wulandari RD, Damayanti NA. Limited Resources and Complicated Procedures Maternal Health Problems of Urban Migrants in Region. In: 2nd International Symposium of Public Health (ISOPH 2017) - Achieving SDGs in South East Asia: Challenging and Tackling of Tropical Health Problems. 2018. p. 468–72.
39. Dartanto T, Halimatussadiah A, Rezki JF, Nurhasana R, Siregar CH, Bintara H et al. Why Do Informal Sector Workers Not Pay the Premium Regularly? Evidence from the National Health Insurance System in Indonesia. Appl Health Econ Health Policy [Internet]. 2020;18(1):81–96. Available from: https://doi.org/10.1007/s40258-019-00518-y
40. Hajek A, Enzenbach C, Stengler K, Glaesmer H, Hinz A, Röhr S, et al. Determinants of willingness to pay for Health Insurance in Germany—Results of the Population-Based Health Study of the Leipzig Research Centre for civilization Diseases (LIFE-Adult-Study). Front Public Heal. 2020;8(August):1–6.
41. Steigenberger C, Flatscher-Thoeni M, Siebert U, Leiter AM. Determinants of willingness to pay for health services: a systematic review of contingent valuation studies. Eur J Heal Econ [Internet]. 2022;(0123456789). Available from: https://doi.org/10.1007/s10198-022-01437-x
42. Rebecca Ferrer. HHS Public Access risk perceptions and health behavior. Physiol Behav. 2017;176(5):139–48.
43. Gao L, Guan J, Wang G. Does media-based health risk communication affect commercial health insurance demand? Evidence from China. Appl Econ [Internet]. 2022;54(18):2122–34. Available from: https://doi.org/10.1080/00036846.2021.1985071
44. Osei Afriyie D, Krasniq B, Hooley B, Tediosi F, Fink G. Equity in health insurance schemes enrollment in low and middle-income countries: A systematic review and meta-analysis. Int J Equity Health [Internet]. 2022;21(1):1–12. Available from: https://doi.org/10.1186/s12939-021-01608-x
45. McGarry BE, Tempkin-Greener H, Grabowski DC, Chapman BP, Li Y. Consumer decision-making abilities and long-term Care Insurance Purchase. Journals Gerontol - Ser B Psychol Sci Soc Sci. 2018;73(4):e1–10.
46. Wang Q, Abiiro GA, Yang J, Li P, De Allegri M. Preferences for long-term care insurance in China: results from a discrete choice experiment. Soc Sci Med. 2021;281:114104.
47. Alo CN, Okedo-Alex IN, Akamike IC. Determinants of willingness to participate in health insurance amongst people living with HIV in a tertiary hospital in South-East Nigeria. Niger Postgrad Med J. 2020;27(3):196–201.

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