



저작자표시-비영리-변경금지 2.0 대한민국

이용자는 아래의 조건을 따르는 경우에 한하여 자유롭게

- 이 저작물을 복제, 배포, 전송, 전시, 공연 및 방송할 수 있습니다.

다음과 같은 조건을 따라야 합니다:



저작자표시. 귀하는 원저작자를 표시하여야 합니다.



비영리. 귀하는 이 저작물을 영리 목적으로 이용할 수 없습니다.



변경금지. 귀하는 이 저작물을 개작, 변형 또는 가공할 수 없습니다.

- 귀하는, 이 저작물의 재이용이나 배포의 경우, 이 저작물에 적용된 이용허락조건을 명확하게 나타내어야 합니다.
- 저작권자로부터 별도의 허가를 받으면 이러한 조건들은 적용되지 않습니다.

저작권법에 따른 이용자의 권리는 위의 내용에 의하여 영향을 받지 않습니다.

이것은 [이용허락규약\(Legal Code\)](#)을 이해하기 쉽게 요약한 것입니다.

[Disclaimer](#)

보건학 석사 학위논문

**Relationship between Stroke,
Disability and Mental Distress of
Productive Ages Population in
East Borneo (Based on Indonesia Basic Health
Research 2013)**

East Borneo의 생산 연령 인구의 뇌졸중, 장애 및 정신
건강문제 사이의 관계 (2013 인도네시아 기본 건강 연
구에 근거)

2020년 2월

서울대학교 보건대학원

보건학과 역학 전공

하나 아마니타

**Relationship between Stroke, Disability and Mental
Distress of Productive Ages Population in East
Borneo (Based on Indonesia Basic Health Research
2013)**

지도교수 조 성 일

이 논문을 보건학 석사 학위논문으로 제출함

2019 년 12 월

서울대학교 대학원

보건학과 의학전공

하나 아마니타

하나 아마니타의

석사학위논문을

인준함

2020 년 2 월

위 원 장 김 호 

부 위 원 장 성 주 현 

위 원 조 성 일 

Abstract

Hana Amanita Khoiril
Public Health, Epidemiology
Graduate School of Public Health
Seoul National University

Background: Stroke is the major cause of death in many countries. Stroke prevalence in Indonesia increased from 7% in 2013 to 10.9% in 2018. The highest prevalence of stroke in Indonesia, East Borneo province, increased 2 times from 7% to 14% in 5 years. Depression and anxiety also become the most common emotional disturbances after stroke. Post-stroke depression (PSD) is highly prevalent among stroke survivors and is associated with significant morbidity and mortality. This study was population-based study as there has been a little research about this topic and they mainly used hospital-based study design.

Objectives: The general objective of this study was to know the correlation between post-stroke disability and mental distress at productive age (15 – 64 years) in East Borneo. Some specific objectives are to know whether severity level of disability has association with mental distress, whether stroke has association with the severity level of disability, whether stroke with disability synergistically increased the chance of having mental distress and whether other individual characteristics such as gender, employment status, age group, education level, marital status associated with mental distress.

Methods: Data was taken from the Basic Health Research Survey in 2013 with a total sample of 15277 people. Variables in this research were independent variables including disability level, stroke status and individual characteristics such as gender, age group, employment status, education level, and marital status. The dependent variable was the mental distress status. The data were analysed using univariate analysis to describe each variable with the frequency and percentage distribution and using spearman correlation and logistic regression to

see the relationship between the 2 variables. The software used in this analysis process was SPSS and R software

Results: Disability level had enough correlation with mental distress. People with high disability level were more likely to develop mental distress. While education level, gender, employment status, marital status, age group and stroke have weak correlation with mental distress. Based on logistic regression results, being female, older, married, having stroke, having high disability by stroke and having no education background significantly increases the risk of having mental distress (p -value < 0.05). On the other hand, being stroke-high disabled and unemployed were not significantly increase the risk of having mental distress (p -value > 0.05). Diagnosed as stroke also correlated with having more severe disability. Being stroke significantly increase the risk of having more severe disability (p -value < 0.05).

Conclusion: As most of stroke and disabled people living in East Borneo are in their peak of productive ages and have significant tendency of having mental distress, it would be better if government did some intervention such as early screening for mental distress and providing some training to live their life without feeling burdensome to people around them.

Keywords: Stroke, Disability, Mental distress, Women

Student number: 2018 – 29685

Table of Contents

Chapter 1. Introduction.....	- 1
1.1 Background.....	- 1
1.2 Literature Review.....	- 8
1.3 Objectives.....	- 10
1.4 Hypotheses.....	- 11
Chapter 2. Methods.....	- 12
2.1 Data collection.....	- 12
2.2 Variable analysis and selection procedures.....	- 12
2.3 Analysis process.....	- 13
2.3.1 Recoding.....	- 13
2.3.2 Descriptive analysis.....	- 14
2.3.3 Statistical analysis.....	- 15
Chapter 3. Results.....	- 16
3.1 Descriptive analysis.....	- 17
3.2 Inferential statistics analysis.....	- 20
3.3 Logistic regression analysis.....	- 23
3.4 Odds ratio.....	- 23
Chapter 4. Discussion.....	- 28
4.1 Discussion.....	- 28
4.2 Limitation.....	- 34
4.3 Effectiveness of This Study.....	- 35
Chapter 5. Conclusions.....	- 36
5.1 Conclusion.....	- 36
References.....	- 37
국문초록.....	- 46

Appendix..... - 48

List of Tables

Table 1. List of literature review..... - 8
Table 2. General characteristics of study population (N=15,277)..... - 17
Table 3. Proportion of mental distress among all population (N=15,277)..... - 18
Table 4. Spearman correlation results (N=15,277)..... - 21
Table 5. Odds Ratio of each categories for mental distress (N=15,277)..... - 24
Table 6. Odds ratio for stroke and disability (N=15,277)..... - 26

List of Figures

Figure 1: Spearman correlation results..... - 22

Chapter 1. Introduction

1.1 Background

Stroke is the major cause of death in many countries. Stroke happened when blood flow to and through the brain is obstructed by blood clot or by narrowed blood vessels thus the brain loses its energy supply and damages the tissue.¹

There are three types of stroke; Ischemic, Hemorrhagic and Transient ischemic attack stroke. Ischemic stroke accounts for 87% of stroke worldwide.² Ischemic stroke happens when blood flow through the artery that supplies oxygen-rich blood to the brain becomes blocked. A haemorrhagic stroke happens when an artery in the brain ruptures. The ruptured blood puts too much pressure on brain cells, which damages them. High blood pressure is one of the example of condition that can cause a haemorrhagic stroke. Most common type of haemorrhagic stroke is intracerebral haemorrhage, happens when artery in the brain bursts and flooding the surrounding tissue with blood. The second one is subarachnoid type. Although it is less common, it can happen when the area between brain and tissues that cover it bleeding.³ Transient ischemic attack (TIA) or sometimes called a “mini-stroke” is different type of stroke because blood flow to the brain is blocked for only a short time—usually no more than 5 minutes.⁴

There are 5 major signs of a Stroke listed by The National Institute of Neurological Disorders and Stroke. They are, sudden numbness or weakness of the face and other parts of body, sudden trouble in speaking or understanding others, sudden trouble in seeing with one or both eyes, sudden trouble in walking or loss of coordination, sudden severe headache with no known cause.⁵

There are several risk factors of stroke that divided into 3 categories; condition, behavior and family history. Had previous stroke, having high blood pressure, high cholesterol, diabetes, heart disease and sickle cell disease included in condition category. While tobacco use, obesity, unhealthy diet, too much alcohol, and lack of physical

activity are in behavioral category. Genetics, sex, age, and race or ethnicity accounts for family history category. Being black, woman and older increase the chance of having stroke.⁶

High blood pressure and tobacco still remain as the major risk factors of stroke. 4 out of 10 people who died from stroke, initially caused by high blood pressure and almost a half of deaths from stroke are related to smoking. Other modifiable risk factors are unhealthy diet, high salt intake, heart disease, diabetes and high blood lipids.¹ In case of Indonesia, Tobacco smoking is the leading risk factor of stroke.⁷

Stroke in developing countries accounting for 75.2% deaths and 81% DALYs lost. Stroke mortality in Asia is higher than in Western Europe, the Americas or Australasia, except in the case of some countries such as Japan.⁸

Globally, more than 10 million people suffered from stroke each year. Even though advanced technology and facilities are available, 67% of those who suffer a stroke die or lived dependently because of post-stroke disability.⁹ Survivors can experience vision and/or speech loss, paralysis, and confusion, eventually become a burden on family and community.

Stroke is the largest cause of complex disability – over half of all stroke survivors are left with a disability.^{10,11} Stroke resulted greater disability impact on some people than any other chronic disease.¹⁰ Almost a half of stroke survivors in England, Wales and Northern Ireland required help to do their daily activities after discharging from hospital.¹¹

Generally, epidemiological studies about stroke focused on recurrence and mortality^{12,13}, only few of them focusing on disability studies. Although in the last few decades stroke mortality has been decreased progressively¹⁴, stroke is still found to be the second leading cause of disability in developing countries¹⁵ with prevalence among stroke survivors lies between 24–54%.¹⁶

Although stroke survivors under 45 years old are considered uncommon, accounted only for 10 –15% of all stroke sufferers, the

disability that happened before their productive years contributes large economic impact disproportionately.¹⁷ 26% strokes in the United Kingdom happened in people under 65 years old and in worldwide¹⁸, the number of people aged 20– 64 having stroke increased by 25% in 20 years (1990 – 2010).¹⁹ 69% of stroke survivors in 25 –59 years old lost their productivity and were unable to return to work.²⁰ Also 65% of them reported a decrease in household income.²⁰

In Australia, stroke survivors belong to productive age categories have relatively low employment rates. The impact of productivity loss has affected the country's economy by reducing the earnings as much as \$975 million in 2012.²¹

Having a stroke could also affect work performance of those who employed. This was measured by calculating the missed work days over a year. In case of Australia, it costed nearly as much as \$1.1 billion in 2012 for people belong in productive age category due to their absences from paid work and lost productivity in unpaid work.²¹

Working while sick for stroke employee can also affect their ability to do tasks effectively at work. This was measured by multiplying the number of days worked with stroke by the percentage of effectiveness reduction on days worked with stroke. In case of Australia, their lower productivity costed nearly as much as \$0.7 billion in 2012 for people belong in working age category.²¹

In Sweden, although Return-To-Work (RTW) is possible over a longer period of time than previously thought. More severe disability at discharge from hospital and sick leave prior to the stroke were shown to be risk factors for no-RTW.²²

Disability is any condition of the body or mind impairment that makes it more difficult for the person with the condition to do certain activities and socialize with the world around them.²³ According to the definition above, World Health Organization divided disability into three dimensions:²³

1. Impairment in a person's body structure or function, or mental functioning; examples of impairments include loss of a limb, vision loss or memory loss.

2. Activity limitation, such as difficulty seeing, hearing, walking, or problem solving.
3. Participation restrictions in normal daily activities, such as working, engaging in social and recreational activities, and obtaining health care and preventive services.

Mainly there are 8 types of disabilities. They are, Mobility and Physical Impairments, Spinal Cord Disability, Head Injuries (TBI) – Brain Disability, Vision Disability, Hearing Disability, Cognitive or Learning Disabilities, Psychological Disorders, and Invisible Disabilities.²⁴

This research used data from Indonesia basic health research (IBHR) survey 2013 which used WHODAS 2.0 as a reference to assess disability. WHODAS 2.0 is a generic assessment instrument for health and disability to produce standardized disability levels in all adult, both clinical and general populations. This reference also used across all diseases, including mental, neurological and addictive disorders.²⁵

There are 2 versions in WHODAS, 36 and 12 item questions. IBHR survey 2013 used 12-item questions with various administration method and simple scoring. The scores assigned to each of the items are “none” (1), “mild” (2) “moderate” (3), “severe” (4) and “extreme” (5). This method is referred to as simple scoring because the scores from each of the items are simply added up without recoding or collapsing of response categories. Thus, there is no weighting of individual items.²⁵

Mental health includes psychological, emotional, and social well-being. It affects how someone acts, feels, and thinks. It also helps determine how someone handles stress, related to others, and make choices. Mental health is important thing at every stage of life, from childhood to adulthood.²⁶

Over the course of someone’s life, if someone experienced mental health problems, their way of thinking, mood, and behaviour could be affected. Many factors contribute to mental health problems, including biological factors such as genes or brain chemistry, life experiences such as trauma or abuse, and family history of mental health problems.

While mental disorders or mental distress are serious disorders which can affect someone's thinking, mood, and behaviour. Both might be occasional or long-lasting and can even affect your relationship ability and every day functioning.²⁷

According to IC-10 mental and behavioural disorders consist of 10 main groups namely:²⁸

- F00 – F09 : Organic, including symptomatic, mental disorders
- F10 – F19 : Mental and behavioural disorders due to psychoactive use
- F20 – F29 : Schizophrenia, schizotypal and delusional disorders
- F30 – F39 : Mood [affective] disorders
- F40 – F48 : Neurotic, stress-related and somatoform disorders
- F50 – F59 : Behavioural syndromes associated with physiological disturbances and physical factors
- F60 – F69 : Disorders of personality and behaviour in adult
- F70 – F79 : Mental retardation
- F80 – F89 : Disorders of psychological development
- F90 – F98 : Behavioural and emotional disorders with onset usually occurring in childhood and adolescence
- F99 : Unspecified mental disorder

Mental health indicators assessed in IBHR survey 2013 include severe mental disorder and emotional mental disorder. Severe mental disorder was evaluated through a series of questions proposed by enumerators to household heads or household members representing the household heads. Basically, the questions are to ask whether there is any household member (regardless of the age) suffering severe mental disorder (psychosis or schizophrenia) in the house. While for emotional mental disorder was evaluated using Self-Reporting Questionnaires (SRQ) 20 questions.²⁹

SQR questions are proposed by enumerators to household members ≥ 15 years old complying with inclusion criteria. These 20 questions had reply options of "Yes" and "No". The cut-off point set for this survey is 6. It implies that if a respondent answers minimum 6

or more with “Yes” replies, then he/she is indicated to get emotional mental disorder. This cut off point is consistent with validity test research of Hartono in 1995.³⁰ Data collected from SRQ instrument have limitation since the data only reveal temporary individual emotional status and not designed to diagnose specific mental disorder.

The term "emotional mental disorders" refer to those psychological disorders that appear to affect the emotions (e.g. anxiety disorders or depressive disorders). There are 4 types of disorders included in this term namely depressive, anxiety, behavioural, and personality disorder.³¹

Depression and anxiety are the most common emotional disturbances after stroke.³² Depression also considered as the strongest factor that can affect the life quality of stroke survivors.³³ Post-stroke depression (PSD) is highly prevalent among stroke survivors and is correlated with significant morbidity and mortality.³⁴⁻³⁶

Data from developed countries showed that approximately one-third of stroke survivors experience depression with highest incidence rates happened within the first year after stroke and declines afterward.^{34,35,37-39} Another study also showed correlation between depression and functional decline in doing daily life activities. The correlation peaked at 6 months and slowly decreased, but still remained significant until 1- and 2-years after stroke.⁴⁰

Another secondary analysis study in Korea stated that 69 of 383 post-stroke patients, with a diagnosis of acute stroke, from Asan Medical Center were suffering from PSD. The study also claimed that physical dysfunction, together with genetic factors, contributed to development of PSD at 3 months' post stroke.⁴¹

Subjects who were female or diagnosed as having any disability tend to have higher levels of depression than males.⁴² Another research also stated that Women often face discrimination and other forms of inequality thus more likely to experience disability and some mental health issues than men.^{43,44}

Stroke can cause continuous emotional problem that can be appeared over time as young people usually expect new things

happened in new situations. Having stroke can trigger depression and anxiety in some situations such as socializing and working. It is hard for them to think and act positively after knowing the fact that they might not be able to do something properly. Yet still there only a few researches about emotional issues on young stroke survivors.⁴⁵

Diagnosis of PSD often remains unrecognized. PSD is correlated with disability, mortality increment and risk of falls, cognitive impairment, and worse rehabilitation outcome.⁴⁶ The significant correlation of functional disability in Activities of Daily Living (ADL) with depression may reflect the effect of severe depression in persisting—and possibly even delaying recovery from—physical retardation. The majority of the previous studies have reported a significant correlation between disability and PSD.^{47,48,40}

Indonesia has the second highest mortality and DALY rates across Asia after Mongolia, 193.3/100,000 person-years and 3,382.2/100,000 people, respectively.⁸ Stroke prevalence in Indonesia increased from 7% in 2013 to 10.9% in 2018. The highest prevalence of stroke in Indonesia, East Borneo province, increased 2 times from 7% to 14% in 5 years.^{29,49} Stroke prevalence was found to be higher in cities and urban areas than in rural regions.⁵⁰

Generally, the prevalence of mental distress on East Borneo in 2007 is 6.9%. The survey results showed that being older, women, have low education level, unemployed and live in rural areas have more tendency to possess mental distress than the ones who are not.⁵¹

A study in one of the public hospitals in Indonesia, Tugurejo hospital Semarang showed that there was positive correlation between ADL and depression in 20 observed post-stroke patients. Around 30–60% patients have dependency on ADL.⁵²

Also, according to a research about the relationship between individual characteristic and depression in Rajawali hospital, Bandung⁵³, it is concluded that from 60 post-stroke patients, the proportion of patients having heavy depression are bigger than ones that have light depression around 51,7%. Majority of the heavy PSD patients were elderly (55,6%), men (63,3%), married patients (96,7%), and low

education level patients (60%).

This study is about the relationship between stroke, disability and mental distress of productive ages respondents in East Borneo with main purposes to know the effect of stroke, disability and interaction between both variables on mental distress and another side purpose, that is also to know the effect of individual characteristics such as gender, age group, employment status, education level and marital status on mental distress. Data used in this research will be a secondary data based on Indonesia basic health research 2013 obtained from National Institute of Health Research and Development (NIHRD), Indonesian Ministry of Health.

1.2 Literature Review

Although there have been some studies observing this topic, some have different conclusions with other similar studies. For instances, some said post stroke disability significantly correlated with the chance of someone being depressed and anxiety while others said the correlation was not significant. In Indonesia, research regarding this topic considered as few, and also with limited number of respondents since those studies were hospital-based, not population-based studies. Table 1 below showed some of literatures studying topic related to mental distress, stroke and disability.

Table 1. List of literature review

Research title	Author	Results
----------------	--------	---------

<p>Post-stroke depression in Ghana: Characteristics and correlates⁵⁴</p>	<p>Sarfo, F. S., et al</p>	<p>Out of 200 stroke survivors aged 62.0 ± 14.4 years, 78.5% classified as depressed by The Centre for Epidemiologic Studies Depression Scale (CES-D), 42.5% by Geriatric Depression Scale (GDS), and 36.5% on both CES-D and GDS. When disability getting worse, there were higher odds of depression. Also, being divorced was linked to depression.</p>
<p>The Relationship Between Individual Characteristic and Level of Post Stroke Depression in Nerve Polyclinic Rajawali Hospital of Bandung⁵³</p>	<p>Biantoro, et. al</p>	<p>About a half of 60 post stroke patients have a tendency to become heavily depressed. Male, married, elderly, less education had higher chance, but the characteristic of individual had not significant relationship with level of post stroke depression (PSD) in this study.</p>
<p>Prevalence of post-stroke anxiety and its association with socio-demographical factors, post-stroke depression, and disability⁵⁵</p>	<p>Patel, A. V., et al</p>	<p>35 of 100 patients anxious. PSA is not significantly associated with post-stroke disability. has been significantly associated with socio-economic deprivation, illiteracy, and PSD.</p>

Post-stroke depression: Prevalence and relationship with disability in chronic stroke survivors ⁵⁶	Srivastava, A., et al	18 of 51 patients mean age 46.06 ± 11.19 years and post-stroke duration of ± 1 year had depression. Depression was associated with functional impairment after stroke but to a statistically insignificant level (p-value > 0.05). PSD is related mainly to demographic variables.
Relationship between activity of daily living (ADL) dependent with depression on post-stroke patients at Tugurejo Hospital Semarang ⁵²	Ratnasari, P., et al	The study showed that there was positive correlation between ADL and depression in 20 observed patients. Around 30-60% patients have dependency on ADL.

1.3 Objectives

The general objective of this study was to know the correlation between post-stroke disability and mental distress at productive age (15 – 64 years) in East Borneo. Some specific objectives included were knowing whether severity level of disability has association with mental distress, stroke has association with the severity level of disability, stroke with disability synergistically increased the chance of having mental distress and other individual characteristics such as gender, employment status, age group, education level, marital status association with mental distress.

Also, the lack of research regarding mental distress related to stroke and disability in Indonesia encourage me to do this study. Hopefully by having the knowledge about the effect of stroke, disability and other factors on mental distress, it will lead to understanding of

disease risks and its influence on disease management. So that in future, we can anticipate and create better possible interventions to help the stroke survivors, especially ones in their productive ages, to live with good quality of life. Moreover, it will also give a chance and challenge to public health workers to provide counselling for patients and their families or care givers.

1.4 Hypotheses

1. The more severe the disability level the more likely to have mental distress
2. Stroke is associated with severity of disability level
3. Having stroke and disability synergistically increased the chance of having mental distress.
4. Being female, unemployed, older, low education, married, and having stroke tend to have positive correlation with mental distress.

Chapter 2. Methods

2.1 Data collection

Data was taken from Indonesian Basic Health Research Survey. The research was conducted in 2013 by National Institute of Health Research and Development (NIHRD) of the Ministry of Health. The sample taken in this basic health research survey was from 33 provinces in Indonesia but for this research, only the data from East Borneo province which has the highest stroke prevalence in Indonesia used. Total respondents in this research are 15277 people.

The Purposes of Basic Health Research Survey is to provide information based on evidence for health policy formulation at various administration tiers. The survey was community-based health research designed at nationwide, province and municipality scale using cross sectional designed survey with multi-stage stratified sampling design based on household.

To obtain the data from NIHRD Indonesian Ministry of Health, the researcher sent the data request and proposal by e-mail to NIHRD, it took approximately one month to be assessed and approved. After being approved, the researcher was asked to sign the Data Usage Statement and pay data request fee. after that, the staff will give the link to download the data through email with a password that can be accessed only by the researcher and the staff.

2.2 Variable analysis and selection procedures

Variables in this research consist of Independent and dependent variables to identify whether there is a correlation between independent variables to the possibility of mental distress happened. Independent variables including disability level, stroke status and individual characteristics such as gender, age group, employment status, education level and marital status while dependent variable is mental distress status.

Mental distress was assessed using SQR-20 questionnaire (yes/no

question) with 6 of 20 as cut-off value. 6 “yes” answers were selected because it has better specificity and sensitivity value, 68.5% and 82.9%, respectively compare to others.⁵⁷ on the survey for each “yes” answer, 1 score was given and for each “no” answer, 2 scores were given. Using 6 as cut-off value, the total score of someone to be included in mental distress category was between 1 to 1.7.

Disability level category was assessed using WHODAS-12 with 12 questions and the values of each answers are:

- 1: no disability
- 2: mild disability
- 3: moderate disability
- 4: severe disability
- 5: very extreme disability

The study purpose was to know the correlation of mental distress and some independent variables in productive ages population. Thus, for the selection procedure for study, respondents aged above 64 years old were excluded and only people between 15 – 64 years old residing in East Borneo included in this study.

2.3 Analysis process

2.3.1 Recoding

In order to have more proportional samples distribution, samples are recoded into some categories. Gender was re-coded into male and female, disability level was re-coded into 4 categories; none, low, moderate and high but for interaction analysis with stroke, disability variable changed into 3 categories; none, low and high.

On age groups variable, only respondents aged below 64 included in this research, which later will be divided into 3 categories: 15 – 30 years (early-productive age), 31 – 55 years (peak-of-productivity age), and 56 – 64 years (after-retirement age). Respondents aged more than 64 years’ old will be excluded.

Marital status from 6 categories (single, married, live separately but still married, live together but not married, divorced and partner

died) re-coded into 2 categories namely unmarried category which consists of single, live together but not married, divorced and partner died and married category which consists of married and live separately but still married.

For education level recoded from 7 categories (no education, not graduated from elementary school, elementary school, junior high school, high school, diploma, and university) into 5 categories namely no education (no education and not graduated from elementary school included), elementary school, junior high school, high school and higher education (diploma and university included).

Employment status recoded from 4 categories (not working, working, searching for a job, and student) into 2 categories namely unemployed (not working, searching for a job, and student included) and employed. Disability status recoded from 5 categories (none, low, moderate, high, extreme) into 4 categories namely none, low, moderate, and high (high and extreme included).

Stroke status variable was recoded into 2 categories, non-stroke and having stroke. "Having stroke" category only included stroke respondents that had been diagnosed by doctor, people having stroke by feeling any stroke symptoms but had not been check it to doctor were not included.

Mental distress variable was re-coded into 2 categories, not having and having mental distress. A respondent categorized as having mental distress if the total score was 1 – 1.7 according to cut-off value of SQR-20 questionnaire. The questionnaire was attached on appendix part

2.3.2 Descriptive analysis

The data was analysed using descriptive statistic to describe each variable with the frequency and percentage distribution also, to make it more presentable and easier to understand. The result will be presented in table. Software used for descriptive analysis was SPSS version 25.

2.3.3 Statistical analysis

There are 6 steps for statistical analysis process, the first one is Kolmogorov–smirnov normality test, to see if the data has normal distribution or not, next step is reliability test with α Cronbach value as standard, the closer its value to 1, the more reliable the data is.

Since the data is not normal, Spearman correlation with a significance level 95% to see the relationship between 2 variables used. The general purposes of spearman correlation are to see the relationship strength, direction and significance of 2 variables.

The significance criteria are when the p-value < 0.05 , the data is statistically showing significant relationship but if the p-value > 0.05 , there is no significant relationship statistically.

Relationship direction can be seen through the sign located in front of the correlation coefficient value. If it's positive then it means if X variable increased, Y will be increased too but if it's negative, X increased, Y decreased.

There are some reference of correlation coefficient values to see the relationship strength of 2 variables in SPSS:

0,00 – 0,25 = weak relationship

0,26 – 0,50 = enough relationship

0,51 – 0,75 = strong relationship

0,76 – 0,99 = very strong relationship

1,00 = perfect relationship

In order to see the effect between independent variables and dependent variable, the data will be analysed using binomial logistic regression. The criteria was by looking at p-value if p-value < 0.05 , there is significant effect between 2 variables.

Since we also would like to see the association between stroke and disability level, multinomial logistic regression analysis will be used to determine the effects. It is used when the dependent variable has more than 2 categories. In this case, the independent variable was stroke and the dependent variable was disability which has 4 categories: none, low, moderate and high. None was set as reference category.

Last step was odds ratio calculation to see how much tendency of each categories in independent variables have to cause dependent variable, in this case is mental distress. Since some variables has more than 2 categories, reference will be used. The software used in this statistical analysis process were SPSS version 25 and R studio.

Chapter 3. Results

3.1 Descriptive analysis

Table 2. General characteristics of study population (N=15,277)

Variables	Categories	N	Percentage
Gender	Male	7514	49.2%
	Female	7763	50.8%
Age	15 – 30 years old	5082	33.3%
	31 – 55 years old	8957	58.6%
	56 – 64 years old	1238	8.1%
Marital status	Married	11,254	73.7%
	Unmarried	4023	26.3%
Education level	Not educated	2094	13.7%
	Elementary school	4019	26.3%
	Middle school	3444	22.5%
	High school	4628	30.3%
	Higher education	1092	7.2%
Employment status	Unemployed	6809	36.9%
	Employed	8468	55.4%
Stroke status	Yes	96	0.6%
	No	15181	99.4%
Mental distress	Yes	5029	32.9%
	No	10248	67.1%
Disability level	None	13465	88%
	Low	1297	8%
	Moderate	456	3%
	High	59	1%
Total		15277	100%

Table 2 showed general characteristics of IBHR survey respondents. The respondents were taken randomly using 2010

citizen's census. At East Borneo, IBHR was done in 14 cities, 105 subdistricts, and 244 villages. Total citizens of East Borneo in their productive age in 2013 were 2,203,353 people while respondents surveyed in IBHR were 15277 people (0.06%).

From this frequency table, we can see that women (50.8%) are slightly more than men (49.2%), married respondents (73.7%) are way more than unmarried respondents (26.3%). Married includes live separately (but still married) and married respondents while single consists of live together (but not married), divorced, partner died, and single respondents.

Respondents were mostly in peak productivity age group (31 – 55 years old) accounted for 58.6% of population, followed by 33.3% early productivity age group (15 – 30 years old) and the remaining 8.1% was in their late productivity age or as called after retirement age (56 – 64 years old).

Respondents education dominated by high school level (30.3%). Followed by elementary and junior high school for 26,3% and 22.5% each, and the lasts are non-educated (13.7%) and higher education, including diploma and university for 7.2%. Working respondents (55.4%) are more than unemployed respondents (jobless, finding a job and student) that accounted for 36.9% of population.

The proportion of stroke: non stroke in 15277 respondents are 96 : 15181 respondents. The ratio between none : low : moderate : high disability level is 88 : 8 : 3 : 1 while the ratio between respondents having mental distress and not having it is 33:67.

Table 3. Proportion of mental distress among all population (N=15,277)

Variables	Categories	Mental distress		p-value*
		Yes (%)	No (%)	
Gender	Male	2021 (26.9)	5493 (73.1)	< 0.001
	Female	3008 (38.8)	4755 (61.2)	
Age	15 – 30 years	1427	3655 (71.9)	< 0.001

	old	(28.1)		
	31 – 55 years old	3042 (33.9)	5915 (66.1)	
	56 – 64 years old	560 (45.2)	678 (54.8)	
Marital status	Married	3938 (34.9)	7316 (65.1)	< 0.001
	Unmarried	1091 (27.1)	2932 (72.9)	
Education levels	Not educated	960 (45.9)	1134 (54.1)	< 0.001
	Elementary school	1523 (37.9)	2496 (62.1)	
	Middle school	1074 (31.1)	2370 (68.9)	
	High school	1183 (25.5)	3445 (74.5)	
	Higher education	289 (26.4)	803 (73.6)	
Employment status	Unemployed	2430 (35.6)	4379 (64.4)	< 0.001
	Employed	2599 (30.6)	5869 (69.4)	
Stroke status	Yes	78 (81.2)	18 (18.8)	< 0.001
	No	4951 (32.6)	10230 (67.4)	
Disability level	None	3536 (26.2)	9929 (73.8)	< 0.001
	Low	1032 (79.5)	265 (20.5)	
	Moderate	405 (88.8)	51 (11.2)	
	High	56 (94.9)	3 (5.1)	

* Significance was tested by χ^2 -test

Table 3 above showed the proportion of mental distress among all population. Females have bigger composition for having mental illness than males. 39% of female population have mental distress,

while males are 27%. The difference was as much as 12%.

For age categories, people in their 50s and 60s are most likely to have mental illness compare to all age groups as much as 45% of their own population. Also, people in their 30s and 40s are more likely to have mental illness than people in their 10s and 20s with 6% difference between both age groups composition. 34% in people of 31 – 55 years old and 28% in people of 15 – 30 years old.

Married people have bigger composition for having mental illness than unmarried ones. 35% of married people have mental distress, while singles are 27%. The difference was as much as 8%.

For education levels, people have no education are most likely to have mental illness compare to the ones who have, as much as 46% of their own population. 38% of people in elementary school level, 31% in junior high school level, and 26% of people in high school and higher education (college and diploma) level have mental distress. The percentages are increasing as the education level decreased.

Unemployed people have slightly bigger composition for having mental illness than employed ones. 36% of unemployed people have mental distress, while workers are 31%. The difference was as much as 5%.

People with stroke have bigger composition for having mental illness than the ones who don't. 81% of stroke patients have mental distress, while non-stroke patients are 33%. The difference was as much as 48%.

For disability severity levels, high severe disability people are most likely to have mental illness compare to the ones who have less severe disability, as much as 94% of their own population. Also, 88% and 79% of people in both moderate and low severity level, and 26% in people with no disability have mental distress. The percentages are increasing as the severity level increased.

3.2 Inferential statistics analysis

Normality test shows that the data is not normal (p -value < 0.05). Therefore, Spearman correlation and Logistic regression will be used

for analyzing the data. Spearman test is a non-parametric correlation test that doesn't need normality assumption on the data.

Table 4. Spearman correlation results (N=15,277)

Variable	Rho value	p-value*	CI 95%
Mental distress and disability level	0.387	< 0.001	0.371 – 0.40
Mental distress and gender	0.126	< 0.001	0.111 – 0.141
Mental distress and marital status	0.074	< 0.001	0.057 – 0.088
Mental distress and age groups	0.090	< 0.001	0.074 – 0.106
Mental distress and education level	-0.144	< 0.001	-0.160 – -0.129
Mental distress and employment status	-0.052	< 0.001	-0.069 – -0.036
Mental distress and stroke	0.081	< 0.001	0.066 – 0.096
Disability and stroke	0.113	< 0.001	0.084 – 0.140

Spearman correlation was analyzed using R. Before jumping into results interpretations, it is better to look back into variable codes once more.

Mental distress code as dependent variable ranging from 0 to 1. 0 means not having mental distress while 1 means having mental distress. For stroke code as independent variable, ranging from 1 to 2, 1 means not having stroke while 2 means having stroke. The other independent variables such as disability level, marital status, age group, education level, employment status and gender are also ranging from low to high (increased range).

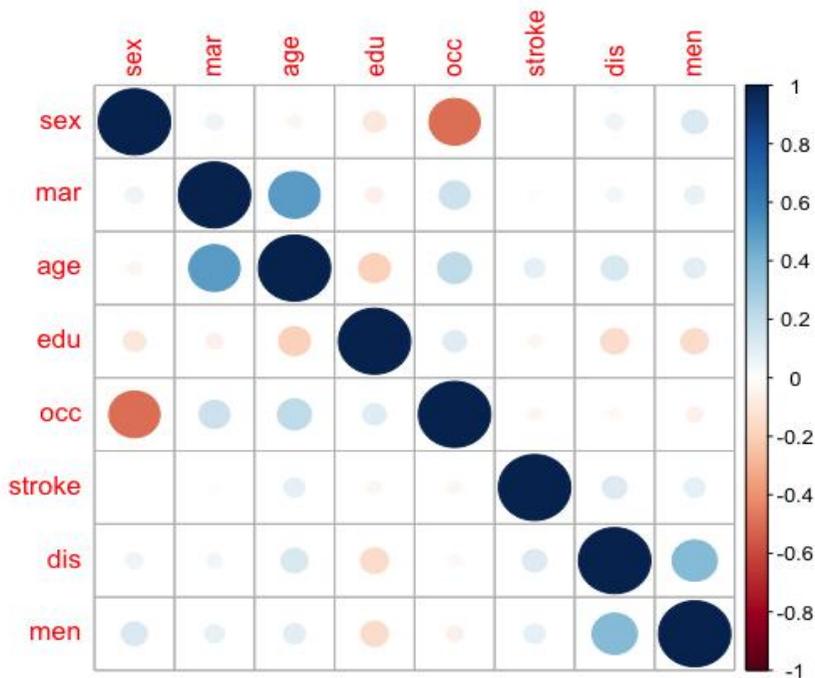


Figure 1: Spearman correlation results

Disability level divided into 4 categories from none to high, marital status from unmarried to married, age group from early-productivity group (15 – 30) to after-retirement group (56 – 64), education level divided into 5 categories from no education to higher education, employment status from unemployed to employed, and gender coded as men and women.

From Table 5 and Figure 1 above, we can see that correlation tests between mental distress and disability level, gender, marital status, stroke status and age group significantly resulted positive correlations with values 0.387, 0.126, 0.074, 0.090 and 0.081 respectively. Those mean, as disability level, gender, marital status, stroke and age group increased, the probabilities of having mental distress were also increasing.

On the other hand, the correlation tests between mental distress and employment status and education level significantly resulted negative correlations with values -0.052 and -0.144 , respectively which

mean as employment status and education level increased, the probabilities of having mental distress were decreasing.

Meanwhile, from Table 5 it was also concluded that the correlation between stroke and disability level resulted positive correlation, with value 0.113, which means people with stroke will more likely will develop greater disability compare to non-stroke people.

3.3 Logistic regression analysis

Logistic regression analysis was used to determine the effects of independent variables on mental distress as dependent variable. There were 4 models for logistic regression, first model used individual characteristics; gender, marital status, age group, education level and employment status as independent variables. Second model used disability and stroke, while third model used gender-marital status interaction as independent variables. The last model used disability by stroke as independent variables.

Hosmer and Lemeshow test or known as Goodness of fit test was used to predict whether logistic regression model was appropriate to explain the data. Using Chi-Square and df values, we can decide whether to reject or accept H_0 . H_0 indicates logistic regression model was able to explain the data. H_0 accepted if the Chi-Square value is less than Chi-Square table. Chi square value was 9.699 , less than chi square table value for $df = 8$ (15.51), therefore means logistic regression model was appropriate to explain the data.

Multinomial logistic regression analysis was used to determine the effects of independent variables on dependent variable. It is used when the dependent variable has more than 2 categories. In this case, the independent variable was stroke and the dependent variable was disability which has 4 categories: none, low, moderate and high. None was set as reference category.

3.4 Odds ratio

The correlation results only showed whether variables have

correlation with dependent variables or not. Logistic regression also, only showed whether independent variables have effect on dependent variable, but both couldn't show how much tendency of each categories in independent variables have to cause mental distress. Thus, odds ratios were calculated. Since some variables has more than 2 categories, reference will be used.

Table 5. Odds Ratio of each categories for mental distress (N=15,277)

Variable	Categories	Model 1 ^a (OR – 95% CI)	Model 2 ^b (OR – 95% CI)	Model 3 ^c (OR – 95% CI)	Model 4 ^d (OR – 95% CI)
Disability level	None		REF		
	Low		10.78* (9.37 – 12.41)		
	Moderate		21.87* (16.3 – 29.3)		
	High		42.55* (13.2 – 136.7)		
Age groups	15 – 30	REF			
	31 – 55	1.09 (0.99 – 1.19)			
	56 – 64	1.62* (1.41 – 1.86)			
Gender	Male	REF			
	Female	1.65* (1.52 – 1.79)			
Employment status	Unemployed	REF			
	Employed	0.99 (0.91 – 1.08)			
Marital status	Unmarried	REF			
	Married	1.28* (1.16 – 1.41)			

Education level	No education	REF
	Elementary school	0.75* (0.68 – 0.84)
	Junior-high school	0.62* (0.55 – 0.69)
	High school	0.48* (0.40 – 0.56)
	Higher education	0.47* (0.39 – 0.55)
Stroke status	No	REF
	Yes	4.59* (2.59 – 8.13)
Disability by Stroke	Non stroke – none	REF
	Stroke – none	5.08* (2.70 – 9.57)
	Non stroke – low	1.08* (0.43 – 1.25)
	Stroke – low	2.26* (1.68 – 7.51)
	Non stroke – high	2.27* (1.70 – 3.02)
	Stroke – high	2.20 (1.12 – 4.31)
	Sex–Marital status	Man–single
Man–married		1.43* (1.27 – 1.61)
Woman–single		1.75* (1.52 – 2.01)
Woman–married		2.41* (2.15 –

*: result significant in 0.05

a: Model 1 consists of age, gender, employment status, marital status and education level variable

b: Model 2 consists of disability level and stroke status

c: Model 3 consists of interaction between gender and marital status variables

d: Model 4 consists of interaction between disability level and stroke status variables

Table 6. Odds ratio for stroke and disability (N=15,277)

Variable	Categories	Disability level ^a	Odds Ratio	95% CI
Stroke	No (n= 15181)	None (n= 13423)	REF	REF
		Low (n= 1270)	0.147*	(0.090 – 0.239)
		High (n= 488)	0.057*	(0.035 – 0.092)
	Yes (n= 96)	None (n= 42)	REF	REF
		Low (n= 27)	6.79*	(4.176 – 11.056)
		High (n= 27)	17.68*	(10.813 – 28.916)

*: result significant in 0.05

a: disability level was re-categorized as 3 categories, “moderate” and “high” category combined in “high” category

Results of multiple logistic regression analysis are shown in table 5 as odds ratio values. Model 1 showed odds ratio of mental distress between individual characteristics variables such as gender, marital status, age group, education level and employment status. Model 2 considered disability and stroke as independent variables and Model 3 used gender–marital status interaction as independent variable. While in Model 4, disability by stroke was used as independent variable.

Among those models, interaction between stroke and high disability, employed status and 31–55 years old group variables don't have significant results. 15 – 30 years old group, male, unemployed, unmarried, having no education, disability level none, diagnosed as stroke, being single man and having none disability– non stroke was set as reference categories of each variables.

Among those, variables that have significant values were: (a)

female (OR 1.65 95% CI 1.52 – 1.79), (b) age group 56 – 64 (OR 1.62 95% CI 1.41 – 1.86), (c) married (OR 1.28 95% CI 1.16 – 1.41), (d) education levels; elementary school (OR 0.75 95% CI 0.68 – 0.84), junior high school (OR 0.62 95% CI 0.55 – 0.69), high school (OR 0.48 95% CI 0.40 – 0.56), and higher education (OR 0.47 95% CI 0.39 – 0.55), (e) stroke (4.59 OR 95% CI 2.59 – 8.13), (f) disability level; low (OR 10.78 95% CI 9.37 – 12.41), moderate (OR 21.87 95% CI 16.3 – 29.3), and high (OR 42.55 95% CI 13.2 – 136.7), (g) interaction between disability and stroke; stroke – none disability (OR 5.08 95% CI 2.70 – 9.57), no stroke – low disability (OR 1.08 95% CI 0.43 – 1.25), stroke – low disability (OR 2.26 95% CI 1.68 – 7.51), and no stroke – high (OR 2.27 95% CI 1.70 – 3.02), (h) interaction between gender and marital status; married men (OR 1.43 95% CI 1.27 – 1.61), single woman (OR 1.75 95% CI 1.52 – 2.01), and married woman (OR 2.41 95% CI 2.15 – 2.70).

Table 6 showed the odds ratio of regression between disability level as dependent variables and stroke as independent variables. These results showed how much the risk of having disability for people diagnosed stroke. Results are all significant in 0.05 with OR and 95% CI each are: (OR 6.79 95% CI 4.17 – 11.05) for low disability, and (OR 17.68 95% CI 10.813 – 28.916) for high disability.

Chapter 4. Discussion

4.1 Discussion

This study was population-based cross-sectional analysis study observing the correlation between stroke, disability and other individual characteristics associated with mental distress of productive ages people in East Borneo using 2013 Indonesia Basic Health Research data.

Although from 15277 people that included in the survey, woman; married; employed; high school graduate; non-stroke; non-disabled and peak productivity age groups respondents were dominated the population distribution, the mental distress proportion were bigger in people that have no education, unemployed, woman, married, late productivity group, diagnosed as stroke and having high disability.

The proportion were also in line with correlation and logistic regression results, Disability level, gender, marital status, age group and stroke have positive correlation with mental distress, which means people with high disability level, woman, married, older and having stroke were increasing the chance of having mental distress. While employment status and education level resulted negative correlation which means being employed and having higher education decreased the chance of having mental distress.

Also based on logistic regression results, being female, older, married, diagnosed as stroke, high-disabled and having no education background significantly increased the risk of having mental distress (p -value < 0.05). Being unemployed was also increasing the chance of having mental distress compare to being employed, though, the result was not significant (p -value > 0.05). Diagnosed as stroke also correlated with having more severe disability as being stroke significantly increase the risk of having more severe disability (p -value < 0.05).

Disability level, stroke status, and interaction between both were the 3 main independent variables we were interested in predicting mental distress. Disability level was separated into 4 categories (None,

Low, Moderate, High). In the logistic regression model, none disability was set as the reference level. For each level of the disability index, odds ratios are greater than 1, describing a positive relationship. This positive relationship means that as the level of disability “increases,” the odds of developing mental distress also increases. Based on our coding, an “increase” in severity was from none disability to low disability, moderate disability, and high disability.

None disability has odds ratio 0.092, 0.045, and 0.023 compare to low, moderate and high disability, respectively when it comes to chance of having mental distress. This can specifically be interpreted that having Low Disability, puts one at about 10.78 times greater odds of developing mental distress. Having Moderate Disability, puts one at about 21.87 times greater odds of developing mental distress. Being highly disabled puts one at about 42.55 times greater odds of developing mental distress.

Most of disability people in East Borneo were employed and living in their productive ages (31 – 55 years old). Having unable to work properly in disability people could be resulted greater mental distress than ones who do not experience any disabilities.⁵⁸

Interaction between disability and stroke variables resulted significant odds ratios 5.08, 1.08, 2.26, and 2.27 for being stroke–non disabled, non–stroke low disabled, stroke–low disabled, and non–stroke high disabled compare to not having disability and stroke when it comes to the chance of having mental distress. While being stroke–high disabled resulted insignificant odds ratio 2.20. This can specifically be interpreted that having stroke in non–disabled and low–disabled people increase the chance of having mental distress compare to ones who don’t. On the other hand being high–disabled without stroke put someone at greater risk on having mental distress compare to being both, stroke and high–disabled. This could be because stroke duration of each person was unknown and the prevalence of people having disability with stroke was much smaller than people without stroke.

Although Byle findings stated that stroke was significantly associated with higher risk of K10 scores when comorbidity and

disability factors were added, this associations were eventually reduced by time.⁵⁹ K10 is Kessler Psychological Distress Scale (K10) that measures various psychological distress according to comorbid conditions, disability, and sociodemographic circumstances.

Stroke status was separated into 2 categories, having stroke and not having stroke. In the logistic regression model, having no stroke was set as the reference level. For each level of the stroke status, odds ratios are greater than 1, describing a positive relationship. This positive relationship means that as the level of stroke status “increases,” the odds of developing mental distress also increases. Based on our coding, an “increase” happened on people having stroke.

Having stroke has odds ratio 4.59 compare to not having stroke when it comes to chance of having mental distress. This can specifically be interpreted that having stroke, puts one at about 4.59 times greater odds of developing mental distress.

Among stroke people in East Borneo, most of them are women and unemployed. Women were assumed to be more likely to develop depression as a comorbidity of stroke because of their higher rate of lesions on the left hemisphere of the brain.⁶⁰ Having stroke while being unemployed also could resulted higher tendency of having mental distress as some significant personality changes after stroke⁶¹ and eventually made stroke people feel they live as burden for people around them because of their unemployment status. Therefore, Liman’s study suggested the cognitive screening test for stroke survivors because from his findings, it was known that a low mini-mental status has a significant impact on long-term health outcome after stroke.⁶²

In terms of Age group, the group was divided into 3 categories: 15 – 30 years old, 31 – 55 years old and 56 – 64 years old. 15 – 30 years old was set as the reference group. For each grouping of age, odds ratios are greater than 1, describing a positive relationship that means belonging to an older age group increases the odds of developing mental distress.

15 – 30 years old has odds ratio 0.91 and 0.61 compare to 31 – 55 and 56 – 64 years old, respectively when it comes to chance of having mental distress. This can specifically be interpreted that

belonging in 31 – 55 age group, puts one at 1.09 times non-significantly greater odds of developing mental distress while belonging in 56 – 64 group puts one at 1.62 times significantly greater odds of developing mental distress compared to the youngest age group.

We could hypothesize that this could be as a result of older people recovering and rehabilitating slower than people belonging in the younger age groups or as a result of them having other health conditions, which would in turn worsen their mental burden, such as age-associated cognitive decline.⁶³ Other findings also stated that among elderly and retirees, depression, dementia and anxiety were considered as the most common mental health problem.⁶⁴ The retirement because of health problem was also correlated with higher level of mental distress.⁶⁵

There are 2 categories in terms of Gender, male and female. Male was set as the reference. Being male decreases the odds of developing mental distress compared to being female by 0.58. This result can also be interpreted as being female increases the odds of mental distress by roughly 1.7 times as much as being male.

According to other studies, Female gender was significantly associated with poor mental health⁶⁶ and high proportions of reproductive-age women reported having frequent mental distress. The study also found out that women experiencing mental distress were more likely to consume cigarettes and alcohol than women without mental distress.⁶⁷ Another systematical review study also assumed that psychosocial inequities and access to rehabilitation support might be the reason for this gender difference.⁶⁸

Previous study also suggested that women are vulnerable to mental distress not only because they got more pressure than men in their lives but also because different restriction on society, such as restriction on marriage and education that predominantly forced on women than they do on men.⁶⁹

Employment status was divided into 2 categories, Unemployed and Employed. Unemployed status was set as the reference, employed people have 0.9 times the odds of having mental distress compared to their employed counterparts. This can also be interpreted as being

unemployed have 1.1 times odds for having mental distress.

Although the regression result was not significant, some studies found out that being unemployed had a significant influence on mental health of the working age population.⁷⁰ The unemployed participants had a significantly poorer mental health compared to the employed ones and unemployed has 3.14 times risk of having mental distress compared to the employed group.⁷¹ Another study also found out that being unemployed was correlated with the higher levels of mental distress compared to being employed for men and women aged 45–64.⁶⁴

As we know, if someone doesn't work, it will be hard for them to get money thus their income will be lower or none. In East Borneo, the unemployed people were increased from 16.000 in 2016 to 30.000 people in 2017⁷², on the other hand most of East Borneo people like to spend their money in non-food things which cost more moneys. This could resulted mental distress for someone who has big desire to buy something but unfortunately have no money.

As for marital status, 2 categories were assigned as unmarried and married, as the majority of the people are married with a very small group unmarried, it is a bit difficult to make definite inferences about one's odds of mental distress. However, based on the analyses we can report that being married significantly increases the odds by 1.28 times compared to unmarried. It should further be mentioned that the unmarried group consists of people that responded with separated, single and widowed.

The interaction between gender and marital status also resulted significant odds ratio 1.43, 1.75, and 2.41 for married man, single woman, and married woman, respectively. It means being married put woman and man at greater risk of having mental distress compare to being single in each gender. These results were in line with the fact that in East Borneo, girls were expected to married in young age. According to statistics from woman and child protection organization, child marriage (married under 17 years old) were increasing from 440 children to 472 in 2018 where 380 of the total were consisted of girls.⁷³

Other studies reported that married woman significantly having

more mental health problems than married man⁷⁴ and married woman also has higher prevalence in having mental distress than man in general.⁶⁵ Having roles as wives and mothers after marriage could bring greater stress to women that eventually contributed to higher rates of mental distress than men as husband and fathers.^{75,76} that made sense because generally when women got married, they were expected to do domestic tasks such as bearing children, doing household chores, taking care of children and husband. Those tasks could restrain their own opportunities for self-development giving them no time for their own self and socializing more with others.

Looking at the education level variable which were divided into 5 categories, No education, Elementary, junior high school, high school, and higher education. No education was set as the reference level. The odds ratios are less than 1, describing a negative relationship. This negative relationship means that *as the level of education "increases,"* the odds of developing mental distress *decrease*. This can specifically be interpreted to mean that having elementary education, puts one at lower odds of developing mental distress by 0.75 and obtaining education in junior high school, high school and higher education decreases one's odds by 0.62, 0.48, and 0.47 respectively. In better terms, we can inversely interpret these result as having no education at all, increases one's odds of developing mental distress by 1.28 times compared to having just elementary education and by 1.3 to 2 times compared to obtaining education beyond elementary school.

The latter, were also significant results, considering that the more education one receives the more likely they are to have a better understanding of their condition and how to manage it, by in turn lowering their mental burden. Another study also concluded similar results. Those who attained lower education level reported incrementally more mental health problems than ones in higher education.⁷⁴ People with low levels of education and income have less knowledge about disease, even among those who have experienced a previous event or who have had a family history of the disease.^{77,78} Moreover, low levels of education may interfere with treatment adherence and medical recommendations.⁷⁹ Also, women having lower

education had highest prevalence of having mental distress compared to men and women in higher level of education.⁶⁵

As for stroke and disability, the independent variable was stroke and the dependent variable was disability which has 4 categories: none, low, moderate and high. None was set as reference category. From the results above, having stroke put one's 6.8 times higher on having low disability level compare to having none disability and the probability of having high disability becomes 17.7 times higher for someone having a stroke.

Other study also stated that out of 21% stroke survivors that survived to 15 years, 34% had mild, 14% had moderate and 15% had severe disability. The prevalence of disability increased with time but 1 in 10 of the 15-year survivors had lived with moderate-severe disability since their stroke.⁵⁹

4.2 Limitation

The findings in this study have several limitations. First, the limited number of people diagnosed as stroke since stroke respondents in this study only consisted of people that had been diagnosed by doctor, people having stroke by feeling any symptoms but had not been check it to doctor were not included and the fact that Indonesian people often disregard minor disability as a factor that will restrict their everyday activities²⁹ could resulted different interpretation regarding disability for each individuals thus limit the number of people categorized as disabled. Second, every answer is reported by individuals, therefore there is a possibility of under-reporting and over-reporting. Lastly, data used in this study is a cross-sectional survey developed by Indonesia Ministry of Health containing individual questions of 900 variables which do not focus only on mental distress, disability and stroke. Therefore, other data such as stroke duration, the cause of disabilities on some people and other related questions were not specifically stated.

4.3 Effectiveness of This Study

The result of this study suggested that stroke and disability people have higher risk of mental distress. As previously told, stroke prevalence in East Borneo is increasing 2 times and if people around there especially government don't take care of this situation, it is not possible that their mental health status could be affected too. East Borneo has second highest income per capita after Jakarta in Indonesia.⁸⁰ This fact could also be the reason why the stroke prevalence is increasing. As income increase, lifestyle could be changed. It's better for government, together with the society to push healthy lifestyle such as providing facility to do physical activity and giving variety choices of health foods, or even better to make it cheaper than junk food.

As for disability people, Recently government have done some improvement by giving scholarship to disability children and allocated 3 position in public workers but still the government should allocated more budget to provide better facility⁸¹ especially in public places, as not so many public places are disability-friendly and also give some skill education so that disability people won't feel isolated from others.

All these results and suggested ideas hopefully will be useful for people living in Indonesia especially in East Borneo. Moreover, in near time the capital city will be moved from Jakarta to one of the areas in East Borneo.

Chapter 5. Conclusions

5.1 Conclusion

The findings from this study answered the hypotheses earlier. The results from logistic regression were in line with Spearman correlation test, showing similar conclusion. From this study known that the more severe the disability level, the odds of having mental distress increased thus more likely to have mental distress. Stroke was associated with severity of disability level and having stroke puts seven times higher on having low disability and becomes higher as the severity of disability level increased. These findings also suggested that having stroke in non-disabled and low-disabled people could synergistically increasing the odds of having mental distress although somewhat the risk are smaller compare to having disability without stroke.

Gender, age groups, marital status, stroke status and disability level variables showed positive correlation with mental distress means being female, older, married, having stroke and more severe disability increase the probability of having mental distress. While employment status, education level showed negative correlation, it means being employed, and having higher education level decrease the probability of having mental distress compared to their counterparts.

As most of stroke and disabled people living in East Borneo are in their peak of productive ages and have significant tendency of

having mental distress, it would be better if government did some intervention such as early screening for mental distress and providing some training to live their life without feeling burdensome to people around them.

References

1. Mackay J. The Atlas of Heart Disease and Stroke. USA: World Health Organization and US Centers for Disease Control and Prevention (CDC); 2014
2. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. On behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2016 update: a report from the American Heart Association. *Circulation*. 2016;133(4):38–360.
3. Centres for Disease Control and Prevention (CDC) 24/7: saving lives protective people [Internet]. USA: U.S. Department of Health & Human Services; 2019. Types of Stroke; 2018 May 3 [cited 2019 Oct 3]; [about 1 screen]. Available from: https://www.cdc.gov/stroke/types_of_stroke.htm
4. American Stroke Association [Internet]. USA: American Heart Association; 2019. What is a TIA?; 2016 Oct 16 [cited 2019 Oct 2]; [about 1 screen]. Available from: <https://www.stroke.org/en/about-stroke/types-of-stroke/tia-transient-ischemic-attack/what-is-a-tia>
5. Hyattsville MD. 2003 Chartbook on the Health of Americans. USA: National Center for Health Statistics Department of Health and Human Services; 2003.
6. Centres for Disease Control and Prevention (CDC) 24/7: saving lives protective people [Internet]. USA: U.S. Department of

- Health & Human Services; 2019. Family History and Other Characteristics That Increase Risk for Stroke; 2018 March 27 [cited 2019 Oct 3]: [about 1 screen]. Available from: https://www.cdc.gov/stroke/family_history.htm
7. Misbach J, Ali W. Stroke in Indonesia: a first large prospective hospital-based study of acute stroke in 28 hospitals in Indonesia. *J Clin Neurosci* 2001;8:245–249.
 8. Feigin VL, Forouzanfar MH, Krishnamurthi R, Mensah GA, Connor M, Bennett DA, et al. Global Burden of Diseases, Injuries, and Risk Factors Study 2010: findings from the Global Burden of Disease Study 2010. *Lancet*. 2014;383 (9913):245–254.
 9. WHO. World health report 2002. Geneva: WHO; 2002
 10. Adamson J, Beswick A, Ebrahim S. Is Stroke the Most Common Cause of Disability?. *J Stroke Cerebrovascular Dis*. 2004 Jul–Aug;13(4):171–7
 11. Royal College of Physicians, Clinical Effectiveness and Evaluation Unit on behalf of the Intercollegiate Stroke Working Party. Sentinel Stroke National Audit Programme (SSNAP) Clinical Audit August–November 2016 Public Report. United Kingdom: Royal Royal College of Physicians; 2017
 12. Kappelle LJ, Adams HP Jr, Heffner ML, Torner JC, Gomez F, Biller J. Prognosis of young adults with ischemic stroke: A long-term follow-up study assessing recurrent vascular events and functional outcome in the Iowa Registry of Stroke in Young Adults. *Stroke*. 1994; 25:1360–5.
 13. Lai SM, Alter M, Friday G, Sobel E. Prognosis for survival after an initial stroke. *Stroke*. 1995; 26:2011–5.
 14. Sarti C, Rastenyte D, Cepaitis Z, Tuomilehto J. International trends in mortality from stroke (1968 to 1994). *Stroke*. 2000; 31:1588–601.
 15. Gopi S, Anbazhagan G, Balamurali K, et al. Prevalence and Severity of Post stroke depression and its relation with demographic and stroke characteristics. *IOSR-JDMS*. 2017; 16: 12–17.

16. Sacco RL. Risk factors, outcomes, and stroke subtypes for ischemic stroke. *Neurology*. 1997; 49:39– 44.
17. Smajlović D. Strokes in young adults: epidemiology and prevention. *Vascular Health and Risk Management*. 2015;11:157–164
18. Health and Social Care Information Centre. Health and Social Care Information Centre Annual Report and Accounts 2015/16. United Kingdom: Health and Social Care Information Centre; 2016
19. Feigin VL, et al. Global Burden of Diseases, Injuries, and Risk Factors Study 2010: findings from the Global Burden of Disease Study 2010. *Lancet*. 2014;383 (9913):245–254.
20. Stroke Association. State of the nation: The Financial Impact of stroke on people of working age. United Kingdom: Stroke Association; 2012
21. Deloitte access economics. The economic impact of stroke in Australia. Australia: National Stroke Foundation; 2013
22. Westerlind E, Persson HC, Sunnerhagen KS. Return to Work after a Stroke in Working Age Persons; A Six-Year Follow Up. *PLoS ONE*. 2017;12(1)
23. Centres for Disease Control and Prevention (CDC) 24/7: saving lives protective people [Internet]. USA: U.S. Department of Health & Human Services; 2019. Disability and Health Overview; 2019 Sep 4 [cited 2019 Oct 2]: [about 1 screen]. Available from: <https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html>
24. Disabled World[Internet]. Disabled World; 2019. Disabilities: Definition, Types and Models of Disability; 2019 Mar 27[cited 2019 Oct 4]; [about 1 screen]. Available from: <https://www.disabled-world.com/disability/types/>
25. World Health Organization [Internet]. Geneva: WHO; 2018. WHO Disability Assessment Schedule 2.0 (WHODAS 2.0); 2018 June 14[cited 2019 Oct 2]; [about 1 screen]. Available from: https://www.who.int/classifications/icf/more_whodas/en/

26. Mental Health.gov: Let's talk about it [Internet]. USA: U.S. Department of Health & Human Services; 2019. What Is Mental Health? 2019 May 4 [cited 2019 Oct 3]; [about 1 screen]. Available from: <https://www.mentalhealth.gov/basics/what-is-mental-health>
27. MedlinePlus: Trusted health information for you [Internet]. USA: U.S. National Library of Medicine; 2019. Mental Health; 2019 Sep 3 [cited 2019 Oct 2]; [about 1 screen]. Available from: <https://medlineplus.gov/mentalhealth.html>
28. World Health Organization. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical descriptions and diagnostic guidelines. Geneva: WHO
29. Ministry of health Republic of Indonesia. Basic health research (IBHR) survey. Indonesia: Ministry of health Republic of Indonesia; 2013
30. Hartono IG. Psychiatric morbidity among patients attending the Bangetayu community health centre in Indonesia [Thesis]. Australia: University of Western; 1995
31. Right diagnosis [Internet]. Health grades; 2014. Emotional disorders; 2015 Aug 13 [cited 2019 Oct 4]; [about 1 screen]. Available from: https://www.rightdiagnosis.com/e/emotional_disorders/causes.htm
32. Hackett ML, Kohler S, O'Brien JT, et al. Neuropsychiatric outcomes of stroke. *Lancet Neurology*. 2014; 13: 525–534.
33. Kim P, Warren S, Madill H, Hadley M. Quality of life of stroke survivors. *Qual Life Res*. 1999; 8:293– 301.
34. Hackett ML, Pickles K. Part I: frequency of depression after stroke: an updated systematic review and meta-analysis of observational studies. *Int. J. Stroke*. 2014; 9: 1017–1025.
35. Kutlubaev MA, Hackett ML. Part II: predictors of depression after stroke and impact of depression on stroke outcome: an updated systematic review of observational studies. *Int. J. Stroke* 2014; 9: 1026–1036.

36. Bartoli F, Lillia N, Lax A, Crocamo C, Mantero V, Carra G, et al. Depression after stroke and risk of mortality: a systematic review and meta-analysis. *Stroke Res. Treat.* 2013;862–978.
37. Ayerbe L, Ayis S, Crichton S, Wolfe CD, Rudd AG. The natural history of depression up to 15 years after stroke: The South London Stroke Register. *Stroke.* 2013; 44:1105–1110.
38. Hackett ML, Yapa C, Parag V, Anderson CS. Frequency of depression after stroke: a systematic review of observational studies. *Stroke.* 2005; 36:1330–1340.
39. Ayerbe L, Ayis S, Crichton S, Wolfe CD, Rudd AG. Natural history, predictors and outcomes of depression after stroke: systematic review and meta-analysis. *Br. J. Psychiatry.* 2013;202.
40. Parikh RM, Lipsey JR, Robinson RG, Price TR. Two-year longitudinal study of post-stroke mood disorders: dynamic changes in correlates of depression at one and two years. *Stroke.* 1987;18:579–84.
41. Mihye K. Post Stroke Depression and Emotional Incontinence: Focused on TPH2 Polymorphisms[Dissertation]. Seoul: Seoul National University; 2013
42. Noh JW, Kwon YD, Park J, Oh I-H, Kim J. Relationship between Physical Disability and Depression by Gender: A Panel Regression Model. *PLoS ONE.* 2016;11(11): e0166238. doi:10.1371/ journal.pone.0166238
43. Das J, Do QT, Friedman J, McKenzie D, Scott K. Mental health and poverty in developing countries: Revisiting the relationship. *Social Science & Medicine.* 2007;65:467–480.
44. World Health Organization. World report on disability. Geneva: WHO; 2011
45. The Stroke Association. Feeling overwhelmed. UK: the Stroke Association; 2013
46. Paolucci S. Epidemiology and treatment of post-stroke depression. *Neuropsychiatry Dis Treat.* 2008; 4:145–54.
47. Paolucci S, Gandolfo C, Provinciali L, Torta R, Toso V. The Italian multicenter observational study on post-stroke depression (DESTRO). *J Neurol.* 2006; 253:556–62.

48. Głodzik–Sobańska L, Słowik A, Borratyńska A, Szczudlik A. Depressive symptoms following ischemic stroke. *Neurol Neurochir Pol.* 2003; 37:17–25.
49. Ministry of health Republic of Indonesia. Basic health research (IBHR) survey. Indonesia: Ministry of health Republic of Indonesia; 2018
50. Ministry of health Republic of Indonesia. Basic health research (IBHR) survey. Indonesia: Ministry of health Republic of Indonesia; 2007
51. Kusuma Y, Venketasubramanian N, Kiemas LS, Misbach J. Burden of stroke in Indonesia. *Int J Stroke.* 2009; 4: 379–380.
52. Ratnasari P, Kristiyawati SP, Solechan A. Relationship between activity of daily living (ADL) dependent with depression on post-stroke patients at Tugurejo Hospital Semarang. Indonesia: STIKES Telogorejo Semarang; 2012.
53. Biantoro, Tohri T, Juariah L. The Relationship Between Individual Characteristic and Level of Post Stroke Depression in Nerve Polyclinic Rajawali Hospital of Bandung. *Jurnal Stikes A. Yani.* 2006.
54. Sarfo FS, Jenkins C, Singh A, et al. Post-stroke depression in Ghana: Characteristics and correlates. *Journal of the Neurological Sciences.* 2017; 379: 261–26
55. Patel AV, Shah SH, Patel K, et al. Prevalence of post-stroke anxiety and its association with socio-demographical factors, post-stroke depression, and disability. *Neuropsychiatry i Neuropsychological.* 2018; 13(2): 43–49
56. Srivastava A, Taly AB, Gupta A, Murali T. Post-stroke depression: Prevalence and relationship with disability in chronic stroke survivors. *Ann Indian Acad Neurol.* 2010;13:123–7
57. Westhuizen C, Wyatt G, Williams JK, et al. Validation of the Self Reporting Questionnaire 20-Item (SRQ-20) for Use in a Low- and Middle-Income Country Emergency Centre Setting. *Int J Ment Health Addict.* 2016;14: 37–48

58. Okoro C, Strine T, McGuire L, Balluz L, Mokdad A. Employment status and frequent mental distress among adults with disabilities. *Occupational Medicine*. 2007;57:217–220
59. Byles JE, Robinson I, Banks E, et al. Psychological distress and comorbid physical conditions: disease or disability?. *Depression and anxiety*. 2014; 31:524–532
60. Alajbegovic A, Djelilovic–Vranic J, Alajbegovic S, Nakicevic A, Todorovic L, Tiric–Campara M. Post stroke depression. *Medical archives*. 2014; 68(1):47
61. Stone J, Townend E, Kwan J, Haga K, Dennis MS, Sharpe M. Personality change after stroke: some preliminary observations. *J Neurol Neurosurg Psychiatry*. 2004; 75:1708–1713.
62. Liman TG, Heuschmann PU, Endres M, Flo òel A, Schwab S, Kolominsky–Rabas PL. Impact of low mini–mental status on health outcome up to 5 years after stroke: the Erlangen Stroke Project. *J Neurol*. 2012;259:1125–1130.
63. Deary IJ, Corley J, Gow AJ, Harris SE, Houlihan LM, Marioni RE, Starr JM. Age–associated cognitive decline. *British medical bulletin*. 2009; 92(1): 135–152.
64. Tiwari SC, Pandey NM, Singh I. Mental health problems among inhabitants of old age homes: A preliminary study. *Indian J Psychiatry*. 2012; 54:144–8.
65. Vo K, Forder PM, Tavener M, et al. Retirement, age, gender and mental health: findings from the 45 and Up Study. *Aging & Mental Health*. 2015;19(7):647–657
66. Kim IH, Muntaner C, Khang YH, Paek D, Cho S. The relationship between nonstandard working and mental health in a representative sample of the South Korean population. *Social Science & Medicine*. 2006; 63: 566–574
67. Ahluwalia IB, Mack KA, Mokdad A. Mental and Physical Distress and High–Risk Behaviors Among Reproductive–Age Women. *The American College of Obstetricians and Gynecologists*. 2004 Sep; 104(3)
68. Poynter B, Hon MS, Diaz–Granados N, Kapral M, Grace SL, Stewart DE. Sex differences in the prevalence of post–stroke

- depression: a systematic review. *Psychosomatics*. 2009;50(6):563–569.
69. Stroebe S. Disease and dowry: Community context, gender, and adult health in India. *Social Forces*. 2015; 93:1599–1623.
70. Batic–Mujanovic O, Poric S, Pranjić N, Ramić E, Alibasić E, Karić E. Influence of Unemployment on Mental Health of the Working Age Population. *Mater Sociomed*. 2017 Jun; 29(2): 92–96
71. Katikireddi SV, Niedzwiedz CL, Popham F. Employment status and income as potential mediators of educational inequalities in population mental health. *The European Journal of Public Health*. 2016. 26(5):814–816.
72. Jawa Pos [Internet]. Indonesia: PT Jawa Pos Grup Multimedia; 2019. Hidup di Kota Rentan Sakit Jiwa; 2019 Feb 05[cited 2019 Dec 12]; [about 1 screen]. Available from: <https://www.jawapos.com/jpg-today/15/02/2019/hidup-di-kota-rentan-sakit-jiwa/>
73. Antara News [Internet]. Indonesia: Kantor Berita Antara; 2019. DKP3A Kaltim catat 916 kasus pernikahan dini periode 2017–2018; 2019 Jul 26[cited 2019 Dec 12]; [about 1 screen]. Available from: <https://www.antaranews.com/berita/977232/dkp3a-kaltim-catat-916-kasus-pernikahan-dini-periode-2017-2018>
74. Strohschein L, Ram U. Gender, Marital Status, and Mental Health: A Test of the Sex Role Hypothesis in India. *Journal of Family Issues*. 2017; 38(13):1899–1922
75. Gove W. The relationship between sex roles, marital status and mental illness. *Social Forces*. 1972; 51:34–44.
76. Radloff, L. Sex differences in depression: The effects of occupation and marital status. *Sex Roles*. 1975; 1:249–265.
77. Travis LH, Flemming KD, Brown Jr. RD, Meissner I, McClelland RL, Weigand SD. Awareness of stroke risk factors, symptoms, and treatment is poor in people at highest risk. *J Stroke Cerebrovasc Dis*. 2003; 12:221–7.

78. Jones SP, Jenkinson AJ, Leathley MJ, Watkins CL. Stroke knowledge and awareness: an integrative review of the evidence. *Age Ageing*. 2010; 39:11–22.
79. Fernandes TG, Goulart AC, Santos–Junior WR, Alencar AP, Benseñor IM, Lotufo PA. Educational levels and the functional dependence of ischemic stroke survivors. *Cadernos de saude publica*. 2012; 28:1581–1590.
80. Tribun Kaltim [Internet]. Indonesia: KG Media; 2019. Kaltim Posisi Tertinggi Penderita Stroke, Dinkes Kota Samarinda Ingatkan Jaga Pola Hidup Sehat; 2019 Oct 29[cited 2019 Dec 12]; [about 1 screen]. Available from: <https://kaltim.tribunnews.com/2019/10/29/kaltim-posisi-tertinggi-penderita-stroke-dinkes-kota-samarinda-ingatkan-jaga-pola-hidup-sehat>.
81. Antara Kaltim [Internet]. Indonesia: Kantor Berita Antara; 2019. Penyandang disabilitas Kaltim mencapai 7.331 Orang; 2019 June 21[cited 2019 Dec 12]; [about 1 screen]. Available from: <https://kaltim.antaranews.com/berita/57434/penyandang-disabilitas-kaltim-mencapai-7331-orang>

국문초록

East Borneo의 생산 연령 인구의 뇌졸중, 장애 및 정신건강문제 사이의 관계 (2013 인도네시아 기본 건강 연구에 근거)

하나 아마니타 코이릴
보건학과 역학전공
보건대학원 서울대학교

배경 : 뇌졸중은 많은 국가에서 주요 사망 원인이다. 인도네시아의 뇌졸중 유병률은 2013 년 7 %에서 2018 년 10.9 %로 증가했다. 인도네시아 보르네오 주에서 가장 높은 뇌졸중 유병률은 5 년 동안 7 %에서 14 %로 2 배 증가했다. 우울증과 불안은 뇌졸중 후 가장 흔한 정서적 장애가 된다. 뇌졸중 후 우울증 (PSD)은 뇌졸중 생존자들 사이에서 널리 퍼져 있으며 상당한 이환율 및 사망률과 관련이 있다. 이 연구는 주제에 대해 인구 기반 조사를 이용한 연구이다.

목표 : 이 연구의 일반적인 목표는 이스트 보르네오의 생산 연령 (15 - 64 세) 에서 뇌졸중 후 장애와 정신건강문제 사이의 상관 관계를 파악하는 것이 있다. 구체적인 목표는 중증 장애 수준이 정신건강문제과 관련이 있는지, 뇌졸중이 중증 장애 수준과 관련이 있는지, 장애가 있는 뇌졸중이 정신건강문제를 가질 가능성을 증가시키고 성별, 고용 상태, 연령과 같은 기타 개인 특성과의 연관성이 있는지 착안하고자 한다

방법 : 이 연구는 2013년 인도네시아 기초 건강 조사에 참여한 총 15227 명의 자료를 분석하였다. 이 연구의 변수는 장애 수준, 뇌졸중 상태 및 성별, 연령 그룹, 고용 상태, 교육 수준 및 결혼 상태와 같은 개인 특성을 포함한 변수이다. 종속 변수는 정신 문제 상태였다. 정신건강문제의 측정은 SRQ-20 설문을 이용하여 유무로 정의하였고, 장애의 측정은 WHODAS-12 도구를 이용하여 장애 정도를 4수준으로 범주화하였다. 데이터는 일 변량 분석을 사용하여 빈도 및 백분율 분포를 갖는 각 변수를 설명하고 스피어맨 상관 및 로지스틱 회귀를 사용하여 두 변수 간의 관계를 확인하였다. 이 분석에 사용된 소프트웨어는 SPSS 및 R 소프트웨어이다.

결과 : 장애 수준은 정신건강문제과 관련이 있었다. 장애 수준이 높은 사람들은 정신건강문제를 겪을 가능성이 더 컸다. 교육 수준, 성별, 결혼 여부, 연령 그룹 및 뇌졸중은 정신건강문제의 상관 관계가 약한 반면, 고용 상태는 거의 상관 관계가 없었다. 로지스틱 회귀 분석 결과에 따르면, 여성, 노인, 결혼, 취업, 뇌졸중, 뇌졸중으로 인한 장애가 많고 교육 배경이 없는 경우 정신건강문제가 발생할 위험이 크게 증가한다 (p -값 < 0.05). 반면에, 뇌졸중에 의해 장애가 있다고 해서 정신건강문제의 위험이 크게 증가하지는 않는다 (p -값 > 0.05). 뇌졸중은 또한 더 심각한 장애를 갖는 것으로 나타났다. 뇌졸중이되면 더 심각한 장애가 발생할 위험이 상당히 높아진다 (p -값 < 0.05).

결론 : 이스트 보르네오에 거주하는 대부분의 뇌졸중 및 장애인은 생산성이 가장 높은시기에 정신건강문제를 겪는 경향이 있으므로 정부가 정신건강문제를 조기에 선별하고 훈련을 제공하는 등의 개입을하는 것이 필요하다.

키워드 : 뇌졸중, 장애, 정신건강문제, 여자들

학번: 2018 - 29685

Appendix

Table A. 1. General Characteristics of Population by Disability Status (N=15,277)

Variables	Categories	Disability	
		Yes (%)	No (%)
Gender	Male	757 (42)	6757 (50)
	Female	1055 (58)	6708 (50)
Age	15 – 30 years old	385 (21)	4697 (35)
	31 – 55 years old	1079 (59.5)	7878 (58.5)
	56 – 64 years old	348 (19.5)	890 (6.5)
Marriage status	Married	1437 (79)	9817 (73)
	Unmarried	375 (21)	3648 (27)
Education levels	Not educated	456 (25.2)	1638 (12.2)
	Elementary school	616 (34)	3403 (25.3)
	Middle school	318 (17.5)	3126 (23.2)
	High school	328 (18.1)	4300 (31.9)
	Higher education	94 (5.2)	998 (7.4)
Occupation status	Unemployed	874 (48)	5935 (44)
	Employed	938 (52)	7530 (56)
Stroke status	Yes	54 (3)	42 (0.3)
	No	1758 (97)	13423 (99.7)
Mental distress	Yes	1218 (67)	3463 (26)
	No	594 (33)	10002 (74)

Table A. 2. General Characteristics of Population by Stroke Status
(N=15,277)

Variables	Categories	Stroke	
		Yes (%)	No (%)
Gender	Male	44 (46)	7470 (49)
	Female	52 (54)	7711 (51)
Age	15 – 30 years old	3 (3)	5079 (33.5)
	31 – 55 years old	51 (53)	8906 (58.5)
	56 – 64 years old	42 (44)	1196 (8)
Marriage status	Married	81 (84)	11173 (73.5)
	Unmarried	15 (16)	4008 (26.5)
Education levels	Not educated	22 (23)	2072 (13.6)
	Elementary school	36 (37.5)	3983 (26.2)
	Middle school	20 (20.8)	3424 (22.6)
	High school	12 (12.5)	4616 (30.4)
	Higher education	6 (6.2)	1086 (7.2)
Occupation status	Unemployed	62 (64.6)	6747 (44.5)
	Employed	34 (35.4)	8434 (55.5)
Mental distress	Yes	58 (60.4)	4623 (30.5)
	No	38 (39.6)	10558 (69.5)
Disability level	None	42 (44)	13423 (88.4)
	Low	27 (28)	1270 (8.4)
	Moderate	13 (13.5)	443 (2.9)
	High	14 (14.5)	45 (0.3)

Table A. 3. General Characteristics of Population by Disability–Stroke Status (N=1,812)

Variables	Categories	Disability by Stroke	
		Yes (%)	No (%)
Gender	Male	20 (37)	737 (42)
	Female	34 (63)	1021 (58)
Age	15 – 30 years old	0	385 (22)
	31 – 55 years old	27 (50)	1052 (60)
	56 – 64 years old	27 (50)	321 (18)
Marriage status	Married	45 (83)	1392 (79)
	Unmarried	9 (17)	366 (21)
Education levels	Not educated	16 (29.6)	440 (25)
	Elementary school	19 (35.2)	597 (34)
	Middle school	10 (18.5)	308 (17.5)
	High school	10 (13)	321 (18.5)
	Higher education	2 (3.7)	92 (5)
Occupation status	Unemployed	42 (78)	832 (47)
	Employed	12 (22)	926 (53)
Mental distress	Yes	40 (74)	1178 (67)
	No	14 (26)	580 (33)
Disability level	None	–	–
	Low	27 (50)	1270 (72)
	Moderate	13 (24)	443 (25)

High	14 (26)	45 (3)
------	---------	--------

Table A. 4. Proportion of mental distress among disabled population (N=1,812)

Variables	Categories	Mental health distress	
		Yes (%)	No (%)
Gender	Male	565 (38)	192 (60)
	Female	928 (62)	127 (40)
Age	15 – 30 years old	324 (22)	61 (19)
	31 – 55 years old	897 (60)	182 (57)
	56 – 64 years old	272 (18)	76 (24)
Marriage status	Married	1194 (80)	243 (76)
	Unmarried	299 (20)	76 (24)
Education levels	Not educated	391 (26)	65 (20.5)
	Elementary school	507 (34)	109 (34)
	Middle school	269 (18)	49 (15.5)
	High school	249 (17)	79 (25)
	Higher education	77 (5)	17 (5)
Occupation status	Unemployed	772 (52)	102 (32)
	Employed	721 (48)	217 (68)
Stroke status	Yes	51 (4)	3 (1)
	No	1442 (96)	316 (99)
Disability level	None	–	–
	Low	1032 (69)	265 (83)

Moderate	405 (27)	51 (16)
High	56 (4)	3 (1)

Table A. 5. Proportion of mental distress among stroke population (N=96)

Variables	Categories	Mental health distress	
		Yes (%)	No (%)
Gender	Male	27 (35)	17 (95)
	Female	51 (65)	1 (5)
Age	15 – 30 years old	2 (3)	1 (6)
	31 – 55 years old	40 (51)	11 (61)
	56 – 64 years old	36 (46)	6 (33)
Marriage status	Married	66 (85)	15 (83)
	Unmarried	12 (15)	3 (17)
Education levels	Not educated	20 (25.5)	2 (11)
	Elementary school	35 (45)	1 (6)
	Middle school	11 (14)	9 (50)
	High school	9 (11.5)	3 (16.5)
	Higher education	3 (4)	3 (16.5)
Occupation status	Unemployed	59 (75.5)	3 (17)
	Employed	19 (24.5)	15 (83)
Disability level	None	27 (34.5)	15 (83)
	Low	24 (31)	3 (17)
	Moderate	13 (16.5)	-
	High	14 (18)	-

Table A. 6. Proportion of mental distress among stroke-disabled population (N=54)

Variables	Categories	Mental health distress	
		Yes (%)	No (%)
Gender	Male	17 (33)	3 (100)
	Female	34 (67)	-
Age	15 – 30 years old	-	-
	31 – 55 years old	25 (49)	2 (67)
	56 – 64 years old	26 (51)	1 (33)
Marriage status	Married	42 (82)	3 (100)
	Unmarried	9 (18)	-
Education levels	Not educated	16 (31.4)	-
	Elementary school	18 (35.3)	1 (33)
	Middle school	8 (15.7)	2 (67)
	High school	7 (13.7)	-
	Higher education	2 (3.9)	-
Occupation status	Unemployed	41 (80)	1 (33)
	Employed	10 (20)	2 (67)
Disability level	None	-	-
	Low	24 (47)	3 (100)
	Moderate	13 (25.5)	-
	High	14 (27.5)	-

SRQ – 20 for Mental Distress Assessment

SRQ-20

A copy of the English version of the Self Reporting Questionnaire-20 is shown below.

- | | | |
|-----|--|--------|
| 1. | Do you often have headaches? | yes/no |
| 2. | Is your appetite poor? | yes/no |
| 3. | Do you sleep badly? | yes/no |
| 4. | Are you easily frightened? | yes/no |
| 5. | Do your hands shake? | yes/no |
| 6. | Do you feel nervous, tense or worried? | yes/no |
| 7. | Is your digestion poor? | yes/no |
| 8. | Do you have trouble thinking clearly? | yes/no |
| 9. | Do you feel unhappy? | yes/no |
| 10. | Do you cry more than usual? | yes/no |
| 11. | Do you find it difficult to enjoy your daily activities? | yes/no |
| 12. | Do you find it difficult to make decisions? | yes/no |
| 13. | Is your daily work suffering? | yes/no |
| 14. | Are you unable to play a useful part in life? | yes/no |
| 15. | Have you lost interest in things? | yes/no |
| 16. | Do you feel that you are a worthless person? | yes/no |
| 17. | Has the thought of ending your life been on your mind? | yes/no |
| 18. | Do you feel tired all the time? | yes/no |
| 19. | Do you have uncomfortable feelings in your stomach? | yes/no |
| 20. | Are you easily tired? | yes/no |



WHODAS 2.0

WORLD HEALTH ORGANIZATION
DISABILITY ASSESSMENT SCHEDULE 2.0

12-item version, self-administered

This questionnaire asks about difficulties due to health conditions. Health conditions include diseases or illnesses, other health problems that may be short or long lasting, injuries, mental or emotional problems, and problems with alcohol or drugs.

Think back over the past 30 days and answer these questions, thinking about how much difficulty you had doing the following activities. For each question, please circle only one response.

In the past 30 days, how much difficulty did you have in:						
S1	<u>Standing for long periods</u> such as 30 minutes?	None	Mild	Moderate	Severe	Extreme or cannot do
S2	Taking care of your household <u>responsibilities</u> ?	None	Mild	Moderate	Severe	Extreme or cannot do
S3	<u>Learning a new task</u> , for example, learning how to get to a new place?	None	Mild	Moderate	Severe	Extreme or cannot do
S4	How much of a problem did you have <u>joining in community activities</u> (for example, festivities, religious or other activities) in the same way as anyone else can?	None	Mild	Moderate	Severe	Extreme or cannot do
S5	How much have you been <u>emotionally affected</u> by your health problems?	None	Mild	Moderate	Severe	Extreme or cannot do

Please continue to next page...



WHODAS 2.0

WORLD HEALTH ORGANIZATION
DISABILITY ASSESSMENT SCHEDULE 2.0

12
Self

In the past 30 days, how much difficulty did you have in:						
S6	Concentrating on doing something for <u>ten minutes</u> ?	None	Mild	Moderate	Severe	Extreme or cannot do
S7	<u>Walking a long distance</u> such as a kilometre [or equivalent]?	None	Mild	Moderate	Severe	Extreme or cannot do
S8	<u>Washing your whole body</u> ?	None	Mild	Moderate	Severe	Extreme or cannot do
S9	<u>Getting dressed</u> ?	None	Mild	Moderate	Severe	Extreme or cannot do
S10	<u>Dealing with people you do not know</u> ?	None	Mild	Moderate	Severe	Extreme or cannot do
S11	<u>Maintaining a friendship</u> ?	None	Mild	Moderate	Severe	Extreme or cannot do
S12	Your day-to-day <u>work</u> ?	None	Mild	Moderate	Severe	Extreme or cannot do

H1	Overall, in the past 30 days, how many days were these difficulties present?	Record number of days ____
H2	In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of any health condition?	Record number of days ____
H3	In the past 30 days, not counting the days that you were totally unable, for how many days did you <u>cut back</u> or <u>reduce</u> your usual activities or work because of any health condition?	Record number of days ____

This completes the questionnaire. Thank you.

심의면제 통보서

수신

책임연구자	이름: 조성일	소속: 보건대학원 보건학과	직위: 교수
지원기관	해당없음		

과제정보

승인번호	IRB No. E1906/002-002
연구과제명	동쪽 borneo의 생산가능인구인 뇌졸중 환자의 정신 건강 문제와 뇌졸중 후유증 수준 간의 관계
연구종류	학술 연구, 학위 논문 연구, 공개된 정보를 이용하는 연구
면제일자	2019-06-10
검토의견	본 연구는 연구참여자에 대한 기존의 자료인 'Indonesian Basic Health Research Survey(2013년)' 자료를 이용하는 연구로서 「생명윤리 및 안전에 관한 법률 시행규칙」 제13조 제1항 제3호에 근거하여 심의를 면제합니다.
심의결과	면제승인

상기 연구과제에 대하여 본 위원회에서는 심의면제대상임을 확인합니다.

모든 연구자들은 아래의 사항을 준수하여야 합니다.

1. 연구자께서는 제출하신 계획서에 따라 연구를 수행하여야 하며, 이와 다르게 연구를 진행하실 경우 다시 심의를 진행하셔야 함을 유의하시기 바랍니다.
2. 위원회의 요구가 있을 때에는 연구의 진행과 관련된 보고를 위원회에 제출하여야 합니다.
3. 연구윤리를 위하여 관련부처가 필요시 조사 및 감독 차원에서 현장점검을 실시할 수 있습니다.
4. 연구와 관련된 기록은 연구가 종료된 시점을 기준으로 최소 3년간 보관하여야 합니다.

2019년 06월 10일

서울대학교 생명윤리위원회 위원장

