Dementia & Neuropsychologia - Decision on Manuscript ID DN-2022-0012

Sonia Maria Brucki <onbehalfof@manuscriptcentral.com> Tue, Mar 22, 2022 at 6:40 AM
Reply-To: sbrucki@uol.com.br
To: rahmi.setiyani@unsoed.ac.id

21-Mar-2022

Dear Ms. Setiyani:

Manuscript ID DN-2022-0012 entitled "Cognitive impairment among older adults living in the community and in nursing homes in Indonesia" which you submitted to Dementia & Neuropsychologia, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

The reviewer(s) have recommended publication, but also suggest some revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript.

To revise your manuscript, log into https://mc04.manuscriptcentral.com/dn-scielo and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

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IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely publication of manuscripts submitted to Dementia & Neuropsychologia, your revised manuscript should be submitted by 11-Apr-2022. If it is not possible for you to submit your revision by this date, we may have to consider your paper as a new submission.

Once again, thank you for submitting your manuscript to Dementia & Neuropsychologia and I look forward to receiving your revision.

Sincerely,
Prof. Sonia Maria Brucki
Editor-in-Chief, Dementia &
Neuropsychologia
sbrucki@uol.com.br

Reviewer: 1

Recommendation: Major Revision

Comments:
1. Introduction section:

a. the author mentioned previous studies that showed the prevalence of dementia among Indonesian older people were ranging from 20% to 40%. Also,several studies have been conducted to identify the risk factors of dementia. Please add more detailed information about the justification of this study, what is the research problems?
b. what are the debatable risk factors that would be addressed by this study.
2. Methods:
a. This section needs more explanation about the population, how many older people are in the population, how many nursing homes are in the area? whydid the authors choose central Java? How many older people in total are in Central Java?
b. Sampling technique: How many percent of older people were recruited for this study? What were sampling techniques to recruit participants?
c. Instruments: What was the language used for respondents? Was there any translation and back-translation for the instruments?
d. The number of respondents in nursing homes group: Why was the number of respondents for nursing home groups smaller than community-dwellinggroups? How many nursing homes did the author approach? there must be more than one nursing home in the province, so it would be possible to recruit more respondents from all nursing homes in the province.
e. For the analysis, the authors mentioned some type of analysis, please add more explanation about the type of analysis for each variable..
3. Results section:
a.Tables 1 and 2 need some notes about the analysis type.
b. Table 3 also needs notes about the analysis type and the coefficient correlation. Why did the authors separate the correlation analysis between the older people living in community and nursing homes? why did table 2 use categorical MMSE, but in table 3 authors used the mean score of the MMSE?
4. Discussion section: what are the new findings from this study? There are also conflicting results that were different from the previous study. The newfindings and the strength of the study must be highlighted in the discussion section.
5. Conclusion section: what are the conclusion and recommendations from this study?

Additional Questions:
Does the manuscript contain new and significant information to justify publication?: No

Does the Abstract (Summary) clearly and accurately describe the content of the article?: Yes

Is the problem significant and concisely stated?: No

Are the methods described comprehensively?: No

Are the interpretations and conclusions justified by the results?: Yes

Is adequate reference made to other work in the field?: Yes

Length of article is: Adequate

Number of tables is: Adequate

Number of figures is: Adequate

Please state any conflict(s) of interest that you have in relation to the review of this paper (state “none” if

this is not applicable).: None Rating:

Interest: 3. Average

Quality: 3. Average

Originality: 2. Good

Overall: 3. Average

Reviewer: 2

Recommendation: Minor Revision

Comments:
Dear authors,

Thank you for your interesting work.

Please consider the following points to revise:

1- One of the obvious points is that you mix between cognitive impairment and Dementia disorder. Dementias have known diagnostic criteria and shouldnot be referred to as cognitive impairment only. Consistency is needed. The manuscript is mostly referring to cognitive impairment of all types and not dementia. Also please be consistent about stating "cognitive impairment in old age".

2- As a continuation to the first point, the first paragraph in introduction refers to the epidemiology of "cognitive impairment" around the world. This is clearlynot the case as this is the epidemiology of dementia and not cognitive impairment. Also please check the numerical reference at the end of the paragraph "233".

3- reference number 4 says 12-18% of older individuals suffer from MCI not 15-20%. Still, I don't think the number is accurate (Not exclusively for MCI) asreference number 5 was referring to cognitive decline in aging in general and reference 6 included Dementia patients. You can say :cognitive impairment in older adults instead.

4- In the methodology section, you mentioned the participants were able to speak the languages used to administer the tests. What are those languagesand are those languages affected by the years of education the participants have received or can those languages be considered as a native language for some participants and a second language fro others? This can be a confounding factor.

5- In the first paragraph in page 5 - the comment on table 3-: social bonding, interaction and/or loneliness should be considered since married participantsin nursing homes are expected to be "single" most of the week. Have you considered assessment of the social interaction and loneliness as these factors affect cognition?

6- Please revise the grammar of the sentence carrying the reference 19 in the text.

7- Paragraph with reference number 21 should be moved to the introduction. No need for it in the discussion section.

8- In the next paragraph you mentioned that the dementia rate was similar between men and women.The majority of international studies mention theprevalence of dementia to be higher in older females>males. why mention the odds? You can check this article for more clarification: https://www.nature.com/articles/s41598-021-86397-7

9- better refer to BMI as normal vs. abnormal rather than normal vs. malnutrition.

10- Was there an exclusion for other medical problems that would require placing in nursing home and can affect cognition e.g. hypothyroidism, heartfailure, recurrent strokes?

10- Please add figures to your manuscript.

Good luck.

Additional Questions:
Does the manuscript contain new and significant information to justify publication?: Yes

Does the Abstract (Summary) clearly and accurately describe the content of the article?: Yes

Is the problem significant and concisely stated?: Yes

Are the methods described comprehensively?: Yes

Are the interpretations and conclusions justified by the results?: Yes

Is adequate reference made to other work in the field?: Yes

Length of article is: Adequate

Number of tables is: Adequate

Number of figures is: Too few

Please state any conflict(s) of interest that you have in relation to the review of this paper (state "none" if

this is not applicable).: None Rating:

Interest: 2. Good

Quality: 2. Good

Originality: 2. Good

Overall: 2. Good

Author's Responses:

Please find the revised manuscript and the addressed comments and suggestions in the following documents.

Best regards,

Rahmi

Reviewer 1

	Reviewer's comments	Author's responses
1.	Introduction section:	
a.	The author mentioned previous studies that showed the prevalence of dementia among Indonesian older people were ranging from 20% to 40%. Also, several studies have been conducted to identify the risk factors of dementia. Please add more detailed information about the justification of this study, what is the research problems?	Justification of this study has been revised
b.	What are the debatable risk factors that would be addressed by this study.	It has been revised
2.	Methods:	
a.	This section needs more explanation about the population, how many older people are in the population, how many nursing homes are in the area? why did the authors choose central Java? How many older people in total are in Central Java?	– This study actually only covered one regency in the province (Banyumas regency), not the whole province. Our apology for the mistake. – The information regarding population and number of nursing home in the study area has been added in the manuscript.
b.	Sampling technique: How many percent of older people were recruited for this study? What were sampling techniques to recruit participants?	The information regarding sample size and sampling technique has been added to the manuscript.
c.	Instruments: What was the language used for respondents? Was there any translation and back-translation for the instruments?	The information regarding the instrument (the languange and translation-backtranslation process) has been added in the mansucript.

d.	The number of respondents in nursing homes group: Why was the number of respondents for nursing home groups smaller than community-dwelling groups? How many nursing homes did the author approach? there must be more than one nursing home in the province, so it would be possible to recruit more respondents from all nursing homes in the province.	The information about how we ended up with different number of respondents in each living condition has been added to the manuscript.
e.	For the analysis, the authors mentioned some type of analysis, please add more explanation about the type of analysis for each variable..	Explanation about the analysis have been added in the text.
3.	Results section:	
a.	Tables 1 and 2 need some notes about the analysis type.	Notes about the analysis type have been added.
b.	Table 3 also needs notes about the analysis type and the coefficient correlation. Why did the authors separate the correlation analysis between the older people living in community and nursing homes? why did table 2 use categorical MMSE, but in table 3 authors used the mean score of the MMSE?	– Notes about the analysis type and the coefficient correlation have been added. – We seperated the correlation analysis because we wanted to examine the differences in the variables associated to cognitive decline between two living conditions (nursing home vs community). – We used both categorical and numerical (mean score) of the MMSE in table 2, not only the former (categorical). In our opinion, the statistical analysis of continuous data is more powerful than that of categorical data. However, because of the clinical relevance, we thought it was necessary to inform readers how many respondents had cognitive decline when it was defined as MMSE score <24 (categorical). We really appreciated your suggestions. Thus, we decided to delete the categorical part in the table 2, but we would like to keep information regarding the prevalence (categorical) in the main text and abstract, if it is possible.
4.	Discussion section: what are the new findings from this study? There are also conflicting results that were different from the previous study. The new findings and the strength of the study must be highlighted in the discussion section.	The new findings have been highlighted
5.	Conclusion section: what are the conclusion and recommendations from this study?	Conclusion and recommendations has been revised

Reviewer 2

1.	One of the obvious points is that you mix between cognitive impairment and Dementia disorder. Dementias have known diagnostic criteria and should not be referred to as cognitive impairment only. Consistency is needed. The manuscript is mostly referring to cognitive impairment of all types and not dementia. Also please be consistent about stating "cognitive impairment in old age".	The introduction has been revised to focuse only on cognitive impairment (decline) in general older population, not in dementia patients
2.	As a continuation to the first point, the first paragraph in introduction refers to the epidemiology of "cognitive impairment" around the world. This is clearly not the case as this is the epidemiology of dementia and not cognitive impairment. Also please check the numerical reference at the end of the paragraph "233".	This part has been revised to present only the case of cognitive impairment in general population, not dementia case.
3.	Reference number 4 says 12-18% of older individuals suffer from MCI not 15-20%. Still, I don't think the number is accurate (Not exclusively for MCI) as reference number 5 was referring to cognitive decline in aging in general and reference 6 included Dementia patients. You can say :cognitive impairment in older adults instead.	References referring to dementia case has been excluded.
4.	In the methodology section, you mentioned the participants were able to speak the languages used to administer the tests. What are those languages and are those languages affected by the years of education the participants have received or can those languages be considered as a native language for some participants and a second language for others? This can be a confounding factor.	– Participants in this study speak Bahasa Indonesia and/ or Javanese (the local language). – The language/s spoken by participants was not a confounding factor because researchers used the Bahasa Indonesia and Javanese versions of MMSE that have been validated in previous study (Hogervorst et al, 2011).
5.	In the first paragraph in page 5 - the comment on table 3-: social bonding, interaction and/or loneliness should be considered since married participants in nursing homes are expected to be "single" most of the week. Have you considered assessment of the social interaction and loneliness as these factors affect cognition?	– Yes, we agree that married participants live in nursing home could be considered as singles. That is why the married and single participants did not differ in cognitive status. – Unfortunately we did not do assessment of the social interaction and loneliness in this study. – We have addressed this issue in the discussion section and study limitation.

6.	Please revise the grammar of the sentence carrying the reference 19 in the text.	The grammar has been revised.
7.	Paragraph with reference number 21 should be moved to the introduction. No need for it in the discussion section.	The paragraph containing this reference has been moved to the introduction
8.	In the next paragraph you mentioned that the dementia rate was similar between men and women. The majority of international studies mention the prevalence of dementia to be higher in older females>males. Why mention the odds? You can check this article for more clarification: https://www.nature.com/articles/s41598-021-86397-7	– The statement mentioning that the dementia rate was similar between men and women has been removed. – A sentence carrying the suggested reference (article) has been added.
9.	Better refer to BMI as normal vs. abnormal rather than normal vs. malnutrition.	"Malnutrition" has been replaced by "abnormal"
10.	Was there an exclusion for other medical problems that would require placing in nursing home and can affect cognition e.g. hypothyroidism, heart failure, recurrent strokes?	We did not exclude respondents with these medical problems. Instead, we included illness history (cardiovascular/ neurological/ metabolic diseases) as a studied variable.
11.	Please add figures to your manuscript.	Thank you for the suggestin. But unfortunately, we don't have other data to be presented in a new figure

Cognitive impairment among older adults living in the community and in nursing home in Indonesia: A pilot study

Abstract

Background: The demographic phenomenon of population aging has brought some consequences, including a higher prevalence of cognitive impairment. **Objective:** This study aims to assess and compare ~~the prevalence of~~ cognitive impairment and its risk factors between older persons living in the community and in nursing home in Indonesia. **Methods***:* A cross-sectional study was employed among 99 older adults living in the community and 49 nursing home residents. Cognitive function was assessed using the Mini-Mental State Examination (MMSE). **Results***:* ~~The prevalence of cognitive impairment among older adults living in the community was significantly lower than those living in nursing home (20.2 % compared to 44.9%, p=0.002).~~ Older people living in the community showed a higher score on MMSE than those living in nursing home (p=0.044). ~~Education level and literacy status were significantly associated with cognitive function in both groups (p=0.005, p=0.001, and p=0.004, p=0.001 respectively). Age and marital status were related to the cognitive function of older adults living in the community (p=0.003, p=0.007 respectively), while gender was related to that of nursing home residents (p=0.012).~~ Age,

marital status, education level, and literacy status were significantly related to the cognitive function of older adults living in the community (p=0.003, p=0.007, p=0.005, p=0.001 respectively), while gender, education level, and literacy status were significantly related to that of nursing home residents (p=0.012, p=0.004, p=0.001 respectively). **Conclusion***:* Older adults living in the nursing home were more likely to experience cognitive decline than their counterparts in the community. Factors associated with cognitive decline differ between community community-dwelling older adults and nursing home residents. ~~Health promotion strategies to prevent cognitive decline should focus on older women and less educated and illiterate older people.~~

Keywords: Cognitive impairment; community; nursing home; older adults

INTRODUCTION

~~In 2015, cognitive impairment affected about 47 million people worldwide or approximately 5% of the world's older people population. The figure is projected to rise to 75 million by 2030 and to 132 million by 2050.[1] A previous study estimated that there were about 0.6 million of people over 60 years old who have dementia in Indonesia, Thailand and Sri Lanka in 2001. The number is projected to increase to reach about 2.7 million by 2040.[2]~~

Globally, the number of older people is increasing at a faster rate than all other age groups.[1] This rapid aging demographic transition has resulted in greater levels of cognitive decline, which is a growing public health issue. Previous studies demonstrated that about half of older people experienced a decline in cognitive function as part of the aging process.[2,3]

~~Cognitive impairment in the older population can range from mild to severe. Mild cognitive impairment (MCI) is described as a decline in cognitive function, which does not meet the threshold for dementia.[3] Approximately 15 to 20% of older people suffer from MCI.[4] Previous studies demonstrated that the prevalence of MCI among Indonesia's older population is between 20-40%.[5-7]~~

~~Even though individuals with MCI did not experience difficulties with daily activities, they are more likely to progress to Alzheimer's disease or other kinds of dementias than individuals without MCI.[4] Dementia is defined as a syndrome occurring as a result of disease in the brain, that is usually progressive or chronic in nature.[8] People with dementia show decline in several higher cortical capacities, that include memory, calculation, comprehension, thinking, language, learning, and judgement.[9]~~

The range of cognitive function decline in the older population encompasses normal aging, mild cognitive impairment (MCI), and severe cognitive impairment.[4] Changes in cognitive abilities that occur as a normal part of the aging process should not impair an older person's abilities to perform daily life activities.[5] However, the changes can progress at different rates, with many individuals suffering from cognitive decline severe enough to interfere with their ability to perform activities of daily living, the later diagnosed as dementia.[5]

~~Preventive strategies are definitely needed considering that health care spending for people with cognitive impairment considerably high. A study reported that people with dementia had more than three times the yearly out-of-pocket spending compared to people with normal cognitive function.[10] One of the strategies is identifying and managing the risk factors. In general, risk factors for cognitive impairment in older adults can be divided into two, which are somatic factors and genetic factors.[11] Several studies have been done in the Indonesian context to identify risk factors for cognitive decline in older adults.[5-7] However, the results are still debatable. Moreover, most studies were only conducted in a single setting. Thus, comparing prevalence of cognitive decline and its risk factors among older people living in different settings would provide more comprehensive information, which is necessary for developing an appropriate preventive strategies.~~

Studies on cognitive function in older adults in different countries have predominantly identified socio-demographic and health characteristics as risk factors.[6-8] Among demographic variables, place of residence has not been much investigated. Living arrangement has been an emerging aging-related issue. In general, in most countries, most older people lived in private households and only small number of them lived in institutional settings.[9] However, changes in living arrangements of older people has occurred in many regions, and the number of older people living in an institution is expected to increase.[9]

The place of residence has been linked to the health status, well-being, and quality of life of older people.[10-12] Few previous studies have compared cognitive function and associated risk factors of older adults who live at home and in an institution. However, respondents of this study were those with MCI and dementia, not aging-related decline.[13,14]

Like many other countries, Indonesia is also experiencing a rapid increase in the older population.[1] Regarding living arrangement, most of the older people in Indonesia lived in a multigenerational household and only a minority lived in institutional settings.[15] Few studies have examined the cognitive functioning of older people in Indonesia.[16,17] However, there is a lack of studies comparing the cognitive function of older adults across the different living settings. Thus, the present study aimed to identify and compare the cognitive decline and risk factors between older people living in the community and those living in nursing home in Indonesia.

METHODS

Settings and Participants

This is a descriptive analytic study using a cross-sectional method. The study was conducted from June to September 2019. This study was conducted among older people who live in the community and in nursing home in Banyumas Regency, Central Java Province, Indonesia.

Based on the 2019 Indonesian Population Census, the population of older people in Banyumas accounted for about 236,193 people, or approximately 14% of its total population, a bit higher than the national average (9.6%). Most older people in Banyumas live in the community, and only a few live in nursing homes. There are two nursing homes in the regency; one is a private religious-based, and another is a state-owned nursing home, with a total number of residents in 2019 was 147 people.

The sample size was calculated using a simple formula to calculate the sample size for a pilot study.[18] An online calculator is available at http://www.pilotsamplesize.com. With a confidence level of 95% and a probability of 0.068 based on the previous study in Indonesia,[19] the minimum sample size was 43 subjects in each group. Considering the low response rate based on our previous study (≤50%) (unpublished), a total of 100 community-dwelling older adults and 100 nursing home residents were invited to participate in the study.

The community samples were conveniently selected from the participants of Posyandu Lansia (integrated health service post for older people) in the nearby area, following the recommendation by cadres (community volunteers). A total of 100 community-dwelling older people were visited at their homes, and 99 of them were eligible for this pilot study. Meanwhile, the nursing home samples were conveniently recruited from the state-owned nursing home. The nursing home has a

total of 100 residents, but only 49 of them met the study criteria. Eligible participants were no less than 60 years old, willing to participate, and able to speak the language(s) used to administer (Bahasa and/ or Javanese). Participants who had visual or auditory impairment or active psychiatric symptoms that preclude them from completing the assessment were excluded from the study. ~~A total of 99 community-dwelling older adults and 49 nursing home residents participated in this study.~~

Instruments

The studied variables were cognitive function, health status, and demographic characteristics. Cognitive function was assessed using the Mini-Mental State Examination (MMSE) that consists of the following sub functions: orientation, registration, attention and calculation, repetition/ recalled, and language.[20] MMSE scoring ranges from 0 to 30. The higher the score, the better cognitive functioning. An MMSE score <24 indicates cognitive deficits. ~~MMSE was originally developed to distinguish between organic and functional mental disorder. MMSE was used to estimated the severity and progress of cognitive decline as well as changes in the cogntive functioning history on individuals over time. However, MMSE is not intended to be used as a diagnotic tool~~.

This study used the adapted version of the MMSE in Indonesian.[21] In this validity study, the tool was adapted and translated into several languages, including Bahasa and Javanese, using the procedure translation back-translation. The tool showed optimum sensitivity using a similar cut-off of 24.

Health status characteristics included blood pressure, nutritional status, smoking, and illness history. Blood pressure measurement was conducted at the beginning of the research interview and then classified into "normal (normotension)" or "hypertension" using JNC 7 algorithm.[22] Nutritional status was determined by measuring body mass index (BMI) and then classified into normal or abnormal ~~suffering from malnutrition~~ (underweight, over-weight, obese, or extreme obese).[23] Smoking and illness history referred to any cigarettes consumption and presence of any cardiovascular/ neurological/ metabolic diseases in the last 6 months as reported by the respondents.

Meanwhile, demographic variables included age, sex, marital, educational, literacy and living arrangement status.

Ethical consideration

Before collecting the data, respondents were given an explanation about the aim and nature of this study, and they signed an informed consent form if they agreed to participate. The five rights of human subjects in the research including self-determination, privacy, dignity, anonymity, and confidentiality, were maintained throughout the study. This study has gained an ethical approval from the Health Research Ethics Committee No. 2516/KEPK/V/2019 dated 29.05.2019.

Data Analysis

The demographic and health status characteristics of respondents were described using frequency tables of categorical variables, and descriptive statistics of numerical variables. Chi-Square tests were used to compare the categorical variables. Fisher's Exact tests used as an alternative to the

Chi-Square when one or more cells had expected count less than 5 (ie. presence of cardiovascular/ neurological disease). Independent t-tests compared the means between two unrelated groups on the same continuous variables. Mann-Whitney tests were used as an alternative to Independent t-tests when variables followed the non-parametrical distribution. Spearman rank tests were used instead of Pearson correlation to measure the correlation between two continous variables which were not normally distributed. This study used $p \leq 0.05$ to define the level of statistical significance. Data processing was carried out using the IBM SPSS version 25.0 software.

RESULTS

Older people living in both the community and nursing homes had relatively similar characteristics in terms of gender, years of education, and literacy, but were significantly different in terms of age and marital status (Table 1). Older people in both groups were more likely to be of female gender with less years of education (< 9 years) and literate. However, nursing home residents were significantly older and more likely to be single (i.e., widowed) than their community-dwelling counterparts (p=0.029 and p=0.000 respectively).

In terms of health status, both older adults living in the community and nursing home had relatively similar characteristics (Table 1). Most of them had normal BMI, did not smoke, and did not have cardiovascular/ neurological/ metabolic diseases. However, about two third of both groups had high blood pressure (hypertension).

Please insert Table 1 here

~~The prevalence of cognitive impairment among older adults living in the community was significantly lower than those living in nursing homes (20.2% compared with 44.9%, p=0.002) (Table 2)~~. The total MMSE score of nursing home residents was ~~also~~ significantly lower than those of community-dwelling older people (p=0.044). The two groups showed a significant differences in the language function (p=0.004) (Table 2). When cognitive decline was defined as MMSE<24, it was found that it was present in 20.2% and 44.9% of older adult living in the community and in nursing homes respectively (p=0.002).

Please insert Table 2 here

There were factors related to MMSE scores among older adults living in the community and in nursing home (Table 3). Results showed that education level and literacy status were significantly related to the cognitive function of older adults in both groups (p=0.005, p=0.001 and p=0.004, p=0.001 respectively). Better educated and literate older adults are more likely to have MMSE score above or very close to the thresshold (≥24).

Please insert Table 3 here

Age had a significant negative correlation with MMSE scores but only among community-dwelling older people (p=0.003, cc=-0.298). The effect of marital on cognitive functioning were also demonstrated by this group. Married older people showed higher MMSE scores above the thresshold (≥24) compared to their counterparts (p=0.007). Meanwhile, a significant difference in MMSE scores between gender was only found among those living in nursing home (p=0.012). Male older people showed a higher scores above the thresshold than their female counterparts.

DISCUSSION

This pilot study determined ~~the prevalence of~~ cognitive decline among older people in two different living settings, that is, community and nursing home, and their related characteristics. ~~Cognitive decline was indicated by MMSE score below 24~~. Findings showed that ~~the prevalence of cognitive impairment among~~ older adults living in nursing home showed a lower cognitive function~~was significantly higher~~ than those living in the community. The results from this study support a previous study that reported that older people ~~living in institutions had a lower cognitive function than those remaining in the community~~ who admitted to nursing homes showed a greater cognitive decline after their admission than those who remained at home.[24]
The reasons for the decline are still unclear, but are probably linked to physical and psychological consequences of living in institution on older people. A previous study reported that many long-term care residents~~, which are mostly women,~~ suffered from depression due to perceived innadequacy of care.[25] ~~Perceived innadequacy of care was identified to be the most significant predictor of depression~~A previous study in Indonesia indicated that admitting older people in nursing home is unusual due to the perception that it is against the cultural values of filial obligation as well as having a detrimental effect on older people's physical and psychological health.[26]

However, it is also very possible that the decline was not a result of institutionalization. Older adults might have already been suffering from cognitive decline when they were admitted to the nursing home. A previous longitudinal study found that dementia was the strongest predictors of living in institution in old age.[27]~~A previous systematic review also suggested that there is strong evidence that nursing home placement caused by cognitive or functional impairment.[19]~~ A previous systematic review also suggested that cognitive impairment was one of the main underlying conditions of nursing home placement.[28] The causal relationship between cognitive decline and institutionalization in the present study, however, could not be determined due to the study design.

The difference in cognitive decline between community community-dwelling older adults and nursing home residents could also be explained by the difference in respondents' characteristics, namely age and marital status. In the present study, nursing home respondents were significantly older than their counterparts in the community. Cognitive function generally declines with age among older adults.[29] However, after controlling the living setting, age was associated with cognitive decline in community-dwelling older adult but not in nursing home residents. This finding is in accordance with a previous study conducted among nursing home residents that found no significant association between age and cognitive decline.[30]

Regarding marital status, in the present study, nursing home residents were also more likely to be single than their community-dwelling older people. ~~Married older people in the community-dwelling group showed higher cognitive functioning. This is in line with~~ Previous studies ~~that~~ demonstrated that marriage was related to a reduced likelihood of having cognitive decline.[31,32] Marriage has been suggested as having psychological benefits, which protect individuals from cognitive decline in later life. Married individuals would have more cognitive and social engangement and experience less loneliness and psychological distress.[32] It has been indicated in previous studies that high levels of distress and loneliness were related to a decline in cognitive ability among older people.[33,34] However, like the age variable, after the living setting was controlled, marital status was related to cognitive functioning only in community respondents. The lack of association between marital status and cognitive decline among nursing home residents in

the present study was possibly related to the fact that married individuals who lived in nursing homes could be considered "single" without the presence of their spouse. Thus, it seems that not the relationship status itself but the meaningful social interaction that affects the cognitive function. However, it warrants further investigation since this data was not available.

~~Findings showed that some demographic characteristics, including age, gender, marital status, education, and literacy, were associated with cognitive functioning. The present study demonstrated that the cognitive functioning of older adults living in the community declined with age. Some changes in cognitive abilities occur as a normal part of the aging process. The most noticeable changes are deteriorations in cognitive functions that require individual to immediately process information to make a judgement, including working memory processes, attentional, and cognitive control processes.[20] These changes, known as a mild cognitive impairment (MCI), should not impair an older person's abilities to perfom daily life activities.[20] Rates of MCI increase after the age of 80.[21] However, age-related diseases can accelerate the rate of cognitive impairment, with many individuals suffering from cognitive decline serious enough to interfere their ability to perform activities of daily living; the later diagnosed as dementia.[20] Like MCI, the rates of dementia also rised significantly with age.[21]~~

The female gender was associated with lower cognitive functioning among nursing home residents. ~~Results from previous studies on this association remain debatable. A previous study indicated that gender was not related to cognitive functioning.[22] A previous study reported that the dementia rate was similar between men and women.[21] In contrast, s~~Some studies did find gender differences in cognitive functioning. ~~However, t~~They found that gender discrepancies were suggested to involve complex interactions with other factors, for example, education period, specific cognitive domains, genetic vulnerability and hormonal status.[35-37] In another study, hypertension and stroke accounted for gender differences in cognitive decline in women and men respectively.[29]

Shorter periods of education and illiteracy were related to declines in cognitive functioning in both community and insitutional-dwelling older people. The protective benefits of education and literacy on cognitive performance has been demonstrated in several studies.[6,7,17] Poorer cognitive functioning among lower educated and iliterate older adults is possibly due to the fact that they are relatively lacking in cognitive stimulation. A previous study suggested that the length of education had a considerable impact on cognitive ability in relation to the individual's work situation, socio-economic status, and social activity.[35]

Interestingly, none of the health status indicators in the present study were associated with cognitive function. ~~Previous studies also suggested similar findings.[7,22] However, other~~ Previous studies showed contrary results, which found that high blood pressure, obesity, smoking, and chronic diseases, including diabetes, heart disease, and stroke have all been suggested to have an influence on cognitive function.[5,38-40] Further research in this area is required.

This study has several limitations: (1) the number of respondents in both groups ~~this study~~ was not equal ~~considered small~~ due to the limited number of nursing home residents who met the study criteria; (2) the cross-sectional design cannot determine a cause-effect relationship between

variables, and (3) this study only investigated a few factors while there might be other factors that affect cognitive functioning in older adults.

To summarise, the present study suggests that older people living in nursing home presents a more significant cognitive decline than those living in the community. ~~The prevalence of cognitive impairment among community-dwelling older people was lower than those living in nursing home~~. ~~Lower cognitive function was related to advanced age,~~ Female gender~~, not being married~~, shorter years of education, and illiteracy were related to lower cognitive function among nursing home residents, while advanced age, not being married, shorter years of education, and illiteracy were related to that of community-dwelling older people. Health promotion strategies to prevent further cognitive decline should be focused on those vulnerable sub-groups.

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Table 1. Demographic and health status characteristics of respondents

	Community-dwelling (n=99)	Institutional-dwelling (n=49)	P value
Age, mean (SD)	68.01±6.910	71.71±9.381	0.029[a,*]
Gender, n(%)			
Male	26 (26.3)	18 (36.7)	0.190[b]
Female	73 (73.7)	31 (63.3)	
Marital Status, n(%)			
Married	59 (59.6)	3 (6.1)	0.001[b,*]
Single (unmarried, widowed)	40 (40.4)	46 (93.9)	
Years of education, n(%)			
>= 9 years	13 (13.1)	11 (22.4)	0.148[b]
<9 years	86 (86.9)	38 (77.6)	
Literacy, n(%)			
Literate	78 (78.8)	35 (71.4)	0.321[b]
Illiterate	21 (21.2)	14 (28.6)	
Blood pressure, n(%)			
Normal	39 (39.4)	19 (38.8)	0.942[b]
Hypertension	60 (60.6)	30 (61.2)	
BMI, n(%)			
Normal	57 (57.6)	35 (71.4)	0.102[b]
Abnormal ~~Malnutrition~~	42 (42.4)	14 (28.6)	
Smoking status, n(%)			
Not smoking	84 (84.8)	41 (83.7)	0.853[b]
Smoking	15 (15.2)	8 (16.3)	
Cardiovascular/ neurological/ metabolic disease, n(%)			
No	92 (92.9)	46 (93.9)	1.000[c]
Yes	7 (7.1)	3 (6.1)	

[a]Mann-Whitney U test, [b] Chi-Square test, [c] Fisher's Exact test,*p≤0.05

Table 2. Cognitive functioning

	Community (n=99)	Nursing Home (n=49)	P value
~~MMSE score category, n (%)~~			
~~Normal~~	~~79 (79.8)~~	~~27 (55.1)~~	~~0.002*~~
~~Decline~~	~~20 (20.2)~~	~~22 (44.9)~~	
MMSE score (mean±SD)	24.09±5.043	22.59±5.082	0.044[a,*]
Orientation	8.20±1.969	8.00±2.363	0.798[a]
Registration	2.79±0.689	2.86±0.408	0.797[a]
Attention and calculation	3.23±1.640	2.71±1.696	0.083[a]
Recalled	2.24±1.001	2.20±0.979	0.727[a]
Language	7.63±1.549	6.82±1.787	0.004[a,*]

[a]Mann-Whitney U test, *p≤0.05

Table 3. Factors related to cognitive function among older people living in community and nursing home residents

	Community (n=99)		Nursing Home (n=49)	
	MMSE score (Mean±SD)	**P value**	**MMSE score (Mean±SD)**	**P value**
Age (correlation coefficient)	r= -0.298	0.003[a,*]	r= -0.270	0.061[a]
Gender				
Male	24.69±4.038	0.804[b]	24.94±4.277	0.012[c,*]
Female	23.88±5.364		21.23±5.071	
Marital Status				
Married	25.27±4.046	0.007[b,*]	26.33±2.887	0.185[c]
Single (unmarried, widowed)	22.35±5.860		22.35±5.117	
Years of education				
>= 9 years	27.08±2.397	0.005[b,*]	26.27±4.474	0.004[b,*]
<9 years	23.64±5.190		21.53±4.786	
Literacy				
Literate	25.55±3.410	0.001[b,*]	23.89±5.184	0.001[b,*]
Illiterate	18.67±6.374		19.36±3.054	
Blood pressure				
Normal/	25.15±3.957	0.145[b]	21.58±5.480	0.370[b]
Hypertension	23.40±5.561		23.23±4.797	
BMI				
Normal	24.35±4.658	0.735[b]	22.77±5.292	0.700[c]
Abnormal ~~Malnutrition~~	23.74±5.561		22.14±4.672	
Smoking status				
Not smoking	23.99±5.180	0.818[b]	22.37±5.333	0.487[c]
Smoking	24.67±4.304		23.75±3.576	
Cardiovascular/ neurological/ metabolic disease				
No	23.98±5.146	0.607[b]	22.46±5.124	0.471[c]
Yes	25.57±3.309		24.67±4.726	
Living arrangement				
Multi-generation	24.32±4.964	0.318[b]		
Independent living	23.27±5.347			

[a]Spearman rank test, [b] Mann-Whitney U test, [c] Independent t-test *p≤0.05