The Measuremet of Well-being Index of Older People in Indonesia

Sri Hartini Rachmad and Ayesha Tantriana

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Sri Hartini Rachmad
shrachmat@yahoo.com
BPS Statistics Indonesia

Ayesha Tantriana
ayesha.tantriana@gmail.com
BPS Statistics Indonesia

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ABSTRACT

Well-being of older people can encourage older people to participate actively and positively in the development of a region which has encountered second demographic dividend. However, well-being of older people in Indonesia is still poor. In order to improve it, it is necessary to build a measurement which can monitor its level. By this research, the authors provide a measurement for describing the level of well-being of older people in every province in Indonesia which is called composite well-being index of older people. This composite index is built with Organization for Economic Co-operation and Development (OECD) method. It consists of four dimensions of people, health, resources, and environment. Source of data of this research is Indonesian Intercensal Population Survey and National Socio-Economic Survey in 2015. The result of this research shows that the well-being index is a valid measure due to its significant correlation with Human Development Index (HDI). Three provinces with the highest score of well-being index are Yogyakarta, Jakarta, and Bangka Belitung. The suggestion for Indonesian government is that in order to improve well-being of older people, the development priority for every province can be started from the dimension of well-being with the lowest achievement.

Keywords: well-being, Indonesia, older people, composite index

Indonesia is one of the countries which agreed with *International Madrid Plan of Action on Ageing* by *United Nations*. It is a plan of ageing development whose priorities are the development of older people, improve the health quality and well-being of older people, and make sure that older people participate actively and live in a supportive society (United Nations, 2002). One of its priorities related to well-being of older people is supposed to get more attention in the development of a country. Because, basically, well-being of older people can encourage them to participate actively and positively to the development of a country.

Indonesia's population is ageing. The percentage of people aged 60 years or over was 8,03 percent in 2014 and it keeps increasing year by year (BPS, 2015). The increasing percentage of older people is due to the increase of life expectancy. The growing number of older people doesn't only describe a success of national development which brought positive impact on the health quality in Indonesia, but also an obstacle for itself. The obstacle is because of the decreasing function of older people which affect physical, social, and economic aspect.

Indonesia is actually one of the 96 countries which involved in the calculation of *Global AgeWatch Index* in 2015 conducted by HelpAge. HelpAge is an active organization which has been an international volunteer for dealing with ageing problems. Global AgeWatch Index consists of 13 indicators in 4 dimensions which are economic, health, capability, and environment. According to its index, Indonesia only gets 36,6 percent from scale 0 to 100 percent and its position is 74thth among the 96 countries involved. It means that the well-being of older people in Indonesia is not good enough if compared to other countries.

The well-being of older people actually has got attention from the government with the declaration of constitution (Undang-undang No. 13 year 1998) about The Well-being of Older People. By that constitution, every right of older people is supposed to be fulfilled so that they can live as the way they are. However, in fact, the life of older people in Indonesia hasn't met the expectation. According to the National Social and Economic Survey conducted by BPS Statistics Indonesia in 2014, the morbidity rates of older people increased by 1,01 percent from 2013. It means that there's an increase of older people who got sick and couldn't do activities normally. In 2014, 59,24 percent of older people with sickness cured their disease by themselves. Besides, 46,33 percent of older people still lived in a household with low income and only 6,66 percent of older people had social security.

In order to monitor the achievement of well-being of older people, the government needs a measurement. The measurement needed by Indonesia is not only in national scale, but also lower scale which is in province scale. Thus, the achievement of every province in Indonesia can be monitored and the government will prioritize the province with lowest achievement. The measurement of well-being of older people can be constructed using composite index. Composite index can summarize all the indicators about well-being only with one single value. Moreover, composite index can be used to compare the well-being between each province, capture the gap between each province, and become a guidance for the governments to make a right policy for older people.

1. Definitions

According to United Nations and Indonesian constitution, older people is people aged 60 years and/or over. The definition of older people in this research refers to the United Nations and Indonesian constitution.

Well-being of Older People

According to Marian Barnes, Beatrice Gahagan, dan Lizzie Ward (2013), well-being is related to happiness, life quality, and life satisfaction. Well-being of older people is a complex issue. Well-being is about the personal feeling about their life, not others. Well-being is not only acquired by older people themselves, but also the way other people treat them.

According to Midgley, Tracy, and Livermore (2000), well-being is related to condition in which material and non-material needs fulfilled. There are three characteristics about it, the first one, older people's needs such as decent life, clothes, health service, etc. the second is spiritual needs such as family's affection to live the rest of their lives. The third one is social need which is good social relationship with their society.

Dimension of Well-being of Older People

According to the theory of Marian Barnes, Beatrice Gahagan, dan Lizzie Ward (2013), there are four dimensions to construct the well-being and all of them are adopted to construct the well-being index of older people.

1. People, measured by the social relationship dimension
2. Health care, and support, measured by health dimension
3. Resources, measured by resource dimension
4. Places and environment, measured by environment dimension

2. Methodology

2.1 Indicators Used in The Index

Social relationship dimension

1. Social activities: percentage of older people who joined the social activity within one last month
2. Taking care of grandchildren: percentage of older people who took care of their grandchildren within one last month
3. Looking after pets/plants: percentage of older people who looked after their pets/plants within one last month

Health dimension

1. Life expectancy at 60 years old: the average number of years that a person at that age can be expected to live, assuming that age-specific mortality levels remain constant.
2. Health condition: percentage of older people who were healthy or didn't have any health complaint either because of acute disease, accident, crime, or other causes within one last month
3. Health rate: percentage of older people who didn't have any health complaint which interrupted them from their daily activities within one last month
4. Ability to see: percentage of older people who didn't have any sight problem
5. Ability to hear: percentage of older people who didn't have any hearing problem
6. Ability to walk: percentage of older people who didn't have difficulty on walking or coming up the stairs
7. Ability to move hands: percentage of older people who didn't have any problem on using hands or moving them
8. Ability to memorize/concentrate: percentage of older people who didn't have any difficulty on memorizing something or focusing on something
9. Ability to take care of themselves: percentage of older people who didn't have any difficulty on taking care of them such as taking a shower, dressing up, eating, etc.

10. Non-behavioral and emotional disorder: percentage of older people who didn't have behavioral and emotional disorder
11. Ability to communicate: percentage of older people who didn't have any difficulty on speaking and understanding what someone's saying

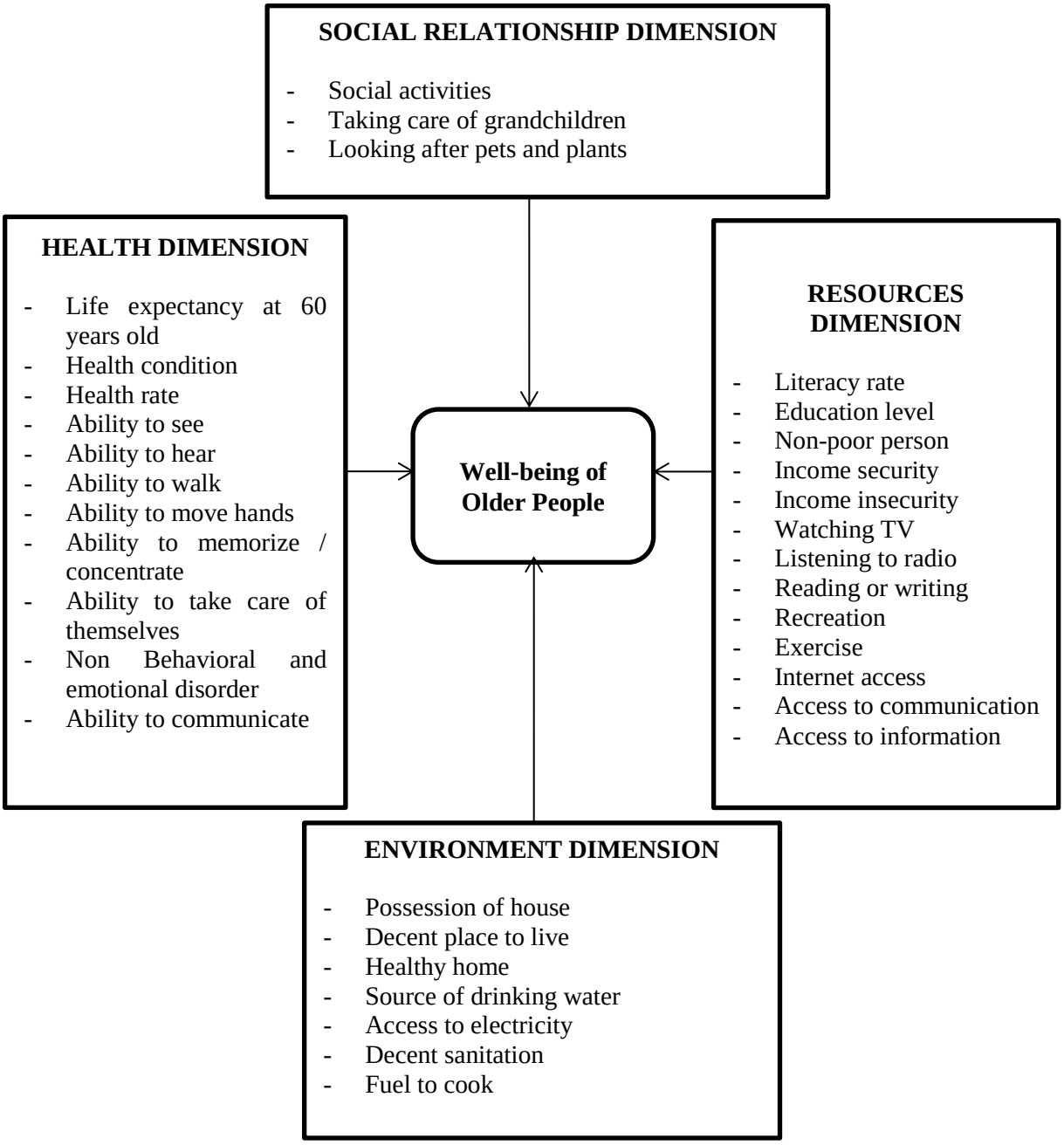
Resources dimension

1. Literacy rate: percentage of older people who have ability to write and read sentences in latin words, Arabian words, etc
2. Educational attainment: percentage of older people whose educational attainment is at least senior high school
3. Non-poor people: percentage of older people whose expenditure is above the poverty line
4. Income security: percentage of older people who get money or goods from work, pension fund, savings, or stocks.
5. Income insecurity: percentage of older people who get money or goods transferred from spouse, child/child in law, family, or social service
6. Watching TV: percentage of older people who watched TV within one last month
7. Listening to radio: percentage of older people who listened to radio within one last month
8. Reading/writing: percentage of older people who read or wrote withing one last month
9. Recreation: percentage of older people who did sightseeing or had recreation within one last month
10. Exercise: percentage of older people who exercised within one last month
11. Access to internet: percentage of older people who had access to internet including browsing, social media, etc within 3 last months
12. Access to communication: percentage of older people who had access to communication media (telephone or handphone) within 3 last months
13. Access to information: percentage of older people who who possesed radio/tape/VCD/DVD and TV

Environment dimension

1. Possession of house: percentage of older people who posses home
2. Decent home: percentage of older people whose house has decent wall, roof, and floor.
3. Healthy home: percentage of older people living in a house whose area per capita is at least 8 square meter
4. Decent drinking water: percentage of older people with decent drinking water source
5. Access to electricity: percentage of older people who had access to electricity
6. Decent sanitation: percentage of older people who had facilities for the safe disposal of human urine and faeces.
7. Cooking fuel: percentage of older people whose cooking fuel are electricity, LPG, and kerosene

Figure 1. **Framework**



2.2 Composite Index Construction

A composite index is formed when individual indicators are compiled into a single index on the basis of underlying model (OECD, 2008). A composite index should ideally measure multi-dimensional concepts which cannot be captured by a single indicator. It is easier to interpret and possible to include more information within the existing size limit. It also enables users to compare complex dimensions effectively.

The method to construct the composite index adopts the method developed by Organization for Economic Co-operation and Development (OECD). Every dimension has their own indicators. The steps to construct the composite index in this research will be explained as follows.

1. Building a theoritical framework

2. Data selection
3. Data normalization
   Data normalization used in this research is standardized (*z-scores*).
4. Factor analysis
   Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors (Richard A. Johnson & Dean W. Wichern, 2007). In factor analysis, there is random vector X with p component which has mean μ and covariant matrix Σ. Factor model states X linearly dependent with some unobserved variables which are called common factors (F_1, F_2, …, F_m), and other source of variation which is summed up as p (e_1, e_2, …, e_p) or called error or specific factor. Factor analysis model can be written as follows.

$$X_1 - \mu_1 = l_{11}F_1 + l_{12}F_2 + \ldots + l_{1m}F_m + \varepsilon_1$$
$$X_2 - \mu_2 = l_{21}F_1 + l_{22}F_2 + \ldots + l_{2m}F_m + \varepsilon_2$$
$$\vdots \qquad\qquad \vdots$$
$$X_p - \mu_p = l_{p1}F_1 + l_{p2}F_2 + \ldots + l_{pm}F_m + \varepsilon_p$$

Which :
X : random variable vector
μ_i : mean of variable i, where i = 1,2,3,..,p
p : number of variables in a dimension
F_j : general factor j, where j = 1,2,3,…,m
m : number of factors formed
ε_i : specific factor i
l_{ij}: loading variable i of factor j
In matrix notation can be written as follows.

$$\tilde{X}_{(p \times 1)} - \tilde{\mu}_{(p \times m)} = \tilde{L}_{(p \times m)} \tilde{F}_{(m \times 1)} + \tilde{\varepsilon}_{(p \times 1)} \qquad (1)$$

with assumption:

- $E[F] = 0$, $\text{cov}(F) = E[FF'] = 1$
- $E[\varepsilon] = 0$, $\text{cov}(\varepsilon) = E[\varepsilon\,\varepsilon'] = \Psi = \begin{bmatrix} \Psi 1 & 0 & \cdots & 0 \\ 0 & \Psi 2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \Psi p \end{bmatrix}$
- F and ε are independent so $\text{cov}(\varepsilon,F) = E(\varepsilon F') = 0$

The covariance structures of a model is as follows.

$$\text{Cov}(X,F) = L \text{ or } \text{Cov}(X_i, F_j) = l_{ij}$$
$$\sum_{i=1}^{m} h_i^{\,2} = \lambda_1 + \lambda_2 + \ldots + \lambda_m \qquad (2)$$

In this research, X is variance-covariance matrix and p(max) for indicators in dimension social relationship, health, resources, and environment are 3, 11, 13, and 7 with condition that $m \leq p$. λ is eigen value of variance-covariance matrix $\sum$ or correlation matrix **R**. $h_i^{\,2}$ is communalities which shows the variance proportion of indicator/variable i which can be explained in general factor. While a variance which can't be explained by general factor will be explained by specific factor with specific variance. l_{ij} is loading which shows correlation between general factor formed and each indicators. The bigger l_{ij} means the bigger correlation between them. Loading estimation in this research using principal component analysis (central decomposition).

$$L = [\sqrt{\lambda_1}e_1 \quad \ldots \quad \sqrt{\lambda_m}e_m] \qquad (3)$$

- Steps in Factor Analysis
  1. Identify the purpose of using factor analysis and fulfill its requirements.

2. Checking correlation matrix

In this step, there are two ways of checking assumption so that the factor analysis could be used(Hair, Black, Babin, & Anderson, 2010).

a) Bartlett Test of Sphericity:

1. Hypothesis
   H_0 : correlation matrix is identity matrix
   H_1 : correlation matrix is not identity matrix
2. Alpha (α) used is 5%
3. Statistical test is as follows.

$$\chi^2_{hitung} = -\left[(n-1) - \frac{2p+5}{6}\right] \ln |R| \quad (4)$$

in which:
n : the amount of sample
p : the amount of variables
|R| : determinant of correlation matrix

4. Comparing χ^2_{hitung} with $\chi^2_{\alpha,(p-1)/2}$. Rejecting H_0 if $\chi^2_{hitung} > \chi^2_{\alpha,(p-1)/2}$ or $p_{value} < \alpha$.

b) Data appropriateness can be assessed by measuring Keiser-Meyers-Oklin (KMO) or Measure of Sampling Adequate (MSA).

$$KMO = \frac{\sum_i \sum_{i \neq j} r_{ij}^2}{\sum_i \sum_{i \neq j} r_{ij}^2 + \sum_i \sum_{i \neq j} a_{ij}^2} \quad i = 1,2,\ldots,p \; ; \; j = 1,2,\ldots,p \quad (5)$$

In which:
r_{ij} : coefficient of modest correlation between variable i and j
a_{ij} : coefficient of partial correlation between variable i and j

$$: \frac{r_{ij} - r_{ik} r_{jk}}{\sqrt{(1-r_{ik}^2)(1-r_{jk}^2)}}$$

p : the amount of variables

The criteria of KMO is as follows (Kaiser dan Rice (1974) dalam Sharma, 1996).

i. $0{,}90 \leq KMO < 1{,}00$, almost perfect
ii. $0{,}80 \leq KMO < 0{,}90$, very good
iii. $0{,}70 \leq KMO < 0{,}80$, good
iv. $0{,}60 \leq KMO < 0{,}70$, more than enough
v. $0{,}50 \leq KMO < 0{,}60$, enough
vi. $KMO < 0{,}5$, data is inappropriate

$$MSA_i = \frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 + \sum_{i \neq j} a_{ij}^2} \quad (6)$$

Indicators whose MSA is less than 0,5 should be reduced one by one with choosing indicator with the least score of MSA (Hair, Black, Babin, & Anderson, 2010).

3. Factor Extraction

Factor analysis extracts factors with methods such as principal components, unweighted least squares, generalized least squares, maximum likelihood, principal axis factoring, alpha factoring, or image factoring. This research uses principal component analysis.

4. Factor rotation

   There are two methods of rotation, orthogonal rotation and non-orthogonal rotation (oblique). In orthogonal rotation, some researchers have recommended varimax (variance of maximum). The total of loading square variance is as follows:

$$V = \frac{1}{p}\sum_{j=1}^{m}\left[\sum_{i=1}^{p}\left(\frac{\hat{l}_{ij}^{*}}{\hat{h}_i}\right)^4 - \left\{\sum_{i=1}^{p}\left(\frac{\hat{l}_{ij}^{*}}{\hat{h}_i}\right)^4\right\}^2 / \; p\right] \quad (7)$$

   in which:

   $\hat{h}_i$ = estimated communalities i

   $\hat{l}_{ij}$ = estimated loading of variable i of factor j which has been rotated

   p = the amount of variables

5. Getting factors score

   Factor score in this research is used as a base to construct the composite index. Method for estimating factor score is regression method because principal component is implemented in estimating loading score beforehand.

$$F_i = w_{i1}X_1 + w_{i2}X_2 + \ldots + w_{ik}X_k \quad (8)$$

   In which:

   F_i : factor score i

   w_i : weight or factor score coefficient

   k : the amount of variables

   i : the amount of factors

5. Weighting

   In this research, there are two types of weight implemented in this index calculation, namely weight for factors in a dimension and weight for each dimension. Unequal weighting is used for factor weight in a dimension. Whilst, equal weighting is used for each dimension so that every dimension has the same weight to contribute to the composite index.

6. Aggregation

   Every dimension has its own score. Then, the composite index will be built by calculating the average of dimension score (every dimension has equal weighting as explained in step 5).

7. Correlate the composite index to other composite index

   The purpose is to see whether the composite index is good or not. It can be seen by using scatter plot to see the correlation with other index. In this research, Human Development Index (HDI) will be used.

The data used for this research are from Survey of Intercensal Population and National Social and Economic Survey Indonesia conducted by BPS Statistics Indonesia. All the indicators used are based on survey in 2015 so this index will capture the well-being of older people in 2015.

3. General Description of Older People in Indonesia

Based on the result of Intercensal Population Survei and National Social and Economic Survey Indonesia, the estimated number of older people in Indonesia is 255.187.872 people. The composition of people based on the age group is divided into three parts 0-14 years old, 15-59 years old, and 60+ years old. The percentage of older people (60+ years old) is 8,47 percent in which 52,81 percent of them are women.

The composition of people based on the age group could affect the old dependency ratio. Old dependency ratio is the comparation between older people and productive people (aged 15-59 years old). That ratio describes the economic burden productive people must have in order to fund the older people, with assumption that older people are not economically the productive ones. The old

dependency ratio in 2015 is 13,28. It means that every 100 productive people must shoulder the lives of 13 older people.

4. The Construction of Well-being Index of Older People

4.1 The Indicator Selection

The indicator selection process shows the anti-image matrix which can decide whether an indicator deserves to be analyzed further or not. In factor analysis, if the MSA score of an indicator more than 0,5, it means that the indicator deserves to be analyzed further in factor analysis. Otherwise, indicator whose MSA score is less than 0,5 must be reduced because it doesn't deserve to be analyzed further.

In the first step, indicator social activities in social relationship dimension must be reduced because it has the lowest MSA score. Then, in the next step in which there are two indicators left, the MSA scores of both of them are 0,5. So they both deserve to be analyzed further. The KMO score of this dimension with two indicators are categorized as enough to be analyzed using factor analysis.

In the health dimension, all the indicators have MSA score more than 0,5, except the life expectancy at 60 years old. The MSA score of that indicator s 0,397. It means that the indicator must be reduced. After reducing that indicator, the MSA score of all the remaining indicators are more than 0,5 and the KMO score is 0,766. It means that the 10 indicators left in health dimension are good to be analyzed using factor analysis.

In the resources dimension, the first step of indicator selection shows that the indicators with MSA score less than 0,5 are income security and listening to radio. Because income security has the lowest score, it must be reduced. Then in the next step, indicator with MSA score less than 0,5 is listening to radio. After that, all the remaining indicators have MSA score more than 0,5. Therefore, there are only 11 indicators which deserve to be analyzed further in factor analysis. The KMO score of this dimension with the remaining indicators is 0,790 so that they are good to be analyzed using factor analysis.

In the environment dimension, all the indicators have MSA score more than 0,5. It means that there is no indicator needs to be reduced. All the indicators deserve to be analyzed further. The KMO score of this dimension is 0,706. It means that the indicators in this dimension are good to be analyzed using factor analysis.

All the process of indicator selection in factor analysis can be seen in detail in Annex 1.

Table 1. **Indicators in Every Dimension in The Well-being Index of Older People Which Will be Used in The Further Analysis**

Dimension	Indicator
Social Relationship	Taking care of grandchildren
	Looking after pets and plants
Health	Health condition
	Health rate
	Ability to see
	Ability to hear
	Ability to walk
	Ability to move hands
	Ability to memorize/concentrate
	Ability to take care of themselves
	Non-behavioral and emotional disease
	Ability to communicate
Resources	Literacy rate
	Education level

	Non-poor people
	Income insecurity
	Watching TV
	Reading or writing
	Recreation
	Exercise
	Internet access
	Access to communication
	Access to information
Environment	Possession of house
	Decent place to live
	Decent sanitation
	Healthy home
	Decent drinking water
	Access to electricity
	Cooking fuel

4.2 Factor Construction

The factor analysis will produce dominant factors in every dimension of the index. The number of dominant factors which characterize the dimension could be decided based on the Kaiser criteria. Kaiser criteria is when factor whose eigen value is more than one would be the dominant factor (OECD, 2008). If there's only one dominant factor, the factor score would be the dimension score. If there is more than one dominant factor, the score factors will be aggregated with weight. Factor weight is the variance explained by one dominant factor compares to total variance explained by all the dominant factors in each dimension. The bigger weight, the more important a factor in a dimension.

An indicator will be included in one factor if the absolute component score is more than 0,5. But, sometimes some component score between each indicator are similar which coild lead to a mistake of indicator classification in a factor. Therefore, it's necessary to rotate a factor. After factor rotation, there will be rotated component score which describe the correlation between each indicator to the constructed factor. Based on analysis factor in social relationship dimension in Annex 2, there's only one factor in social relationship dimension so the two indicators are included in that factor. The factor score is the dimension score. The cumulative variance described by that factor is 65,967 percent. It means that the variation of indicators in social relationship dimension can be explained with variation of one dominant factor which s 65,967 percent, the rest is explained by other factors.

Based on total variance explained in Annex 2, there are two dominant factors in health dimension with percentage of variation explained by each factor are 41,058 percent and 32,547 percent. Factor 1 is formed by ability to walk, ability to move hands, ability to memorize/concentrate, ability to take care of themselves, non-behavioral and emotional disorder, and ability to communicate. Factor 1 is named motoric and emotional health. While in factor 2, there are health condition, health rate, ability to see, and ability to hear. The name of factor 2 is healthy living and sensory health.

In resources dimension, there are 3 dominant factors with variation score explained by each factor is 34,775 percent, 26,845 percent, and 22,429 percent. The indicators in factor 1, education and lifestyle, are education level, recreation, exercise, and access to internet. Factor 2 consists of literacy rate, non-poor people, reading or writing, and access to communication. The name of factor 2 is the financial, intelligence, and communication capability. Third factor is named income insecurity and access to information because it consists of income insecurity, watching TV, and access to information.

In environment dimension, there are two dominant factors with each variation score is 37,764 percent and 32,697 percent. Factor 1 is home facility and ownership. The indicators included are home ownership, decent place to live, decent sanitation, decent drinking water, and cooking fuel. Factor 2 is healthy home and access to electricity. Indicators that are included in each factor in each dimension can be seen in Table 2.

Tabel 2. **Factors in Every Dimension**

Dimension	Indicator	Factor Name
Social Relationship	Taking care of grandchildren	Social Relationship
	Looking after pets and plants	
Health	Ability to walk	Motoric and Emotional Health
	Ability to move hands	
	Ability to memorize / concentrate	
	Ability to take care of themselves	
	Non Behavioral and emotional disorder	
	Ability to communicate	
	Health condition	Body and Sensory Health
	Health rate	
	Ability to see	
	Ability to hear	
Resources	Education level	Education and Lifestyle
	Recreation	
	Exercise	
	Internet Access	
	Literacy rate	The Financial, Intelligence, and Communication Capability
	Non-poor people	
	Reading or writing	
	Access to communication	
	Income Insecurity	*Income* Insecurity and Access to Information
	Watching TV	
	Access to information	
Environment	Possession of house	Home Facility and Ownership
	Decent place to live	
	Decent sanitation	
	Decent drinking water	
	Cooking fuel	
	Healthy home	Healthy Home and Access to Electricity
	Access to electricity	

4.3 The Composite Index Result

Composite index is obtained by averaging each dimension score. The equal weight of each dimension means that the four dimensions have the same role to the well-being of older people. Because analysis factor is done using transformative data (z-score), the transformative data of each province and each indicator could be positive if the original data is more than the average, and could be negative if the original data is less then the average. Therefore, the composite index result could be

positive, zero (if it is the same as the average), and negative. Province with index score more than zero means that in the aggregate, the well-being of older people living in that province are above the national average well-being. Otherwise, if a province has negative index score, on aggregate, the well-being of older people living in that province are below the national average well-being.

Composite index score with the transformative data is not easy to compare as there's no clear minimum and maximum score. Thus, the composite index score would be transformed into cumulative probability with approach that the distribution of the data are standardized normal (mean 0 and variance 1). This kind of transformation has been used beforehand by BPS Statistics in Regional Development Index construction and by India to construct Environmental Sustainibility Index in 2009.

Well-being index of older people which has been transformed then multiplied by 100 so the index score will be in range 0-100. Province with index score 0 means that the older people living in that province are not prosperous at all, while province with index score 100 means that the older people in that province are perfectly prosperous. The score index before and after the transformation are shown in Table 3.

Table 3. **The Score of Well-being Index of Older People in Every Province**

No	Provinsi	Index Score before transformation	Index Score after Transformation
1	Aceh	-0,4541	32,49
2	North Sumatera	0,1775	57,04
3	West Sumatera	0,3032	61,91
4	Riau	-0,0280	48,88
5	Jambi	-0,1746	43,07
6	South Sumatera	-0,2431	40,40
7	Bengkulu	-0,4100	34,09
8	Lampung	-0,1138	45,47
9	Bangka Belitung	0,5851	72,08
10	Riau Islands	0,2213	58,76
11	Jakarta	0,7575	77,56
12	West Java	-0,1068	45,75
13	Central Java	0,2999	61,79
14	DI Yogyakarta	1,0239	84,71
15	East Java	0,3540	63,83
16	Banten	-0,2440	40,36
17	Bali	0,1735	56,89
18	West Nusa Tenggara	-0,7793	21,79
19	East Nusa Tenggara	-0,5398	29,47
20	West Kalimantan	-0,2603	39,73
21	Central Kalimantan	0,1208	54,81
22	South Kalimantan	0,1913	57,59
23	East Kalimantan	0,3787	64,75
24	North Kalimantan	0,5193	69,82
25	North Sulawesi	0,5786	71,86
26	Central Sulawesi	-0,3501	36,31
27	South Sulawesi	0,1143	54,55
28	South East Sulawesi	-0,2479	40,21

29	Gorontalo	-0,3401	36,69
30	West Sulawesi	-0,2040	41,92
31	Maluku	-0,5450	29,29
32	North Maluku	-0,6266	26,55
33	West Papua	0,1664	56,61
34	Papua	-0,2978	38,29

5. Correlation between Well-being Index of Older People and Human Development Index

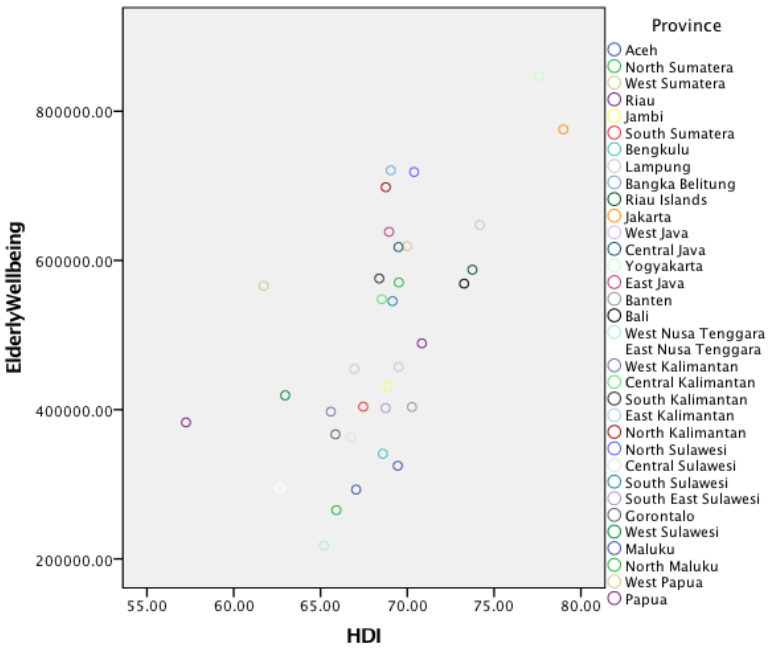
To assess the validity of a composite index, it can be correlated with another valid composite index (OECD, 2008). This step needs to be done because the sensitivity analysis is not done in this research. In this research, the well-being index of older people will be correlated with Human Development Index (HDI) of every province in Indonesia in 2015.

Table 4. **Bivariate Correlation between Well-being Index of Older People and Human Development Index in 2015**

	HDI	
Well-being of Older People	Pearson correlation	0,632**
	Sig. (2-tailed)	0,000

** correlation is significant at the 0,01 level (2-tailed)

Figure 2. **Scatter Diagram of Correlation between Well-being Index of Older People and Human Development Index in 2015**



Based on Table 4, well-being index o folder people and HDI have strong enough, positive, and significant correlation. It indicates that well-being index of older people are strong and sensitive enough to capture the achievement of human life quality specifically older people in Indonesia. The Figure 2 shows that the pattern which shows the correlation between two indices are positive. The

increase in HDI score in a province will be followed by an increased in the score of well-being index, vice versa.

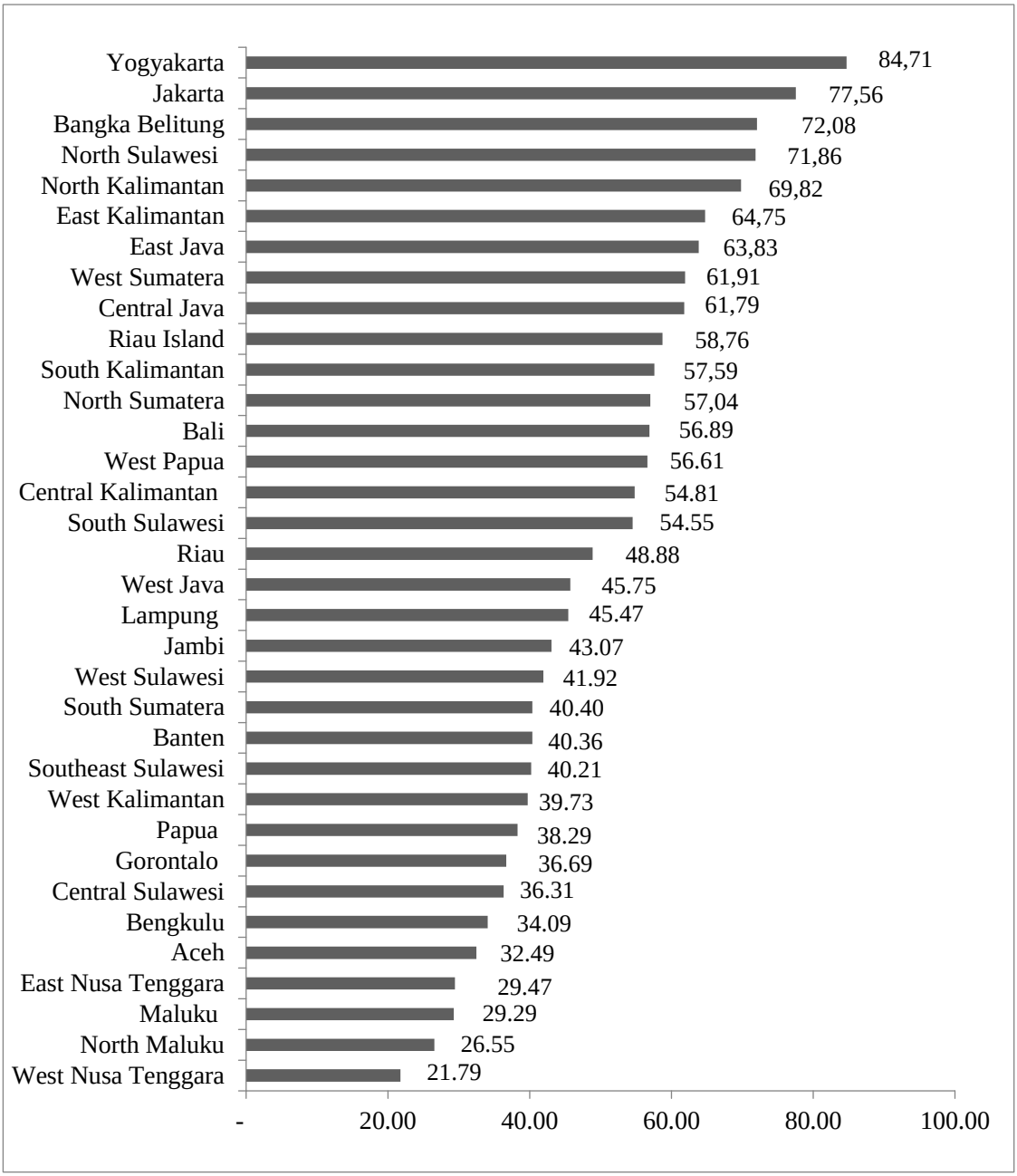
6. Ranking of Provinces in Indonesia Based on the Well-being Index of Older People in 2015

The well-being index of older people can be used for analyzing the life quality of older people in every province in Indonesia. Province with high score index means that the life quality of older people in that province are relatively high or in other words, older people's needs and rights have been well fullfilled. While, province with low score index means that life quality of older people in that province hasn't been good enough and need more attention from the government.

Based on figure 1, three provinces with highest achievement are DI Yogyakarta, DKI Jakarta, and Bangka Belitung. DI Yogyakarta has index score 84,71. It indicates that the province has good life quality of older people. Besides, if it's seen from the indicators used in the index, the achievement of all indicators are good. Second position is the capital city of Indonesia, DKI Jakarta, with index score 77,56. It's obvious because Jakarta has complete infrastructure to fulfill older people's needs and rights. The third position is Bangka Belitung with index score 72,08. The province has good achievements in all dimension. That's why the score is three highest.

There are some provinces with low well-being index score. They are Maluku, North Maluku, and West Nusa Tenggara. The three provinces are located in East Indonesia. The low index score indicates that the fulfillment of older people's needs and rights haven't been achieved yet. To make it easy for the government to make the right policy, the priority could be started from dimension with the lowest score. The rank of provinces based on score of each dimension can be seen in Annex 3.

Figure 2. **Ranking of Provinces in Indonesia Based on Well-being Index of Older People in 2015**



7. The Classification of Provinces in Indonesia Based on the Well-being Index of Older People in 2015

Classification of provinces in Indonesia based on the well-being index of older people is made to simplify the analysis. By far, there's no fixed method for classifying a region based on well-being of older people, but this research classifies every province in Indonesia in three groups, wealthy, wealthy enough, and less wealthy. The classification is done with assumption that the distribution of the well-being index of older people are normal/symmetric. The classification is made as follows.

1. Wealthy, if well being index of older people $> \mu + z \propto_{/2} {}^{\sigma}\!/\!\sqrt{n}$
2. Wealthy enough, if $\mu - z \propto_{/2} {}^{\sigma}\!/\!\sqrt{n} \leq$ well being index of older people $\leq \mu + z \propto_{/2} {}^{\sigma}\!/\!\sqrt{n}$
3. Less wealthy, if well being index of older people $< \mu - z \propto_{/2} {}^{\sigma}\!/\!\sqrt{n}$

Figure 3. **Map of Well-being of Older People in Indonesia in 2015**

Figure 3 shows the thematic map of Indonesia based on the categories of well-being index of older people. The green color is the provinces which are classified as wealthy, the yellow one is for the enough wealthy, and the red one is for the less wealthy provinces. As seen in figure 3, West Indonesia has more wealthy or enough wealthy provinces than East Indonesia. There are only some provinces in West Indoensia which need to become the priority in the development of older people. Provinces which need to be prioritized in Sumatera are Aceh, Jambi, Bengkulu, and South Sumatera, while in Jawa and Kalimantan island, Banten and West Kalimantan are the only provinces with less wealthy older people. In East Indonesia, all the provinces are classified as less wealthy, except North Sulawesi, South Sulawesi, and West Papua. It means that the government should pay more attention on East Indonesia regarding the well-being of older people. The government needs to evaluate what aspect needs to be improved and make right program or policy which can improve the well-being of older people living there.

8. Conclusion and Policy Recommendation

Indonesia is obviously an ageing country with elderly population more than 8 percent in 2015. With the growing number of elderly population, the well-being of older people should be one of the agenda in the development of Indonesia in general and provinces in sepcific. Provinces with the highest score of well-being index of older people are Yogyakarta, Jakarta (capital city), and Bangka

Belitung. Provinces with the lowest score are Maluku, North Maluku, and West Nusa Tenggara and those are located in East Indonesia.

Provinces in Indonesia are categorized based on the well-being of older people. The number of provinces which are classified as less wealthy are more than the number of wealthy provinces. There are 14 provinces which are categorized as wealthy province in terms of the condition of older people, 5 provinces categorized as wealthy enough, and 15 provinces as less wealthy provinces. Provinces with classification less wealthy are mostly located in East Indonesia.

The priority of ageing development in every province in Indonesia can be started from dimension with lowest achievement. For example, Maluku performance in health dimension is good enough, but the score in resources and environment dimension are below the average national score, and even social relationship dimension is the lowest among all the provinces. Therefore, it is necessary to put more attention on the development of older people specifically in their social relationship, resources, and environment.

Refering to Law Number 13 of Republic Indonesia in 1998 regulates the development of problems-identifications of the elderly and elderly policies nationally and globally. It was mentioned the efforts to improve the protection and empowerment of the Indonesian elderly, efforts to fulfill the rights of the elderly, review the limitations of the elderly, and optimize the role of independent community institutions in order to play an active role in improving the welfare of the elderly. From the findings of this research paper, it could be recommended that there should be a priority for a specific development according to certain dimensions in accordance with the province that tracks the low welfare index of the elderly. So that in the achievement of SDGs targets no one is left behind in development and can be integrated into other the social-economic program protection-development in simultaneously.

Short Biographies of Authors

Sri Hartini Rachmad is a researcher on Social-Economic Demography and Applied Statistics at BPS Statistics Indonesia; lecturer and research student adviser at Statistics Institute, Jakarta; and columnist at financial and entrepreneurship national magazine. She graduated from Statistics Institute- Jakarta and attained postgraduate degree from the Australian National University, Canberra-Australia. Her research interests are international and population development: climate change and vulnerability, disaster and water management, data assurance & quality, MDGs-SDGs, poverty, employment, migration, education, health, children, youth, gender, ageing and family planning.

Sri Hartini is a prolific researcher with numerous publications in academic journals and in association with organizations such as Oxfam International, UNDP, WHO, UNICEF and others.

Contact information: Email: shrachmat2@gmail.com, Mobile Phone: +62(0) 818 955 652 / 813 87 098 324

Ayesha Tantriana is a junior demographic researcher in BPS Statistics Indonesia. She majored in social and demographic statistics for her bachelor's degree. She graduated from Statistics Institute Jakarta in 2016 and gained an achievement as 1 of 15 students with the highest GPA. She's also actively involved in a youth organization which is focused on solving environmental issues in Jakarta. Her research interests are population, SDGs, children, ageing, employement and development.

Contact information: Email: ayeshatantriana@gmail.com. Mobile phone

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ANNEX A1

INDICATOR SELECTION

Table A1.1. Factor Analysis Output for Selecting Indicators in Social Relationship Dimension

No	Indicator		Step I	Final Step
(1)	(2)		(3)	(4)
1	KMO		0.498	0.500
2	Bartlett Sig.		0.331	0.066
3	Measure of Sampling Adequacy	Social activities	**0.427**	Reduced
4		Taking care of grandchildren	0.499	0.500
5		Looking after plants and pets	0.499	0.500

Table A1.2. Factor Analysis Output for Selecting Indicators in Health Dimension

No	Indicator		Step I	Final step
(1)	(2)		(3)	(4)
1	KMO		0.694	0.766
2	Bartlett Sig.		0.000	0.000
3	Measure of Sampling Adequacy	Life expectancy at 60 years old	**0.397**	Reduced
4		Health condition	0.636	0.692
5		Health rate	0.637	0.667
6		Ability to see	0.729	0.821
7		Ability to hear	0.680	0.759
8		Ability to walk	0.762	0.768
9		Ability to move hands	0.731	0.840
10		Ability to memorize / concentrate	0.760	0.856
11		Ability to take care of themselves	0.858	0.844
12		Non Behavioral and emotional disorder	0.586	0.655
13		Ability to communicate	0.817	0.807

Table A1.3. Factor Analysis Output for Selecting Indicators in Resources Dimension

No	Indicator		Step I	Step II	Final Step
(1)	(2)		(3)	(4)	(5)
1	KMO		0.674	0.738	0.790
2	Bartlett Sig.		0.000	0.000	0.000
3	Measure of Sampling Adequacy	Literacy rate	0.631	0.654	0.693
4		Education level	0.791	0.849	0.851
5		Non-poor person	0.586	0.678	0.828
6		Income security	**0.125**	Reduced	Reduced
7		Income insecurity	0.418	0.623	0.676
8		Watching TV	0.576	0.652	0.703
9		Listening to radio	0.417	**0.439**	Reduced
10		Reading or writing	0.813	0.790	0.785
11		Recreation	0.808	0.785	0.833
12		Exercise	0.818	0.806	0.828
13		Internet access	0.720	0.722	0.785
14		Access to communication	0.744	0.883	0.882
15		Access to information	0.652	0.687	0.724

Table A1.4. Factor Analysis Output for Selecting Indicators in Environment Dimension

No	Indikator		Final Step
(1)	(2)		(3)
1	KMO		0.706
2	Bartlett Sig.		0.000
3	Measure of Sampling Adequacy	Home ownership	0.526
4		Decent place to live	0.737
5		Healthy home	0.611
6		Source of drinking water	0.604
7		Access to electricity	0.765
8		Decent sanitation	0.816
9		Fuel to cook	0.809

ANNEX A2

FACTOR CONSTRUCTION

Figure A2.1. Factor Analysis Output for Determining the Number of Dominant Factors in Social Relationship Dimension

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.319	65.967	65.967	1.319	65.967	65.967
2	.681	34.033	100.000			

Extraction Method: Principal Component Analysis.

Figure A2.2. Factor Analysis Output for Determining the Number of Dominant Factors in Health Dimension

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.371	53.714	53.714	5.371	53.714	53.714	4.106	41.058	41.058
2	1.989	19.891	73.604	1.989	19.891	73.604	3.255	32.547	73.604
3	.814	8.139	81.743						
4	.639	6.390	88.134						
5	.492	4.916	93.049						
6	.255	2.546	95.595						
7	.177	1.769	97.364						
8	.122	1.223	98.587						
9	.099	.993	99.581						
10	.042	.419	100.000						

Extraction Method: Principal Component Analysis.

Figure A2.3. Factor Analysis Output for Determining the Number of Dominant Factors in Resources Dimension

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.955	54.134	54.134	5.955	54.134	54.134	3.825	34.775	34.775
2	2.010	18.277	72.411	2.010	18.277	72.411	2.953	26.845	61.620
3	1.280	11.637	84.048	1.280	11.637	84.048	2.467	22.429	84.048
4	.575	5.232	89.280						
5	.445	4.047	93.327						
6	.289	2.631	95.958						
7	.169	1.540	97.497						
8	.130	1.179	98.677						
9	.066	.602	99.278						
10	.042	.384	99.663						
11	.037	.337	100.000						

Extraction Method: Principal Component Analysis.

Figure A2.4. Factor Analysis Output for Determining the Number of Dominant Factors in Environment Dimension

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.401	48.586	48.586	3.401	48.586	48.586	2.643	37.764	37.764
2	1.531	21.875	70.461	1.531	21.875	70.461	2.289	32.697	70.461
3	.912	13.033	83.494						
4	.414	5.912	89.405						
5	.345	4.934	94.339						
6	.208	2.973	97.313						
7	.188	2.687	100.000						

Extraction Method: Principal Component Analysis.

Table A2.1. Component Matric Score in Social Relationship Dimension

No	Indicator	*Component Matrix*
		Factor 1
(1)	(2)	(3)
1	Zscore(Taking care of grandchildren)	0,812
2	Zscore(Looking after plants and pets)	-0,812

Extraction Method: Principal Component Analysis

Table A2.2. Rotated Component Matric Score in Health Dimension

No	Indicator	Rotated Component Matrix	
		Factor 1	Factor 2
(1)	(2)	(3)	(4)
1	Zscore(Health condition)	0.114	**0.955**
2	Zscore(Health rate)	0.111	**0.913**
3	Zscore(Ability to see)	0.211	**0.892**
4	Zscore(Ability to hear)	0.529	**0.594**
5	Zscore(Ability to walk)	**0.752**	0.335
6	Zscore(Ability to move hands)	**0.839**	0.283
7	Zscore(Ability to memorize / concentrate)	**0.733**	0.395
8	Zscore(Ability to take care of themselves)	**0.695**	0.080
9	Zscore(Non Behavioral and emotional disorder)	**0.844**	0.055
10	Zscore(Ability to communicate)	**0.868**	0.049

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

Table A2.3. Rotated Component Matric Score in Resources Dimension

No	Indicator	Rotated Component Matrix		
		Factor 1	Factor 2	Factor 3
(1)	(2)	(3)	(4)	(5)
1	Zscore(Literacy rate)	0.231	**0.876**	-0.061
2	Zscore(Education level)	**0.878**	0.394	-0.086
3	Zscore(Non-poor person)	0.147	**0.750**	0.283
4	Zscore(Income insecurity)	0.084	-0.354	**0.784**
5	Zscore(Watching TV)	0.182	0.314	**0.871**
6	Zscore(Reading or writing)	0.651	**0.674**	-0.014
7	Zscore(Recreation)	**0.803**	0.390	0.292
8	Zscore(Exercise)	**0.894**	0.071	0.328
9	Zscore(Internet access)	**0.928**	0.187	0.190
10	Zscore(Access to communication)	0.416	**0.691**	0.164
11	Zscore(Access to information)	0.199	0.347	**0.864**

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

Table A2.4. Rotated Component Matric Score in Environment Dimension

No	Indicator	Rotated Component Matrix	
		Factor 1	Factor 2
(1)	(2)	(3)	(4)
1	Zscore(Home ownership)	**-0.879**	0.297
2	Zscore(Decent place to live)	**0.580**	0.476
3	Zscore(Healthy home)	-0.068	**0.941**
4	Zscore(Source of drinking water)	**0.630**	0.128
5	Zscore(Access to electricity)	0.345	**0.843**
6	Zscore(Decent sanitation)	**0.655**	0.468
7	Zscore(Fuel to cook)	**0.764**	0.377

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

ANNEX A3

FIGURE RANKING DIMENSION

Figure A3.1. Ranking of Provinces Based on Score of Social Relationship Dimension

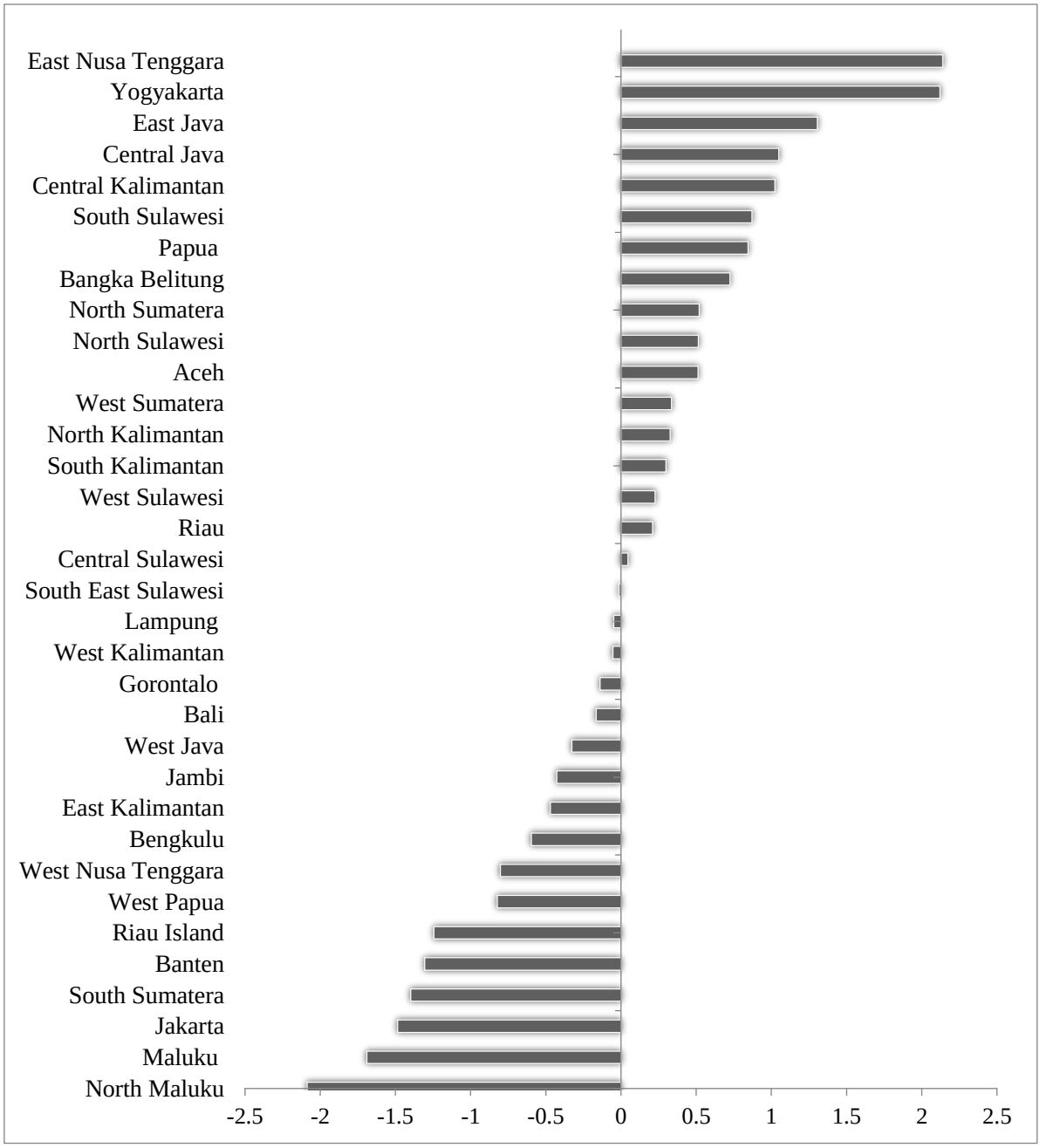

Figure A3.2. Ranking of Provinces Based on Score of Health Dimension

Figure A3.3. Ranking of Provinces Based on Score of Resources Dimension

Figure A3.4. Ranking of Provinces Based on Score of Environment Dimension