

# The Validity of the Sports Participation Index Measurement Instrument

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**Abstract**— The global epidemiological transition has caused increase in the prevalence of non-communicable diseases (NCD). It is necessary to increase community sports participation to prevent NCD. There is no instrument that can be used to measure these indicators yet. The purpose of this study is to develop an instrument for the assessment of sports participation index (SPI). The development research design was used to produce an SPI measurement instrument model. This research was carried out until the model development stage. Preliminary study was done by literature review then followed by a focus group discussion (FGD), and validation assessment by experts in the field of public health and sports. Research has produced valid SPI measurement instrument models. The instrument contains 4 main dimensions, 1) Individual participation, 2) Infrastructure 3) Socio-cultural, 4) Institutional. Of the 4 dimensions are broken down into 17 parameters. The SPI score is obtained by formulation =  $\frac{1}{4}$  (Individual Participation Dimension Index) +  $\frac{1}{4}$  (Infrastructure Dimension Index) +  $\frac{1}{4}$  (Socio Cultural Dimension Index) +  $\frac{1}{4}$  (Institutional Dimension Index). Validity test with Aiken's V coefficient shows each item is declared valid (coefficient  $\geq 0.92$ ). It is recommended to local governments to integrate SPI parameters into health program performance indicators in their respective regions.

**Keywords**— *Instrument validity, Sports Participation Index*

## I. INTRODUCTION

Global epidemiological transitions cause shifts in disease patterns from infectious diseases to degenerative diseases. The public health sector currently carrying a double burden. On one hand various infectious diseases are still found, while on the other hand there was increasing incidence of degenerative diseases/ non-communicable diseases (NCD). NCD is a disease which was not transmitted to other people with any form of contact. Various types of non-communicable diseases such as cardiovascular disease, chronic respiratory diseases, diabetes and cancer are the main threats to human health and development in the present [1] [2].

NCD caused death of around 35 million people each year, or 60% of all deaths globally with 80% prevalence in developing countries. Predictions made by WHO showed that the total death caused by NCD will increase up to 17% in 10 years. It was estimated that many countries suffered billions of dollars losses due to this degenerative disease, therefore it takes

concrete steps to overcome it. NCD is related to genetics, environment, and lifestyle such as smoking, alcohol consumption, poor diet and lack of physical activity [3].

It was undeniable fact that NCD was prevalently found in many countries with low and moderate national income. About 80% of death caused by degenerative diseases occurred in several countries with low and moderate national income [4]. In addressing this, governments, multilateral organizations such as WHO and national and international NGOs have collaborated to develop a general strategy that focuses on the prevention and control of cardiovascular disease, prevention and control of cancer, prevention and control of chronic respiratory diseases, and control of diabetes mellitus.

There were NCD risk factor that could not be modified such as genetic, but there were also those that can be modified such as diet, stress levels, lifestyle and physical activity. Many studies showed link between lack of physical activity and NCD. Less physical activity decreased muscle mass in the body. Loss of muscle mass caused slower calorie burning rate. Without reducing the amount of calorie intake, there were accumulations of energy in the body which ultimately results in various non-communicable diseases such as obesity which were increasing risks of complications from hypertension to stroke and other diseases [5], [6].

In order to become a developed nation, it was necessary to give attention to good quality human resources which were healthy, intelligent and productive. Therefore, development programs to increase physical activity must be regarded as concern to improve the quality of society at large. One dimension in measuring human development is Sports Participation. The Sports Participation Index (SPI) would reflect good and valid NCD countermeasures as an important indicator in tackling NCD globally [7]. The results of development can be measured and observed. For this reason, it was important for the Government through leading sectors, to understand the extent of the progress of community sports participation. Methods that could be used to measure the success of development or programs include an index. However, the sports participation index (SPI) that is truly capable of describing broader community sports participation still needs to be improved. Therefore, it is necessary to develop an index that can measure community sports participation.

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Based on these problems, it is necessary to develop an instrument to measure the index of community sports participation that can be implemented both in developed and developing countries. It was hoped from the use of the index that the government in certain regions can oversee the progress of programs to increase sports participation. In the end it was hoped that the achievement of the sports participation index can reflect serious efforts to prevent NCD.

## II. MATERIALS AND METHODS

This research is part of the development research design. The study was intended to develop an assessment instrument for Sports Participation Index (SPI). The development was carried out by researchers, and taking into account the opinions of experts, trainers, public officials, and community leaders interested in public health and sports. Primary data in this study were obtained through focus group discussions (FGD). The FGD involved qualified speakers with Doctoral degree in the fields of public health and/or sports. Secondary data obtained through the study of literatures and documents related to the focus of this research. Furthermore, the validity of the measurement model of sports participation index instruments was tested using the Aiken V formula [8].

## III. RESULTS AND DISCUSSION

During the development phase of the Sports Participation Index, a FGD was conducted by involving experts in the field of public health and sports. The FGD produced the dimensions and parameters of the Sports Participation Index. The Dimension of Sports Participation Index consists of 4 components, namely: individual participation, infrastructure, socio-cultural, and institutional.

The dimension of individual participation was a manifestation of people's participation in sports activities. Individuals who do physical exercise or sport activities in a measured and regular manner will produce an outcome in the form of optimal physical fitness. The optimal results require frequency, duration, and consistency in physical exercise or sports [9], [10].

The infrastructure dimension was supporting factor for individuals to carry out physical exercise or sports activities. Several studies have shown that the availability of supporting infrastructure such as sports fields and open spaces strongly increase public sports participation. Included in the aspect of infrastructure is the accessibility of sports infrastructure for the general public and people with disabilities[11], [12].

The socio-cultural dimension in the context of sports participation was also important. Included in the socio-cultural dimension was the social and cultural value of the urgency of sport in the eyes of the stakeholders. The stereotype of women's impropriety in conducting sports activities in open spaces is one example of the socio-cultural role in the level of community sports participation[13], [14].

The institutional dimension in the context of community sports participation is an illustration of the function of the sports program management. Good sports management required budgets and human resources. Furthermore, the

program to increase sports participation also requiring innovation and cross-sector collaboration[13], [15]. Table I summarizes the dimensions and parameters needed in the Sports Participation Index Measurement.

TABLE I. DIMENSIONS, PARAMETERS AND DEFINITIONS OF SPORTS PARTICIPATION INDEX MEASUREMENT INSTRUMENTS

No	Parameter	Definition
<b>Individual Participation Dimensions</b> [9], [10]		
1	The frequency of physical exercise and / or sports activities	The average frequency of physical exercise and / or sports activities of the people in the area to be assessed in their sports participation index
2	Duration of physical exercise and / or sports activities	The average duration of each physical exercise and / or sports activity of the community in the area to be assessed for their sports participation index
3	Consistency of physical exercise and / or sports activities	The percentage of individuals who consistently carry out physical exercise and / or sports activities from the community in the area to be assessed for their sports participation index
4	Participation in clubs / groups in physical exercise and / or sports activities	The percentage of individuals who joined a club / group in physical training and / or sports activities from the community in the area to be assessed for their sports participation index
5	Physical fitness	The percentage of physical fitness level of the community in the area to be assessed for their sports participation index
<b>Infrastructure Dimensions</b> [11], [12]		
1	Availability of infrastructure	The ratio between the total population and the sports infrastructure available in the area to be assessed by the sports participation index
2	Availability of open space	The ratio between the total population and the amount of open space for sports available in the area to be assessed by the sports participation index
3	Management of infrastructure and open space	The function of management of infrastructure and open space in the area to be assessed by the sports participation index
4	Accessibility of infrastructure and open space	The degree of accessibility of infrastructure facilities and open space for all residents in the region to be assessed by the sports participation index
5	Accessibility of infrastructure and open space for people with disabilities	The degree of accessibility of infrastructure facilities and open space for residents with disabilities in the area to be assessed for their sports participation index
<b>Socio-cultural Dimension</b> [13], [14]		
1	The value system related to the urgency of physical exercise / sports activities adhered to by stakeholders	The condition when evaluating the existence of a value system related to the urgency of physical exercise / sports activities adhered by the stakeholders.
2	Awareness of stakeholders in the need for physical exercise / sports activities with disabilities	The condition when evaluating the concern of the authorities towards the need for physical exercise / sports activities for persons with disabilities.
3	Gender discrimination in	The condition when evaluating gender discrimination in physical exercise / sports

	physical exercise / sports activities	activities.
<b>Institutional Dimension</b> [13], [15]		
1	Budget support for programs to increase community sports participation	The percentage of the budget allocated to provide support to programs to increase community sports participation.
2	The existence of a task force in charge of community sports participation	The existence of a task force in charge of community sports participation owned by stakeholders that will be assessed on the sports participation.
3	Innovation program to increase community sports participation	There were innovation programs for increasing the participation of community sports owned by stakeholders that will be assessed for their sports participation index.
4	Cross-sectoral cooperation in programs to increase public sports participation	There were cross-sectoral collaborations in the program to increase community sports participation owned by stakeholders that will be assessed as sports participation index.

Based on the dimensions and parameters in table I, the scoring of each parameter is done by giving a value with a range of 1 to 5. A score of 5 reflects the most ideal conditions. The score of 1 indicates the worst conditions. In addition to scoring 1 - 5, the parameters for which no data was given was a score of 1. This is because each parameter compiled, through the FGD, has discussed the possibility of data availability and program sustainability. Therefore, the absence of data could indicate the lack of attention in the development of the program from these parameters.

Furthermore, from each dimension the index is calculated with adapting formula of the nutritional development index as follows [16]:

$$\text{Dimension Index} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

After the index of each dimension has been calculated, the final index is also calculated, namely the sports participation index with the following formula:

$$\text{SPI} = \frac{1}{4} (\text{Individual Participation Dimension Index}) + \frac{1}{4} (\text{Infrastructure Dimension Index}) + \frac{1}{4} (\text{Socio Cultural Dimension Index}) + \frac{1}{4} (\text{Institutional Dimension Index})$$

The SPI criteria / limits are set as follows:

TABLE II. CRITERIA FOR SPORTS PARTICIPATION INDEX

Index	Category
0.800 – 1	Sports participation is good
0.500 – 0.799	Sports participation is moderate
0 – 0.499	Sports participation is poor

The development phase in this research has resulted in the model of Sports Participation Index Measurement Instrument. The smartphone application model Nutriatlet

could be used as a valid instrument for measuring sports participation, then the next step is expert validation. Validation is done by involving experts in the field of public health and sports. Validation is intended to obtain an instrument model that was relevant to the review from the field of public health and sports. The relevance of the instrument for measuring the Sports Participation Index with both aspects shows the validity of the developed model.

At this stage the experts provide an assessment using Likert scale with a score range of 1-5 to show the degree of relevance of each item. The following are the results of expert assessments:

TABLE III. FEASIBILITY ASSESSMENT INSTRUMENT FOR MEASURING SPORTS PARTICIPATION INDEX FROM THE REVIEW OF PUBLIC HEALTH SCIENCES AND SPORTS

No	Dimensi	Parameter	Coefficient value Aiken's V	Conclusion
1	<b>Dimensions of Individual Participation</b>	The frequency of physical exercise and / or sports activities	1,00	Valid
		Duration of physical exercise and / or sports activities	1,00	Valid
		Consistency of physical exercise and / or sports activities	1,00	Valid
		Participation in clubs / groups in physical exercise and / or sports activities	1,00	Valid
		Physical fitness	1,00	Valid
2	<b>Infrastructure Dimensions</b>	Availability of infrastructure	1,00	Valid
		Availability of open space	0,92	Valid
		Management of infrastructure and open space	1,00	Valid
		Accessibility of infrastructure and open space	1,00	Valid
		Accessibility of infrastructure and open space for people with disabilities	1,00	Valid
3	<b>Socio-cultural Dimension</b>	The value system related to the urgency of physical exercise / sports activities adhered to by stakeholders	1,00	Valid
		Awareness of stakeholders in the need for	1,00	Valid

		physical exercise / sports activities with disabilities		
		Gender discrimination in physical exercise / sports activities	1,00	Valid
4	<b>Institutional Dimension</b>	Budget support for programs to increase community sports participation	1,00	Valid
		The existence of a task force in charge of community sports participation	1,00	Valid
		Innovation program to increase community sports participation	1,00	Valid
		Cross-sectoral cooperation in programs to increase public sports participation	1,00	Valid

Based on table III it appears that the coefficient value of Aiken's V for each item  $\geq 0.92$ . This shows that the developed instrument for measuring sports participation index was declared valid from public health and sports expert review.

#### IV. CONCLUSION

Research has produced a valid SPI measurement instrument model. The instrument contains 4 main dimensions, namely 1) Individual participation, 2) Infrastructure 3) Socio-Cultural, 4) Institutional. The 4 dimensions than broken down into 17 parameters. The SPI score was obtained by formulation =  $\frac{1}{4}$  (Individual Participation Dimension Index) +  $\frac{1}{4}$  (Infrastructure Dimension Index) +  $\frac{1}{4}$  (Socio Cultural Dimension Index) +  $\frac{1}{4}$  (Institutional Dimension Index)}. Validity test with Aiken's V coefficient shows each item is declared valid (coefficient  $\geq 0.92$ ). It was recommended that local governments integrate the SPI parameters into health program performance indicators in their respective regions.

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