# *EFFECTIVENESS OF NUTRITIONAL INTELLIGENCE PROGRAM TOWARDS IMPROVING MATERNAL KNOWLEDGE AS AN EFFORT TO PREVENT STUNTING IN CHILDREN*

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***Abstract*— Nutrition is an important source of energy for children to be able to absorb learning information. Various studies have shown that good eating habits, nutritional balance of composition, and physical activity can support children's development. In line with the results of the study, there needs to be a sustainable learning pattern so that the child can easily understand about nutrition, namely parents as the nearest environment of the child as an effort to prevent stunting cases in the child. The participants of this study were 30 mothers in Bojongsoang District, Bandung Regency, West Java Province. This research aims to test the effectiveness of nutritional intelligence programs in mothers as stunting efforts in children through the design of the-before-after study design experiment with two experimental and control research groups. Specifically packaged in the form of training activities that include materials: (1) cooking; (2) healthy eating; (3) fitness; and (4) fun. In general, the average maternal knowledge score of nutritional intelligence and stunting in the experiment group (Mpre test = 97.5 and Mpost test =123.7) both pre-test and post-test had higher scores than the control group (Mpre test = 97.3 and Mpost test= 88.5). By comparison, the control group's pre-test and post-test scores decreased by 4.7%, while the experiment group saw an 11.8% increase in scores. The effectiveness of the learning model can be measured through Mann Whitney tests that compare the average pre and post test scores measured through stunting instruments, which are demonstrated through the significance of scores in the control group and experiments after being given nutritional intelligence programs. This means that nutritional intelligence programs are considered effective in increasing maternal knowledge as an effort to prevent stunting in children.**

***Keywords: nutritional intelligence, stunting, children***

## I. INTRODUCTION

Health and nutrition are among the standards set by the National Association for The Education Young Children, an organization that oversees regulations on early childhood education that apply around the world (Marotz, 2012). Cases relating to health and nutrition in children can have an effect on other developments such as intelligence, motor ability, and neurological disorders (Davies and MacDowall, 2006). One of the nutritional health cases that palign highlighted is stunting. This is considered reasonable because cases of stunting or lower height growth of his age can have an impact on other developments (Greene, 2009), these cases mainly often afflict low-income countries. Even in 2011 there were reportedly more than 148 million or about 30-40% of children worldwide experiencing stunting (Rodriguez, et.al. 2013). The main factor causing stunting is the not being given proper nutrition and activity on the first thousand days of its birth (Morisson, 2012).

Whereas in the regulations issued by NAEYC, it is mentioned that the first standard is to stimulate the development of children's learning by developing their knowledge including health, appreciating, supporting, and challenging the ability of children in various learning activities. The regulation is in

line with Morrison's (2012) thinking that the scope of child health and nutrition includes health, safety, and nutrition, further stating that nutrition is a very important aspect to support the child's learning development. Homes and schools are the most strategic places to apply information about the importance of nutrition to children as both places become the closest microsystem environment to the child (Bronfenbrenner, 1993). This assumption is reinforced by the results of research (Davies and MacDowall, 2006) which stated that there needs to be curriculum integration to specifically study the importance of nutrition in children both applied in school and at home, while Bahndan, et.al (2004) considers that schools need to provide a nutritious food menu to support child development and avoid indiscriminate food buying behaviors, even since children attend early childhood institutions. The results of the study show the need for special learning about the importance of nutrition which is also in the direction of nutritional intelligence concept a program that teaches teachers, parents and early childhood to understand the importance of food selection, food processing, nutritional composition of food, activities that support child nutrition intake (Greene, 2009). Some studies have also shown that the interaction between parents and children can have a major positive impact in nutrition in children through cooking together, choosing healthy food products, exercising, and playing together (Rodriguez, et.al. 2013). Through research titled nutritional intelligence learning model in early childhood, it is expected to provide learning information about the importance of maintaining a healthy diet and activities that support early growth.

## II. METHODS

The purpose of this study is to know the effectiveness of nutritional intelligence programs as an effort to prevent stunting in children. The research method used in this scientific work is a method of experimentation with the design of 'control and experiment design' (Bernard, 2000). The design of this study uses two test groups given treatment in the form of nutritional intelligence program. The first group referred to as the experimental group was given an intervention in the form of a direct meeting on nutritional intelligence programs consisting of: (1) parent's knowledge and understanding of content; (2) parent's shift in attitudes or intentions; and (3) interpretations through children's life experiences. The second group referred to as the control group was given an indirect meeting about nutritional intelligence programs and self-learning through video and modules. Both groups intervened to prevent stunting: (1) cooking; (2) healthy eating; (3) fitness; and (4) fun for 5 meetings. To find out the initial condition of both groups, the researchers applied the before study. That way researchers can find out the initial condition of the study participant's knowledge level regarding stunting. Furthermore, research participants were given treatment in the form of nutritional intelligence program. The final stage in this study is the after study. This is done to find out the end result of the mother's knowledge of stunting in the child.

The study participants involved as many as 30 mothers using purposive sampling techniques located in Bojongsoang Sub-District, Bandung Regency, West Java Province. The criteria for selection of study participants are mothers who have children aged 3-6 years with lower middle economic conditions, with the last education of the maximum mother of high school/equivalent. The assumption of the selection of these criteria is the level of knowledge of mothers with a bachelor's degree, not even schools need more information about nutritional intelligence in an effort to prevent stunting in children.

Primary or primary data collection methods use test instruments (Kumar, 2011) to measure the level of maternal knowledge about stunting prevention, as well as use questionnaire instruments (Kumar, 2011) to measure the success and effectiveness of nutritional intelligence programs. Furthermore, the collected data is tested through the independent t-two test on normal distributed data, while the Wilcoxon Rank Sum (Mann Whitney) Test, is performed if the data is not distributed normally. The guide to the preparation of data collection instruments is derived from the criteria of maternal

knowledge about stunting (Rodriguez, 2013). A total of 50 items were tested with a scale measurement of 4 consisting of: (1) never for a score of 1; (2) sometimes for a score of 2; (3) often for a score of 3; and (4) always for a score of 4.

## III. RESULTS AND DISCUSSION

This research generally aims to provide knowledge to mothers about essential nutrition in children aged 3-6 years as a preventive effort for stunting in children, involving 30 mothers as participants of this study. Pre-test results in the control group showed not much different scores before and after being given a nutritional intelligence intervention program (Mpre test control = 97.5; Mpost test control= 97.3), meaning the mother's knowledge of stunting in the child shows the same results. This was considered reasonable considering that the study participants in the control group were not educated undergraduates, there were even 2 people who did not finish junior high school. Referring to the level of competence, the average mother who has education has little knowledge of nutrition in the child (Milman, et.al, 2005), generally mothers assume that when the child is full, then all the nutrients can be fulfilled.

Whereas when referring to the stunting dimension, more detail is mentioned that in the cooking dimension, mothers need to arrange a menu that follows the family menu pattern (item number 1), then pay attention to the composition and variation of the menu for the child (item number 2), these two items alone indicate that participants in the control group often never pay attention to this. Selection of fresh ingredients, making vegetables, and engaging children in the cooking process (item number 4,6,10) Most choose categories sometimes on those items. Even the high selection occurs in item number 9 which is to use stimulating and sharp-flavoured seasonings for cooking, and often does not involve the partner in this case the father in the cooking activity (item number 18), because the mothers assume that cooking is not the father's job. The cooking dimension has an important role in describing the parent's knowledge and understanding of content aspects in the nutritional intelligence program, meaning that in this cooking dimension the parents in this case need to have knowledge on how to choose and process food well so that the nutrient content in the food can be absorbed well by the child. The results of a 2001 study showed that most mothers are able to process food, but have difficulty combining food with other food stings, for example combining protein, carbohydrates, and good fats according to the nutritional needs of the child (Shrimpton, et.al., 2001). This is indicated by the pre-test and post test scores in the cooking aspect control group which has a 3.4% sedative (Mpre test control=36.7 and Mpost test control = 34.3). This means that mothers still need stimulus nutrition intelligence programs, especially strengthening the cooking dimension. In contrast to the experimental group that experienced a 10.5% increase in pre-test and post test scores (Mpre test experiment = 36.1 and Mpos test experiment = 44.6), meaning nutritional intelligence program needs to be done maximally through personal approach, so that the obstacles experienced by mothers in choosing a balanced food composition for the child can be implemented to the maximum.

Looking at the dimensions of healthy eating which is the implementation of parent's shift in attitudes or intentions, namely the ability of parents in this case especially the mother regarding the attitude and the right way in healthy eating behaviour in the child, for example the frequency of feeding, behaviour when eating that should not be sambal watching television, allowing the child to eat alone, the need to spend the food that has been served indicated through item number 19 20, 22, and 23. The majority of mothers force the child to spend the food served, whether the child enjoys it or not, then often the mothers choose to let the child watch television sambal eat, as well as forbid the child to take his own food because it often spills and dilutes. These three behaviours are actually not appropriate to apply to the child. Because children need to focus on eating activities in order to enjoy, know the taste, and know the texture of eating (Fetman, 2010), even research in 2008 showed that

children do not need to be supervised when eating so that they can explore and give their response to the food they eat (Semba, et.al., 2008). The healthy eating dimension also showed a 5.7% decrease in scores between pre-test and post-test in the control group (Mpre test 22.2 and Mpost test 19.8), meaning that the healthy eating dimension also needs to be further stimulated through nutritional intelligence program so that parents can have knowledge about attitudes and appropriate ways to educate children when eating. Participants in the experiment group showed different conditions with an increase in score of 8.9% (Mpre test experiment = 22.4 and Mpost test experiment = 26.8). The most highlighted indicator of healthy eating is sharing tasks with a partner to give the child an understanding of good eating behaviours, as well as giving the child an understanding of how and how to eat well.

The previous two dimensions described the importance of having knowledge of stunting prevention in the nutritional aspect, hence the dimensions that further highlight the physical activity section to support the motoric balance of the child. The dimensions of fitness and fun are the implications of interpretations through children's life experience, which involves children through first-hand experience in the form of play and exercise activities. In the fitness dimension, the exercise activity in the mother's knowledge child in the control group both before and after the nutritional intelligence program also experienced a 6.5% dissing (Mpre test control = 21.2 and Mpost test control = 18.6). The pre-test scores of control group participants highlighted in the Indicators of Arranging exercise schedules, taking children to exercise, having ideas for exercise, and sharing tasks with a partner while exercising indicated through items number 31, 32, 35, and 37, showed mothers found it difficult to set aside time for physical activity with the child, let alone involve a partner. Whereas the role of couples in stunting prevention, especially in the fitness dimension is in a central position, because in the previous two aspects of the father is judged to have less role in cooking and eating activities Together, while in the aspects of fitness and fun, fatherhood is indispensable (Greene, 2009). Fathers are seen as having the right mental physique to accompany their child to exercise together, but in contrast to the recognition and knowledge of mothers who consider that engaging fathers to exercise together is not considered a priority. Mothers in the control group consider that parenting duties that are also included in exercise are the mother's duty as the primary caregiver (Rodriguez, et.al., 2013). Participants in the experiment group actually experienced a 14.6% increase in scores (Experiment mpretest = 22.1 and Mpost test = 29.8).

Not much different from the fitness dimension, in the fun dimension that mainly involves the child in the activity of playing as a form of exploration of the learning experience and motor balance, the mothers also have difficulty to realize the idea of playing with the child, whereas the mothers have many ideas to play with the child as well as the difficulty to buy the child's favourite toys and schedule the play activities to a new place indicated through item number 44,45,48 , and 49. Providing a child's playing experience is one form of reward to appreciate each child's success (Marotz, 2012), parents need to share a role to provide valuable experiences to the child so that the children feel valued, cared for and appreciated about their struggles in the learning process. The level of maternal knowledge in the control group also fell by 4.2% which means it requires advanced and in-depth intervention in order for information on stunting to be improved (Mpre test control = 17.2 and Mpost test control = 15.8). Participants in the experiment group actually experienced a 14.5% increase in scores (Experiment Mpretest = 16.8 and Mpost test = 22.5).

In general, maternal knowledge scores in the experiment group increased by 11.8% (Mpre test experiment = 97.5 and Mpost test experiment =123.7), meaning nutritional intelligence program intervened through personalized guidance in online activities in mothers, rated effective. Through interviews conducted to research participants, they were very enthusiastic when getting edubox packages containing role playing activities for cooking and healthy eating. This game package is a package of physical activity or fitness activities and a form of role playing or fun in the form of

cooking activities at home with the profession of chef. Then the personalized webinar activity also allows for two-way communication between participants and facilitators to overcome obstacles and difficulties when implementing nutritional intelligence programs. In contrast to the participants of the control group, the mothers in the experiment group considered that the presence of a partner is important so that the child does not experience stunting, such as his presence psychologically accompanying the mother while pregnant, advising the mother, as well as the maximum affection and attention of the partner can increase the mother's spirit to provide good nutrition and nutrition for the child (Davies, et.al., 2006).

When referring to each dimension the control group showed a decrease in scores between the pre-test and post-test, while the experiment group showed an increase in scores between the pre-test and post-test after being given the nutritional intelligence program, then the hypothesis test showed contradictory facts. That nutritional intelligence programs presented through self-learning activities with activities guided by facilitators have good significance, means that nutritional intelligence programs are considered effectively applied to control groups and experimental groups.

## IV. CONCLUSION AND RECOMMENDATION

This research generally aims to test the effectiveness of nutritional intelligence programs in mothers as a stunting prevention effort. The participants of the study were divided into two groups, namely control groups given programs in the form of self-help activities and learning videos on nutritional intelligence, while the experimental group was given a personal direct practice on nutritional intelligence programs. Referring to the question attached to the introduction, it is concluded the following:

1. In general, the average maternal knowledge score of nutritional intelligence and stunting in the experiment group (Mpre test = 97.5 and Mpost test =123.7) both pre-test and post-test had higher scores than the control group (Mpre test = 97.3 and Mpost test= 88.5). By comparison, the control group's pre-test and post-test scores decreased by 4.7%, while the experiment group experienced an increase in scores of 11.8%, meaning the intervention form in the experimental group in the form of direct practice was assessed as effective to provide knowledge to the mother about the dangers of stunting packaged through the program (1) ccooking; (2) helthy eating/ information on healthy foods; (3) fun/play activities; and (4) fitness/exercise.
2. 2. Referring to the stunting dimensions of the cooking aspect, the average pre-test score in the control group of 36.7 had a greater score than the experiment group's pre-test score of 36.1. This means that the mother's level of knowledge about the child's nutritional needs and physical activity in the control group was higher compared to the experiment group. The difference was then made after the intervention of the nutritional intelligence program, which was a control group post-test score of 34.3 had a smaller score than the experiment group's post-test score of 44.6. By comparison, the control group's pre-test and post-test scores decreased by 3.4%, while the experiment group saw a 10.5% increase in scores. In contrast to the healthy eating dimension, it was found that the average pre-test score of healthy eating aspects in the control group of 22.2 had a smaller score than the experiment group's pre-test score of 22.4. The average score changed when given intervention, which was a control group post-test score of 19.8 had a smaller score than the experiment group's post-test score of 26.8. By comparison, the control group's pre-test and post-test scores decreased by 5.7%, while the experiment group saw an 8.9% increase in scores. Similar to the fitness dimension, it was known that the average pre-test score of fitness aspects in the control group of 21.2 had a smaller score than the experiment group's pre-test score of 22.1. The average score changed

when intervened, which was that the control group's post-test score of 18.6 had a smaller score than the experiment group's post-test score of 29.8. By comparison, the control group's pre-test and post-test scores decreased by 6.5%, while the experiment group saw a 14.6% increase in scores. Similar to the fun dimensions, it was known that the average pre-test score of the fun aspect in the control group of 17.2 had a score greater than the experiment group's pre-test score of 16.8. The average score changed when intervened: the control group's post-test score of 15.8 had a smaller score than the experiment group's post-test score of 22.5 When compared, the control group's pre-test and post-test scores decreased by 4.2%, while the experiment group saw a 14.5% increase in scores.

3. The process of implementing nutritional intelligence program was carried out during 5 meetings involving 15 mothers in the control group who were given interventions in the form of self-study and 15 mothers in the experimental group who were given interventions in the form of learning by facilitators with nutritional intelligence program materials including: (1) parent's knowledge and understanding of content, namely the ability to have knowledge about the right nutrition in the child described in the cooking aspect; (2) parent's shift in attitudes or intentions, i.e. the ability to have knowledge of food and the right way of eating in the child described in the aspect of healthy eating; and (3) interpretations through children's life experiences, namely the ability of parents to practice physical activity in children based on experiences depicted in the fun and fitness aspects. The mother's knowledge of stunting is then measured through instruments that measure four dimensions, including (1) cooking; (2) healthy eating; (3) fitness; and (4) fun.
4. Hypothetical tests showed that both groups had significant results after the intervention of nutritional intelligence programs, meaning mothers had the same level of knowledge both self-learning, as well as learning with personalized guidance on stunting prevention efforts in children.

This research is applied, i.e., the research program can be applied directly to the mother as an effort to prevent stunting in the child.

1. There needs to be a thorough survey in the large number of participants as well as a large population to know the needs and problems of mothers in their efforts to prevent stunting in children.
2. It is necessary to set up nutritional intelligence program in an effort to prevent stunting on fathers and other family members, so that child support information can be received and applied in full and thoroughly
3. Nutritional intelligence program in this study is recommended for the implementation of training programs for other participants such as early childhood professional as an initial knowledge stimulus as well as a form of simultaneous skills in compiling teaching materials, educational toys for children.

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