

## Original Research Article

# The efficacy of combined nutrition education and nutritional supplementation on nutritional status of prospective brides to prevent stunting in newborns

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## ABSTRACT

**Background:** Optimal growth and development of children is an indicator of the quality of human resources. Stunting is a condition of linear growth retardation which is the result of a long-term lack of nutrients. The stunting problem prevention program is prioritized in the first 1000 days of and the bride and groom who will later become pregnant and give birth to offspring. The purpose of this study was to determine the effect of a combination of nutritional education and nutritional supplementation on changes in the nutritional status of the prospective bride and groom to prevent stunting in newborns.

**Methods:** The design was quasi-experimental with a pre-post intervention in Sumbawa Regency, West Nusa Tenggara in June 2020 to October 2021. Sample size: 126 of prospective brides aged 20-30 years who were divided into 3 groups. Data analysis used Paired t-test, Wilcoxon, ANOVA and Kruskal Wallis.

**Results:** Mean BMI after intervention:  $22.08 \pm 3.12$  kg/m<sup>2</sup>. The intervention reduced the underweight category from 31 (24.6%) to 19 (15.1%). The average weight gain of pregnant women after the intervention was  $63.08 \pm 7.02$  kg. Statistical test there was a difference between groups ( $p = 0.000$ ). The effect of intervention on infant anthropometry was 13 (11.21%) body length <48 cm and 11 (9.48%) LBW and 10 (8.62%) abnormal head circumference.

**Conclusions:** The intervention can change the parameters of the nutritional status of the subject and there is a relationship between weight gain during pregnancy and infant anthropometry ( $p=0.000$ ).

**Keywords:** Education, Nutrition supplementation, Nutritional status, Prospective bride, Stunting

## INTRODUCTION

Women of childbearing age as prospective mothers are a vulnerable group whose health status must be considered, especially their nutritional status. The quality of the next generation will be determined by the condition of the mother before pregnancy and during pregnancy. Preconception health is very important to consider including nutritional status, especially in an effort to prepare for pregnancy because it will be closely related to pregnancy outcomes.<sup>1</sup> Mothers who have poor nutritional

status, suffer from complications during pregnancy are a predisposing factor for the low health of babies born.<sup>2</sup> Efforts to create a quality generation through healthy families, by preparing starting from the bride and groom are expected to have good health status, especially for female catin who will later become pregnant and give birth. The fertile period in women is the most important period so that the need for nutritional intake before pregnancy must be balanced in order to achieve optimal nutritional and health status to prepare for a healthy pregnancy.<sup>3</sup> Women of childbearing age (WUS) are

vulnerable to the problem of lack of macro and micro nutrients so that they experience nutritional problems.<sup>4</sup> Pre-pregnancy Body Mass Index (BMI) is the most influential factor on birth weight.<sup>5</sup> WUS who experience chronic energy deficiency (KEK) during pre-pregnancy and pregnancy will have low body weight so that they are at risk of giving birth to stunting babies.<sup>6</sup>

The fulfilment of nutrients during pregnancy has an impact on the health of the mother and fetus. During pregnancy, the mother's nutritional needs will increase for metabolism in the body and the addition of body tissues to support the growth and development of the fetus in the womb, and maintain the condition of the placenta so that the mother can carry out a healthy pregnancy. In women who are not yet pregnant, lack of micronutrients can cause difficulties in getting pregnant, while for pregnant women it can cause pregnancy complications, fetuses, anemia, low birth weight, premature birth and babies.<sup>7,8</sup> Nutrients that are needed in small amounts have a very important role in the body's activities but metabolism are known as micronutrients, which consist of several essential vitamins and minerals such as iron, folic acid, vitamin A, calcium, and others. Malnutrition due to micronutrient deficiency is still quite high among women of childbearing age and pregnant women worldwide. The prevalence of anemia in the world according to WHO the prevalence of anemia in pregnant women in the world is 41.8% and non-pregnant women aged 15-49 years are 30%. Based on data from Riskesdas 2008, the incidence of anemia in Indonesia in adolescents is 32%, meaning that 3-4 out of 10 adolescents suffer from anemia and the prevalence of anemia in pregnant women is 48.9%. This illustrates that the health status of women in Indonesia is still low.<sup>9</sup> Micronutrient deficiencies have adverse effects not only during pregnancy but throughout the life cycle.<sup>10</sup> The provision of IFA supplementation is a universal strategy that is carried out and recommended globally in the management of anemia in pregnant women due to iron deficiency and reduces the risk of LBW.<sup>11,12</sup> Targets for adolescents and women of childbearing age through optimization of weekly IFA supplementation.<sup>13,14</sup> Health services at the preconception target have a positive impact on one million pregnancies worldwide each year.<sup>13,14</sup> Many studies have stated in several countries around the world about the success of IFA supplementation in improving maternal health and pregnancy outcomes.<sup>15</sup> However, there is increasing concern that IFA supplementation alone is not sufficient to address the problem of micronutrient deficiency that often occurs in pregnant women, prompting the launch of micronutrient supplementation.<sup>16</sup> There has been a lot of scientific evidence showing the superiority of MM supplementation to overcome anemia during pregnancy, the low incidence of LBW and Small Gestational Age (SGA) and congenital defects (Neural Tube Defect) in newborns when compared with IFA supplementation. The national strategy for the prevention and treatment of anemia for adolescents, women of childbearing age and pregnant women is to provide supplementation with

blood-added tablets (iron and folic acid).<sup>17-22</sup> Pre-pregnancy Body Mass Index (BMI) is the most influential factor on birth weight.<sup>5</sup> Women of childbearing age (WUS) who experience chronic energy deficiency (KEK) during pre-pregnancy and pregnancies who have low body weight will be at risk of giving birth to stunting babies.<sup>6</sup> Efforts to reduce the risk of CED and anemia in the pre-pregnancy period are very important to reduce the risk of malnutrition in the next generation.<sup>20</sup> Body weight before pregnancy (preconception period) should not be more or less than 10 percent of normal body weight according to height (BB/TB), in fact many women of childbearing age have unbalanced nutritional intake. An imbalance that lasts for a long time can cause nutritional problems in WUS.<sup>21</sup> Mothers with short stature (<145 cm) and low body weight before pregnancy had a higher risk of giving birth to babies with low birth weight than mothers with normal height.<sup>22</sup> The purpose of this study was to determine the efficacy of a combination of nutrition education and nutritional supplementation on changes in nutritional status (BMI, weight gain of pregnant women) to prevent stunting in newborns.

## METHODS

### *Study design, location and duration*

Current study is the intervention research used a quasi-experimental design with a pre-post-intervention study research. The research was carried out in Sumbawa Regency, West Nusa Tenggara Province, namely in Labangka District, Moyo Hilir District and Utan District. The research location was chosen purposively based on 1) the high prevalence of stunting and anemia Research time July 2020 to December 2021.

### *Study participants and sampling*

Based on the calculation of the sample size of the outcome variable, the highest number of subjects was the variable Hb level, body length, and head circumference of newborns, namely 16 infants.<sup>22,23</sup> The minimum sample size for prospective brides is 2 (two) times the minimum sample size for babies, which is 32 people. To anticipate drop out, the number of subjects was increased by 25% and each intervention group consisted of 40 subjects. So, the number of subjects from the three intervention groups was 120 people. Subjects who met the criteria at the time of the study were 42 respectively, so the total number of subjects in this study was 126 people. The intervention group is group 1: nutrition education intervention (stunting material)+multi micronutrien, group 2: nutrition education (stunting material)+IFA (iron folic acid) and group 3: nutrition education (reproductive health material)+IFA.

### *Inclusion and exclusion criteria*

The inclusion criteria in this study inclusion criteria as follows: prospective brides who have been registered at

the office of religious affairs (first marriage) in the Districts of Moyo Hilir, Utan and Labangka, 20-30 years, subjects were willing to participate in the whole series of studies. Subject exclusion criteria are: pregnant, suffer from severe anemia (Hb level <8 g/dl), smoke, suffer from chronic disease, abnormal menstrual cycle and do a diet program.

### Data collection

The characteristics of the subject (age, education, occupation, income), health status includes data on Hb levels, nutritional intake. Nutritional status of subjects by measuring antropometri (body weight, body high and MUAC). Compliance with nutritional supplement consumption with a dose of 1 tablet per week from catin until before pregnancy and during pregnancy a dose of 1 tablet daily during pregnancy until before pregnancy. give birth to. Anthropometry of newborns (body weight, body length and head circumference).

### Statistical analysis

Data were analyzed using Microsoft Excel 2016 and SPSS (V.26) programs. The analysis was performed using the mean (SD) and number (percentage). Kolmogorov-Smirnov test with a cut of point significance of normal distribution ( $p$  values >0.05) with a 95% confidence level. Analysis of the data for the test of differences between groups using the Paired t-test, Wilcoxon, ANOVA and Kruskal Wallis.

## RESULTS

### Subject characteristics and nutrition intake

Based on age, the majority of prospective brides subject were  $\leq 25$  years old (61.11%). The average age in group 1, 2 and 3 was  $24.19 \pm 2.60$ ,  $24.33 \pm 2.74$  and  $23.48 \pm 2.53$ . The highest level of education was senior high school at >50% in groups 2 and 3. While in terms of occupational variables, >50% of subjects from all groups did not work/housewives, and the income level was also >50% low. The statistical analysis showed no difference between the intervention groups ( $p > 0.05$ ). Nutritional status data showed that group 1 has a normal BMI of 81.0% more than groups 2 and 3. The examination of Hb levels in groups 2 and 3 showed that more than 40% had anemia, compared to 1, which was only 26.2%. The subjects' height in the three groups was  $\geq 150$  cm (69.05%) and weight  $\geq 40$  kg (90.4%). More than 40% suffered from CED (chronic energy deficiency) in group 3 based on compared to 1 and 2. The level of energy and protein adequacy of the three intervention groups on the subject prospective brides and pregnant women of the is mostly quite  $\geq 70\%$  and protein  $\geq 80\%$ . Overall, the levels of vitamin and mineral adequacy in the three groups were below recommended dietary allowances (RDA) or had a deficit (<100%). but there was an increase in energy, protein and micronutrient intake of pregnant women

compared to prospective brides. Subjects who consumed coffee/tea in the intervention group were 20 (47.62%), 26 (61.9%), and 24 (57.14%), respectively. Coffee/tea is a food source of inhibitors that can interfere with iron absorption. Nutrition education in this study resulted in an increase in subject compliance in consuming nutritional supplementation (MM and IFA) in the three groups, with a compliance level of  $99.36 \pm 1.41$ .

### Effect of nutrition education and nutritional supplementation on changes in BMI and weight gain of pregnant women

The average BMI value of the three groups on the subject of the bride and groom, before the intervention was  $21.64 \pm 3.16$  kg/m<sup>2</sup>. The mean BMI after intervention was  $22.08 \pm 3.12$  kg/m<sup>2</sup> with a difference change of  $0.45 \pm 0.36$  kg/m<sup>2</sup>. The results of the Wilcoxon test showed that there was a difference in the mean BMI before and after the intervention in all groups ( $p < 0.05$ ), meaning that there was a significant difference in the mean before and after the intervention. The statistical test showed that there was a significant difference in the mean BMI between the three groups ( $p < 0.05$ ). The effect of the intervention can reduce the category of underweight nutrition BMI of the subject from 31 (24.6%) to 19 (15.1%). Normal nutrition category from 76 (60.3%) to 88 (69.8%). In addition, it was found that 14 (11.1%) subjects in the overweight/obese category increased to 19 (15.1%). Determination of the nutritional status of pregnant women using indicators of measuring weight gain (BB) during pregnancy and measurement of Upper Arm Circumference (MUAC). MUAC is more often used to determine the status of Chronic Energy Deficiency (CED). Nutritional status of pregnant women with indicators of weight gain from before pregnancy and during pregnancy is guided by weight gain according to the recommendations of the IOM/NRC (2009) (Table 2), taking into account the nutritional status (BMI) before pregnancy. The average value of weight gain on the subject of pregnant women after the intervention was  $63.08 \pm 7.02$  kg. The results of statistical tests before and after the intervention showed that there was a significant difference in the mean weight gain of the three treatment groups ( $p = 0.000$ ). The difference test between groups (ANOVA) showed that there was a significant difference in the mean increase in gestational weight gain in the three groups ( $p = 0.000$ ). The results of the ANCOVA test by adjusting the independent variables, showed significant results ( $p < 0.05$ ), namely the variable weight before pregnancy and nutrition practices before pregnancy as confounding variables for weight gain after pregnancy. The effect of the intervention remained significant as seen from the corrected model value ( $p = 0.000$ ). The nutritional status of the subject can be seen in (Table 1). In line with the research of Pojda and Laura Kelley (2000) malnourished women contribute to the trans-generational cycle of malnutrition and poverty.<sup>24</sup> The period of a woman in a fertile condition is the most important period so that the intake of nutrients during

pre-pregnancy and pregnancy must be balanced in order to achieve optimal maternal nutritional status and health,

if nutritional status Inadequate motherhood causes impaired fetal growth and development in the womb.<sup>3,25</sup>

**Table 1: Nutritional status of subjects before and after intervention.**

| Nutritional status variable    | Intervention Group      |                         |                         | P value <sup>a,b,c</sup> |
|--------------------------------|-------------------------|-------------------------|-------------------------|--------------------------|
|                                | Group 1 (n=42)          | Group 2 (n=42)          | Group 3 (n=42)          |                          |
|                                | Rata-Rata±SD            | Rata-Rata±SD            | Rata-Rata±SD            |                          |
| BMI prospective brides         |                         |                         |                         |                          |
| Before                         | 22.28±2.70              | 21.67±3.11              | 20.97±3.54              | 0.029 <sup>c*</sup>      |
| After                          | 22.72±2.75              | 22.30±3.06              | 21.31±3.44              | 0.000 <sup>b*</sup>      |
| Δ                              | 0.44±0.40 <sup>1</sup>  | 0.34±0.29 <sup>2</sup>  | 0.34±0.37 <sup>2</sup>  | 0.011 <sup>c*</sup>      |
| P value <sup>d,e</sup>         | 0.00 <sup>d*</sup>      | 0.00 <sup>d*</sup>      | 0.00 <sup>e*</sup>      |                          |
| Weight gain for pregnant women |                         |                         |                         |                          |
| Before                         | 52.47±6.13              | 52.79±6.36              | 49.46±8.41              | 0.027 <sup>c*</sup>      |
| After                          | 65.34±4.99              | 64.27±5.68              | 59.46±8.25              | 0.000 <sup>b</sup>       |
| Δ                              | 12.86±2.45 <sup>1</sup> | 11.48±2.53 <sup>2</sup> | 10.00±2.65 <sup>3</sup> | 0.000 <sup>a</sup>       |
| P value <sup>e</sup>           | 0.00*                   | 0.00*                   | 0.00*                   |                          |

SD: standard deviation, : difference after-before; <sup>a</sup>Anova, <sup>b</sup>Ancova (adjusted BW before pregnancy and BW variable before pregnancy and nutrition practice before pregnancy on the addition of BW after pregnancy), Post hoc LSD: the same number on the same line shows no difference, <sup>c</sup>Kruskal wallis, <sup>d</sup>Paired t test, ewilcoxon, <sup>\*</sup>significant at p<0.05.

Preconception health is very important to pay attention to, including nutritional status in an effort to prepare for pregnancy which is closely related to the anthropometric health of newborns.<sup>1</sup> Anthropometric measurements of pregnant women used were weight gain during pregnancy and the size of the Midle Upper Arm Circumference (MUAC). If the nutritional status of the mother before pregnancy is good, the mother will give birth to a baby who is healthy, full term and has a normal weight. Pregnancy checkups, especially in monitoring the weight of pregnant women, need to be carried out regularly to monitor the needs of the mother and fetus during pregnancy.<sup>26</sup> Inadequate intake of nutrients will affect the storage and energy needs of the mother and the growth and development of the fetus in the womb. The weight gain is due to the development of the uterus and fetus.<sup>27</sup> Pregnancy causes increased metabolism of energy and other nutrients. Increased energy and nutrients are needed for fetal growth and development. The increase in the size of the uterine organs, changes in the composition and metabolism of the mother and the preparation for breastfeeding after giving birth. The nutritional status of pregnant women determines the weight of the baby born. The nutritional adequacy of pregnant women can be seen from their weight gain during pregnancy. Low or inappropriate maternal weight gain has a high risk of giving birth to a LBW baby. So that pregnant women should experience weight gain. The effect of the intervention can reduce the category of weight gain that does not match BMI from 116 (100%) to 46 (39.7%). Weight gain category according to BMI from 0 (0.0%) to 70 (60.3%). The results of the Spearman Rank correlation test showed that the weight gain of pregnant women was quite strong (if r=0.26-0.50) with body length (p<0.05; r=0.396), baby weight (p<0.05; r=0.430) and baby's head circumference (p<0.05; r=0.322). The weight gain of

subjects that were not in accordance with BMI gave birth to stunting babies, namely 11 (9.48%), LBW infants as many as 9 (7.76%) and abnormal head circumference, namely 1 (0.86%). The results of this study are in line with Ruchayati that the length of a baby's body is affected, one of which is weight gain during pregnancy.<sup>28</sup> Maternal nutritional status during pregnancy is a determining factor for fetal growth and development in the womb.<sup>29</sup> Mothers who have poor nutritional status, suffer from complications during pregnancy are predisposing factors for low infant health and have a 7 times risk of suffering from stunting compared to pregnant women with good nutritional status.<sup>2</sup>

### **Effect of nutrition education and nutritional supplementation interventions on newborn anthropometry**

The provision of education and nutritional supplementation since the bride and groom (premarital) until delivery, based on the distribution of outcome variables, showed that of 116 newborns, 13 babies (11.21%) had a body length of <48 cm, namely stunting. And as many as 11 (9.48%) had low birth weight (<2,500 grams). For the variable head circumference, 10 infants (8.62%) had abnormal head circumferences, i.e. <32 cm for male infants and <31 cm for female infants. The distribution of the number of cases at risk of stunting was highest in group 3 and the lowest cases in the group that received intervention in group 1. The average body length of the babies in the three groups was 49.21±1.36 cm. The results of the Kruskal Wallis statistical test showed that there was a significant difference in the mean body length of infants between groups (p=0.03). For the variable mean baby weight in the three groups that is equal to 2920.921±309.7 grams.

**Table 2: Effect of intervention on newborn anthropometric variables.**

| Antropometric newborn variable | Intervention Group |      |                |      |                |      | P value |
|--------------------------------|--------------------|------|----------------|------|----------------|------|---------|
|                                | Group 1            |      | Group 2        |      | Group 3        |      |         |
|                                | Mean±SD            |      | Mean±SD        |      | Mean±SD        |      |         |
|                                | N                  | %    | N              | %    | N              | %    |         |
| Body Length                    | 49.41±1.29         |      | 49.32±1.50     |      | 48.67±1.22     |      | 0.03*   |
| Stunting <48 cm                | 1                  | 0.9  | 5              | 4.3  | 7              | 6.0  |         |
| Stunting ≥48 cm                | 39                 | 33.6 | 35             | 30.2 | 29             | 25.0 |         |
| Body weight                    | 3013.83±299.79     |      | 2916.10±312.56 |      | 2823.03±294.06 |      | 0.04*   |
| LBW <2500 gram                 | 1                  | 0.9  | 4              | 3.4  | 6              | 5.2  |         |
| Normal ≥2500 gram              | 39                 | 33.6 | 36             | 31.0 | 30             | 25.9 |         |
| Head circumference             | 33.11±1.72         |      | 33.01±1.86     |      | 32.32±1.08     |      | 0.06    |
| Abnormal (P<31 cm; L<32 cm)    | 1                  | 0.9  | 4              | 3.4  | 5              | 4.3  |         |
| Normal (P>31; L>32 cm)         | 39                 | 33.6 | 36             | 31.0 | 31             | 26.7 |         |

\*Kruskal Wallis test, with a significance of  $p < 0.05$ , the same number in the same row shows no difference; LBW: low birth weight.

The results of the different test (Kruskal Wallis) showed a significant difference in the baby's weight variable between the three groups ( $p = 0.04$ ). The average head circumference of infants from the three groups was  $32.83 \pm 1.63$  cm. The results of the Kruskal Wallis test showed that there was no significant difference in the mean between the three groups ( $p = 0.06$ ). The highest average value of changes in the parameters of the baby's length, weight and head circumference was in the group that received the intervention of group 1 compared to groups 2 and 3. The results of further analysis with the post hoc Kruskal-wallis test showed that the group that was significantly different was group 1 and 3 with  $p < 0.05$ , while groups 2 and 3 and groups 1 and 2 were not significantly different/the difference was not significant ( $p > 0.05$ ). The Effect of intervention on newborn anthropometric variables can be seen in (Table 2).

The results of adjusted confounding variables show that the covariates that affect birth length are Hb levels of pregnant women, intake of folic acid, Vitamin A, difference in weight gain of pregnant women and knowledge of nutrition. For the birth weight of the baby, the covariates that affect the Hb level of pregnant women, intake of iron acid, Vitamin A, the amount of supplementation consumed by the mother and nutritional knowledge. These results are in line with research.<sup>30</sup> The results of adjusted confounding variables show that the covariates that affect birth length are Hb levels of pregnant women, intake of folic acid, Vitamin A, difference in weight gain of pregnant women and knowledge of nutrition. For the birth weight of the baby, the covariates that affect the Hb level of pregnant women, intake of iron acid, Vitamin A, the amount of supplementation consumed by the mother and nutritional knowledge. These results are in line with research.<sup>31</sup> Babies born with low birth weight and height <48 cm (risk of stunting) describe a growth disorder in the fetal or fetal period.<sup>32</sup> Allen in his research also emphasizes that the lack of various kinds of micronutrients causes problems in pregnancy and affects the outcome of

pregnancy.<sup>33</sup> Meeting the adequacy of micronutrients during the preconception period can contribute to improving the baby's birth length. The mean value of birth length in the group given the MM supplement was significantly higher than the birth weight in the control group ( $p = 0.001$ ).<sup>34</sup>

The relationship between the parameters of pregnancy weight gain and the incidence of stunting based on anthropometric variables of newborns showed that the body length of infants at risk of stunting was 13 (11.2%) born to mothers who had an increase in pregnancy weight that did not match the BMI of 11 (9.5%) and mothers who had weight gain/gain according to BMI were 2 (1.7%). Parameters of birth weight showed that 9 (7.8%) were born with LBW from mothers whose weight gain did not match BMI and 2 (1.7%) were born LBW from mothers whose weight increase/gain was in accordance with BMI. Pregnant women who have a weight gain that does not match their BMI have given birth to a baby with an abnormal head circumference of 1 (0.9%). The results of the spearman rho test showed that there was a relationship between weight gain/gain during pregnancy with the length of the baby's body, the baby's weight and the baby's head circumference ( $p < 0.005$ ).

## DISCUSSION

Prospective brides as the target of pre 1000 HPK, namely their nutritional status has major implications for the growth, development, and long-term health of their offspring. Inadequate nutritional intake before and during pregnancy will have an impact on the health of the mother and fetus in the womb. Maternal nutritional needs during pregnancy have increased for optimal health of the mother and fetus in the womb, if the intake is less then they will suffer from nutritional deficiencies both macro and micro.<sup>7,30-35</sup> The provision of micronutrient supplementation in the preconception period is more important than only given during pregnancy. Intervention during pregnancy will miss the critical preconception

period. Giving multi micro nutrients 2-6 months before pregnancy overcomes the problem of low quality of pregnancy outcomes (spontaneous abortion, prematurity and LBW).<sup>34</sup> The results of statistical tests showed that there was a significant difference in the mean weight gain of pregnancy in the three groups ( $p=0.000$ ). And there is an effect of weight gain of pregnant women (nutritional status) on pregnancy outcomes.

The nutritional status of the mother during pregnancy is a determining factor for the growth and development of the fetus in the womb.<sup>29</sup> Malnourished women contribute to the trans-generational cycle of malnutrition. The MMS supplementation intervention gave a larger mean change when compared to IFA.<sup>24</sup> This shows that the MMS intervention is more effective than the IFA supplementation intervention than Fe alone, combining Fe with Folic Acid or Fe with Vitamin C helps to improve the anthropometric quality of newborns, so it is recommended that supplementation should be given early in pregnancy or even before pregnancy in order to reserve nutrients in the newborn. the body is able to meet the increased needs before and during pregnancy.<sup>36</sup> Babies born with low birth weight and height <48 cm (risk of stunting) represent impaired growth in the fetus or fetal period.<sup>32</sup>

Lack of various types of micronutrients causes problems in pregnancy and affects pregnancy outcomes.<sup>33</sup> Meeting the adequacy of micronutrients during the preconception period can contribute to improving the baby's birth length. The mean length of the babies born from the group given the MM supplement was significantly higher than the birth weight of the babies given the control/IFA supplementation group ( $p=0.001$ ).<sup>37</sup> Various research has proven the superiority of MMS in overcoming pregnancy problems and low outcomes when compared to IFA.<sup>38</sup>

### Strength and limitations

The strength in this study is that the intervention of a combination of nutrition education and nutritional supplementation that is given is effective from the time of marriage to childbirth, changes nutritional status that affect the incidence of stunting in newborn anthropometry. Research results can reduce/break the cycle of malnutrition between generations. The limitations of this study are: the study was carried out during the COVID-19 pandemic, causing the implementation time to be more than planned. The implementation time starts from birth so it cannot measure the long term of this intervention against the intervention period in the first 1,000 days of life (mothers). breastfeeding and infants up to 2 years of age).

### CONCLUSION

Providing educational interventions and effective nutritional supplementation can change the parameters of the nutritional status of the subject and affect the length

of the baby's body and weight of the newborn ( $p<0.05$ ) and there is a relationship between weight gain during pregnancy and the length of the baby's body, baby's weight and head circumference ( $p<0.005$ ).

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