



# Application of Decision Support System for Infant Nutrition Women using Weighted Product on Health

Eva Darnila<sup>1</sup>, Fajriana<sup>2</sup>, Ulvityatni<sup>3</sup>

Department of Informatic, Universitas Malikussaleh, Indonesia

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## ABSTRACT

Pregnant women must understand and practice a healthy, nutritionally balanced lifestyle as an effort to maintain good nutrition. This is very necessary so that the fetus in the womb gets adequate nutrition so that it can avoid miscarriage, abortion, congenital defects, and low birth weight of the fetus. Selection of nutritional intake can be done with information about the mother's nutrition during pregnancy which can be processed and presented with a decision support system so that we can find out the effect on the baby that is born, that way, it is easy to determine the best nutrition that the mother should consume so that can give birth to a healthy baby. Research on maternal nutrition for infants used the weighted product method, with 5 criteria consisting of vegetables, fruits, meat / fish, nuts and milk. The research data were obtained from the results of filling out the questionnaire to 50 respondents with 48 pregnant women and 2 breastfeeding mothers at the Puskesmas Muara Dua Lhokseumawe, the questionnaire data was calculated manually by giving weight to each point so that the total amount of nutrition obtained by each respondent was obtained. the accuracy obtained is 18% and an error of 82%. The data concluded that only 18% of pregnant women had informed that the nutritional intake was good enough, while the remaining 82% had not informed the results of the nutrition intake properly.

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## Corresponding Author:

Eva Darnila  
Department of Informatic, Universitas Malikussaleh,  
Tengku Nie, Cot Rd, Reuleut Tim., Muara Batu, Kabupaten Aceh Utara, Aceh.  
Email: [eva.darnila@unimal.ac.id](mailto:eva.darnila@unimal.ac.id)

## 1. INTRODUCTION

Decision support system is a system capable of providing the ability, good ability of communicating the problem and the ability to issue semi-structured, decisions can be made of alternatives to the existing decision. Nutrition is a substance as builder component of the human body in order to correct and improve the network to function of the human body itself can be walked properly [1]. Ignoring nutrition also means we let the functions of the body's tissues do not work optimally.

Balanced nutrition is the arrangement of everyday foods that contain nutrients in the type and amount corresponding to the needs of the body, taking into accounts the principles of food, physical activity, behavior and clean living in body overseeing teraturdalam order to maintain a normal body weight to prevent nutritional problems [2].

Pregnancy is a process that became the beginning of life of future generations. One essential requirement for a healthy reproductive process is the requirement for energy, protein, carbohydrates, vitamins, and minerals and fiber. Inadequate intake of macro nutrients (carbohydrates, proteins and

fats) and micronutrients (folate, iron, calcium, iodine, and others) can cause problems of nutrition and health of the mother and her baby [3].

Pregnant women have different dietary needs from non-pregnant women, because a fetus is growing in their womb. Food needs are seen not only in portions but must be determined on the quality of the nutrients contained in the food consumed. For fetal growth and activity, it requires food that is distributed through the placenta. For this reason, pregnant women must get adequate nutrition for themselves and for their fetuses. So, for pregnant women, the quality and amount of food that is usually sufficient for their health must be supplemented with nutrients and energy so that fetal growth runs well. During pregnancy, the mother will experience many changes in her body so that it is ready to raise the fetus she is carrying, facilitate birth, and to produce breast milk for the baby she will be born with. If the mother experiences malnutrition during pregnancy it will cause problems, both for the mother and the fetus she is carrying, such as anemia, bleeding and the mother's weight does not increase normally [4].

Based on the researcher [2] Analysis of body weight and height on nutritional status, the aim of the study was to see the effect of weight and height on nutritional status. The results obtained were that there was a very strong relationship between body weight and height on nutrition. Decision support for the mother's nutrition system for babies needs to be done to find out the best nutrition that the mother should consume to give birth to a healthy baby, to prevent and minimize the birth of premature babies, stunting babies who are malnourished and babies born unlike babies in general. From the above problems, a solution is needed to overcome these problems by designing a decision support system so that it has fast computing and can provide accurate data.

Determining the best nutrition for pregnant women in a decision support system application using the Weight product method which can find out what pregnant women should consume so that they can give birth to healthy babies. The purpose of this study was to determine the best nutrition of mothers to babies and to design and classify the weighted product method in the decision-making system for maternal and infant nutrition at the health center [5].

## 2. RESEARCH METHOD

The research was done in the clinic estuary two Lhokseumawe because it has data and aspects that support for both systems to be built so that the research goes well, researchers at the start of January 2020, the data collection methods used in health centers is by visiting and interviewing langsung pregnant women through questionnaires.

The product weight method is a popular multi-criteria analysis decision method and is a multi-criteria decision-making method. The handover decision problem can be expressed as a matrix form and each row  $i$  corresponds to a candidate network  $i$  and each column  $j$  corresponds to an attribute. The following are characteristics [6].

Wp method calculation

$$w_j = \frac{w_j}{\sum_{j=1}^n w_j} \quad (1)$$

$w_j$  is the rank of positive value for the profit attribute, and the rank of negative value for the cost attribute.

Determination of the weight value S

$$S_i = \prod_{j=1}^n X_{ij} w_j \quad (2)$$

Information

- S = Alternative preference is analogous to the vector S
- $x_{ij}$  = The variable value of the alternatives for each attribute
- $w_j$  = The criterion weight value
- $i$  = alternative value
- $n$  = Number of criteria
- $j$  = criterion value

$\prod_{j=1}^n x_{ij}$  Multiply the alternative rating per attribute from  
 $j = 1 - n$ , On this alternative  
 Where  $\sum w_j = 1$

Determination of the weight value V

$$v_i = \frac{\prod_{j=1}^n x_{ij}^{w_j}}{\prod_{j=1}^n (x_j^*)} \quad (3)$$

Information:

v = The alternative preference is analogized as vector V

x = Value Criteria

w = Weight Criteria / Sub criteria

i = Alternative

j = Criteria

n = Number of criteria

$v_i$  is the result of preference alternatives to – i

$\prod_{j=1}^n = 1 x_{ij} * w_j$  s the sum of the multiplication of the attribute's alternative rating.

This accuracy stage aims to test the decision support system using the weight product method where the accuracy calculation method uses a comparison between the results of the pretest and posttest [6].

The formula for calculating accuracy is written as below

Accuracy useful for measuring the performance of a method

$$Accuracy = \frac{\text{amount of accurate data}}{\text{the total amount of data}} \times 100\% \quad (4)$$

b. Error is useful for measuring the degree of mismatch

$$Error = \frac{\text{amount of inaccurate data}}{\text{the total amount of data}} \times 100\% \quad (5)$$

### 3. RESULTS AND DISCUSSION

Determination of maternal nutrition system for infants is a system to determine the best nutritional intake should be in the mother so that she can give birth to a healthy baby, where we find cases of pregnant women who had a miscarriage, weight loss or even death. All of these cases are very berhubungan with maternal nutritional condition of early pregnancy to delivery.

Calculation of weighted product manual method this method to make decisions in a way to connect rating attributes multiplication, where each rating should be in the first pangkatkan with attribute weights are concerned, then proceed with the process of ranking the best alternative that will select from a number of alternatives.

Table 1. Weight Criteria

Criteria code	Criteria provisions	Weight	Attribute
X1	Vegetables	30%	Benefit
X2	Fruits	25%	Benefit
X3	Meat/fish	20%	Benefit
X4	Nuts	15%	Benefit
X5	Milk	10%	Benefit

Improvements criteria weights

Repairs carried criteria weights based on the formula [6], [7] as follows:

$$W1 = \frac{30}{30 + 25 + 20 + 15 + 10} = \frac{30}{100} = 0,3$$

$$W2 = \frac{25}{30 + 25 + 20 + 15 + 10} = \frac{25}{100} = 0,25$$

$$W3 = \frac{20}{30 + 25 + 20 + 15 + 10} = \frac{20}{100} = 0,2$$

$$W4 = \frac{15}{30 + 25 + 20 + 15 + 10} = \frac{15}{100} = 0,15$$

$$W5 = \frac{10}{30 + 25 + 20 + 15 + 10} = \frac{10}{100} = 0,1$$

Table 2. Improvement Weight Criteria

No.	Name	Criteria				
		C1	C2	C3	C4	C5
1	Retno novia	10	10	8	6	10
2	Permata setia ningsih	10	8	12	4	10
3	Martini	8	6	8	4	10
4	Intan julia	10	6	8	2	10
5	Sumarni	8	6	4	8	10
6	Nurlela AR	6	10	6	2	10
7	Devi maisara	8	6	4	4	10
8	Juairiah	6	6	6	4	10
9	Cut lia	6	8	6	6	0
10	Erliza	4	6	6	6	10
11	Sri arma yunita	4	6	6	4	0
12	Lisna wati	6	6	6	4	10
13	Indah hayati	6	6	6	4	0
14	Anisah khairunnisa	4	6	4	4	0
15	Monalisa	4	4	4	4	10
16	Misrawati	4	4	6	4	10
17	Nazariah	8	6	4	2	10
18	Hanum permata sari	6	6	2	2	10
19	Erdawati	8	6	4	2	10
20	Irmawati	8	4	4	2	10
21	Suryani	8	4	4	2	10
22	Susi susilawti	4	4	4	6	0
23	sarwana	2	2	2	2	0
24	Jumiati	6	6	4	4	10
25	Hasmariati	2	6	4	2	10
26	Saleha	6	6	4	2	10
27	Suranti	4	4	6	4	10
28	Husna rita	4	4	4	4	10
29	Rosna wati	4	4	6	0	10
30	Sri devi ratna sari	8	6	8	0	10

31	Budiana	4	2	6	2	0
32	Nurhayati	6	4	2	2	10
33	Khairunnisa	6	6	4	2	10
34	Maryani	2	4	8	2	10
35	Nurmala	4	4	2	2	10
36	Rosdiana B	2	4	2	2	10
37	Apriyanti	2	6	4	2	10
38	Liza	6	4	2	2	10
	Karista					
39	Maryati	4	4	4	2	10
40	Nurlaili	6	2	2	2	10
41	Rika	4	4	4	2	10
	mauliana					
42	Rosdiana A	4	6	2	2	10
43	Zulfia	2	4	4	0	0
	ananda					
44	Ellisa	4	4	2	2	10
45	Nuraini	2	2	2	2	10
46	Rahila	2	4	2	2	10
47	Nur fadilah	2	2	2	4	0
48	Siti zahara	2	2	4	2	10
49	Hilda	2	2	2	4	10
	agustia					
50	Devi ana	2	2	2	4	10

Determine the score for the process of calculating the score is based on formula as follows

Table 3. Score Value

No	Name	Score
1	Retno Novia	$(10^{0.3}) * (10^{0.25}) * (8^{0.2}) * (6^{0.15}) * (10^{0.1}) = 8.858$
2	Permata Setia ningsih	$(10^{0.3}) * (8^{0.25}) * (12^{0.2}) * (4^{0.15}) * (10^{0.1}) = 8.549$
3	Martini	$(8^{0.3}) * (6^{0.25}) * (8^{0.2}) * (4^{0.15}) * (10^{0.1}) = 6.861$
4	Intan Julia	$(10^{0.3}) * (6^{0.25}) * (8^{0.2}) * (2^{0.15}) * (10^{0.1}) = 6.612$
5	Sumarni	$(8^{0.3}) * (6^{0.25}) * (4^{0.2}) * (8^{0.15}) * (10^{0.1}) = 6.627$
6	Nurlela AR	$(6^{0.3}) * (10^{0.25}) * (6^{0.2}) * (2^{0.15}) * (10^{0.1}) = 6.085$
7	Devi Maisara	$(8^{0.3}) * (6^{0.25}) * (4^{0.2}) * (4^{0.15}) * (10^{0.1}) = 5.973$
8	Juairiah	$(6^{0.3}) * (6^{0.25}) * (6^{0.2}) * (4^{0.15}) * (10^{0.1}) = 5.942$
9	Cut Lia	$(6^{0.3}) * (8^{0.25}) * (6^{0.2}) * (6^{0.15}) * (0^{0.1}) = 0$
10	Erliza	$(4^{0.3}) * (6^{0.25}) * (6^{0.2}) * (6^{0.15}) * (10^{0.1}) = 5.591$

(calculations continue until the calculation of 50 alternative data).

Determine the vector for the process of calculating the value of the vector is based on the formula as follows:

Table 4. Rangking

No	Name	Vectore Value
1	Retno Novia	$8.858/(182.11054558794)$ = 0.049
2	Permata Setia Ningsih	$8.549/(182.11054558794)$ = 0.047
3	Martini	$6.861/(182.11054558794)$ = 0.038
4	Intan Julia	$6.612/(182.11054558794)$ = 0.036
5	Sumarni	$6.627/(182.11054558794)$ = 0.036

The calculation continues until the calculation of 50 score data).

The ranking is done by sorting the highest value to the lowest value

Table 5. Rangking

No.	Name	Vector	Ranking
1	Retno Novia	0.049	1
2	Permata Setia Ningsih	0.047	2
3	Martini	0.038	3
4	Intan Julia	0.036	4
5	Sumarni	0.036	5
6	Nurlela AR	0.033	6
7	Devi Maisara	0.033	7
8	Juairiah	0.033	8
9	Cut Lia	0	40
10	Erliza	0.031	10

(Calculation ranking proceed up to 50 data).

Search accuracy value is done by comparing the results of the pretest and posttest. Perangkingan pretest value is the result of a search using the Weight product whereas the result of addition sluruh posttest questionnaire data that has been done on ranking.

Table 6. Acuration

No	Name	Rangking		
		pretest	posttest	remark
1	Retno novia Permata setia	1	1	accurate
2	ningsih	2	2	accurate
3	Martini Intan	3	3	accurate
4	julia	4	4	accurate
5	Sumarni Nurlela	5	5	accurate
6	AR Devi	6	6	accurate
7	maisara	7	7	accurate
8	Juairiah	8	8	accurate
9	Cut lia	9	40	accurate
10	Erliza	10	10	accurate

(calculation accuracy proceeds up to 50 data)

*Presentation for accurate data results used formulas*

$$\text{Hasil akurat} = \frac{9}{50} \times 100\% = 18\%$$

*presentation on the results of data*

*inaccurate use the formula[5]*

$$\text{Inaccurate results} = \frac{41}{50} \times 100\% = 82\%$$

```
function calculation_wp(){
    $this->load->database();
    $this->load->database();
    $data = array('title' => 'Calculation WP', 'nama_menu' =>
'Calculation WP');
    $data['data_kriteria'] = $this->db->query("select * from
data_criteria where weight_dk != 0")->result();
    $data['data_questionnaire_profil'] = $this->db->query("select *
from data_questionnaire_profil order by pretest_dkp asc")->result();
    $this->load->view('h_header', $data);
    $this->load->view('d_header');
    $this->load->view('d_calculating_wp');
    $this->load->view('d_footer');
}
```

Figure 1. Listing of Product Weight Program

#### 4. CONCLUSION

From the questionnaire data taken from 50 respondents, the results of the accuracy test with the comparison of the pretest and posttest with the level of accuracy obtained can be concluded that only 18% of pregnant women have informed that the nutritional intake is good enough, while the remaining 82% still have not informed the results. nutritional intake that is consumed properly.

#### REFERENCES

- [1] Basri. (2017). Metode Weight Product (WP) Dalam Sistem Pendukung Keputusan Penerimaan Beasiswa Prestasi. *Jurnal Insypro*, vo.2, No.1, 2–3.
- [2] Fajriana, & Maryana. (2014). Analisis Berat Badan dan Tinggi Badan Terhadap Status Gizi. *Jurnal Energi Elektrik*, vo.3, No.2, 19.
- [3] Noer, R., & Yudihartanti, Y. (2015). Penerapan Metode Weighted Product Pada Proses Penentuan Pemenang Fashion Show. *ISSN*, vol.4, 815.
- [4] Pritasari, Damayanti, D., & Lestari, N. T. (2017). Gizi Dalam Daur Kehidupan.
- [5] Yustianingrum, L. N., & Adriani, M. (2017). Perbedaan Status Gizi dan Penyakit Infeksi pada Anak Baduta yang Diberi ASI Eksklusif dan Non ASI Eksklusif The Differences of Nutritional Status and Infection Disease in Exclusive Breastfeed and Non Exclusive Breastfeed Toddlers. *Research Study*, 1(4), 415–423. <https://doi.org/10.20473/amnt.v1.i4.2017.415-423>