POSSIBILITY FOR IMPROVING THE PLANNING OF THE NEEDS OF FOOD FROM BULGARIAN ARMY UNITS WHEN PARTICIPATING IN HUMANITARIAN OPERATIONS

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ABSTRACT

The extended range of possible tasks before the Bulgarian Army units requires disclosure and enforcement of specific approaches and techniques with which available military resources to be used to assist the civilians, seeking help and protection. This paper is an attempt to define the norms of food for civilians in need of humanitarian assistance. The object of study is planning the Bulgarian army units involved in humanitarian operations. The theme of the study is the definition of food to help civilians seeking help and protection, based on available defense products. To achieve the objective there have been used norms of the armed forces of the Bulgarian army, medical recommendations for food consumption per capita in Bulgaria and the lessons learned with the participation of armed forces in humanitarian operations. For the purpose of the definition of food is necessary to express the need in kilograms. To achieve this task, the analysis is oriented towards the implementation of two subtasks: determination of daily energy needs of an individual, and second – conversion of the necessary calories into food.

KEYWORDS: humanitarian operation, army units, planning

1. Introduction

Bulgarian Army possess the necessary resource capabilities, organizational culture and staff potential successfully and effectively to execute its tasks in providing humanitarian help to the population, affected by the progress of a complex crisis. To participate in humanitarian operations within the current operations, the ability for timely planning of the necessary material resources are highly limited compared to the similar planning of combat operation or peacekeeping. In the

existing regulative documents, there is no developed norms to cover all demographic categories of population, differentiated by age and gender.

The importance of humanitarian operations and the increased participation of Bulgarian Army units in them reveal the necessity for development of suitable planning factors to meet the needs of the population that seek help. In their development are kept the requirements of the international humanitarian operation

and the abilities of Bulgarian Army to conduct effective humanitarian operation. (UNHCR, 1995; Nichev, 2009)

2. Factors Affecting the Planning of a Humanitarian Operation

Since the escalation of a humanitarian operation in general is unpredictable, the establishment of a model covering the possible variants and analyzing the needs of the potential victims, will allow to shorten the response time of the military troops. The humanitarian operations differ in many factors, including its scale, duration, location, degree of affection and the recovery capabilities of the population. In the conduct of humanitarian operation, it is typical the presence of factors that require special actions by the logistics authorities.

The five factors affecting the planning of humanitarian operations are: location, demography of the affected population, condition of the recipients of the humanitarian assistance, existing infrastructure and duration of the operation.

The study of the various locations of possible humanitarian operations to great extent gives the opportunity to acquire the need of material resources. Geographical position and the corresponding climate can significantly affect the requirements of material resources of a supportive operation. To summarize the needs of material resources in dependence on the different locations, which may require humanitarian assistance, in the model the locations are divided based on the temperature and the climate of the region. Five types of climate are considered: hot-desert and hot-tropical, temperate, cold and extremely cold (Sullivan, 1995; Bulgarian Army Headquarters, 2006; Dimitrova & Nichev, 2011).

The term “demographics of the populations” refers to the statistical composition of the recipients of humanitarian assistance. These are: how many men, women and children and of

what ages need help. Military planning norms are based on a group of people, mostly men at the age of 18 to 45. Obviously these factors cannot cover the needs of a group of people of both genders in the age range 0-99 years. This variable is added to address the different needs of men, women and children.

The physical condition of the population receiving aid is important when determining the requirements for feeding and medical care. Two general categories regarding the physical condition are included in the model. The first category is the physical condition of the population injured prior to the start of the complex crisis. The second category of physical condition is determined by the degree of injury that the affected population got as a result of the crisis. It refers to the type, severity and injuries received.

The existing infrastructure is of a significant importance when construction materials, equipment, fuel, water are expected and the method of their delivery for the operation. The presence of functioning road systems makes more efficient the delivery of objects which delivery time is critical. The categorization of the infrastructure is: “functioning”, “damaged” and “nonexistent”. (NATO, 2015)

The duration of the operation is crucial for the logistics planning authorities because it answers the question whether follow-up, cyclic supplies of material resources are necessary, or the provision of single aid is sufficient. In this model the duration of the operation is classified as one of the following: short, temporary, continuous and of indefinite duration. Operations are classified as short if they do not last more than a month. Short operations usually do not require further supplies. Temporary operation is considered an operation that lasts more than a month, but less than 6 months. These operations required a supply cycle.

Operations which last between 6 months and one year are considered continuous. Operations of indefinite duration are characterized by a period exceeding one year. Besides cyclic supply, continuous operations and the operations of indefinite duration might require planning of material resources for replacement of worn materials.

Although many variables affect the specific material resources, few additional variables affect the needed, the actual quantities. From this perspective, the cultural and religious traditions of a population certainly affect the needed material resources, but the caused differences by these quality requirements won't significantly affect the actual amounts. The model is intended to cover the full range of humanitarian operations, it is very difficult to determine and make quantitative assessment of the extent of the cultural differences in a particular country or region. After the needed quantities are determined, it is necessary to examine the cultural and religious norms of the affected population in order to determine the exact nomenclature of the material resources.

3. Method for Development of Planning Factors for Food

The main task in determination of the planning factor for food is to determine the nutritional needs of the affected population. Human body gets energy from food and the most commonly used unit for measuring the energy value of food is calories. For the purpose of the study it is necessary to express the need in kilograms. To achieve this task, the analysis is oriented towards

the implementation of two subtasks: determination of daily energy needs of an individual, and second – conversion of the necessary calories into food (Bocov & Popova-Cholcheva, 1987; Sullivan, 1995; Nestorova, 2001).

The energy needs of the individual depend on age, physical activity, gender, body weight, growth and health status. The most popular and mostly used method is through recommended dietary values. They do not provide an easy way for calculation of energy needs for a short time in terms of planning (Nestorova, 2001; Paunov, 2002; Ministry of Health, 2005).

Much more rational and flexible way is to determine caloric needs based on the individual's weight, i.e. calories per kilogram of bodyweight. Summarized results for the relation between body weight and calories needed for different age groups in moderate physical activity are presented in Table no. 1.

To determine the amount of calories to feed the affected population, it is necessary to determine to what extent the population is fed. The assessment of the extent of feeding is done according to age category and internationally recognized standards for monitoring of health status. The determination of the calories needed by the population includes definition of average weight of each demographic group in the population and determination of the calories per kilogram body weight, considering the extent of feeding (World Food Programme, 2000; World Health Organization, 2000; World Health Organization, 2004).

Table no. 1

Summarized results for the relation between weight and calories

Age groups	Average energy need [kcal]		Average body weight [kg]		Calories per kilogram body weight [kcal]	
	men	women	men	women	men	women
0-12 months	647	611	7,5	7,1	86,27	86,06
1-3 years	1175	1166	13,1	12,4	89,69	94,03
3-7 years	1769	1607	20	20	88,45	80,35
7-10 years	2000	1779	27	27	74,07	65,89

Age groups	Average energy need [kcal]		Average body weight [kg]	Calories per kilogram body weight [kcal]		
	men	women		women	men	women
10-14 years	2648	2181	45	44	58,84	49,57
14-19 years	3256	2266	64	54	50,88	41,96
19-30 years	3071	2313	74	59	41,50	39,20
30-60 years	2927	2252	74	59	39,55	38,17
60-75 years	2472	2030	74	59	33,41	34,41
75 + years	2393	1999	70	57	34,19	35,07

After the needs of calories are calculated, it is necessary to transform the calories into food.

Based on the recommendations for energy and food intake which satisfy the physiological needs of the basic groups of Bulgaria's population, recommended products sets are made. The recommended products sets are consolidated in food groups. The need of food can be satisfied through different combination of food and the following food groups: bread and bakery; sugar and sugar products; milk and dairy; meat and meat products; fish, eggs and pulse; vegetables and vegetable cans; fruits and fruit cans (Bocov&Popova-Cholcheva, 1987; Nestorova, 2001; Petrova et al. 1998).

To determine the relationship between the quantity of food groups and the average energy needs, it is necessary to model the data for each food group, differentiated by gender and age for the needs of the current age groups and average energy needs. Therefore it is necessary to determine the relationship between calories and grams. Apart from calories need per individual, the distribution of calories must cover 35 % fat, 15 % protein and 50 % carbohydrates (Ministry of Defence, 2006).

Therefore, although the need of calories increases, the amount of food increase, the specific food groups are divided as in less calories need. Taking this into consideration, the linear relationship between calories and grams of food is analyzed and the method of least squares is used.

Using the calories and the quantity of products from particular food group, a model of linear regression of food group as a function of the energy needs is designed. That is, for the purpose of prognosis, by having the values of energy need and the regression correlation, we may suggest the values of a specific food group (Markov, 2002, Trifonov&Tsonkova 2007).

The model has the form:

$$y = a * x + b \quad (1)$$

where:

y – food group [gr.]

x – energy need [kcal]

a and b – unknown in the model

The coefficients **a** and **b** have to be the solutions to the system of two equations with two unknowns.

$$\frac{\partial S}{\partial a} = 2 \sum_{k=1}^n (y_k - (ax_k + b))(-x_k) = 0 \quad (2)$$

$$\frac{\partial S}{\partial b} = 2 \sum_{k=1}^n (y_k - (ax_k + b))(-1) = 0$$

The coefficients **a** and **b** could be calculated by the formulas:

$$a = \frac{n \sum_{k=1}^n x_k y_k - \sum_{k=1}^n x_k \sum_{k=1}^n y_k}{n \sum_{k=1}^n x_k^2 - \left(\sum_{k=1}^n x_k \right)^2} \quad (3)$$

$$b = \frac{\sum_{k=1}^n y_k - a \sum_{k=1}^n x_k}{n} \quad (4)$$

After replacing and calculating the following values of coefficients **a** and **b** are obtained:

$$a = 0,156942675159236 \approx 0,1569$$

$$b = 212,191082802548 \approx 212,1911$$

Therefore the equation for the correlation between energy needs and food

group “vegetables and vegetable cans” has the following analytical form:

$$y = 0,1569 x + 212,1911 \quad (5)$$

The graphical solution is presented in the following graphic:

Graphic no. 1 Correlation between energy needs and food group “vegetables and vegetable cans”

The strength of the correlation of the two variables x and y is measured by the correlation coefficient:

$$R = \frac{\sum_{k=1}^n (y_k - \bar{y})(x_k - \bar{x})}{\sqrt{\sum_{k=1}^n (y_k - \bar{y})^2 \sum_{k=1}^n (x_k - \bar{x})^2}} \quad (6)$$

After calculation, the following values of the correlation coefficient are obtained:

$$R = 0,865697227171529 \approx 0,87 > 0,7$$

The value of R , which is obtained, is indicative for very strong linear correlation between energy needs per day and vegetables and vegetable cans per person per day.

Using the method of least squares, the model is applied for the six types of food and the results of the analysis are summarized in Table no. 2.

Table no. 2

Summarized results for the quantity of food products from each food group, differentiated by gender, age and energy needs in moderate physical activity

Age groups	Gender	Average energy needs [kcal]	Bread, bakery, sugar and sugar products, [gr.]	Milk and dairy [gr.]	Meat and meat products, fish, eggs and pulse [gr.]	Eatable fat [gr]	Vegetables and vegetable cans, [rp]	Fruits and fruit cans, [rp]
1-3 years	m	1175	132	417	90	14	397	265
3-7 years	m	1769	248	402	130	23	490	346
7-10 years	m	2000	293	397	146	26	526	377
10-14 years	m	2648	420	380	190	35	628	466
14-19 years	m	3256	538	365	232	44	723	549
19-30 years	m	3071	502	370	219	42	694	523

Age groups	Gender	Average energy needs [kcal]	Bread, bakery, sugar and sugar products, [gr.]	Milk and dairy [gr.]	Meat and meat products, fish, eggs and pulse [gr.]	Eatable fat [gr]	Vegetables and vegetable cans, [rp]	Fruits and fruit cans, [rp]
30 + years	m	2927	474	373	209	39	672	504
60-75 years	m	2472	385	385	178	33	600	442
75 + years	m	2393	370	387	173	32	588	431
1-3 years	f	1166	131	417	89	14	395	264
3-7 years	f	1607	217	406	119	20	464	324
7-10 years	f	1779	250	402	131	23	491	347
10-14 years	f	2181	329	392	159	29	554	402
14-19 years	f	2266	345	390	164	30	568	414
19-30 years	f	2313	354	389	168	31	575	420
30-60 years	f	2252	342	390	163	30	566	412
60-75 years	f	2030	299	396	148	26	531	382
75 + years	f	1999	293	397	146	26	526	377

4. Conclusion

1. Increased role of the armed forces in solving humanitarian problems leads to the necessity for rapid and effective response to humanitarian disaster due to escalation of complex crises. The basis of this response is timely planning of the necessary material resources. Increased risk for the civilian population and the spread of the complex crises prove the necessity for elaboration of adequate planning factors. By using the results from the developed methods we improve planning the needs for material resources as part of the overall process of planning the logistical support of Bulgarian Army units, participating in humanitarian operations.

2. The analysis of the existing norms for planning of material resources in Bulgarian Army and the requirements of the international humanitarian community to meet the needs people in need is directed to improve the planning the demand of material resources when Bulgarian Army units participate in humanitarian operations.

The importance and practical focus of the developed planning factors are expressed in two directions. First, they allow the logistics authorities, responsible for planning humanitarian operations, to understand the structure of the different needs. In planning particular humanitarian operation, knowing the methodology for determination of planning factors would allow them to determine whether the drawn planning factors correspond to the requirements of the operation. Second, they simplify the process of actualization of the planning factors. This is based on clear definition of the used assumptions and quantitative expressions and if they include new material resources, it is necessary only to update the determined assumptions and weights.

3. Using previously developed planning factors leads to facilitation of the job of the logistics authorities in the immediate planning. This leads to time economy, forces and means for in-time to insure and carry out an effective humanitarian operation.

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