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ON PRIORITIZATION OF THE SUSCEPTIBILITY OF THE HOST TO OVERCOME THE INFECTION THROUGH FUZZY ANALYTICAL HIERARCHY PROCESS

B. ARUNRAJ
Department of Mathematics,
A. V. V. M. Sri Pushpam College (Autonomous),
Poondi 613 503, Thanjavur (DT), Tamil Nadu, India

Abstract

Health promotion is the process to enable people to increase and to improve health. It is not denoted against any particular disease, but is intended to strengthen the host through interventions. The health promotion depends on a combination many factors. The host defences may be strengthened to maintain the health promotion. The susceptibility of the host may be strengthened to maintain the health promotion. To estimate the priorities of the susceptibility, the fuzzy extent analysis, centre area of defuzzification and the cut methods are used in this paper. In order to perform pair-wise comparisons among fuzzy parameter, linguistic variables have been defined for several level of reference. The fuzzy triangular number used to represent these preferences. Finally, a comparison of three defuzzification approaches is presented through graphical distribute.

1. Introduction

Health and disease lie along a long continuum, and there is no single cut off point. The

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Key Words : *Determinants, Susceptibility, Defuzzification Approaches*

health promotion depends on various decisive factors: environment, life styles, nutrition, knowledge and social economic conditions. It is also influenced by the uncertainty susceptible such as age, sex, race and socioeconomic conditions. The environment of man has been divided in to three components: physical, biological and psychosocial. In most developing countries, defective environment continued to be cause the main health problem. Health requires the promotion of healthy life styles. Many current day health problems are associated with life style changes. The great advances have been made during the past 50 yrs in knowledge of nutrition. Specific nutritional defects were controlled by the application of nutritional knowledge. The socioeconomic conditions are dealt with many factors such as education, nutrition, housing, political system, employment etc.

In this paper, we used three methods to choose the priority of susceptibility. The determinants of health and the way of health promotion are obtained from the medical literatures. The various fuzzy methods are compared with each other for the estimation of choosing the priority of susceptibility of the hosts. Analytical hierarchy process (AHP) is one of the more useful methodologies and facilitates in selecting the optimized alternatives. Analytical hierarchy process (AHP) is combined with the fuzzy set theory and used to solve or support to choose priorities of susceptible considered. The rest of the paper is organized as follows. The data processing and rule base is presented in section 2. Section 3 describes the methodology and analysis. The conclusion and results are stated in section 4.

2. Data Processing and Rules Base

In this section, we discuss the determinants which requires for health promotion and susceptibility of the host priorities to promote the health. This information facilitates for better evaluation of the problem. Then the Fuzzy Analytical Hierarchy Process (FAHP) decision makes many tools to be discussed to priority the susceptible.

Determinants of health : Health is a multi factorial. The factors, which influence health, should be both within the individual and the society he lives. These factors interact and these interactions may be health promoting or deliberates only a few important factors are given here which is close related to health status such as environment socioeconomic conditions, behavioural (life style), nutrition and awareness. Those of the criteria are to be by its perfect handling and if not, the outcome is vice versa.

Susceptible of host to be prioritized : The human host is referred to as soil and the germs as 'seed'. The host factor plays a major role in determining the outcome of disease. The factors may be classified such as age, sex, race, socioeconomic conditions. Those factors are responsible for health deteriorative and that should be modified by intervention of determinates, thereby reducing the possibilities of occurrences of disease.

3. Fuzzy Analytical Hierarchy Process (FAHP) Decision Tools

Fuzzy Analytical Hierarchy Process (FAHP) decision tool consists of Analytical Hierarchy Process (AHP), Fuzzy Analytical Hierarchy Process (FAHP), fuzzy extent analysis, centre of area of defuzzification and α-cut analysis. Fuzzy Analytical Hierarchy Process (FAHP) methods are used to overcome the complexity of multiple criteria decision analysis on health promotion and its related matters. Analytical Hierarchy Process (AHP) resolves complex decisions by structuring the alternatives into pair-wise comparisons of individual judgments, rather than attempting to prioritize the entire list of decisions and criteria simultaneously. The Analytical Hierarchy Process (AHP) procedure generally involves six steps:

(i) Define the unstructured problem, stating clearly its objectives and outcomes.

(ii) Decompose the complex problem into decision elements (detailed criteria and alternatives).

(iii) Employ pair-wise comparisons among decision elements to form comparison matrices.

(iv) Use the Eigen value method to estimate the relative weights of decision-makers are consistent.

(v) Calculate the consistency properties of the matrices to ensure that the judgments of decision-makers are consistent.

(vi) Aggregate the weighted decision elements to obtain an overall rating for the alternatives.

A suitable measurement scale for the pair-wise comparisons, where verbal judgments are expressed by a degree of preference: Equally preferred = 1; Moderately preferred = 3; Strongly preferred = 5; Very strongly preferred = 7 and Extremely preferred = 9. The numbers 2, 4, 6 and 8 are used to distinguish similar alternatives. Reciprocals of these numbers are used to express the inverse relationship. The consistency index (CI) is calculated as

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{1}$$

where $\lambda_{\max}$ is the biggest Eigen value of the pair-wise comparison matrix. The consistency index of a randomly generated reciprocal matrix is called the random index (RI). The last ratio that has to be calculated is the consistency ratio (CR). If the consistency ratio (CR) is less than 0.1, the judgments are consistent and the derived weights can be used. The formula for calculating consistency ratio (CR) is simply

$$CR = \frac{CI}{RI}. \tag{2}$$

The use of fuzzy set theory allows the decision-makers to incorporate unquantifiable information, incomplete information, non-obtainable information, and partial facts in to the decision model. Although Fuzzy Analytical Hierarchy Process (FAHP) requires tedious computations, it is capable of capturing a humans appraisal of ambiguity when complex multi-criteria decision-making problems are considered.

4. Triangular Fuzzy Number

The fuzzy set theory introduced by Zadeh (1965) is suitable for handling problems involving the absence of sharply defined criteria. In a universal set of discourse X, a fuzzy subset A of X is defined by a membership-function $\mu_{\tilde{A}}(x)$ which maps each element x in A to a real number in the interval $[0, 1]$. The function value $\mu_{\tilde{A}}(x)$ represents the grade of membership of x in A. The larger the $\mu_{\tilde{A}}(x)$, the stronger is the grade of membership for x in A. A fuzzy number A in $\Re$ (real number) is a triangular fuzzy number if its membership function $\mu_{\tilde{A}}(x) = \Re \to [0, 1]$ is

$$\mu_{\tilde{A}}(x) = \begin{cases} (x-l)/(m-l), & l \leq x \leq m \\ (u-x)/(u-m), & \leq x \leq m \\ 0, & \text{otherwise} \end{cases} \tag{3}$$

with $-\infty < l \leq m \leq u < \infty$.

This membership function is illustrated in Fig.1:

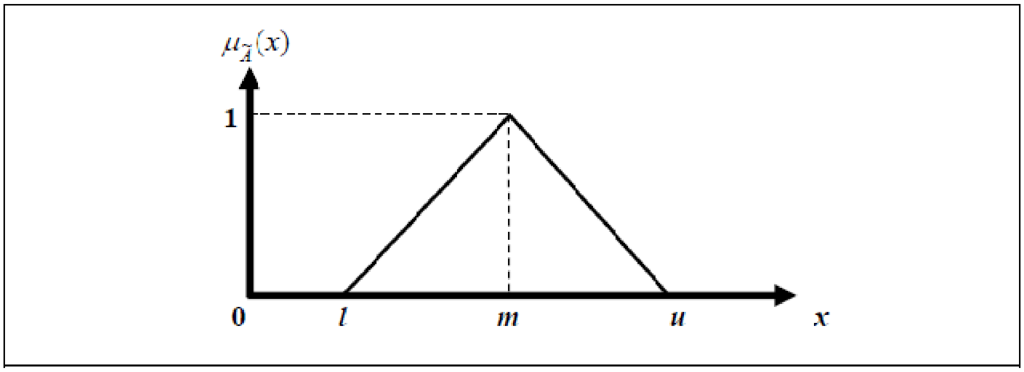

Fig.1: Fuzzy triangular number A = (*l*, *m*, *n*)

A triangular fuzzy number is a special kind of fuzzy number whose membership function is defined by three real numbers (l, m, u). Thus, l, m and u are the lower, mean and upper of the triangular fuzzy number. A fuzzy number can represent and expert's uncertain judgment. Many Fuzzy Analytical Hierarchy Process (FAHP) method based on triangular fuzzy number have been proposed. This study employs fuzzy extent analysis, which is easier to compute than other Fuzzy Analytical Hierarchy Process (FAHP) approaches. We also test the α-cut method and the centreof- area defuzzification method.

5. Linguistic Value

The concept of linguistic values is very useful in handling situations that are too complex or ill defined to be reasonably described in conventional quantitative expressions. In this paper, the triangular fuzzy numbers defined on $[0, 1]$ and / or the linguistic values characterized by triangular fuzzy numbers defined on $[0, 1]$ are utilized to convey the suitability evaluation of alternatives versus criteria. For example, $S = \{ES, VS, S, MS, EQ, IM\}$. The membership functions of those linguistic values are ES (Extremely strong) = (9, 9, 9); VS (Very strong) = (6, 7, 8); S (Strong) = (4, 5, 6); MS (Moderately strong) = (2, 3, 4); EQ (Equally strong) = (1, 1, 1); IM (Intermediate) = (7, 8, 9), (5, 6, 7), (3, 4, 5), (1, 2, 3).

Determine the pair-wise comparison matrices. The fuzzy scale regarding relative importance to measure the relative weights is given in Fig.2.

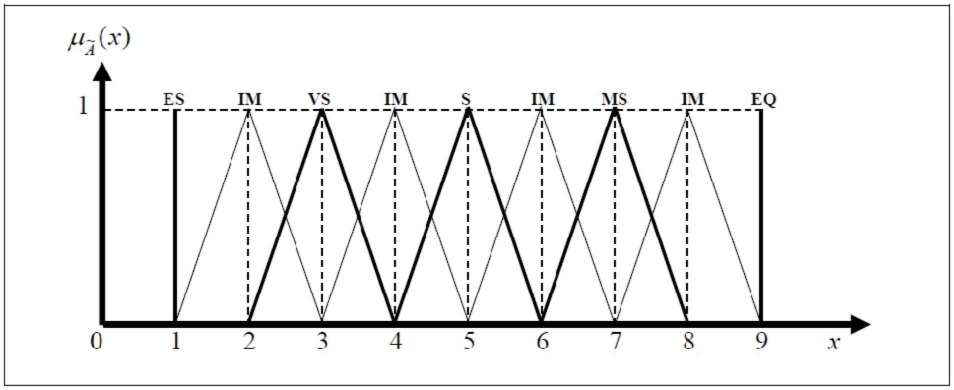

Fig.2: Triangular fuzzy numbers corresponding to linguistic variables representing levels of preference

6. Fuzzy Models

6.1. Fuzzy Extent Analysis

When the expert judgments are expressed as triangular fuzzy numbers, the triangular fuzzy comparison matrix is

$$\tilde{A} = (\tilde{a}_{ij})_{n\times n} = \begin{bmatrix} (1,1,1) & (l_{12}, m_{12}, u_{12} & \cdots & (l_{1n}, m_{1n}, u_{1n} \\ (l_{21}, m_{21}, u_{21}) & (1,1,1) & \cdots & (l_{2n}, m_{2n}, u_{2n}) \\ \vdots & \vdots & \cdots & \vdots \\ (l_{n1}, m_{n1}, u_{n1}) & (l_{n2}, m_{n2}, u_{n2} & \cdots & 1,1,1) \end{bmatrix} \tag{4}$$

where $\tilde{a}_{ij} = (l_{ij}, m_{ij}, u_{ij})$ and $\tilde{a}_{ij}^{-1} = \left(\frac{1}{u_{ij}}, \frac{1}{m_{ij}}, \frac{1}{l_{ij}}\right)$ for $i, j = 1, 2, \cdots, n$ and $\tilde{i} \neq \tilde{j}$. The steps of Chang's fuzzy extent analysis can be summarized follows:

- First, sum each row of the fuzzy comparison matrix $\tilde{A}$. Then normalizes the row sums (obtaining their fuzzy synthetic extent) by the fuzzy arithmetic operation

$$\begin{aligned}\tilde{S}_i &= \sum_{j=1}^{n} \tilde{a}_{ij} \otimes \frac{1}{\sum\limits_{k=1}^{n}\sum\limits_{j=1}^{n} \tilde{a}_{kj}} \\ &= \left(\frac{\sum\limits_{j=1}^{n} l_{ij}}{\sum\limits_{k=1}^{n}\sum\limits_{j=1}^{n} u_{kj}}, \frac{\sum\limits_{j=1}^{n} m_{ij}}{\sum\limits_{k=1}^{n}\sum\limits_{j=1}^{n} m_{kj}}, \frac{\sum\limits_{j=1}^{n} u_{ij}}{\sum\limits_{k=1}^{n}\sum\limits_{j=1}^{n} l_{kj}} \right), \quad i = 1, 2, \cdots, n\end{aligned} \tag{5}$$

where $\otimes$ denotes the extended multiplication of two fuzzy numbers. These fuzzy triangular numbers are known as the relative weights for each alternative under a given criterion, and are also used to represent the weight of each criterion with respect to the total objective. A weighted summation is then used to obtain the overall performance of each alternative.

- Second, compute the degree of possibility for $\tilde{S}_i \geq \tilde{S}_j$ by the following equation:

$$V(\tilde{S}_i \geq \tilde{S}_j) = \sup_{y \geq x}(\min(\tilde{S}_j(x) \geq \tilde{S}_j(y))). \tag{6}$$

This formula can be equivalently expressed as

$$V(\tilde{S}_i \geq \tilde{S}_j) = \begin{cases} 1, & m_i \geq m_j \\ \frac{(u_i - l_i)}{(u_i - m_i) + (m_j - l_j)}, & l_j \leq u_i, i, j = 1, 2, 3, \cdots, nl; i \neq j \\ 0, & \text{otherwise} \end{cases} \tag{7}$$

where $\tilde{S}_i = (l_i, m_i, u_i)$ and $\tilde{S}_j = (l_j, m_j, u_j)$.

Fig. 3 illustrates this degree of possibility for two fuzzy numbers.

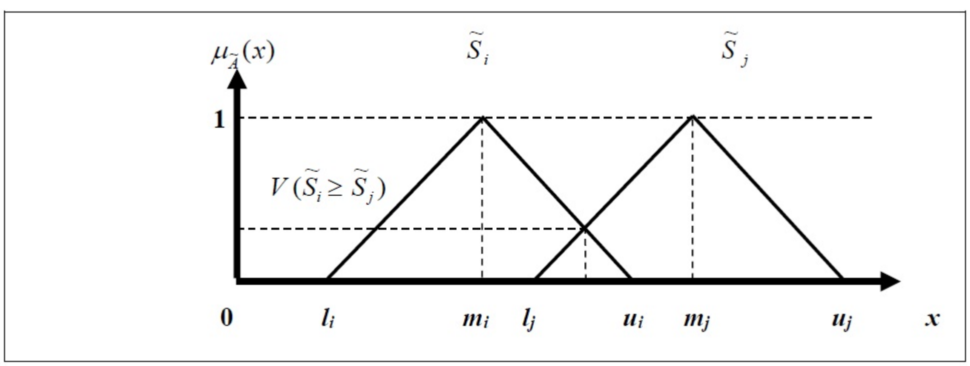

Fig.3: The degree of possibility $V(\tilde{S}_i \geq \tilde{S}_j)$

- Finally, estimate the priority vector $W = (w_1, w_2, \cdots, w_n)^T$ of the fuzzy comparison matrix $\tilde{A}$ as follows:

$$w_i = \frac{V(\tilde{S}_i \geq \tilde{S}_j | j = 1, 2, \cdots, n; i \neq j)}{\sum\limits_{k-1}^{n} V(\tilde{S}_k \geq \tilde{S}_j | j = 1, 2, \cdots, n; j \neq k)}, \quad i = 1, 2, \cdots, n., \tag{8}$$

It is also necessary to consider the weaknesses of fuzzy extent analysis. This method has two main problems: The extent analysis method may assign zero weight to a decision criterion or alternative, leading to its exclusion from the analysis. The weights determined by the extent analysis method do not represent the relative importance of decision criteria or alternatives. So cannot be used as their priorities. It should be noted, however, that these two drawbacks are also important features of the site selection process. The first is related to non-compensatory decision-making (veto dimensions), and the second to conceptual interaction and conditional relevance. Both concepts stem from functional classification theory, and are used when detection of the best site is of prime importance to the decision-maker and there is no the priorities and weights of alternatives. Even so, other methods could be applied to address the above issues. Two of them are introduced in the following subsections.

6.2. Centre-of-area Defuzzification

The centre-of-area defuzzification method is a way of transforming fuzzy triangular numbers into real numbers. This method can determine actual site priorities and overall scores. For a convex fuzzy number $\tilde{C}$, a real number x^* corresponding to its centre or area of $\tilde{C}$ can be estimated as

$$x^* = \frac{\int x\mu_{\tilde{C}}(x)dx}{\mu_{\tilde{C}}(x)dx}. \tag{9}$$

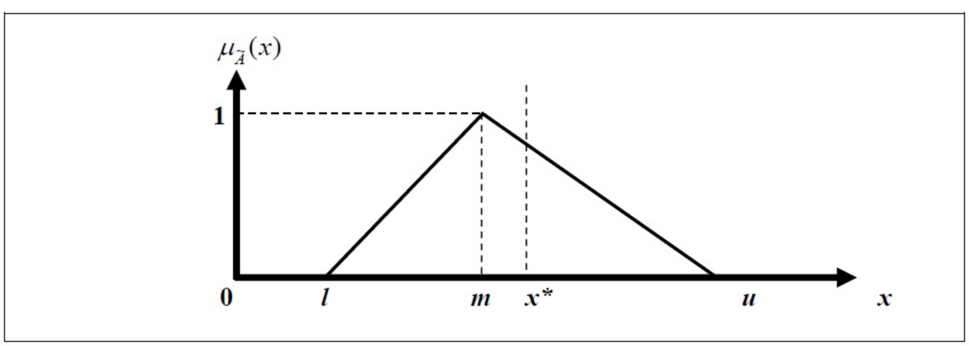

Fig.4: Centre-of-area method for defuzzifying a triangular fuzzy number

6.3. α-Cut Method

In this method, fuzzy extent analysis is applied to calculate the weights and performance matrix for criteria, as well as alternatives under each criterion. A fuzzy weighed sum performance matrix ($\tilde{p}$) can be derived for the alternatives by multiplying the fuzzy weight vector related to criteria with the decision matrix for alternatives under each criterion, and summing the obtained vectors

$$\tilde{p} = \begin{pmatrix} (l_1, m_1, u_1) \\ (l_2, m_2, u_2) \\ \vdots \\ (l_n, m_n, u_n) \end{pmatrix} \tag{10}$$

where n is the number of alternatives. The α-cut method, according to pan (2008), compares two fuzzy numbers A and B in terms of their α-cuts $A_\alpha = [a_\alpha^-, a_\alpha^+]$ and $B_]al = [b_\alpha^-, b_\alpha^+]$. The intervals gives are the upper and lower bounds within which the membership function of A and B area greater than or equal to α. We say that A is smaller than B, denoted $A \leq B$, if $a_\alpha^- < b_\alpha^-$ and $a_\alpha^+ < b_\alpha^+$ for all α in the interval $[0, 1]$. The α-cut method accounts for uncertainty in the fuzzy ranges chosen. In this case, the more α-cuts are examined; the more reliable results are achieved. The α-cuts can be applied to transform the total weighted performance matrices into interval performance matrices, which provide α-left and α-right for each alternative as follow:

$$\tilde{p} = \begin{pmatrix} (l_1, m_1, u_1) \\ (l_2, m_2, u_2) \\ \vdots \\ (l_n, m_n, u_n \end{pmatrix} \tag{11}$$

$\alpha\ \ left\ = \alpha \times (m - 1), \alpha\ right\ \ = u - \alpha \times (u - m)$. The last step is convert interval matrices into crisp values. This is done by applying the lambda (λ) function, which also represents the attitude of the decision-maker. Decision-makers with optimistic, moderate and pessimistic attitudes take on a maximum, intermediate, or minimum lambda values in the range [0, 1] respectively:

$$C_\lambda = \begin{pmatrix} C_{\lambda_1} \\ C_{\lambda_2} \\ \vdots \\ C_{\lambda_n} \end{pmatrix}, \quad C_\lambda = \lambda + \alpha - \ right \quad + (1-\lambda) \times \alpha - \ left, \tag{12}$$

where they C_λ are crisp values corresponding to lambda (f). These values should be normalized to similar scales.

Table 1

	S_1	S_2	S_3	S_4	S_5	Fuzzy synthetic extent
S_1	(1, 1, 1)	(1/5, 1/4, 1/3)	(1, 1, 1)	(1/3, 1/2, 1)	(1/7, 1/6, 1/5)	(0.049, 0.067, 0.104)
S_2	(3, 4, 5)	(1, 1, 1)	(3, 4, 5)	(2, 3, 4)	(1/3, 1/2, 1)	(0.170, 0.285, 0.469)
S_3	(1, 1, 1)	(1/5, 1/4, 1/3)	(1, 1, 1)	(1/3, 1/2, 1)	(1/7, 1/6, 1/5)	(0.049, 0.067, 0.104)
S_4	(1, 2, 3)	(1/4, 1/3, 1/2)	(1, 2, 3)	(1, 1, 1)	(1/6, 1/5, 1/4)	(0.062, 0.126, 0.227)
S_5	(5, 6, 7)	(1, 2, 3)	(5, 6, 7)	(4, 5, 6)	(1, 1, 1)	(0.292, 0.456, 0.704)

Table 2

	S_1	S_2	S_3	S_4	S_5	Fuzzy synthetic extent
S_1	(1, 1, 1)	(2, 3, 4)	(2, 3, 4)	(4, 5, 6)	(6, 7, 8)	(0.268, 0.417, 0.640)
S_2	(1/4, 1/3, 1/2)	(1, 1, 1)	(1, 1, 1)	(2, 3, 4)	(4, 5, 6)	(0.148, 0.227, 0.348)
S_3	(1/4, 1/3, 1/2)	(1, 1, 1)	(1, 1, 1)	(2, 3, 4)	(4, 5, 6)	(0.148, 0.227, 0.348)
S_4	(1/6, 1/5, 1/4)	(1/4, 1/3, 1/2)	(1/4, 1/3, 1/2)	(1, 1, 1)	(1, 2, 3)	(0.048, 0.085, 0.146)
S_5	(1/8, 1/7, 1/6)	(1/6, 1/5, 1/4)	(1/6, 1/5, 1/4)	(1/3, 1/2, 1)	(1, 1, 1)	(0.032, 0.045, 0.074)

Table 3

	S_1	S_2	S_3	S_4	S_5	Fuzzy synthetic extent
S_1	(1, 1, 1)	(1, 2, 3)	(1/3, 1/2, 1)	(1, 1, 1)	(2, 3, 4)	(0.114, 0.216, 0.407)
S_2	(1/3, 1/2, 1)	(1, 1, 1)	(1/4, 1/3, 1/2)	(1/3, 1/2, 1)	(1, 2, 3)	(0.062, 0.125, 0.264)
S_3	(1, 2, 3)	(2, 3, 4)	(1, 1, 1)	(1, 2, 3)	(4, 5, 6)	(0.193, 0.375, 0.692)
S_4	(1, 1, 1)	(1, 2, 3)	(1/3, 1/2, 1)	(1, 1, 1)	(2, 3, 4)	(0.114, 0.216, 0.407)
S_5	(1/4, 1/3, 1/2)	(1/3, 1/2, 1)	(1/6, 1/5, 1/4)	(1/4, 1/3, 1/2)	(1, 1, 1)	(0.043, 0.069, 0.132)

Table 4

	S_1	S_2	S_3	S_4	S_5	Fuzzy synthetic extent
S_1	(1, 1, 1)	(1/3, 1/2, 1)	(1/3, 1/2, 1)	(1/4, 1/3, 1/2)	(1/4, 1/3, 1/2)	(0.0516, 0.0870, 0.1860)
S_2	(1, 2, 3)	(1, 1, 1)	(1, 1, 1)	(1/3, 1/2, 1)	(1/3, 1/2, 1)	(0.0873, 0.1630, 0.3256)
S_3	(1, 2, 3)	(1, 1, 1)	(1, 1, 1)	(1/3, 1/2, 1)	(1/3, 1/2, 1)	(0.0873, 0.1630, 0.3256)
S_4	(2, 3, 4)	(1, 2, 3)	(1, 2, 3)	(1, 1, 1)	(1, 1, 1)	(0.1429, 0.2935, 0.5581)
S_5	(2, 3, 4)	(1, 2, 3)	(1, 2, 3)	(1, 1, 1)	(1, 1, 1)	(0.1429, 0.2935, 0.5581)

Table 5

	S_1	S_2	S_3	S_4	S_5	Fuzzy synthetic extent
S_1	(1, 1, 1)	(1, 2, 3)	(2, 3, 4)	(3, 4, 5)	(2, 3, 4)	(0.0516, 0.0870, 0.1860)
S_2	(1/3, 1/2, 1)	(1, 1, 1)	(1, 2, 3)	(2, 3, 4)	(1, 2, 3)	(0.0873, 0.1630, 0.3256)
S_3	(1/4, 1/3, 1/2)	(1/3, 1/2, 1)	(1, 1, 1)	(1, 2, 3)	(1, 1, 1)	(0.0873, 0.1630, 0.3256)
S_4	(1/5, 1/4, 1/3)	(1/4, 1/3, 1/2)	(1/3, 1/2, 1)	(1, 1, 1)	(1/3, 1/2, 1)	(0.1429, 0.2935, 0.5581)
S_5	(1/4, 1/3, 1/2)	(1/3, 1/2, 1)	(1, 1, 1)	(1, 2, 3)	(1, 1, 1)	(0.1429, 0.2935, 0.5581)

Table 6

	S_1	S_2	S_3	S_4	S_5	Fuzzy synthetic extent
S_1	(1,1,1)	(2,3,4)	(1/5,1/4,1/3)	(1/3,1/2, 1)	(1/4,1/3, 1/2)	(0.0725, 0.1284, 0.2391)
S_2	(1/4,1/3,1/2)	(1,1,1)	(1/7,1/6,1/5)	(1/5,1/4,1/3)	(1/5,1/4,1/3)	(0.0343, 0.0505, 0.0828)
S_3	(3, 4, 5)	(4, 5, 6)	(1,1,1)	(1, 2, 3)	(1, 2, 3)	(0.1916, 0.3537, 0.6299)
S_4	(1, 2, 3)	(3, 4, 5)	(1/3,1/2, 1)	(1,1,1)	(1/3,1/2, 1)	(0.1086, 0.2021, 0.3849)
S_5	(2, 3, 4)	(3, 4, 5)	(1/3,1/2, 1)	(1, 2, 3)	(1,1,1)	(0.1405, 0.2653, 0.4899)

Table 7

	1	2	3	4	5	6
Eigen value (λ_{MAX})	5.0422	5.0828	5.0172	5.0132	5.0331	5.1310
Consistency Index (CI)	0.0106	0.0207	0.0043	0.0033	0.0083	0.0327
Random Index (RI)	1.12	1.12	1.12	1.12	1.12	1.12
Consistency Ratio (CR)	0.0094	0.0185	0.0038	0.0030	0.0074	0.0292

Table 8

	S_1	S_2	S_3	S_4	S_5
Fuzzy weighted sum	(0.09,0.29,0.89)	(0.07,0.22,0.73)	(0.06,0.18,0.56)	(0.04,0.14,0.47)	(0.06,0.18,0.58)

Table 9

	Fuzzy extent analysis			Centre-of-area defuzzification			α-cut based method		
	$V(\tilde{S}_i \geq \tilde{S}_j)$	Normalized	Priority weight (w)	x^*	Normalized	Priority weight (w)	C_λ	Normalized weight (w)	Priority
S_1	1	0.235	1	0.422	0.279	1	0.276	0.285	1
S_2	0.909	0.214	2	0.3396	0.225	2	0.216	0.223	2
S_3	0.813	0.191	4	0.266	0.176	4	0.173	0.178	4
S_4	0.718	0.169	5	0.217	0.143	5	0.134	0.138	5
S_5	0.813	0.191	3	0.269	0.178	3	0.170	0.176	3

7. Methodology and Analysis

Pair-wise comparison matrices were generated to compare alternative with respect to each criterion. Based on the experts own opinion, the evaluation is made. These matrices were then used to calculate the consistency ration of each decision making matrix as represented in table 1 to 6. A new pair-wise comparison matrix according to Fuzzy Analytical Hierarchy Process (FAHP) method is used. The weighted sum of the triangular fuzzy number is computed and in this manner, the total fuzzy weights of each 1S' is obtained. The total fuzzy weights and priorities of all candidate 'S' are presented in table 8. Finally, a comparison of three defuzzification approach is presented fig.5.

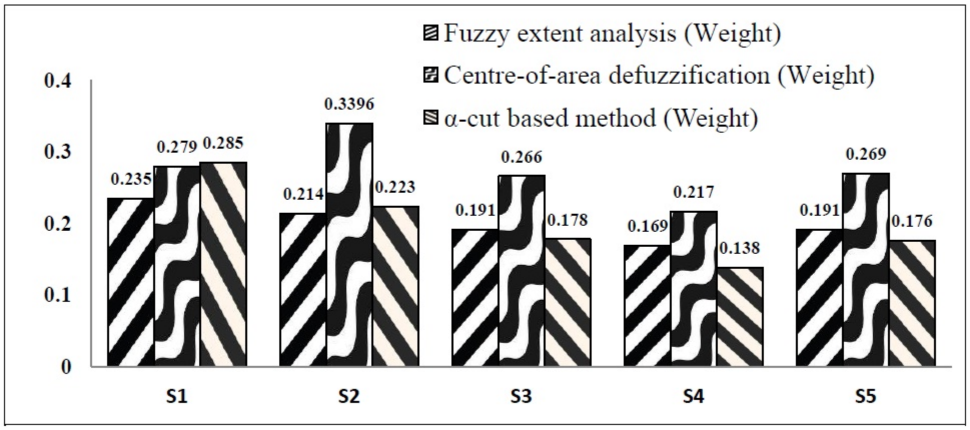

Fig.4: Comparison of the total weights acquired from each of the three defuzzification method.

8. Result and Conclusion

Using fig.1, determination of weights of criteria and sub-criteria, the fuzzy triangular numbers and the linguistic values are utilized to convey the suitability evaluation of alternatives versus criteria. Using fig.2, the fuzzy scale regarding relative importance to measure the relative weights is observed. Using fig.3, the weighted summation is used to overall performance of each alternative. Using fig.4, the actual site properties and overall scores are determined. It transforms fuzzy triangular numbers into real numbers. Using fig.5, a comparison of the total weights acquired from each of the three defuzzification methods is presented.

Conclusion : This paper proposes a method for the prioritization of the susceptibility of the host to overcome the infection through fuzzy analytic hierarchy process. Prioritization of susceptibility of the host is fuzzy parameter which is associated with the determinants and host factors. The main difference between classical methods and fuzzy method is the later model exploits uncertainty parameters whereas the classical model does not. Due to uncertain biological phenomena, a comparison of three defuzzification approaches enables our computational simulation to much more faithfully portray the phenomena under study.

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