

## HEALTH STATUS INDEX USING INTUITIONISTIC FUZZY APPROACH

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### ABSTRACT

In order to drive an operational health status index, it is difficult to define the functional status of human body. In the present paper a Intuitionistic fuzzy approach has been proposed for the use in expressing the health status and its index. We introduce the concept of fuzziness and Intuitionistic fuzzy set in order to study the ambiguous health status. In our study health status has been divided into four factors and seems to be classified into four modes. This study may be useful for those human beings, who are more concerned about their health status. If an individual knows the status of iodine, iron, vitamin A, and folic acid in his body through pathological examinations, he would be able to know the index of his health status. Higher index value, that is closer to unity, indicates a good health in terms of the efficiency of the body and resistance to fight common diseases. A lower value nearing zero may alarm him to be concerned about his level of micronutrients and take necessary steps accordingly. This methodology can be applied to other areas of medical sciences.

**Keywords:** Health Status Index, I.F.S.(Intuitionistic fuzzy sets), Medical Diagnosis, Fuzzy Relations.

### INTRODUCTION

In this paper, we have used Intuitionistic fuzzy approach for interpretations of various factors that effect human health. This paper intends to apply Intuitionistic fuzzy tools to determine a functional status of human body in terms of health status index, using absorption of quantities of iron, iodine, vitamins and folic acid. Studies confirm that becoming depleted in even one nutrient can cause us to suffer a variety of ailments and can certainly predispose us to infection, allergies and even cancer. Our adolescent and elderly population is especially at risk. In order to device an operation health status index; it is necessary to develop the concept of health status. An individual belongs to one of several alternative health statuses, but it is difficult to clearly identify which status is better because the boundaries of statuses are not sharply defined. We introduce the concept of fuzziness and Intuitionistic fuzzy multiple criteria of health status. As doctors or patients often diagnose patients health statuses using the information from imprecise multiple criteria, based on their medical knowledge and their subjective judgment, we try to express the health status in the same way using the Intuitionistic fuzzy integral.

In this paper, we deal with health status as an intrinsically imprecise and multi-dimensional expression which is determinable through some subjective judgment.

**Micronutrients-**Micronutrients are needed only in minuscule amounts; these substances are the “magic wands” that enable the body to produce enzymes, hormones and other substances essential for proper growth and development. Micronutrients are essential elements needed for life in small. They include minerals and Vitamins. Microminerals or trace elements include at least iron, cobalt, chromium, copper, iodine, manganese, selenium, zinc, and molybdenum. They are dietary minerals needed by the human body in very small quantities (generally less than 100mg/day) as opposed to macrominerals which are required in larger quantities. Vitamins are organic chemicals that a given living organism requires in trace quantities for good health, but which the organism cannot synthesize, and therefore must obtain from its diet. The consequences of their absence are severe. Iodine, vitamin A and iron are most important in global public health terms; their lack represents a major threat to the health and development of populations the world over. Vitamins are a group of organic compounds necessary for growth and maintenance of good health in human beings. Vitamins are indispensable for body function and are required in small quantities.

Following micronutrients have been included for the study involved in this paper:

**Iron** - Iron is needed to make healthy red blood cells, which supply the body with oxygen. Without enough iron, immune function and energy levels decline. Yet iron requires careful attention to be of benefit. Too much and too little are equally undesirable.

**Iodine** - Iodine is required for the synthesis of thyroid hormones which in turn are needed for the regulation of metabolic activities of all cells throughout the life cycle. They are also required to ensure normal growth, especially of the brain, which occurs from fetal life to the end of the third postnatal year. Consequently, if severe enough, iodine deficiency will impair thyroid function, resulting in a lower metabolic rate, growth retardation and brain damage. The long-term consequence is irreversible mental retardation.

**Vitamin A** - Vitamin A is primarily represented by cyclic polyene alcohol vitamin A<sub>1</sub> (retinal) whose other active forms are retinal, retinoic acid etc. Beta-carotene is a precursor of vitamin A and is converted to vitamin A as and when needed by the body. Vitamin A fights free radicals, enhances immune function, reduces the consequences of some infectious diseases and may protect against the development of malignancies.

**Vitamins/Minerals-** Vitamins cannot be assimilated without the aid of minerals. Adequate amounts of vitamins A, C, D and B complex are provided besides a judicious combination of supplements of boost the metabolic activities of the human body.

**Iron normal & Folic acid**

$$\begin{aligned}
&= \max \left[ .125 \quad .208 \quad .292 \quad .375 \right] \circ \begin{bmatrix} .050 & .075 & .425 & .450 \\ .075 & .100 & .400 & .425 \\ .100 & .125 & .375 & .400 \\ .128 & .205 & .282 & .385 \end{bmatrix} \\
&= \max \left[ \min (.125, .208, .292, .375), \min (.125, .208, .292, .375), \right. \\
&\quad \left. \min (.425, .400, .375, .375), \min (.450, .425, .400, .385) \right] \\
&= \max [.125, .125, .375, .385] = .385
\end{aligned}$$

Different combinations of Iron, Iodine, Vitamin A and Folic acid within the classification severe, moderate, mild and normal can be obtained in a similar manner.

**5. RESULT AND DISCUSSION**

It is difficult to define the functional status of human body. In the present paper a Intuitionistic fuzzy approach has been proposed for the use in expressing the health status and its index. In our study health status has been divided into four factors and seems to be classified into four modes. This study may be useful for those human beings, who are more concerned about their health status. If an individual knows the status of iodine, iron, vitamin A, and folic acid in his body through pathological examinations, he would be able to know the index of his health status. Higher index value, that is closer to unity, indicates a good health in terms of the efficiency of the body and resistance to fight common diseases. A lower value nearing zero may alarm him to be concerned about his level of micronutrients and take necessary steps accordingly. This methodology can be applied to other areas of medical sciences.

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