# Computer Program of Nutrition Assessment for Elderly Dietary Planning by Using Food Exchangelist

**Achara Dholvitayakhun**
Faculty of Science and Technology, Rajamangala University of Technology Lanna Tak
41/1 moo 7 Phaholyothin road, Mai-Ngarm, Muang, Tak, Thailand 63000
achara2518@yahoo.co.th

**Kriangkrai Kaewwongkhieo**
Faculty of Business Administration, Northern College
888 moo 2 Phaholyothin road, Nong Bua Tai, Muang, Tak, Thailand 63000
kaewwongkhieo@gmail.com

**Jukkrit Kluabwang**
Faculty of Engineering, Rajamangala University of Technology Lanna Tak
41/1 moo 7 Phaholyothin road, Mai-Ngarm, Muang, Tak, Thailand 63000
jukkrit_k@rmutl.ac.th

## ABSTRACT

Statistics in Thailand show that the elderly population aged over 60 years will increase continuously, from 13.2 percent in 2010 to 32.1 percent in 2040. In addition, over 80% of the elderly suffer at least one chronic condition, and 50% have at least two. The situation of elderly people is leading to rising progressively cost of caring and threatens the economic well-being of many nations around the world. Nutrition has been recognized as an important factor in influencing the functional outcome of aging. Therefore, it is extremely important to develop adequate and helpful means to assist the elderly inself-controlling their nutritional state while healthy, and when managing chronic diseases such as diabetes and hypertension. Energy balance method associated with food exchange list is the commonly used method to solve the diatary planning prolem, elderly case also use this method as well. Usually, the energy balance method's solutions can be obtained by trial and error approach or experience-dependent approach, such that it may inconvenient for elderly taking care themselves. This research proposed an alternative finding proper solutions of the elderly dietary planning problem by using an efficient iterative computation. The proposed method was coded in PHP language due to it is familiar with social network. The computational results from five males and five female elderly samples show that their all solutions met all constrains within a few milliseconds by a notebook. The performance of the proposed method is satisfied our basic requirements and will be extended to further challenges.

**Key Words:** energy balance method, food exchange list, dietary planning, elderly population

## INTRODUCTION

The elderly population in Thailand will increase continuously, from 13.2 percent in 2010 to 32.1 percent in 2040 [1]. According to projections by the US Census Bureau, about 1 in 5 Americans would be elderly by the year 2030, compared with about 1 in 8 Americans in 1994. In addition, over 80% of the elderly suffer at least one chronic condition, and 50% have at least two [2]. The situation of elderly people is leading to rising progressively cost of caring and threatens the economic well-being of many nations around the world. Nutrition has been recognized as an important factor in influencing the functional outcome of aging [3] therefore, It is extremely important to develop adequate and helpful means to assist the elderly inself-controlling their nutritional state while healthy, and when managing chronic diseases such as diabetes and hypertension. Energy balance method and also food exchange list for each person are one method that is used to solve malnutrition situation [4].

## METHODOLOGY

How to plan dietay for elderly by using food exchange list and energy balance is the main objective of this research. The dietary planning plays an important key to formulating a hard-to-solve problem. Typically, optimal solutions came from experienced nutrinists either or tedious computation. This research proposes an alternative way to solve the problem by using a searching technique described step by step in Figure I.

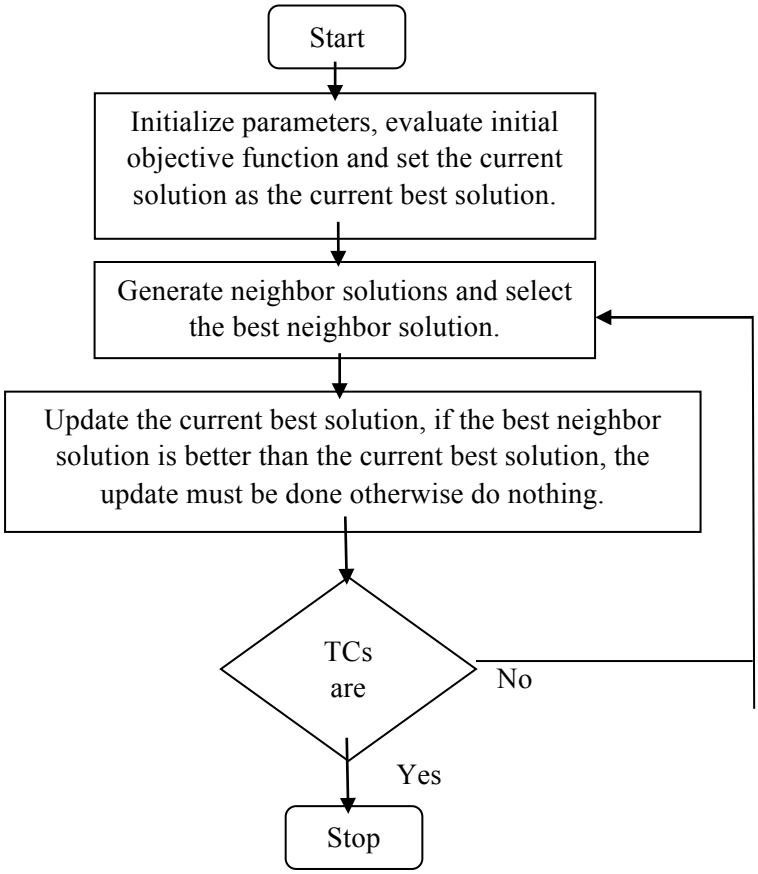
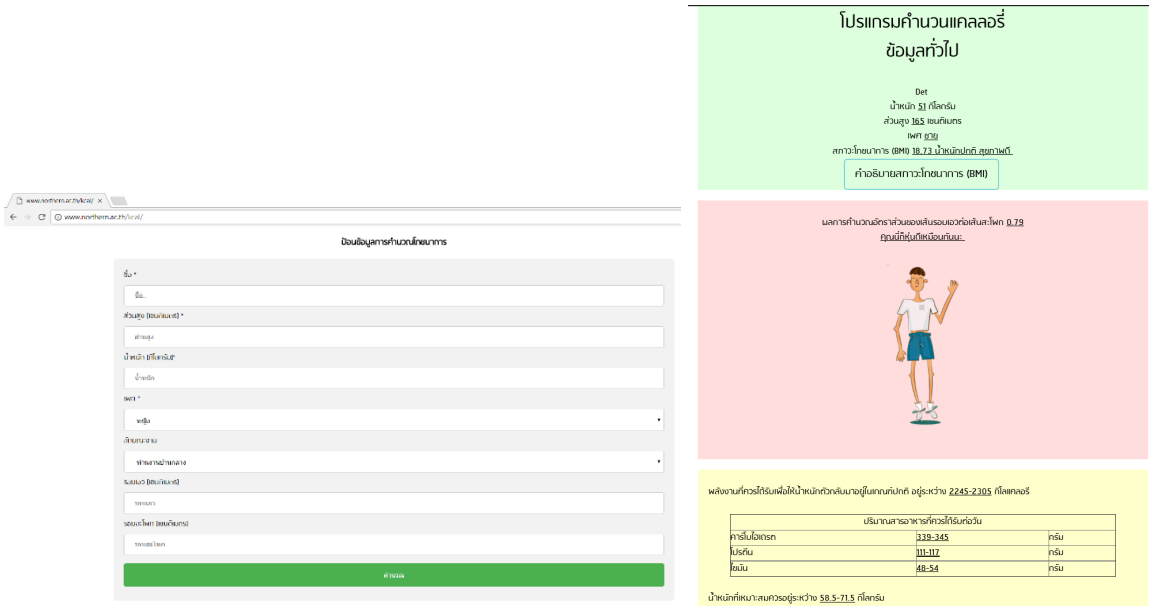



**Figure 1 flowchart of searching algorithm**

## EXPERIMENT AND COMPUTATIONAL RESULTS

The proposed computer program was implemented in PHP language and then installed as an application on a server of North college located Tak province of Thailand. Internet users around world are freely allowed to access and try this proposed program any time and anywhere through this website (http://www.northern.ac.th/kcal). Figure 2 shows both screen captions including input page and resulting page. To verify its performance, experiments had been done with 10 samples divided equally into two groups, male and female. Details of these samples have been distilled in five left columns of the Table I. The computional results are presented in four right columns of Table I.




(a) (b)

**Figure 2 Screen captions of the proposed program, (a) input page and (b) resulting page**

**Table I Computational results from averaged 20 trials for each case**

| Name | Sex | Age (years) | Weight (kg) | Height (cm) | Iterations | | Time (milliseconds) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mean | Std. | Mean | Std. |
| Somchit | Male | 61 | 55 | 168 | 47.65 | 26.12 | 2.47 | 0.43 |
| Sutha | Male | 62 | 68 | 162 | 69.50 | 17.40 | 10.07 | 3.10 |
| Det | Male | 74 | 51 | 165 | 38.90 | 37.26 | 2.83 | 0.57 |
| Lam | Male | 81 | 58 | 150 | 12.30 | 8.60 | 3.29 | 0.81 |
| Po | Male | 80 | 52 | 160 | 22.70 | 16.14 | 3.65 | 0.88 |
| Lamphu | Female | 69 | 50 | 155 | 29.30 | 17.82 | 3.05 | 0.65 |
| Prasert | Female | 75 | 49 | 155 | 21.40 | 21.08 | 3.07 | 0.60 |
| Pin | Female | 60 | 55 | 151 | 98.60 | 22.03 | 4.93 | 2.09 |
| Pranee | Female | 67 | 68 | 158 | 34.25 | 34.61 | 3.81 | 1.13 |
| Sangarun | Female | 77 | 58 | 155 | 70.40 | 58.00 | 4.73 | 1.92 |

## IV.Conclusion

This article proposed a computer program for elderly dietary planning by using food exchang list technique collabrated with a searching algorithm to find the best solution for the problem. The program was coded in PHP language and connected internet in a server for user easy accessibility approach. The experiments treated with ten samples both male and female elders. The computational results show that searching time for each case spent a few milliseconds before delivering the optimized dietary planning for elderly at the end. It can support many elders who wants to care themselves by eating carefully along healthy concept. Future work, we will enhance the performance of the dietary planner and also may be extend to an mobile application soon.

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## References

[1].Foundation for Older Persons' Development. 2015. Situation of the Thai Elderly (Population situations) cite in https://fopdev.or.th/situation-of-the-thai-elderly-population-situations/

[2].Administration on Aging (AoA). 2005. Statistics on the aging population. http://www.aoa.dhhs.gov/prof/Statistics/statistics.asp.

[3].Naveh-Deutsch, N., Ish-Shalom, S. and Rozen, G.S. 2007. Interactive computer nutrition system for elderly. *www.Gerontechjournal* net

[4].Achara Dholvitayakhun and Jukkrit Kluabwang. 2014. Application of Local Search for Optimal Assignment of Food Exchange Lists Problem. *International Journal of Computer Theory and Engineering*. 6(2) : 189-191.

[5]. Achara Dholvitayakhun and Jukkrit Kluabwang. 2017. Design of food exchange list for diabetes mellitus by using modified local search techniques. *Rajamangala University of Technology Krungthep Research Journal*. 11(1) : 1-7 (In Thai).