The 4th National Health Assembly
Agenda Item 2.2 **16 January 2012**

Food Safety: Managing Reuse of Deteriorating Cooking Oil

Current situation and impact

1. Food is essential to life. Eating good food has a direct impact on a person's health. Studies show that some of the major diseases that Thai people suffer are heart diseases, cancer, high-blood pressure, diabetes, cardiovascular disease, and high cholesterol. One of the reasons for the situation is the food they eat. For cancer in particular, it is found that food is a major contributing factor to it, rating 35% compared to other factors[1].

2. At present people take to eating more fried food such as fried chicken, fried fish/meat balls, fried popover, and fried banana on a regular basis. Each year Thai people consume more than 800,000 tons[2] of cooking oil, excluding animal-based cooking oil, like pork or chicken oil/lard. It is also found that such fried food is bought from various kinds of food stores such as food stalls on the side streets and shops in the shopping malls. All food vendors resort to reusing the cooking oil. New oil will be used only to keep up food quality and when the cooking oil has dark colour with black fume, looks sticky, smells of burning, and is foamy.

3. The study also reveals that as a result of frying, the oil undergoes physical as well as chemical changes depending on the type of cooking oil used, type of food, frying pans, level of heat, and frying time. A number of toxic materials occur in reused deteriorating oil[3]. Polar compounds can cause high blood pressure, while polycyclic aromatic hydrocarbons (PAHs) are carcinogenic. The study conducted by the Faculty of Pharmaceutical Sciences, Khon Kaen University[4] shows that the quantity of polar compounds released while the food is fried also correlates to the occurrence of PAHs. In experiments to determine the quantity of these substances in the oil it is found that when polar compounds are at a low level no PAHs are found. However, with an increase of the polar compounds the quantity of PAHs goes up. It can be concluded that these toxic substances occur in the oil while the food is fried. In tests to check its toxicity to the cells (Hep Gs cell line) the deteriorating oil is found to be high in polar compounds and PAH, leading to a reduced number of surviving cells. It also significantly shows the presence of cell abnormality. So, when consumers eat food that is fried in repeatedly used and deteriorating cooking oil, they are more exposed to the dreadful diseases. Worse, when new oil is added to the deteriorating oil, it will quicken the deteriorating process. For consumer safety, the general rule is that when the oil used to fry food deteriorates, it must be disposed of and new oil is used instead. It is forbidden to add the new oil to the existing one.

4. In the years between 2004 and 2009 there were 107.05, 114.3, 124.38, 130.77, 134.21 and 133.1 patients per one hundred thousand suffering from cancer respectively, compared to other major diseases in the country[5]. Despite a low incidence rate, cancer is the number one leading cause of death of the Thai people (in 2011 the mortality rate was 72.9 people per one thousand), while colon and rectal cancer is the fourth most common incidence in both men and women (11.30 and 7.9 respectively). In addition, the carcinogenic PAHs are found in the deteriorating oil and in the fume that rises during food frying, posing a health hazard to consumers and food operators. This information is in line with the epidemiological research findings that non-smoking Chinese and Taiwanese housewives who prepare food using oil causing a lot of smoke and inhale it on a regular basis have a significant high incidence of lung cancer[6].

5. In Thailand, the Ministry of Public Health issued a regulation (No. 283) B.E. 2547 (2004) setting the quantity of polar compounds in cooking oil used to fry or prepare food for sale not to exceed 25% of the weight. Despite past efforts to disseminate academic information on the dangers of the reuse of deteriorating oil, the public sector has not come up with any national

policy and measures with an integrated concrete problem-solving approach involving all sectors concerned. The Department of Medical Science, Ministry of Public Health, and Food and Drug Administration have joint direct responsibility to check polar compounds in oil, using a standard analytical technique of gas chromatography. In practice, however, it is difficult to do, as it involves every cooking oil sample used to fry food in Thailand to be inspected by the standard technique. Attempts have been made to use imported tools to screen the quality of cooking oil, i.e. TLC technique and electrode meter. The techniques, nevertheless, are expensive, not easy to use and costly when it comes to testing and checking the tools. The Department of Medical Science, directly responsible for checking and analyzing the technique, has developed a simple and easy-to-use test kit for the public and food operators, which helps them determine when to change the cooking oil. The kit is 99.2% accurate and the result is known in three minutes. A student or health volunteer can administer it. Importantly, it is economical, costing only 20 baht per test. The agency that has begun to use the technique in earnest is the Health-related Consumer Protection Plan, Chulalongkorn University, under the support of Thai Health Promotion Foundation (ThaiHealth).

6. The Health-related Consumer Protection Plan, Chulalongkorn University, and Medical Science Centre 7 (Ubon Ratchathani) have launched a project to revolutionize the reuse of cooking oil. It aims to raise awareness in every sector of society and advocate a change in health protection for people in the Thai society. The project consists of five dimensions: (1) academic partners, (3) operational partners, (3) policy-setting partners, (4) operation-supporting partners and (5) social communication partners. It has worked in conjunction with a number of local government organizations. The local government organizations act as an important element and partner playing a direct role in developing the quality of life of the people. The public will become more aware of the situation and importance of the problem. They will participate in the prevention, problem-solving, and management in every possible way in the locality. Attempts are made to inspect and monitor the quality and safety of cooking oil used by food operators. The idea is to manage and change the use of deteriorating oil to biodiesel production, thereby keeping it away from being used in cooking food. Instead, it will be filtered, bleached, and resold as alternative energy. With this transformation, there will be at least 100 million litres of fuel for use in agricultural machinery with low rpm. A study by Faculty of Engineering, Ubon Ratchathani University, compares the efficiency and wear and tear of low-rpm single-piston machines used with diesel and biodiesel produced from used cooking oil. It is found that the biodiesel machine experiences a little less torque but functions well within the standard. The wear and tear is no different from that found in the diesel counterpart. It produces less pollution, both carbon dioxide and carbon monoxide. Efforts to promote and use biodiesel at the community level can reduce the consumption of the nation's agricultural fuel to a certain degree and increase the use of high-rpm machines, e.g. those used in garbage collection trucks. Community biodiesel production needs a body of knowledge and expertise from a group of people who can advise and support interested parties. This may start from building biodiesel-making machines that can produce 5-10 litres to 100 litres or even at an industrial level (methyl ester of the fatty acid). The latter can also be used as high-speed diesel for diesel-driven cars.

7. The Social Research Institute, Chulalongkorn University, with the support from the University Health-Related Protection Consumer Plan, has conducted a study on the situation and behaviours in the reuse of cooking oil in Thailand[7]. It focused on two target groups: consumers and operators in 8 provinces covering all the four regions of the country (Lampang, Phitsanulok, Phra Nakhon Si Ayutthaya, Chonburi, Nakhon Ratchasima, Udon Thani, Songkhla, and Phuket) as well as 50 districts in Bangkok. Conducted during April-August 2010, the project collected data from 5,299 samples widely distributed at three levels: municipality, town municipality and sub-district municipality. The findings are as follows:

7.1 Food operators and consumers have very little knowledge and understanding of the danger of the deteriorating cooking oil.

7.2 In normal food frying situations where there is no shortage of cooking oil, it is found that 34% of the cooking oil is deteriorating, while during February 2011 when the oil was more expensive and in short supply it was found that there was more than 60% of the deteriorating oil.

7.3 The survey of the behaviours of food-preparing people, oil which is no longer used is disposed of in water drainage, causing drain blockage and adversely affecting the environment. Food operators, on the other hand, sell the deteriorating oil to used oil buyers, and there is no knowing what they would do with it.

8. The surveys conducted by the Department of Medical Science and the local consumer protection networks show that the deteriorating oil was not properly used as follows:

- It was bleached and put in unlabelled plastic bags, commonly known as "piglet oil" and resold to consumers at weekend and wet markets.
- Black-colored and very sticky deteriorating oil was used to coat noodles.

9. Currently, there are advertisements about cooking oil filters and filter substance of magnesium silicate to improve the colour of the deteriorating oil for further reuse. The Medical Science Centre 7, Ubon Ratchathani, and the Faculty of Pharmaceutical Sciences, Khon Kaen University, have conducted a study on the efficiency of magnesium silicate on the quality of repeatedly used cooking oil. It is found that such substance can barely minimize the number of polar compounds but cannot get rid of PAHs. At present the Food and Drug Administration has not yet approved the use of the substance.

10. Therefore, the best way to ensure consumer safety from the danger of repeatedly used cooking oil is that operators need to change the oil before it deteriorates. This can be done by knowing the timeframe for changing to new cooking oil and proper management of the deteriorating oil to keep it away from the food cycle.

11. It is necessary and urgent for the country to ensure effective implementation and greater awareness, to have in place a public policy to facilitate effective management and the presence of informed public, to involve operators at all levels to take responsibility not to use deteriorating cooking oil, and to involve stakeholder/partner organizations in the society in the problem-solving process.

Policy and relevant measures

12. The Ministry of Public Health issued a regulation (No. 283) B.E. 2547 (2004)[8] setting the quantity of polar compounds in cooking oil used to fry or prepare food for sale not to exceed 25% of the weight. Food operators who use cooking oil with the quantity of polar compounds beyond the approved limit to fry food and sell it to the consumers are deemed to be breaching the law, in particular, Section 25(3) 0f the Food Law B.E. 2522 (1979)[9], and liable to a fine not exceeding 50,000 baht.

Constraints in the implementation and Problem-Solving

13. From the information on the health, environmental and social impacts and from the on-going work, it is found that there are a number of actions taken in various areas in many forms. The problems facing the public agencies have something to do with not having concrete and efficient measures put in place.

13.1 Legal constraints

According to the Ministry of Health Regulation (No. 283) B.E. 2547 (2004), if action is to be taken against a food operator using deteriorating cooking oil, the oil must be analyzed with a standard procedure, the process that is costly and cannot guarantee a permanent solution for consumer safety. Besides, there is a wide range and multitude of operators from very small to industrial status. At present, there are no legal provisions specifying that repeatedly used deteriorating cooking oil is a control material, making it difficult to keep away from the food cycle.

13.2 Administrative constraints

1) The public do not have knowledge or understanding of the situation. They should be informed of the facts on a continuing basis.
2) Responsible organizations/agencies do not have the administrative and management capacity to do the work and do not have good coordination.
3) The monitoring system of health risks and impacts is not efficient.
4) There is no lead coordinating agency when working with concerned social partners.

It is most practical to set local government organizations to manage the matter in the locality as they play a role in developing the quality of life. They can issue bylaws allowing them to take appropriate action in the community. Equipped with resources, they are an important social factor in driving forward the work in their areas of responsibility. Of course, they will need appropriate academic and technological supports.

13.3 Economic constraints

Cooking oil is a production cost for all the related businesses starting from manufacturers, major food operators, market, and restaurants to small food operators everywhere. At present, cooking oil has become more expensive and reuse has become more common.

Point to be considered by National Health Assembly

The National Health Assembly is requested to consider Document Health Assembly 4/Draft Resolution 2.

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[6] Ying-Chin Ko, Li Shu-Chuan Cheng, Chien-Hung Lee, Jhi-Jhu Huang, Ming-Shyan Huang, Eing-Long Koa, Hwei-Zu Wang, and Hsiang-Ju Lin. *Chinese Food Cooking and Lung Cancer in Women Nonsmoker*. Am J Epidemiol. Vol. 151, No.2 :2000

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[8] Ministry of Public Health Regulation (No. 283) B.E. 2547 (2004)

[9] Food Law B.E. 2522 (1979)