IODINE CONSUMPTION BEHAVIORS AMONG MOTHERS OF PRIMARY SCHOOL STUDENTS WITH IODINE DEFICIENCY DISORDERS

WARATIP KANKARN

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Waratip Kankarn.

Miss. Waratip Kankarn
Candidate

Jariyawat Kompayak.

Assoc. Prof. Jariyawat Kompayak,Dr.P.H.
Major-Advisor

Siriorn Sindhu

Asst. Prof. Siriorn Sindhu, D.N.Sc.
Co-Advisor

Vason Silpasuwan

Assoc. Prof. Vason Silpasuwan,Dr.P.H.
Co-Advisor

Liangchai Limlomwongse

Prof. Liangchai Limlomwongse
Ph.D.
Dean
Faculty of Graduate studies.

Kobkul Phancharoenworakul

Assoc.Prof. Kobkul Phancharoenworakul
Ph.D.
Chairman
Master of Nursing Science Programme
Faculty of Nursing

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On

October 29,1999

Waratip kankarn.

Miss. Waratip Kankarn
Candidate

Jariyawat Kompayak.

Assoc. Prof. Jariyawat Kompayak,Dr.P.H.
Chairman

Tassana Boontong

Assoc. Prof. Tassana Boontong Ed.D.
Member

Siriorn Sindhu

Asst. Prof. Siriorn Sindhu, D.N.Sc.
Member

Somboon Jaiyavat

Asst. Prof. Somboon Jaiyavat,M.S.
Member

Vason Silpasuwan

Assoc. Prof. Vason Silpasuwan,Dr.P.H.
Member

Liangchai Limlomwongse

Prof. Liangchai Limlomwongse
Ph.D.
Dean
Faculty of Graduate studies.
Mahidol University

Kobkul Phancharoenworakul

Assoc.Prof. Kobkul Phancharoenworakul
Ph.D.
Dean
Faculty of Nursing
Mahidol University

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The objectives of this study were to investigate iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. Power regression analyses were used to predict iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. The sample group for this study comprised 250 mothers of primary school age children with iodine deficiency disorders in Mukdaharn province. The sample was chosen using a multi-stage sampling technique. The instruments for data collection were interviewed questionnaires forms and, observer suppliers of iodized salt in villages and communities. Data was collected from February to July 1999. Analyses was done using descriptive statistics, frequency, mean, standard deviation, Peason's Product Moment Coefficient and Stepwise Multiple Regression.

The results showed that 74.4 percent of mothers faired poorly in their practices about iodine consumption and more than 80 percent of mothers had no knowledge about preparing iodized water, to eat sea food and not to eat too much raw cabbage turnip and cassava. 50.4 percent of mothers had poor knowledge about iodine consumption and 70.8 percent of mothers had fair perception about iodine consumption. After applying the stepwise multiple regression analyses, the results of the study showed that knowledge about iodine consumption and perception about iodine consumption were predictors accounting for 45 percent ($p<.001$) of the iodine consumption behaviors. The mothers had received information about iodine consumption from health volunteers. This result suggests that nurses in community hospitals should be assigned to home health care duties of mothers of children with iodine deficiency disorders in order to increase their knowledge and perception in their practices of iodine consumption. Likewise, nurses should provide the respective volunteers with adequate knowledge of iodine consumption.

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วราทิพย์ แก่นการ : พฤติกรรมการใช้ไอโอดีนในมารดาเด็กนักเรียนชั้นประถมศึกษาที่มีภาวะขาดสารไอโอดีน (IODINE CONSUMPTION BEHAVIORS AMONG MOTHERS OF PRIMARY SCHOOL STUDENTS WITH IODINE DEFICIENCY DISORDERS) คณะกรรมการควบคุมวิทยานิพนธ์ : จริยาวัตร คมพยัคฆ์,Dr.P.H., ศิริอร สินธุ, D.N.Sc., วสันต์ ศิลปสุวรรณ, Dr.P.H. 86 หน้า. ISBN 974-663-406-2

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาพฤติกรรมการใช้ไอโอดีนในมารดาเด็กนักเรียนชั้นประถมศึกษาที่มีภาวะขาดสารไอโอดีน และหาอำนาจการทำนายระหว่างปัจจัยกับพฤติกรรมการใช้สารไอโอดีนในมารดาเด็กนักเรียนชั้นประถมศึกษาที่มีภาวะขาดสารไอโอดีน ในจังหวัดมุกดาหาร กลุ่มตัวอย่างคือมารดาเด็กนักเรียนที่มีภาวะขาดสารไอโอดีนจำนวน 250 คนในจังหวัดมุกดาหาร เลือกกลุ่มตัวอย่างโดยการสุ่มแบบหลายขั้นตอน เก็บรวบรวมข้อมูลด้วยการสัมภาษณ์ตามแบบสัมภาษณ์ ที่ผู้วิจัยสร้างขึ้นเองและการสังเกตแหล่งเกลือไอโอดีนในบ้าน และในชุมชนระหว่างเดือนกุมภาพันธ์ – เมษายน 2542 วิเคราะห์ข้อมูลโดยคำนวณ ความถี่, ค่าเฉลี่ย, ค่าเบี่ยงเบนมาตรฐาน, ค่าสหสัมพันธ์ของเพียร์สัน และ ค่าพหุคุณถดถอย

ผลการศึกษาพบว่ามารดามีพฤติกรรมการใช้สารไอโอดีนอยู่ในระดับต่ำ ร้อยละ74.4 ได้แก่ มีพฤติกรรมไม่ถูกต้องมากกว่า ร้อยละ 80 เกี่ยวกับเรื่องการเตรียมน้ำผสมไอโอดีน การรับประทานอาหารทะเล และการรับประทานกระหล่ำปลี มารดามีความรู้เกี่ยวกับการใช้ไอโอดีนในระดับต่ำ ร้อยละ 50.4 มีการรับรู้เกี่ยวกับการใช้ไอโอดีนอยู่ในระดับพอใช้ ร้อยละ 70.8 และพบว่าความรู้เกี่ยวกับการใช้ไอโอดีนและการรับรู้เกี่ยวกับการใช้ไอโอดีนซึ่งเป็นปัจจัยนำ สามารถทำนายพฤติกรรมการใช้ไอโอดีนของมารดาได้ร้อยละ 45 ($p<.001$)นอกจากนี้ยังพบว่ามารดาได้รับข้อมูลข่าวสารเกี่ยวกับการใช้โอดีนจากอาสาสมัครแม่บ้านมากที่สุด ผู้วิจัยเสนอแนะให้พยาบาลในชุมชนเยี่ยมบ้านเพื่อให้ความรู้ และดูแลให้มารดาของเด็กนักเรียนที่มีภาวะขาดสารไอโอดีน ปฏิบัติการใช้ไอโอดีนที่ถูกต้อง และอบรมอาสาสมัครให้มีความรู้เกี่ยวกับการใช้ไอโอดีนกันอย่างต่อเนื่อง

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CHAPTER I

INTRODUCTION

Significance and background of the problem

Iodine deficiency disorders are endemic in many regions of the world because of the prevailing lack of iodine in the soil and water.(Dunn & Frist, 1990:10)Iodine deficiency disorders poses a major public health problem, a major impediment to national health and to the attainment of a qulaity life. (Hetzel,Dunn and Stanbury , 1987:10) Iodine is an essential component of the hormones secret by the thyroid gland. All vertebrates have developed the capacity to extract iodine from the environment, concentrate it in a defined organ, store it in organic form and secrete it into the blood, when the supply of iodine falls below a certain minimum, regulatory force save called to cause the thyroid gland to increase in size, i.e. to become a goiter. When the supply of iodine during fetal or early postnatal life is bellow a certain vital level limited that needed in spite of efforts for its compensation. The outcome will be physical retardation as well as neuromotor, auditory and intellectual development. Result in varied disturbance in growth and development, include excessive growth of the thyroid gland (Hetzel,Dunn and Stanbury , 1987:35).

Iodine deficiency disorders affect over 500 million people, with a worldwide distribution. The developing and " Third World " countries are more severely

affected than the industrialized "First World" countries. (Hetzel,Dunn and Stanbury , 1987:35).

In Thailand, iodine deficiency disorders have been known to be endemic for a long time in the North and Northeastern parts of Thailand, and a number of surveys have been conducted in these areas. It appears that of Thailand's total population of 52.7 million, some 39% live in areas where environmental iodine deficiency is a significant problem, particularly in the Northern provinces. Overall, some 14.7%, 7.7 million of the Thai population are estimated to have goiter and the epidemiological reserch suggests that 0.76% of the population are cretinism and 2.29% may have neurological function attributable to iodine deficiency (Hetzel,Dunn and Stanbury , 1987:299).

The Thai Government though the Ministry of Public Health has recently reinforced its efforts to eradicate iodine deficiency disorders and has encourage increased production targets for iodinated salt, as well as meeting targets for reduction of goiter prevalence in its National Scheme for Economic and Social Development (1982-85).

But the goiter control program in Thailand has no enforceable legal provisions for exclusive use of iodized salt in endemic regions, thus preventing retailers from selling the non-iodinated salt. Procedures used to persuade people to consume iodized salt are; health education programs through mass media, group meetings, individual contacts and focal conversion programs through which arrangements are made with the village salt traders to import only iodized salt from dealers most convenient to them; and also cooperation with truck operators to ensure that they supply

iodized salt in the highly endemic areas from registered dealers only (Hetzel,Dunn and Stanbury , 1987:299).

Very recently, two innovative pilot community-level approaches have been used to tackle iodine deficiency disorders. The first, has been to add iodine to drinking water in schools in Chiang Rai province. The second village approach has been the establishment in January 1984 of a village-level salt iodination program in villages in Chiang Mai province, in which the village women take the responsibility of mixing iodine with salt by hand, with the village headman acting as supervisor. This project has generated enthusiasm from all sides and an awareness about the usefulness of iodized salt (Hetzel,Dunn and Stanbury , 1987:300).

Makdahran province, in Northeastern Thailand, has a high goiter prevalence rate, more than 10 percent in primary school students, especially among 6 –12 year olds. This high goiter prevalence rate may result in health problems. The ratio in primary school students is higher than that estimated by WHO (Maeyer,1979). Although, Mukdahran had a National Scheme for Economic and Social Development since 1982 in which every district was 20 percent (Mukdahran Provincial Health Office, 1991) The process of control and prevention of goiter undertook to campaign the population to consume iodized salt which is sold at 3 baht a pack in the villages' drug cooperatives, health depots, community hospitals, general hospitals and given free iodine to be mixed with water for primary school students, demonstrate how to make iodized fish sauce and, give iodine tablets to the severely deficient children. The government also as a means for creating awareness and thus curl campaigned by using posters and broadcasts which could decrease iodine deficiency disorders by a few percentage point among primary school students.

In Mukdaharn province, decision making and taking charge of day-to-day problems is the responsibility of the father in , where as general care of family cooking, house keeping, bringing up children is the domain of the mother when they are sick belong to mother. In addition, she also takes part in decision making for important family matters, educating her children, including social and cultural norms beliefs, attitudes' and practices. As the study of the acceptance of additive iodine of Northeastern housewife groups by Namnarong (1995) found, the role of housewives were personally involve in prevention of iodine deficiency campaign in risk groups. The majority of mothers use local salt to cook, for they believe not only that in it has good taste and easy to buy or produce in the area, but also that it is cheaper than iodized salt. The researcher has interviewed mothers, teachers and students in Kamcha-E District to find out about the effects of drinking iodized water, most of them responded that there was not enough iodine for them, sometimes, often the outlets would run out of supplies without anyone noticing it, also primary school students do not know whether their mothers use iodized to cook with or not. The researcher is interested in studying iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders in Mukdaharn province. The findings will help the planners to be aware of certain factors that have to be focused on. The mothers who have children with iodine deficiency disorders will be benefit when the program is implemented.

Conceptual framework

The primary school children with iodine deficiency disorders ranged in age between six and twelve years old. They are prescribed must consume iodine mixed in drinking water, eating seafood and, using iodized salt but they do not fellow their orders.

So their mother ought to get involved. The researcher uses the concepts of Green and Kreuter (1991). These factors were analyzed in step 3 and step 4 following PRECEDE (Predisposing, Reinforcing and Enabling Construction in Education / Environmental Diagnosis and Evaluation) framework. The framework could describe factors related to iodine consumption behaviors of mothers.

Predisposing factors are: **age**: Developmental age refers to the combination of qualities, aptitude and capacities that develop naturally in each person.(Chalermpol, 1997), **family income**: Family income indicates family economic status and high rank have the high purchasing and have the opportunity to discover or to select methods of taking of themselves. And they can utilize the facilities of society better than low incomes families. (Nomkom,1992) **educational background**: Education is an essential factor in supporting and understanding of other fields. It gives people knowledge to change their behaviors. (Namnarong, 1995) **knowledge about iodine consumption**: People get knowledge and change their behaviors because of learning in about decisions about iodine consumption behaviors (Patchadee, 1995) and **perception about iodine consumption**: Perception help to make decisions which attempt to explain actions in a choice situation to an individual decision about iodine consumption behaviors. (Baiya, 1996)

Reinforcing factors such as: **information received about iodine consumption**: information received plays the role of knowledge given to people, change people's attitude and takes the part of iodine consumption behaviors. (Nomkom, 1992), **Iodine deficiency disorder history in the family**: There should be love, closeness and mutual caring among family members. When some family members have iodine deficiency disorders, the rest will try to treat them. (Chttichai, 1997)

Enabling factors such as: **price of iodized salt**: A major to obstacle to iodine behaviors among the mothers with primary school students with iodine deficiency is the cost of iodized salt. Most people felt that it was more expensive than rock salt. (Division of Nutrition, 1989), **number of suppliers of iodized salt in a village**: The problem of people who used to consume iodized salt was that they could not have it anymore was because people did not know where they could buy it. (Nomkom, 1992) Another problem was the distance between their house and suppliers of iodized salt: People will consume iodized salt if it is convenient to buy and it is distribution is available for people's need. (Nomkom, 1992).

The diagram of factors related to iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders is presented in figure 1.

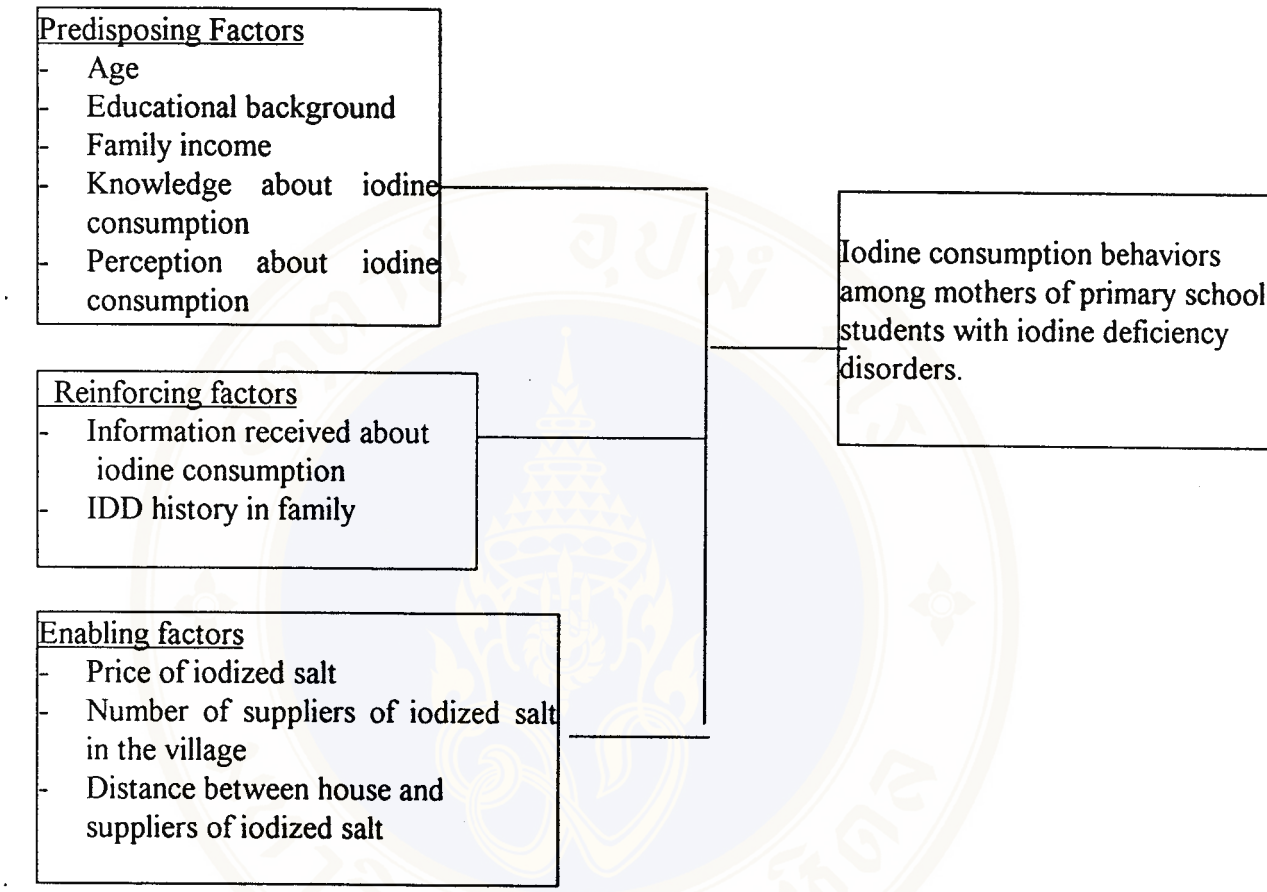

Figure 1. Factors related to iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

Objectives of the study

1. To describe iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

2. To study power regression between predisposing factors such as: age, family income, educational background, knowledge about iodine consumption and perception about iodine consumption, reinforcing factors such as: information received about iodine consumption, iodine deficiency disorder history in family and enabling factors such as: price of iodized salt, number of suppliers of iodized salt in the village and distance between house and suppliers to buy iodized salt and to see if they were related to consumption behaviors among mothers of primary school students with iodine deficiency disorders.

Hypotheses

1. Predisposing factors such as: age, family income, educational background, knowledge about iodine consumption and perception about iodine consumption are correlated to iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

2. Reinforcing factors such as: information received about iodine consumption, iodine deficiency disorder history in the family are correlated to iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

3. Enabling factors such as: price of iodized salt, number of suppliers of iodized salt in the village and distance between house and suppliers to buy iodized salt are correlated to iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

4. Predisposing factors such as: age, family income, educational background, knowledge about iodine consumption and perception about iodine consumption, reinforcing factors such as: information received about iodine consumption, iodine deficiency disorder history in the family and enabling factors such as: price of iodized salt, number of suppliers of iodized salt in the village and distance between house and suppliers to buy iodized salt are predictors of consumption behaviors among mothers of primary school students with iodine deficiency disorders.

Scope of the study

The subjects of this study were mothers who have children ranged in age between is six and twelve years in primary school students with iodine deficiency disorders in the area under The Jurisdiction of the Office of the National Primary Education Commission in Mukdaharn province.

Potential benefits

1. The result of this study will be useful for the planning of programs against iodine deficiency disorders in primary school students in Mukdaharn province. The findings will help the planners to select the points that have to be focused on. The mothers who have children with iodine deficiency disorders will benefit when the program is implemented.

2. The recommendations for the nursing profession is that nurses need to educate mothers about iodine consumption for their children with iodine deficiency disorders.

3. The findings provide guideline data for other, studies in iodine consumption or iodine deficiency disorders.

Operational definitions

1. Iodine consumption behaviors mean the performance of the duties and responsibilities of mothers in primary school students with iodine deficiency disorders will reigned to iodine consumption such as ; drinking iodized water, eating seafood, iodized fish sauce and consuming iodized salt.

2.Predisposing factors mean internal factors of mothers in primary school students with iodine deficiency disorders related to iodine consumption behaviors such as age, educational background, family income, knowledge about iodine consumption and perception about iodine consumption.

2.1 Age means age of the mothers at the time of the interview.

2.2 Educational background means highest grade of education.

2.3 Family income means family economic status per month.

2.4 Knowledge about iodine consumption means knowing the correct information and answers regarding iodine consumption for treatment such as: iodized salt, iodized water, seafood and treatment.

2.5 Perception about iodine consumption means the result of repeated perception closely related to their own experiences, culture, customs and the age of the person in that society. This study takes into consideration the perception the mothers have about iodine consumption consists of :

2.5.1 Perceived seriousness of iodine deficiency disorders.

2.5.2 Perceived benefits of taking action.

2.5.3 Perceived barriers to taking action.

3. Reinforcing factors means external factors of mothers of primary school students with iodine deficiency disorders related to iodine consumption behaviors such as

3.1 Information received about iodine consumption such as: iodized salt, iodized water, seafood and treatment. This study comprises sources of information and media for iodine information.

3.2 IDD history in the family means numbers of family numbers with iodine deficiency disorders.

4. Enabling factors means external factors of mothers of primary school students with iodine deficiency disorders related to iodine consumption behaviors.

4.1 Price of iodized salt means the price of iodized salt compared with rock salt.

4.2 Number of suppliers of iodized salt means the number of suppliers of iodized salt in the village such as: village drug fund or health depots.

4.3 Distance between house and suppliers to buy iodized salt in the village means the distance in meters between a consumers house and a source of supply.

CHAPTER II

LITERATURE REVIEW

The objectives of the research was to study iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. The researcher studied textbooks, documents, and related research as guide lines in the following areas of study.

1. Iodine deficiency disorders in primary school students.

1.1 Causes of iodine deficiency disorders.

1.2 Effects of iodine deficiency disorders of primary school students.

1.3 Effects on the families of primary school students with iodine deficiency disorders.

1.4 Effects on the community and the country.

2. Iodine consumption in the treatment of iodine deficiency disorders in primary school students.

2.1 Iodine consumption in the treatment.

2.2 The iodine consumption in primary school students with iodine deficiency disorders in Mukdaharn province.

3. The iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

4. Factors that affect iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

1. Iodine deficiency disorders in primary school students.

Iodine deficiency disorders (IDD) means a state that occurs when the body does not obtain enough iodine. This causes the thyroid to work harder to produce thyroxin hormone and also results in the enlargement of the thyroid. (Mayer,1979:14)

Classification of goiter size

Grade	Description
0	No goiter
1A	Thyroid lobe larger than ends of thumbs
1B	Thyroid enlarged, visible with head titled back
2	Thyroid enlarged, visible with neck in normal position
3	Thyroid greatly enlarged, visible from about 10 meters

Iodine deficiency disorders are one of the most important medical and public health problems of the world, because people from around the world are at risk of suffering from iodine deficiency. To consider if any area has this problem, an indicator and parameter are generally used, and total goiter rate is an indicator of the problem for the community, society and the country. If the total goiter rate (at every level of intensity) in school aged children is higher than ten percent, it indicates an iodine deficiency rate that is a problem for that community. And the rate of goiter in elementary school children is an indicator of the spread of iodine deficiency disorders. (Mayer, 1979:10). Iodine deficiency disorders was first surveyed in. 1953 in the northern part of Thailand. It was found that the rate of people having this disease was 58 percent, but in the Northeast the rate was between 15 and 21 percent. Therefore in 1962 the Division of Nutrition, Department of Health, Ministry of Public Health,

(Department of Health ,1994)introduced measures to control and prevent this disease, by encouraging people to add iodine to common salt and giving iodized salt to the people, especially in the areas where this disease was spreading. And on July 30, 1991 the cabinet decided to form a committee to control and prevent iodine deficiency disorders, and to decrease the rate of iodine deficiency to lower than 5 percent according to the Eighth National Plan for Economic and Social Development. In Mukdaharn province, before the National Scheme was announced, it was found that the iodine deficiency disorder rate among primary school students was higher than 20 percent, which was considered to be a problem.(Mukdaharn Provincial Health Office,1997)

Iodine deficiency results from many causes arising from both the physical characteristics of the areas and the people.

1.1 Cause of iodine deficiency disorders.

1.1.1 Physical characteristics of the areas.

(1) Iodine exists in nature in the same way as calcium and sodium, but in a lesser quanlity. Iodine is not found distributed everywhere. Soil can contain more iodine than rock (Chiraratsatit & Kaewplung, 1987). People in the North and the Northeast live on highlands and mountainous areas. The heavy rain washes away iodine into rivers and down to the sea resulting in less and less iodine in the soil and the water. This results in low iodine in agricultural products and finally cause iodine deficiency in the people of the areas.

(2) Most of the iodine deficiency areas are remote and isolated from the outside world and the means of communication are difficult. The accessibility

of seafood or other kinds of food from outside, including different iodine adding measures is not ensily accessible to the local population.

1.1.2 The people

(1) Northeasterners eat only the food found in the locality. They do not eat seafood which contains high iodine because seafood is expensive and difficult to get (Tongsaen &Tungmethakul, 1990) and the areas are far away from the sea and most people are poor. A study made by Namnarong (1995) on acceptance of iodine by Northeasterners showed that most of the food consumed was food collected from nature depending on the season and from gardening. But the food bought from outside depends on economic factors.

(2) Consumption behaviors of the people is a part of folk customs and is deeply related to social and cultural contexts which limits the choice of food, and in addition, the choice of food is regulated by many other factors ranging from geographical conditions to the methods of production, including cultural factors such as beliefs, customs and traditions. Northeasterners in particular seldom eat seafood. They think that seafood such as cockles have red blood and smell like menstruation. (Tongsaen & Tungmethakul, 1990). Besides, they think that domestic salt or rock salt has more salinity than iodized salt.

(3) The people consume some substances that affect the function of the thyroid. These substances hinder the body from using the iodine obtained from nature. These substances are found in the Genus Blasicar such as cabbage and tapioca. These plants can cause iodine deficiency because they contain high goitrogen (Burrow, 1990). If these plants are eaten in high quantities and for a long time, they will change

the iodine intake and cause the enlargement of the thyroid. (Hetzel, Dunn & Stanbury,1987:35)Northeasterners like to eat raw cabbage with papaya or chilly sauce. Tapioca is usually produced for sale but can be cooked and eaten as desserts. Besides, some medicines such as Thiochyamite or Aminothyasol contain sulphur, and sometimes, these affecting substances come from drinking water and food.

1.2 Effects of iodine deficiency disorders in primary school students

Iodine is a chemical element. Calcium, oxygen, nitrogen and sodium are other examples of elements, but iodine is much rarer. Humans need iodine to make thyroid hormones. These hormones are produce by the thyroid gland, a butterfly-shaped structure in the front part of the neck consisting of two "lobes" on ether side of the windpipe connected by a narrow bridge called the isthmus. After manufacture in the thyroid gland, thyroid hormones travel in the blood and control many chemical processes in different parts of the body. These hormones are essential for normal development and functions of the brain and nervous system, and for maintenance of body heat and energy.(Maeyer,1979:7) Iodine deficiency disorders affects children so much physically, mentally, emotionally and socially that it eventually affects the family and community.

Physically, children will show chemical symptoms, the most evident of which were goiter or the enlargement of the thyroid, coarseness with yellowing and dryness of the skin, (dryness of litter or no sweating), slowness of pulse and heart rates. There is water within the heart tissue, resulting in less blood flow to the brain. In some children this may cause myxedema madness and agitate type. (Grossman, 1992)

These is no appetite for food, with enlargement of the tongue, constipation, water in the bowel, and little or concentrated urine. In some children the urinating decreases and the urine contains low level of sodium. Children with medium to high levels of iodine deficiency will have a slow growth rate compared with other children of the same age (Chiraratsatit & Kaewplung, 1987).

Mentally, children with iodine deficiency need continual treatment and advice from doctors, which may cause suffering and restlessness. Everyday routine is changed with some conditions because children have to have special diets. That is, they have to drink iodized water, use iodized salt or fish sauce for food seasoning, eat seafood, avoid eating some plants such as cabbage or tapioca. When children have a big lump in the throat, it causes dyspnea, and prevents children from performing normal activities like other children. This affects children mentally. Children became lethargic and depressed. They have to depend on their parents and eventually will become aggressive and short-tempered. (Sooampan, 1985). Some children must be hospitalized and they have to stay away from the family and suffer boredom and loneliness, and pain is critical in a child life. Also children with iodine deficiency have low intelligence and a short memory. This causes them to fall behind in studying resulting in a low study achievement which will eventually make the children feel bored, and not want to go to school. They will develop an inferiority complex. (Kochapakdee, 1985)

Socially, children with iodine deficiency have changeable emotions. They do not want to play with other children and some of them are even separated

from friends and society because they have to receive treatment in the hospital. Some children are aggressive and anti-social and become lonesome and shut in.

1.3 Effects on the families of primary school students with iodine deficiency disorders.

Iodine deficiency disorders in primary school students affects every member of the family, especially the mother or the member of the family who has to take greater care of them than the other members.The mothers encourage them in drinking iodized water, consumping iodized salt and eating seafood. The mother is closest to the child, so the disease increases the mother's burden and leaves her with little rest, which makes her tired and weak which in turn will lead to sickness. (Anderson, 1982) This is owe to the special care the mother gives to the affected child according to the suggested care given by the doctor. Besides, sickness is one of the most important causes that affects the financial and economic condition of the family. Iodine deficiency disease especially because it is a chronic disease and takes a long time to treat. The family must pay expenses arising from the treatment and the transportation between home and the hospital. In cases that need operations in hospitals that are very far from home, the family has to pay for transportation, food, and accommodation. (Ngarmprapasom,1990) The cost to the family is even higher, and in some families, the parents have to stop their work to take children to hospital. This decreases the family income. During the period of national economic crisis the family with a middle or low level income will suffer terribly. They have to work harder, and rest less. They are more tired. This economic change causes higher stress to all members of the family. The mother, having to take better care of the sick child

cannot take good care of the other children. This makes the other children jealous of the sick child and may cause changes their behavior. It also makes the relationship between the mother and the other children in deteriorate.

1.4 Effect on the community and the country

Iodine deficiency affects the socioeconomic development of a community. The people are mentally slower and less vigorous. They are harder to educate and harder to motivate, and thus they are less productive in their work. Also, iodine deficiency produces more handicapped individuals who depend on others for their care, thus diverting community resources. Iodine deficiency disorders do not only affect the individual or his family, but it also affects the community. In the first place, if there is a child who has iodine deficiency in the community, when she grows up, she will give birth to another child who has iodine deficiency disorders. The child's body does not fully develop. Its intelligence level is low or it may be dumb. The creation of the family cannot be fully developed. Besides, the inferior quality of the child will cause higher dependence on others by depending on the family or being a social burden.

2. Iodine consumption in the treatment of iodine deficiency disorders in primary school students.

2.1 Iodine consumption in the treatment

When there are iodine deficiency disorders in primary school students, there are 6 methods of treatment.

(1) The consumption of iodized salt or health salt has been accepted as one of the successful ways in the treatment of iodine deficiency disorders.

(Mannar & Dunn,1995:25)

Iodized salt is salt obtained from the sea or from rock salt under the ground that has been mixed with iodine in an amount suitable for consumption. The preparation of iodine solution for spraying on 12 kilos of common salt can be made by measuring one bottle of concentrated iodine solution (30 cc.) and 3 bottles of boiled water (90 cc.). Fill the spraying bottle with the concentrated iodine solution and water. The bottle is capped and shaken well to make the iodine and water mix. Then the solution is sprayed on the 12 kilos of salt. Stir the salt well till the ratio of Potassium Iodate to salt is 1 : 20,000. This salt is used in food, and should be kept in a well covered or sealed conditioner in order to keep it away from light or heat. Iodized salt is produced by the factories controlled by The Food and Drug Committee, the Ministry of Public Health, according to the Ministry of Public Health notice number 153 (1995). The quality of consumer salt was regulated to have iodine of not less than 30 mg. per 1 kilo of salt and the label must contain at least the following details.

- Name of food
- Name and address of producers or packagers
- Date of production with the words "Produced" included
- Date until which the food is still consumable with the word "should be consumed before" included.
- Net weight in metric system
- With the inclusion of "Should be stored in a cool and dry place"

The iodized salt should be used in cooking at least one tea spoon or five grams per person per day.

(2) Drinking iodized water is the easiest way to solve the iodine deficiency problem. Just add a suitable amount of iodine to drinking water in the water jar at home or in the water tank at school. 110-115 micrograms per day is enough for everyone. Iodized water can be prepared by adding 2 drops of concentrated iodine solution to 10 liters of water or 4 drops to 20 liters of water. After adding iodine, stir the water to mix the water and iodine evenly mixed and the ratio of iodine to water is 200 micrograms/liter. This water can be drunk every day and can be prepared again in the same way when it is finished.

When the thyroid with hyperplasia receives iodine, it will stop shedding thyroid stimulating hormones which will cause the thyroid to become smaller and become well again. This treatment is a good method because it costs very little. People can provide themselves with iodized water and iodized salt.

(3) Iodized fish sauce can be prepared by adding 4 cc. of concentrated iodine solution to a bottle of fish sauce. Tighten the cap and shake the bottle and the result in the iodized fish sauce will be 80 micrograms per 10 cc. of fish sauce.

In the addition of iodine to drinking water, salt or fish sauce the concentrated iodine solution must be prepared according to the following steps.

- Take two capfuls of potassium iodate (a cup for 60 cc. Plastic bottles) or a package of 24 grams of potassium iodate.

- Put the potassium iodate into an empty bottle. (about the size of a fish sauce bottle) Wash the potassium iodate that is still left on the measuring cap into the bottle with clean boiled water after it has been left to cool down to lukewarm.

- Fill the bottle with lukewarm water until the level of water reaches the bottle neck. The bottle will hold about 725 cc. of water.

- Tighten the bottle cap, shake the bottle until all the iodate powder dissolves in the water and the concentrated solution of 20,000 micrograms/cc. is obtained (1 drop = 1,000 micrograms)

The concentrated solution is then filled into 24 (30 cc) bottles and from these bottles the drops of concentrated iodine solutions are added to drinking water. Bottles of concentrated iodine solutions can be obtained from all public health centers, community hospitals, or provincial public health offices.

(4) Taking iodine tablets.

Iodine tablets contain 200 milligrams of iodine. The dose for these tablets is, if the patients weighs less than 20 kilograms, he takes one tablet, and two if he weighs more. One tablet can prevent or solve the iodine deficiency for as long as one year. (The National Program for Controlling Iodine Deficiency Disorders, 1989) From a study on the control of iodine deficiency disorders with iodine tablets in oil by Dr.Chawalit Santikitrungrueng and associates it was found that the group of 70 samples who took 400 mg, iodine tablets did not have any problem in taking the medicine. The amount of iodine in the body increased rapidly from 50 units to 100,000 units. The amount of iodine decreased rapidly in the first seven days and decreased gradually later and came down to 134 units after 10 months. It is expected

that the amount of iodine is still sufficient until the end of 20.5 months for all the sample group.

(5) Potassium iodate (Lugol's solution) is a solution of 5 grams of iodine and 10 grams of potassium iodate (KL) and 100 cc. of water or 6 mg. of iodine per one drop of water. This solution is available in community hospitals. Lugol's solution will accumulate in the body in the thyroid recycling system. Taking one drop of this solution will provide enough iodine for 30 days for the body. Therefore this solution must be taken every 30 days.

(6) Iodized oil injections are made into the young babies' hip muscle. For older children or adults the injection should be made into the muscle of the upper arm. A dose of 1 cc. contains 480 mg. of iodine. Iodine will be accumulated in the muscles and the fat of the body and the iodine will be gradually discharged into the blood circulation system and to the thyroid for the production of thyroid hormone.

In foreign countries, must of the problems are localized goiter. Iodine is added to salt and other media for people to consume. But in the extremely remote areas which are difficult to reach, the injection of iodine in oil, into the muscles is used. One injection will last 2-3 years. The method has been found to be successful in Central Africa, New Guinea, Peru, Nepal and Ecuador. The injection causes much pain and swelling (Ngarmprapasom, 1990)

In Thailand, the application of tablets and injection are used for specific target groups such as pregnant women, whereas iodized salt and iodized water are used for the general public. The campaign for injections takes longer to penetrate the whole area and injection needs skill and technical training to deal with needles, syringes and

sterilization. The disadvantages of potassium iodide is the frequency, the duration of treatment and the dose. Therefore Thailand encourages mainly iodized salt and iodized water because most people with iodine deficiency disorders are poor, so the promotion of iodized salt consumption and iodized drinking water among people is a through solution to the problem.

2.2 Iodine consumption in primary school students with iodine deficiency disorders in Mukdaharn Province.

A control and prevention of iodine deficiency policy in Mukdaharn, has been implemented since 1991. A study done at that time found that 20% of the population had iodine deficiency. (Mukdaharn Provincial Health Office, 1992) Most of them lived inaccessible, high mountainous and valley areas. The strategy was to promote people's consumption of iodized salt or sanitary salt. It was available through the village drug funds, health depots, community hospitals and provincial health offices. It costed 3 baht a sack. Intensified iodized water was distributed at the community hospitals. Primary school students with iodine deficiency disorders were given iodine in lunches cooked with iodized salt and intensified iodine was mixed into drinking water. Iodine tablets were distributed in serious cases. To focus this problem a public relations campaign was mounted including handbills, documents and posters which were distributed throughout the province, districts, tambons and villages. Assessment by The Division of Health Promotion, Mukdaharn Provincial Health Office, found that there were 32 primary schools with 10-40% of children with iodine deficiency disorders. (Mukdaharn Provincial Health Office, 1997)

Treatment of iodine deficiency in primary school children depends on many factors particularly children's families. Families mostly influence iodine consumption among their children, especially their mothers. The result of the study conducted by The Division of Nutrition, Department of Health (1994) discovered that in iodine deficiency epidemic areas in the Northeast the consumption of iodized salt or sanitary salt was very little. People believed that rock salt or local salt was more salty than iodized salt. And Iodized drinking water was insufficient for people. In the experience of the researcher who has worked in the community hospital for more than 11 years, people in Mukdaharn province cook with rock salt or local salt because they could produce it themselves or buy it at local grocerystores where salt was provided to customers all year. Grocery keepers bought this salt from peddlers who went to each village by truck. They bought 200-300 at sacks a time, for sale. People in the village would buy a lot of salt in the rainy season to make Plara, a fermented fish. Iodized salt or sanitary salt was unavailable and people did not know where they could get it. Making iodized salt or additive iodine fish-sauce needed special officials to promote it so that people could make it themselves. When they ran out of iodized salt because of the lack of a leader and cooperation from officials, people continued the consumption of rock salt. Additive iodine drinking water was not popular because of its taste. The researcher interviewed a teacher in a school with iodine deficiency students and found that intense iodine was occasionally mixed with drinking water. Additional data from a child with iodine deficiency disorders in an interview found that his mother or superintendent cooked and provided drinking water for him. In school he would

occasionally drink iodized drinking water provided by the school but he usually drank from the regular water supply.

3. Iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

The family is the smallest social unit and the most important social institution in our society. Each member of the family is closely bonded by love. The family unit is where the child will spend his entire life from birth to death. Family functions are bringing children up, keeping them healthy and looking after them when they are sick. Thus, the family influences children's health conditions. If a child is well looked after, in a healthy environment, he is rarely sick. If there is a sickness in a family, it is important to create for the children a healthy environment before the situation becomes more serious. (Phoopaiboon, 1994)

Roles and functions of the family

1. Social role

1.1 To give love and attention to family members and to respond to psychological needs, to maintain mental health, a strong personality and physical health, so that children can mature properly.

1.2 To bring up the family members and to instill good habits so that they can be an adult in the future.

1.3 To produce a new generation for society. If an iodine deficient woman is pregnant, her newborn, also lacking iodine might be born retarded or

paralyzed. This will result in additional social and medical problems for the family and the entire society.

2. Keeping healthy and the treatment of illnesses.

2.1 To help the family members when sickness occurs. When school aged children suffer iodine deficiency disorders, the family must treat and provide nutritious food for them.

2.2 To take care of all family members. The families' functions are to find ways to treat illness Chanthramolee, (1992) stated that the family of a patient played the most inportant role and had more influence to change the behavior of a patient's health, and took part in decisions in the treatment of the patient and the doctor's treatment. Although a doctor provided health service and controlled symptoms of sickness, without taking care of the family as part of the treatment plan, treatment will not be as good as it should be. Thus, family participation in treatment for iodine deficiency school children is essential.

2.2.1 To provide iodine solution for children everyday by mixing 2 drops of iodine with 10 liters of water.(Mannar & Dunn,1995:25) (10 liters equals 13 bottles of 750 cc capacity) The ingredients are stirred together to make a formula of 200 micrograms per liter of iodine solution. Children need to drink a glass of it once a day.

2.2.2 To cook frequently using iodized salt, or fish-sauce with iodine. Sanitary salt or iodine salt from the Ministry Public Health should be consumed within six months or the iodine will separate from the salt. For this reason the intensity of iodine in the bottom of utensils or container is higher than the top. So,

it should be kept without exposure to sunlight or heat. To make fish-sauce with iodine, 6 drops of intensified iodine is mixed with 740 c.c. of fish sauce. After stirring, it will gain an intensity of iodized salt of 80 micrograms to 10 c.c. Fish sauce should be used in cooking meals for children everyday. (Mannar & Dunn,1995:25)

2.2.3 To prevent children from eating raw cabbage or lettuce. If they want to eat them, be sure they are steamed or cooked.

2.2.4 To notice symptoms of an iodine allergy. If rashes occur on the body,stop eating and parents need to consult a physician immediately.

2.2.5 To take children to a physician for regular checks up and strictly follow the physician's instruction regarding treatment.

Most Northeastern families are extended ones. Decision and problem solving in the family will devolve to the males such as how to work etc. But cooking, house keeping, bringing their children up and taking care of members of family when they are sick are female responsibility. They also take part in decisions on important family problems, give her children knowledge, educate them in beliefs, attitudes and practices in activities. The result of the study of the acceptance of additive Iodine in Northeastern housewife groups by Namnarong (1995) indicated that the roles of housewives were to take direct part in cooperation in the prevention of iodine deficiency in the risk group. Additionally, housewives took part in the participation of information transmission to the public.

Responsibility in iodine provisioning in families with iodine deficient children in primary school is a new item for a family, especially the consumption of iodized salt or sanitary salt. They are not familiar with it. Moreover, most of them consume rock

salt or local salt because they believe that its taste is saltier than iodized salt. (Division of Nutrition, Department of Health, 1994) Drinking of iodized water will change the way of life, so it is necessary to study behavioral patterns of families especially those concerned with health. Health behavior refers to a person's actions that affect health resulting in learning. It will provide both advantages and disadvantages to health. Behavioral factors are educational aspects, understanding, attitude values, knowledge, motivation and actions which will show in the prevention of disease or sickness.

Factors concerned with health behaviors are positive and negative. Some behaviors are linked to health. They deal with health-related behaviors of persons, families and communities. Other fields related are concerned with forms and conditions in living, dwellings, having food, physical exercise, problems of traveling, and the environment. These often cause health problems.

The definition of health behavior differs between behaviorists and health educators. The key concept of behavior is visible external behavior. Internal behavior can be measured by psychological instruments. So, there are many definitions of behavior as follows:

Karl and Cobb (1966) gave their view that health behavior was any action of a good healthy person without any signs of sickness, with the belief it should make him have good health with the aim of prevention of diseases.

Suwan (1983) gave the meaning of health behavior as the same as general behaviors but focused only on health characteristics, for example, performance in keeping clean, taking a bath and brushing teeth. The study and given definition of health behavior should include the concept of diseases.

Green and Kreuter (1991) said that health promotion meant the result of educational and environmental supports to influence actions/practice, and conditions of living with the aim of good health in the person, community or entire society.

Activities and provisioning are need factors which can change personal or community behaviors. To reduce health problems, the researcher will study iodine deficiency disorders in primary school students because it is one of the people's health problems in the target area. The study will analyze behaviors and causes dealing with the problems, the outcome, prevention and solution to the iodine deficiency disorders problem. Factors will be considered for supporting changes in health behavior to be benefical to personal and community health. This study will survey ways of providing iodine to families with iodine deficient primary school students, and find the reinforcing factors and enabling factors to health behaviors in providing iodine to the families. It emphasizes what factors reinforce and what factors frustrate health behaviors, and how to influence health behavior by using the way of thinking of Green and Kreuter concept of PRECEDE - PROCEED(Green & Kreuter, 1991)

PRECEDE - PROCEED framework consists of two parts as follows :

1) PRECEDE; (Predisposing, Reinforcing, and Enabling Constructs in Education/Environmental Diagnosis and Evaluation) means diagnosis and assessment of the causes of health behavior concerning input, reinforcing and facilitated factors to have good health behavior. The study begins with the expected output then finds the causes or factors affecting the desired outcome and assesses whether they are positive or negative. It is the diagnostic phrase.

2) PROCEED stands for Policy, Regulatory and Organizational Constructs in Educational and Environmental Development. It refers to supplementary policies, rules, principles, and control and cohesion of the beneficial resources to operate the plan and assessment. It is the planning development and assessment phrase.

The study uses PRECEDE framework and analyses the health behavioral factors. It is divided into steps, beginning with expected outcome, model of quality of life, and good health in general. It can be conducted as below :

Step 1 Social Diagnosis

Begin with the analysis of the quality of life by assessment of the social problems of target groups i.e. patients, students, workers and consumers, it is the indicator for the level of the quality of life.

Step 2 Epidemiological Diagnosis

Data from step 1 is analyzed in this step. These are vital statistics, and medicinal and epidemiological data. They are arranged in order to find out important problems concerned with health. Then solving them and further analysis is needed.

Step 3 Behavioral and Environmental Diagnosis

Behavioral Analysis is done to find out the cause of healthy and environmental factors that influence health behavior.

Step 4 Educational and Organizational Diagnosis

Analyzes factors that influence health behaviors and is classified into 3 groups.

1. Background factors and their influence on a person's motivation for changing their behaviors. Input factors consist of knowledge, attitude, belief, value,

and a person or people's acceptance includes economic status, age, sex, and size of the family. These factors affect the planing of health promotion.

- Knowledge is an important input factor to affect behavioral performance.

- Belief is the confidence in phenomena or materials and whether they are right, and can be trusted.

- Value is significance, and satisfaction in things. Sometimes there is frustration in a persons mind.

- Perception means the understanding of the person of other situations. It is that both good and bad feelings may change his behavior.

2. Reinforcing factors refers to things or expected things a person hopes to gain from others. It may be rewards or feedback as a result of a person's actions. It may affect others, for example, cousins, friends, and government officials. Their influence may reinforce or frustrate actions and behaviors.

3. Enabling factors means necessary resources in showing personal, community behavior, skills to help one concentrate oneself and ability to use any resources regardless of price, distance, time and other factors. Moreover, the most important ones are availability and accessibility performing behavior or to help in acting behaviors easily. These factors may have positive and negative sides.

As the result of this study, the researcher analyzed what factors influence iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. The factors emphasized were people, environment, and facilities

that may reinforce or frustrate behavioral actions. These factors were analyzed in step 3 and 4 following the PRECEDE framework.

4. Factors that affect iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders.

Age : Age is a basic factor to support experience and understanding in other fields. From the result of the study of Chalermpol in 1997 it was found that the maternal age was predictor accounting for 8.47 percent of variance in the degree of maternal caring behaviors in the prevention of iodine deficiency in children at the statistically significant level of .001. In contradiction, a study by Nomkum in 1992 indicated that no significant difference in iodine consumption was found between children which young mothers and those which old mothers. And a study by Kalajuk in 1995 indicated that there were no significant relationships between age and iodine deficiency disorder preventive behaviors.

Educational background : Education is a basic factors in understanding other fields. It gives people knowledge to change their behaviors. The result of the study of Namnarong (1995) it found that the difference in educational levels influenced the difficulty in receiving information from many mass media. Housewives who studied at higher than Mathayomsuksa 3 level had changed their concepts, and tradition beliefs and integrated them to new items more rapidly than ones who only studied to primary educational level. Similarly a study by Baiya (1996) found education to be statistically associated with the acceptance of iodized salt. Conversely, the result of the study by Boonsin (1996) found that educational level was not

significant in iodine deficient disorders and Chalermpol (1997) indicated that there was no significant correlation between education level and maternal caring behaviors in the prevention of iodine deficiency in their children.

But educational levels which affect the difference in food consumption behavior is statistically significant. And educational level as related to performance is also significant.

Family income : Income indicates family economic status. Families with good economic status and high rank have high power to purchase and have the opportunity to find out or to select methods of taking care of themselves. And they can utilize the facilities of society more than people who have low incomes. The result of the study of B.B. Jacobs (1988) showed that poor economic status of families and difficulty of transportation among remote villages were related to diseases (Jacobs, 1988). The result of the study of Srinay (1987) found that family income influenced peoples' behaviors in controling and protecting themselves from iodine deficiency in Nan. It was in agreement with the study of Thong-arunsri (1987) that most of the affected children's guardians were poor. They did not agree with the importance of the prevention of diseases and rarely cooked food with iodized salt. A study by Chittichai (1997) indicated that the family income levels contributed to preventive behaviors associated with iodine deficiency and Boonsin's study (1996) found that the difference in income levels was the cause of the difference with patient groups with unstable iodine deficiency and patient groups with accepted iodine deficiency.

On the contrary, Namnarong (1995) studied the acceptance of iodine use in the prevention and control of iodine deficiency disorders in a community at Khon

Kaen. It was found that people's income was not an obstacle in buying iodine to treat the members of a family who were at risk. Lailert's study (1992), found that housewives who had different income in the severe iodine deficient areas of Chiang Rai had no difference in behaviors regarding iodine deficiency prevention and Chlermpol (1997) indicated that there was insignicant correlation between family income and maternal caring behaviors in the prevention of iodine deficiency in their children.

The results of the studies above, are in disagreement regarding the effect of family income as and influenction to iodized salt usage. The researcher assumes that family income would be one of the factors influencing iodine use in families with iodine deficiency in school aged children.

Knowledge about iodine consumption : People get knowledge and change their behaviors be cause of learning result in decisions. The result of the study by Patchadee in 1995 indicated that the majority of women had relatively fair knowledge of iodine deficiency disorders. That was contradictory to the study by Phookhauluan in 1997 which indicated that students who had good knowledge, correct beliefs and had good attitudes about iodine deficiency disorders exhibited less iodine deficiency disorders preventive behaviors than students who had low knowledge, incorrect beliefs and had bad attitudes.

Perception about iodine consumption: Perception helps in making decisions which attempt to explain action in a choice situation to an individual's decision about alternative health behaviors. A study by Baiya in 1996 found that their own beliefs are similar with a significant association between perception about goiter and the utilization of iodized salt. Chalerpol in 1997 indicated that there was a positive

significant correlation between maternal health beliefs regarding iodine deficiency at the level of .001.

Iodine deficiency disorder history in family : There should be love, good relationships, closeness and caring for each other among family members. When a family member is sick, the rest will try to treat him. Health behavior will be studied. Children in families with members who had been chronically sick, would differ in health behavior than ones whose family members were not sick. (Medical records showed the effects on behavioral patterns) The result of the study of Siriroj (1993) was that medical records of iodine deficient disorders reflected the performance of iodine deficient prevention at medium levels. Similarly, the result of the study of Patchadee (1995) found that iodine deficiency disorder history in a family was related to continuous use of iodized salt. Lailert (1992) found that families with a difference in number of members who had iodine deficiency disorders had no difference in iodine consumption. On the contrary the study of Phookhauluan, found that student or family members who had iodine deficient disorders performed their behavior more than ones who had never been sick with iodine deficient disorders.

So having family members with iodine deficient disorders should influence the behavior of iodine use in families with school aged children.

Information received about iodine consumption : Information received plays the role of knowledge given to people, changes people's attitudes and takes part in consumption behavioral adaptation. The effective types of information given to the public are radio programs, television programs, newspapers, and magazines, respectively. Radio programs are the most effective because the cost of radio receivers

is not expensive and people who are illiterate can listen to them (Stawathin :1984 cited in Nomkum, 1992) The result of the study of The Division of Nutrition found that the effective mass media for people in Lampun and Loei were television programs, radio programs and newspapers, in order, because these media played high roles in giving knowledge to people in remote areas. In Nongkhai, provincial health officials carried out a plan of iodine deficient control by health education using , pamphet distribution, and a public health mobile unit. The result were 36% of people received iodine information from public health officials, 9% of people from public health volunteers and only 7% of people from radio and television programs. The result of the study of Namnarong (1995) found that the important messengers in the transfer of iodine information to people were public health officials, physicians and teachers. Similarly a study by Patchadee (1995) found that having information about iodized salt was related to contineous use of iodized salt. Kalajuk (1995) found that the contributiig factor to preventive behaviors associated with iodine deficiency in pregnant women was information received. In additional, the quality of public relations was rather poor although there were a lot of facilities.

So mass media and information distribution should be important factors in effective iodine use in the family.

Price of iodized salt : An obstacle to iodine use in families with school aged iodine deficient children is the cost of iodized salt. Most people felt that it was more expensive than rock salt. So they usually cooked with rock salt because it was cheap (Division of Nutrition, Department of Public Health, 1989). (Thongsane &

Tangmethakul, 1990) The opposite result was found by of Boonsin (1995) that the cost of iodized salt was not a factor of iodine use in iodine deficient patients.

From the results of studies it was found that the cost of iodised salt was, and was not an obstacle in iodized salt consumption. So the researcher will focus on the cost of iodized salt in her study.

Number of suppliers of iodized salt :From the result of the study of The Division of Nutrition, Department of Public Health (1994), it was found that 92% of people in Maehongson, Lumpun, Nan and Loei wanted to consume iodized salt but only 36% of them actually consummed it. 27% of people who used to use it, but could not anymore since there was no suppliers in the villages. It was consistent with the result of the study of Sirinart (1990) that the important problem of people who used to consume iodized salt and could not anymore was because people did not know where they could buy it or it was inconvenient to buy. In addition, the result of the study of Nomkum (1992) found that people did not know where iodized salt was sold but they knew that the cost of iodized salt was expensive. With the same result as Samibut and Samibut's study, it was found that availability of iodized salt in the villages was a problem for people who wanted to consume iodized salt regularly, and it was found that only 65% of people still consummed both iodized and rock salt.

The researcher will study the relationship between the ability to reach iodized salt suppliers and behavior of iodine deficiency prevention.

Distance between house and suppliers to buy iodized salt :People will consider two factors when consisting purchase of iodized salt, convenience to buy and the availability to meet people's needs (Division of Nutrition, 1994). The result of a

survey study of Nomkum (1992), in the remote areas of Maehongson Province, found that iodized salt consumption was not popular because it was inconvenient to buy, people did not know if their village shops sold it, and more importantly, most of the villages had little iodized salt available and the supply was on an irregular basis.

As the related literature shows, it could be concluded that behaviors in iodine use in families with school aged iodine deficient children varied in the situation, person and regions. The factors which concerned iodine use were age, educational level, family income, iodine use and acceptance of iodine treatment. The supporting factors were receiving information on iodine, iodized salt, distance from home to suppliers and convenience in buying.

CHAPTER III

METHODOLOGY

Research design

This research is descriptive research to study iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders by these steps:

Population and sample

Population

The population of this study were mothers who have children ranging in age between six and twelve years in primary school, with iodine deficiency disorders, living in areas under The Jurisdiction of the Office of the National Primary Education Commission in Mukdahan province. There are approximately 2,388 persons (Mukdaharn Provincial Health Office,1997).

Makdahan province, in Northeastern Thailand, approximately 700 kilometers from Bangkok is an area of 4,339 square kilometers. In the North, it joins Nakornpanom Province. To the South is Amnatcharoen Province. To the West is Roi-et and Yasothorn Province. And to the east is The Khong river, the border with LAO PDR. There are 7 districts, 52 sub-districts, 488 villages, 30 communities and 47,704 households. There is 1 municipality and 6 sanitation areas, with a total population of 315,638 people . The average income is 109,973 bath per year, higher than average income of the northeastern region.

Sample

The sample of this study was mothers who have children ranging in age between six and twelve years in primary school, with iodine deficiency disorders, living in areas under The Jurisdiction of the Office of the National Primary Education Commission in Mukdahan province. There are approximately 2,388 persons with iodine deficiency disorders in primary school. This study uses 250 persons, or 10% of the iodine deficiency disorders population. All levels of students with iodine deficiency disorders were chosen by using the multi-stage sampling technique. Multi – stage sampling techniques were used to select the areas of study also.

1 st step : The study chooses 50% of the districts in Mukdaharn

2 nd step : The study chooses 20 schools in 4 districts of The Provincial Primary Education Office.

3 rd step: The study chooses 250 students who with iodine deficiency disorders (all grades)from step 2.

The multi-stage sample techniques are shown table 1.

Table 1 Sample size of students aged 6-12 years with iodine deficiency disorders in primary school.

Districts	School	Student with IDD	Sample
Mueng	Sunmai	14	5
	Dankam	22	5
	Kudngong	39	13
	Kongsamran	35	13
	Nakum	23	8
Kamcha-E	Nong-iendong	38	15
	Nongsrapang	11	5
	Kor	20	5
	Tumwharn	22	5
	Namthieng	20	5
Dontan	Nawar	16	5
	Napoe	22	9
	Posai	12	5
	Parai	23	9
	Huaikok	10	5
Dongluang	Pied	79	30
	Kangnang	87	33
	Dongluang	53	20
	Pondaeng	66	25
	Soke	76	30
Total		682	250

Instruments

The research instrument was a questionnaire in Thai. The questionnaire consists of the following 4 parts.

Part 1: Predisposing factors such as: age, educational background, family income. Reinforcing factors such as: information received about iodine consumption, iodine deficiency disorder history in the family; and enabling factors such as: price of iodized salt, number of suppliers of iodized salt in the village and distance between house and suppliers to buy iodized salt.

Part 2: Knowledge about iodine consumption. Knowledge in this study was classified into three categories, good, fair and poor by scoring : (Teranon, 1980:160)

Score : 0 for wrong answer

1 for correct answer

Score of instrument 1-15

80 percent or more(12-15 score)was defined as having good knowledge.

70-79 percent (8-11 score) was defined as having fair knowledge.

69 percent or less (0-7 score) was defined as having poor knowledge .

Part 3: Perception about iodine consumption. This was classified into two categories, positive perception and negative perception by scoring.

Positive question Score : 4 for strongly agree

3 for agree

2 for disagree

1 for strongly disagree

Negative question

Score : 1 for strongly agree

2 for agree

3 for disagree

4 for strongly disagree

Score of instrument 1-60

80 percent or more (41-60 score) was defined as having as good perception.

70-79 percent (21-40 score) was defined as having fair perception.

69 percent or less (1-20 score) was defined as having poor perception.

Practice 4: Iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. It included 10 items and each item has 4 levels as follows ;

"Always" means the mothers have done it every day which scored 4 .

"often" means the mothers follow the instruction nearly every day which scored 3.

" Sometimes" means the mothers have done it only some day which scored 2 .

" Never" means the mothers never have done it which scored 1 .

Score of instrument 1-40

80 percent or more (32-40 score) was defined as having good practice.

70-79 percent (23-31 score) was defined as having fair practice.

69 percent or less (1-22 score) was defined as having poor practice.

Validity and Reliability

Validity

The questionnaire was content validate by five experts in iodine deficiency disorders.

1.An instructor of community health nursing.

2. An instructor of iodine consumption.

3. An instructor of family nursing.

4. An instructor of nutrition.

5. An instructor to study iodine consumption behaviors.

These tested the applicability of the questionnaire ,and the investigator improved the questionnaire by using their recommendations.

Reliability

The reliability of the questionnaire was tested among 30 mothers who have children ranging in age between six and twelve years old in primary school with iodine deficiency disorders and had similar characteristics to the subjects in this study.

The Kuder Recharson formula 20 coefficient was 0.60 for the knowledge.

The Cronbach's Alpha coefficient was 0.74 for the perception.

The Cronbach's Alpha coefficient was 0.75 for the iodine consumption behaviors.

Collection of the data

Collection of the data was carried out in three stages:

1. Select and prepare the assistant researcher.

1.1Select the assistant researcher from the community hospital in Mukdaharn province.(A nurse with knowledge of IDD)

1.2 Orientate the assistant researcher on the goal of the research and the methods of interview for the collection of the data.

1.3 Researcher and the assistant researcher tested the interview with mothers who were not samples.

2. Coordinate with primary schools.

2.1 Identification documents were obtained for the research from the Faculty of Graduate Studies, Mahidol University, for presentation to The Director of Education in Mukdaharn.

2.2 The identification documents were presented to The Director of Education and the goal of the study was explain.

3. The researcher and the assistant researcher collected data.

3.1 They visited the schools, introduced the team and explained the goals of the study to the teachers, and students with iodine deficiency disorders.

3.2 The visit the homes of the students with iodine deficiency disorders, explained the goals of the study to the mothers, requested the mothers approval and co-operation in data collection by means of interview.

3.3 The mothers were interviewed by means of an approved questionnaire.

3.4 During the interview process, the researcher observed how the mothers consumed iodine within their home.

3.5 The researcher observed suppliers of iodized salt could bought in the village and interviewed the grocery shop keepers.

4. Collection of the data was from February to July 1999.

Data Analysis

Data was analyzed by computer using Statistical Package For the Social Science (SPSS7.5).

1.Frequency, percentage, mean and standard deviation were calculated to describe the predisposing factors, reinforcing factors and enabling factors and iodine consumption behaviors.

2.Pearson's Product Moment Correlation Coefficient would be conducted to examine the relationship between predisposing factors, reinforcing factors and enabling factors and iodine consumption behaviors.

3. Stepwise multiple regression would be conducted to predict predisposing factors, reinforcing factors and enabling factors and iodine consumption behaviors.

CHAPTER IV

RESULTS

This research studyed iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders . The results are described below :

1.Demograbphic characteristics of the mothers: age, educational background, family income, characteristics of the family, IDD history in family, knowledge about iodine consumption, perception about iodine consumption and iodine consumption behaviors are shown in tables 2 – 11.

2.The correlation between predisposing, reinforcing and enabling factors and iodine consumption behaviors are present in tables 12 – 13.

3. Power regression between predisposing, reinforcing and enabling factors and iodine consumption are present in behaviors tables 14.

Table 2 Age, education background and family income of mothers.

Variable	Frequency (n= 250)	Percentage
Age (year)		
20-29	38	15.2
30-39	146	58.4
40-49	42	16.8
50 and above	24	9.6
Range = 20-55		
Mean = 34		
SD = 18		
Educational background		
No formal education	6	2.4
Primary school	218	87.2
Secondary and high school	20	8.0
Collage	4	1.6
University	2	0.8
Family income/month (Baht)		
<3,000	209	83.6
3,001-6,000	29	11.6
6,001-9,000	3	1.2
>9,000	9	3.6
Range = 550- 9,500		
Mean = 2200		
SD = 1602		

Table 2 show the majority of the mothers (58.4%) were 30 to 39 years old.The mean age of the mothers was 34 years, ranging from 20 to 55 years with standard deviation of 18.Most of them (87.2%) had graduated from primary school.The majority had family income less than 3,000 baht/month. The mean family income was 2,200 baht, ranging from 550 to 9,500 baht with standard deviation of 1602.

Table 3 Characteristics of Family and IDD History in the Family

Variable	Frequency (n= 250)	Percentage
Characteristics of family		
Nuclear family	142	56.8
Extended family	108	43.2
IDD history in the family		
IDD present	30	12.0
IDD not present	212	84.8
Unknown	8	3.2

Table 3 show that approximately 56.8 percent of mothers had a nuclear family. 84.8 percent of mothers were without iodine deficiency disorder history in the family and 12 percent had iodine deficiency disorder history in the family. Mothers of primary school students with iodine deficiency disorders were 4 percent, grandmothers of primary school students with iodine deficiency disorders were 2 percent and brothers were 6 percent of primary school students with iodine deficiency disorders.

Table 4 Information received about iodine consumption, sources of information and media for iodine information.

Variable	Frequency	Percentage
Information received about iodine consumption (n= 250)		
No received	8	3.2
Received	242	96.8
Sources of information (n=242)		
Health officer	90	37.1
Health volunteer	124	51.2
Neighbor	28	11.5
Media for iodine information (n=242)		
Radio	75	30.9
Television	123	50.8
Poster	38	13.7
Broadcasting	6	2.4

Table 4 show that it's approximately 96.8 percent of the mothers had information received about iodine consumption. Information received about iodine consumption from health officer and nurse in community hospitals. Sources of information is health volunteer. it's approximately 51.2 percent. Most of media received television 50.8 percent.

Table 5 Price of Iodized Salt, Number of Suppliers of Iodized Salt in the Village, Convenience of Buying Iodized Salt and Distance between House and Supplier of Iodized salt.

Variable	Frequency (n=250)	Percentage
Price of iodized salt		
Cheaper than rock salt	41	16.4
Equal to rock salt	77	30.8
More expensive than rock salt	132	52.8
Number of suppliers in the village		
Without suppliers	50	20.0
With suppliers	200	80.0
Distance between house and supplier of iodized salt		
0-500 m.	184	73.6
501-1,000 m.	39	15.6
1,001-5,000 m.	27	10.8
Convenience of buying iodized salt		
Inconvenient	53	21.2
Convenient	197	78.8

Table 5 shows that 52.8 percent of mothers thought that the price of iodized salt was more expensive than rock salt. 80.00 percent have a number of suppliers of iodized salt in the village. 73.6 percent of mothers traveled 500 m. or less to a supplier to buy iodized salt and

Table 6 Knowledge about iodine consumption overall.

Knowledge		Frequency	Percentage
Poor	(0-7)	126	50.4
Fair	(8-11)	90	36.0
Good	(12-15)	34	13.6
Total		250	100

Table 6 reflected that 50.4 percents of mothers possessed poor level of knowledge about iodine consumption, 36.0 percents of mothers possessed fair level of knowledge and 13.6 percent of mothers possessed good knowledge.

Table 7 Specific Knowledge about Iodine Consumption .

Knowledge	Right		Wrong	
	Frequency	Percentage	Frequency	Percentage
1. Iodized salt.	203	81.2	47	18.8
2. Iodized water.	154	61.6	96	38.4
3. Iodized fish sauce.	83	33.2	167	66.8
4. Keeping iodized salt.	143	57.2	107	42.8
5. Time to keep iodized salt.	49	19.6	201	80.4
6. Drinking iodized water.	48	19.2	202	80.4
7. Buying iodized salt.	216	86.4	34	13.6
8. Receiving iodized water.	179	71.6	71	28.4
9. Goiter changes with iodine consumption	157	62.8	93	37.2
10. Seafood.	231	92.4	19	7.6
11.Iodine consumption	122	48.8	128	51.2
12.Below normal consumption	106	42.4	144	57.6
13. Above normal iodine consumption.	32	12.8	218	87.2
14. Side effects of iodine Consumption	98	39.2	152	60.8
15. Time of iodine consumption.	47	18.8	203	81.2

Table 7 show that the mothers had knowledge about iodine consumption of more than 80 percent with regard to seafood, drinking iodine water and time to keep iodized salt.

The mothers had knowledge about iodine consumption of between 50-80 percent with regard receiving iodized water, goiter changes with iodine consumption, iodized water and keeping iodized salt.

The mothers had knowledge about iodine consumption of less than 50 percent with regard keeping iodized salt, drinking iodized salt, below normal iodine consumption, above normal iodine consumption and side effects of iodine consumption.

Table 8 Perception about iodine consumption overall.

Variable	Frequency(n=250)	Percentage
Perception		
Poor (1-20)	0	0
Fair (21-40)	177	70.8
Good (41-60)	73	29.2

Table 8 display the level of the perception of the mothers in the study. The total score is 60. The high the score possess the fair perception. The table also display that 70.8 percent of the mothers achieved the fair perception and 29.2 percent of the mothers have possessed good level of perception about iodine consumption.

Table 9 Perception about iodine consumption specific.

Perception	Strongly agree		Agree		Disagree		Strongly disagree	
	n	%	n	%	n	%	n	%
Perceived Seriousness								
1. School age : physical development	64	25.6	169	67.6	17	6.8	0	0
2.Adult : impaired mental function	54	21.6	140	56.0	56	22.4	0	0
3.Goiter enlarge make dyspnea	66	26.4	145	58.0	39	15.6	0	0
4.Adolescent : fertility	48	19.2	111	44.4	87	34.8	4	1.6
5.Pregnancy: abortion, stillbirth	83	33.2	118	47.2	49	19.6	0	0
Perceived benefit								
1.Drinking iodized water	90	36.0	154	61.6	6	2.4	0	0
2.Cooking iodized salt	109	43.6	136	54.4	5	2.0	0	0
3.Cooking iodine fish sauce	84	33.6	153	61.2	13	5.2	0	0
4.Treatment goiter by doctor	103	41.2	125	50.0	22	8.8	0	0
Perceived barriers								
1.Difficult to buy iodized salt	7	2.8	70	28.0	119	47.6	54	21.6
2.Difficult to mix iodized water	5	2.0	78	31.2	122	48.8	45	18.0
3.Iodized salt more expensive	44	17.6	120	48.0	73	29.2	13	5.2
4.Iodine fish sauce more expensive	27	10.8	90	36.0	100	40.0	33	13.2
5.Iodized salt no salty taste	9	3.6	77	30.8	122	48.8	42	16.8
6.Iodized water bad taste	8	3.2	77	30.8	123	49.2	42	16.8

Table 9 show that the mothers had perceived seriousness about iodine consumption more than 80 percent such as school age: physical development and goiter change make dyspnea.

The mothers had perceived benefit about iodine consumption more than 80 percent such as drinking iodized water, cooking iodized salt, cooking iodine fish sauce and treatment goiter by doctor.

The mothers had perceived barriers about iodine consumption more than 50 percent such as iodized salt more expensive.

Table 10 Iodine consumption behaviors overall.

Practice	Frequency(n=250)	Percentage
Poor (1-22)	180	74.4
Fair (23-31)	54	21.6
Good (32-40)	10	4.0

Table 10 display the level of practice of the mothers in the study. The total score is 40.In this table reflect that 74.4 percent of the mothers possessed poor practice and 21.6 percent of the mothers possessed fair practice and 4.0 percent of the mothers possessed good practice.

Table 11 Specific Iodine Consumption Behaviors .

Practice	Usually		alway		Sometimes		Never	
	n	%	N	%	n	%	n	%
1.To cook seafood	1	0.4	25	10.0	208	83.2	16	6.4
2. To mix iodine to drinking water	28	11.2	37	14.8	142	56.8	43	17.2
3.To drink iodized water	28	11.2	40	16.0	112	44.8	70	28.0
4.To cook with iodized salt	54	21.6	71	28.4	100	40.0	25	10.0
5.To eat too much raw cabbage turnip and cassava	3	1.2	21	8.4	162	64.8	64	25.6
6. To seek information	7	2.8	34	13.6	132	52.8	77	30.8
7. To prepare iodized water	5	2.0	9	3.6	32	12.8	204	81.6
8.To ask health officer	24	9.6	39	15.6	109	43.6	78	31.2
9. To tell benefit	26	10.4	27	10.8	73	29.2	124	49.6
10.To cook iodine fish sauce	18	7.2	33	132.	82	32.8	117	46.8

Table 11 shows that the mothers had wrong practice about iodine consumption more than 80 percent regarding to cook seafood, eat too much raw cabbage turnip cassava, seek information and prepare iodized water.

The mothers had wrong practice about iodine consumption 50-80 percent regarding to mix iodine to drinking water, drink iodized water, ask health officer, tell benefit of iodine, cook with iodized salt and cook iodized fish sauce.

Table 12 Correlation iodine consumption behaviors.

Variable	(r)
Knowledge about iodine consumption	.517**
Perception about iodine consumption	.554**
Family income	.316*
Educational background	.223**
Information received about iodine consumption	-.142*
Price of iodized salt	.198**
Number of suppliers iodized salt in village	.148*
Distance between house and suppliers to buy iodized salt	-.221**

* p <.05, ** p <.01

Table 12 show that there was a positive significant correlation between knowledge about iodine consumption, perception about iodine consumption, educational background and price of iodized salt and iodine consuming behaviors at the level of .01 but a negative significant correlation between distance between house and suppliers to buy iodized salt.

Table 13 Matrix of Correlation Coefficient among Variables.

Variable	1	2	3	4	5	6	7	8	9	10
1.Age										
2.Educational back ground	-.010									
3.Family income	.045	.447**								
4.IDD history in the family	-.027	.064	.167**							
5.Information received about iodine consumption	.115	.077	.009	-.045						
6.Price of iodized salt	-.026	.125*	.012	-.136*	.055					
7.Number of suppliers of iodized salt in the village	-.118	.079	.052	.091	.112	.163**				
8.Distanc between house and suppliers of iodized salt	.086	-.111	-.083	-.092	-.045	.071	-.498**			
9.Knowledge about iodine consumption	-.113*	.233**	.259**	-.014	-.168**	.175**	.191**	-.362**		
10.Perception about iodine consumption	-.002	.447**	.153**	-.011	-.143*	.120	.020	-.243**	.277**	
11.Iodine consumption behaviors	-.066	.223**	.136*	-.031	-.142*	.198**	.148*	-.293**	.517**	.554**

* < .05 ** < .01

Table 13 show that there was a positive significant correlation between educational background and family income, knowledge about iodine consumption, perception about iodine consumption and iodine consumption behaviors at the level of .01

There was a positive significant correlation between family income and IDD history in the family, knowledge about iodine consumption and perception about iodine consumption at level .01

There was a negative significant correlation between information about iodine consumption at the level of .01

There was a positive significant correlation between price of iodized salt and number of suppliers iodized salt in village, knowledge about iodine consumption and perception about iodine consumption at level .01

There was a negative significant correlation between number of suppliers iodized salt in village and distance between house and suppliers to buy iodized salt but positive significant correlation between knowledge about iodine consumption at level .01, and iodine consumption behaviors at to level .05.

There was a negative significant correlation between distance between house and suppliers to buy iodized salt, knowledge about iodine consumption , perception about iodine consumption and perception about iodine consumption at level .01

There was a positive significant correlation between knowledge about iodine consumption, perception about iodine consumption and perception about iodine consumption at level .01

Table 14 Stepwise Multiple Regression on Iodine Consumption Behaviors.

Variable	Multiple R	R^2	R^2 Change	F Change	b	Beta	t	sig
1.Perception about iodine consumption	.554	.307	.304	109.728		.554	10.475	.000
2. Perception about iodine consumption		.555				.445	9.057	.000
						.394	8.012	
Knowledge about iodine consumption	.671	.445						
Constants = -4.607		.450	.445	100.945				
Overall F= 100.945		.580						

From table 14 it was found that in the first step of the analysis of the stepwise multiple correlation, the first predictor selected to the equation was the iodine consumption behaviors, which had the highest relation with the iodine consumption, with the predictive coefficient of .307 . It was found that the perception about iodine consumption could predict the iodine consumption behaviors for 30.7 percent at the statistically significant level of .001. In the second step, the second predictor selected to the equation was knowledge about iodine consumption . It was found that the predictive coefficient increased to .450 , and the predictor power increased to 45 percent at the statistically significant level of .001. After entering more predictors, it was found that the predictive coefficient change was at the non statistically significant level, so the process of stepwise multiple correlation was stopped at the second stage. From the analysis by the multiple correlation , it was found that the predictors that could predict the iodine consumption behaviors at the statistically significant level were perception about iodine consumption and knowledge about iodine consumption, in which predictors could co-predict the iodine consumption behaviors for 45 percent at the statistically significant level of .001.

CHAPTER V

DISCUSSION

The study of iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders found that :

1.Two in three mothers of primary school students with iodine deficiency disorders had poor practice about iodine consumption.

2.Only a half mothers of primary school students with iodine deficiency disorders had good knowledge about iodine consumption.

3.Two in three mothers of primary school students with iodine deficiency disorders had fair perception about iodine consumption.

4. Knowledge about iodine consumption and perception about iodine consumption could predict the iodine consumption behaviors.

5. The best resource to seek information about iodine consumption was health volunteers.

1.Two in three of mothers of primary school students with iodine deficiency disorders had poor practice about iodine consumption.

The result found that 74.4 percent of mothers had poor practice about overall iodine consumption. 94.4 percent of mothers had wrong practice about iodine consumption in preparing iodized water because they though that the primary school preparing iodized water for students, and 28.4 percent of mothers did not know where to receive iodized water. 73 percent of mothers did not know how to mix iodized water . 90.4 percent of mothers prepared food with raw cabbage. These plants cause

an increase of iodine deficiency disorders because they contain high goitrogen (Burrow,1990). If these plants are eaten in a high quantity and for a long time, they change the iodine uptake and cause the enlargement of the thyroid.(Hetzel, Dunn & Stanbury,1987: 35) The families liked to eat raw cabbage with papaya or chilly sauce. 89.6 percent of mothers had wrong practice about seafood because Mukdaharn province is far away from the sea and the location is mountainous. Seafood is more expensive and 83.6 percent of mothers had family income of less than 3,000 baht /month. Therefore the family could not cook seafood. Similarly a study by Pattchadee (1995) found that mothers in Yasothon province not eat sea food on account of it is more expensive and difficult to buy. A study by Nammarong (1995) on the acceptance of iodized salt by mothers found that most of the food was collected from nature depending on the season, and from gardens but the food bought from outside depended on economic factors. The mothers thought that iodized salt was more expensive than rock salt and not salty enough.

2.Only a half of mothers of primary school students with iodine deficiency disorders had good knowledge about iodine consumption.

The study found that 50 percent of mothers had poor knowledge about iodine consumption. More than 80 percent of mothers had poor knowledge about iodine consumption about how to keep iodized salt, drinking iodized water and above normal iodine consumption. 80.4 percent of mothers had received information about iodine consumption but from one way communication such as television (50.8 percent) and radio (30.9 percent). The mothers did not ask about iodine consumption therefore they did not get knowledge about right or wrong iodine consumption . The result

showed that mothers had received information about iodine consumption from health volunteer so it made information about iodine consumption incomplete. 83.6 percent of mothers seek information about iodine consumption because they had only graduated from primary school.

3.Two in three of mothers of primary school students with iodine deficiency disorders had fair perception about iodine consumption.

The result found that 70.8 percent of mothers had fair perception about iodine consumption because they are deep limited by culture and local tradition. More 65.6 percent of mothers did not consume iodine because they believe that iodized salt was not salty (33.8 percent) and more expensive (52.8 percent). Similarly a study by Tongsane &Tongmethakul in 1990 found that mothers thought that rock salt has more salty than iodized salt and they could product rock salt themselves or buy it at a local grocery store where salt was provided to customers all year. Grocery keepers bought this salt from peddlers who went to each village by truck. They bought 200-300 sacks at a time for sale. Mothers in the village would buy a lot of salt in the rainy season to make Plara, a fermented fish. Iodized salt or sanitary salt was unavailable and they did not know where they could get it.

4. Knowledge about iodine consumption and perception about iodine consumption could predict the iodine consumption behaviors.

The study found that the perception about iodine consumption, and knowledge about iodine consumption could predict the iodine consumption behaviors for 45 percent at the statistically significant level of .001. The perception helping making decision which attempted to describe action in a choice situation to an

individual's decision about alternative health behaviors (Good,1973). A study by Baiya in 1996 found that their own beliefs were associated between perception and the utilization of iodized salt. The knowledge causes change in behaviors (Suwan,1983). A study by Patchadee in 1995 indicated that the majority of women had fair knowledge of iodine deficiency disorders related to iodine consumption.

5. The best resource to seek information about iodine consumption was health volunteers.

The study found that 51.2 percent of mothers had received information about iodine consumption from health volunteers. Because health volunteers are close to the people in the village and provide basic health care such as dressing wounds, basic health education and refer causes thus the health education given to mothers about iodine consumption was incomplete.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

Conclusion

The objectives of this descriptive research was to study iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. The research used the approach Green Kreuter (1991) by utilizing PRECEDE framework.

The sample of this study were mother who have children ranging in age between six and twelve years in primary school, with iodine deficiency disorders in the area under The Authority of the Office of The Nation Primary Education Commission in Mukdaharn province who were chosen by using the multi-stage sample technique. The research instrument was a questionnaire in Thai. The questionnaire consists of the following 4 parts. Predisposing factors such as age, educational background, family income; reinforcing factors such as information received about iodine consumption, IDD history in family, enabling factors such as price of iodized salt, number of suppliers iodized salt in the village, distance between house and suppliers of iodized salt, knowledge about iodine consumption, perception about iodine consumption and iodine consumption behaviors. Collection of the data was carried out in three stages: selection and preparation the assistant researcher, coordination with primary school, and collection the data from February to July 1999. The data was analyzed by using a computer program SPSS 7.5 . Percentage, Pearson's product moment correlation and

stepwise multiple regression analysis were employed in this study. The results are described below.

Most of the mothers were aged 30-39 years old. The majority had graduated from primary school. 56.8 percent of them lived in a nuclear family. The majority had family income of less than 3,000 baht/month. 84.8 percent had no iodine deficiency disorder history in the family. 96.8 percent of the mothers had received information about iodine consumption; from health volunteers (51.2 percent) and health officers (37.1 percent). Media information about iodine consumption was mostly television (50.8 percent) and radio (30.9 percent). 52.8 percent of the mothers thought that the price of iodized salt was more expensive than rock salt. The majority 80 percent had a number of suppliers iodized salt in the village, 73.6 percent of mothers traveled 500 m. or less to suppliers of iodized salt in the village and it was convenient to buy iodized salt. 50.4 percent of mothers had poor knowledge about iodine consumption and 36 percent of mothers had fair knowledge. Approximately 70.8 percent of mothers had fair perception about iodine consumption. But 47.4 percent of mothers had poor practice about iodine consumption.

The results found that educational background, family income, knowledge about iodine consumption, perception about iodine consumption, information received about iodine consumption , price of iodized salt, number of suppliers iodized salt in the village and distance between house and suppliers of iodized salt were related to iodine consumption behaviors.

After applying the stepwise multiple regression , two independent variables, the knowledge about iodine consumption and perception about iodine consumption could predict the iodine consumption behaviors among mothers of primary school students

with iodine deficiency disorders for 45 percent at the statistically significant level of .001

Recommendation

1. The results found that mothers had poor iodine consumption behaviors(74.4 percent), poor knowledge about iodine consumption (50.4 percent), fair perception about iodine consumption (70.8 percent) and found that knowledge about iodine consumption and perception about iodine consumption could predict the iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. Therefore, the health officers specifically nurse working in community health, in community hospitals, should be emphasize in policy making by promotion of iodine consumption to mothers of primary school students with iodine deficiency disorders. The nurse should visit home and community and refer case to nurses in health office. Procedures used to persuade mothers consume iodine are ; health education through mass media, home health care, individual contacts by home visiting, group meeting of the mothers who have children with iodine deficiency and focal conversion programs through which arrangements are made with villages.

2.The results show that mothers had received information about iodine consumption from health volunteers (51.2 percent). Therefore, the health officers should give knowledge to health volunteers about iodine consumption, and give close supervision, follow up and training.

3. Dong Luang district inconvenient to buy iodized salt because of the mountainous area. The distance between house and supplier of iodized salt to far more than 5 kilometers. Therefore, the health officers should demonstrate

to mix iodinate with rock salt by hand in village. The preparation of iodine solution for spraying on 12 kilos of rock salt can be made by measuring one bottle of concentrated iodine solution (30 cc.) and 3 bottles of boiled water (90 cc.).

4. The primary school prepare iodized water for students and in village health volunteers give iodine solution concentrated to people, but the study found that the mothers don't know iodized water 38.4 percent , don't know seek iodine solution concentrated and don't know prepare iodized water 94.4 percent. Therefore, the health officer should be close supervise and suppliers iodized salt in village inconvenience.

Further researches

1. To study knowledge and practice about iodine consumption in health volunteer.

2. To study iodine consumption behavior in primary school students with iodine deficiency disorders.

3. The predictor increased to 45 percent. Therefore, the other factors that may have predict iodine consumption behaviors such as; the health care service factors and the relationship in family.

BIBLIOGRAPHY

Anderson, L.et al. (1982). **Nutrition in health and disease.** 17th ed. Philadelphia : J.B.Lippincott Company.

Baiya, T.(1996). **Factors affecting the acceptance of iodized salt among villagers of Santisuk District Nan Province.** M.A. Thesis in Public Health, Faculty of Graduate Studies, Mahidol University.

Boonsin, Y. (1996). **Factors affecting the iodine deficiency disorders in school age : A study in Nakornsithamaraj Province.** Master of Science (Technology of Environmental Management), Faculty of Graduate Studies, Mahidol University.

Burrow, G.N. (1990). "Thyroid Disorders." **In thyroid function and disease.** pp. 141-146. E cited by Burrow, G.N. et Al. Philadelphia : W.B. Saunclers Company.

Charamart, M. (1995). **Effect of educational program on perception and preventive behavior of iodine deficiency disorders among grade 6 students, Kutbak District, Sa Konnakhon Province,** Master of Science (Public Health) major in Family, Faculty of Graduate Studies, Mahidol University.

Chalermpol, J. (1997). **Relationship between demographic factors, health beliefs, and behaviors of mothers in preventing school–aged children form iodine deficiency.** M.A. Thesis in Nursing, Faculty of Graduate Studies, Mahidol University.

Chiraratsatit & Kaewplung (1987) **Endocride.** Chang Mai: Tippanet Printing.

Chttichai, S. (1997). **Preventive behavior associated with iodine deficiency disorders in the parents of primary school student of Sangkhlaburi District Kanchanaburi Province.** Master of Science (Population), Faculty of Graduate Studies, Mahidol University.

De Maeyer, E.M. et al. (1979). **The control of endemic goiter**. Geneva : World Health Organization.

Division of Health Promotion Mukdaharm Provincial Head Office (1992). **Report of Control and Prevention Iodine Deficiency Disorder in Primary School.**

_____. (1997). **Report of Control and Prevention Iodine Deficiency Disorder in Primary School**

Division of Nutrition Department of Health. (1994). **To study knowledge attitude and practice for prevention and control iodine deficiency disorder.**

Dornkamsawad, D. (1991). **The effectiveness of health education program with social support by community leader in preventing iodine deficiency disorders among housewives, Sermngam District, Lampang Province.** Master of Science (Public Health) major in Health Education, Faculty of Graduate Studies, Mahidol University.

Dunn John T. And Frits Van Der Haar. (1990). **"A practical guide to the correction of iodine deficiency".** International Council for Control of Iodine Deficiency Disorders, Netherlands.

Eawchawna, O.(1992). **The effective of health education program on preventing iodine deficiency disorders among primary school students in Thapla District, Utiradit Province.** Master of Science (Public Health) major in Health Education, Faculty of Graduate Studies, Mahidol University.

Foater, R.L. et al. (1989). **Family–central nursing care of children.** Philadelphia : W.B. Saunders Company.

Good V.C. (1973). **Dictionary of Education**. New York : McGraw Hill Book company.

Green, Lawrence W. & Kreuter, Marshall w. (1991). **Health promotion planning** : An Education and Environmental Approach. (second edited). Toronto : Mayfield Publishing Company.

Grossman Aahley, (1992). **Clinical endocrinology**. London : Blackwelll Scientific.

Hetzel, B. S., Dunn, J.T. & Stanbury, J.B. (1987). **The prevention and control of iodine deficiency disorders,** Amsterdam : Elsevier Science Publishers.

Jacob, B.B.(1988). **"Endemic goiter in highland village in Northern Thailand".** Asia – Pacific Journal of Public Health. 9 : 213 – 215.

Kasal, S.V. & Cobb, S.(1966)." **Health behavior and illness behavior**." Archives Environmental Health. 12(February) : 246 – 261.

Kalajuk, P.(1995). **Knowledge, attitude and practice for IDD of pregnancy women attending. The fist attending visit in district hospitals in Yasothon province;** Thesis Human Reproduction and Population Planing. M.Sc. Faculty of Graduate Studies, Mahidol University.

Mannar MGv. & Dunn JT. (1995). **Salt iodization for elimination of iodine deficiency.** ICCIDD/MI/UNICEF/WHO.

Mc Dongall,I.R.(1992). **Thyroid disease in clinical practice.** London : Chapman 8 Hall Medical.

Mikikit, R.(1992). **Factors affecting self practices in iodine deficiency prevention among 6th grade primary school students in Chiang Khong District, Chiang Rai Province,** Thesis (M.S.) Chiang Mai University.

Namnarong, S.(1995). **Patterns of acceptance of iodine supplement for iodine deficiency prevention and control among Northeastern Housewives : A community study in Khon Kaen Province.** M. A. Thesis in Art, Faculty of Graduate Studies. Mahidol University.

Ngarnprapasom, N.(1990). **The effectiveness of health education program for preventing behavior to control iodine deficiency disorder disease among Raran Hilltribes in Phrae Province.** Master of Science (Public Health) major in Health Education, Faculty of Graduate Studies, Mahidol University.

Nomkon, P,(1992) **Socio-cultural factors effecting iodine salt consumption in Maehongson Province**. Master of Arts (Medical and Health Social Sciences), Faculty of Graduate Studies, Mahidol University.

Orem, D. E. (1985). **Nursing : Concepts of practice,** 3rd. New York : Mcgraw – Hill Book Company.

Patchadee, S. (1995). **Factors affecting iodine salt consumption behaviors of women in iodine deficiency disorders endemic areas : A case study of Nakhon – Phanom and Yasothon Province.** M.A. Thesis in Population and social, Faculty of Graduate Studies, Mahidol University.

Phookhauluan, S.(1997). **Iodine deficiency disorders preventive behaviors of primary school children in Krabi Province.** M.A. Thesis in Art, Faculty of Graduate Studies, Mahidol University.

Phoopaiboo, R.(1994) **Research report on the role of parents in nurturing off springs with rheumatic heart disease.** Ramathibode Hospital.

Rosenstock, I.M.(1974). **"Historical origins of the health belief model."** Health Education Monograph. 2(4 winter) : 328 – 335.

Sakomban, S.(1996). **Preventive behaviors associated with iodine deficiency disorders in pregnant women in Nakornrajchasima province.** (Public Health), Faculty of Graduate Studies, Mahidol University.

Siviroj, P.(1993). **Preventive behaviors associated with iodine deficiency disorders in school – aged children in Chiang Mai Province.** Master of arts (Medical and Health Social Sciences, Faculty of Graduate Studies, Mahidol University.

Sirisuwan, P.(1994). **The effectiveness of health promotion student leaders on iodine deficiency disorder prevention among primary school students in Nongphauk District, Roi–ed Province.** Master of Science (Public Health) major in Health Education, Faculty of Graduate Studies, Mahidol University.

Sirinart, R.(1990). **The effectiveness of health education program on prevention and control of iodine deficiency disorders among primary school students, Pong District, Payao Province.** Masters of Science (Public Health) major in Health Education, Faculty of Graduate Studies, Mahidol University.

Somwats, M.(1998). **Changes in iodine content in fermented fish (Pla–Ra) Made with iodated salt and sensory acceptability of various Fermented fish products.** Masters of Science (Food and Nutrition), Faculty of graduate Studies, Mahidol University.

Srinay. P. (1987). **A Study knowledge, Attitude and Practice for control and prevent iodine deficiency disorders in Nan province**. Bachelor of Public Health, Faculty of Public Health, Mahidol University.

Tanasestt, P. (1996). **The compliance of implementation for the control of iodine deficiency disorders.** Master of Science (Food and Nutrition), Faculty of Graduate Studies, Mahidol University.

Teeranon.W. (1980). **The procedure used in the studies from the learning and teaching system,** unit 8-15 Education and Development, Sukothai Thammartiraj University, Bangkok.

The National Program for Controlling Iodine Deficiency Disorders, 1989.

Thermserkul, S.(1993). **Comparasion of nutrition value of dietary intake in elderly women with and without goiter–iodine deficiency in Khon Kaen Province.** Masters of Science (Public Health), Faculty of Graduate Studies, Mahidol University.

Tonboon, N.(1995). **Health education program for preventing iodine deficiency disorders among pregnant women Lamplaimat Buriram Province.** Masters of Science (Public Health) major in Health Education, Faculty of Graduate Studies, Mahidol University.

Thong-arunsri S. (1987). **Knowledge and Attitude in Parents of Primary school students for preventing behavior to control iodine deficiency disorder in Pisanulok province**. Bachelor of Public Health, Mahidol University.

Vlope Robert.(1990). "Hypothyroiclism." **In thyroid function and disease**. pp.274 – 279. Edited by Burrow, G.N. et al. Philadelphia ; W.B. Saunders Company.

World Health Organization.(1985). **Iodine deficiency disorders in South–East Asia.** New Delhi : WHO SEAKO Regional Health Paper No. 10.

APPENDIX

RESEARCH INSTRUMENTS

Research Title Iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders

Questionnaire There are 4 parts of the questionnaire which are :

Part 1 Predisposing factors such as : age, educational background, family income, Reinforcing factors such as : information received about iodine consumption, iodine deficiency disorders history in family, Enabling factors such as : price of iodized salt, number of suppliers of iodized salt in village and distance between house and suppliers to buy iodized salt in village.

Part 2 Knowledge about iodine consumption

Part 3 Perception about iodine consumption

Part 4 Iodine consumption behaviors

No.....

Date of Record.....

DEMOGRAPHIC QUESTIONNAIRE

.....

Please choose the choice that is closest to your opinion of your status.

1. Age
   ( ) 20-29 years
   ( ) 30-39 years
   ( ) 40-49 years
   ( ) 50 and above

2. Educational Background
   ( ) No formal education
   ( ) Primary school
   ( ) Second and high school
   ( ) Collage
   ( ) University

3. Family income/month/baht

.
.
.

11. Distance between house and suppliers to buy iodized salt
   ( ) Inconvenient
   ( ) Convenient

KNOWLEDGE ABOUT IODINE CONSUMPTION

.....

Choose the answer that you right of the statement to indicate you fill right now.

1. Do you know iodized salt ?
   ( ) No
   ( ) Yes.....

2. Do you know iodized water ?
   ( ) No
   ( ) Yes.....

3. Do you know iodine fish sauce?

.
.
.

15. How long do you iodine consumption?
   ( ) No
   ( ) Yes.....

Knowledge about iodine consumption

.....

Please answer yes or no and give relevant details

1. Do you know the meaning of iodized salt ?

( ) .....

2. Do you know the meaning of iodized water ?

( ) .....

3. Do you know the meaning of iodized fish sauce?

( ) .....

.

.

.

15. How long have you consumed iodine?

( ) .....

IODINE CONSUMPTION BEHAVIORS

.....

Practice	Usually	Always	Sometimes	Never
1.How often do you cook seafood?				
2.How often do you mix iodized water?				
3.How often do you drink iodized water?				
. . .				
10. How often do you cook iodine fish sauce?				

CONSENT INFORM SHEET

My name is Waratip Kankarn. I am a master student at Faculty of Nursing, Mahidol University. I am studying the iodine consumption behaviors among mothers of primary school students with iodine deficiency disorders. The objective of the study are iodine consumption behaviors. The information from the study will help you and other health professionals provide health education program to increase iodine consumption.

If you agree to participate with this study. I would like you to answer the questionnaires about the personal information, knowledge about iodine consumption, perception about iodine consumption and iodine consumption behaviors for just only within 45 minutes.

All the information are confidential, without disclosure name to the other. You can reject the study at anytime and your care at the hospital will not be affected by your decision to participate or not participate in this study. The success of the study depends on your cooperation and I would like to express my gratitude to you too.

My name is ..... I understand and participate in this study.

Signature.....

LIST OF EXPERTS

There are five experts who validate content of the iodine consumption. There are :

1. Associate Profession Somchai Toonkool
   Department of Public Health Nursing,
   Faculty of Public Health, Mahidol University

2. Associate Profession Vason Silpasuwan
   Department of Health Education and Behavioral Science,
   Faculty of Public Health, Mahidol University

3. Associate Profession Kallaya Kijboonchoo
   Institute of Nutrition, Mahidol University

4. Associate Profession Supong Pattanachak
   Department of Radiology,
   Faculty of Medicine Siriraj Hospital, Mahidol University

5. Assistant Profession Somboom Jaiyavat
   Department of Public Health Nursing, Faculty of Medicine
   Ramathibodi Hospital, Mahidol University

BIOGRAPHY

NAME	Miss Waratip Kankarn
DATE OF BIRTH	2 March 1965
PLACE OF BIRTH	Ubonrajchathani, Thailand
INSTITUTIONS ATTENDED	Surin Nursing College, 1974-1977
	Diploma of Nursing and Midwife
	Mahidol University, 1991-1993
	Bachelor of Nursing Science
	Mahidol University, 1997-1999
	Master of Nursing Science (Adult Nursing)
POSITION & OFFICE	1977-1990, Division of Nursing
	Kamcha-E Hospital
	1993-1997 Division of Nursing
	Kamcha-E Hospital.