HEALTH STATUS, HEALTH PROMOTING BEHAVIORS AND USE OF MOBILE HEALTH APPLICATION AMONG SERVICE USERS IN PRIVATE HOSPITALS

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ABSTRACT

This descriptive study aimed to describe 1) health status, health-promoting behaviors, and use of mobile health application among service users in private hospitals, 2) the relationship between personal factors and use of mobile health application, 3) the relationship between use of mobile health application and health-promoting behaviors, and 4) the relationship between health-promoting behaviors and health status in service users in private hospitals. Through convenience sampling with inclusion criteria, the sample included 420 service users at the wellness centers in two private hospitals. Data were collected using self-reported questionnaires and health assessment. The data were then analyzed using frequency, percentage, mean, standard deviation, range, Chi - Square test, Fisher's exact test and Biserial Correlation.

The results revealed that most of the samples had normal waist circumference (96.19 %). Their body mass index was within the normal range (37.61%) and systolic and diastolic blood pressure were appropriate (57.86 % , 74.29 % respectively). The grip strength remained very low (77.38 %) and body fat was moderate (65.71 %). Most of the samples with health promoting behaviors had a habit of weighing (99.28 %), followed by a measurement of blood pressure (95.0%). Most of them used mobile health application on food (77.23 %) and the least application they sometimes used was on drug use (11.55 %).

Each personal factor was not significantly correlated with use of mobile health application ($p > .05$). Use of mobile health application on food was significantly correlated with health promoting behaviors for nutritious food consumption ($p = .006$) and body fat ($p = .021$). Use of mobile health application on exercise was significantly correlated with health promoting behaviors for nutritious food consumption ($p = .029$).

Moreover, use of mobile health application on basic self-care was significantly correlated with nutritious food consumption behavior ($p = .024$) and systolic blood pressure ($p = .022$).

The results suggested that health team should consider using mobile health application on diet, exercise, and primary care as appropriate for service users at the wellness centers in private hospitals.

KEY WORDS: HEALTH STATUS/ HEALTH-PROMOTING BEHAVIORS/ USE OF MOBILE HEALTH APPLICATION/ PRIVATE HOSPITAL

85 pages

ภาวะสุขภาพ พฤติกรรมสร้างเสริมสุขภาพและพฤติกรรมการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพของผู้ใช้บริการโรงพยาบาลเอกชน
HEALTH STATUS, HEALTH PROMOTING BEHAVIORS AND USE OF MOBILE HEALTH APPLICATION AMONG SERVICE USERS IN PRIVATE HOSPITALS

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บทคัดย่อ

การศึกษาวิจัยครั้งนี้เป็นการวิจัยเชิงบรรยาย มีวัตถุประสงค์เพื่อศึกษาภาวะสุขภาพ พฤติกรรมสร้างเสริมสุขภาพและพฤติกรรมการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพของผู้ใช้บริการโรงพยาบาลเอกชน และศึกษาความสัมพันธ์ของปัจจัยส่วนบุคคลกับพฤติกรรมการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพ ความสัมพันธ์ของพฤติกรรมการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพกับพฤติกรรมสร้างเสริมสุขภาพ และความสัมพันธ์ของพฤติกรรมการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพกับภาวะสุขภาพของผู้ใช้บริการในโรงพยาบาลเอกชน ตัวอย่าง คือ ผู้ใช้บริการที่แผนกตรวจสุขภาพของโรงพยาบาลเอกชนจำนวน 2 แห่ง จำนวน 420 ราย เลือกตัวอย่างแบบสะดวกตามเกณฑ์คัดเข้า เก็บรวบรวมข้อมูลโดยการตอบแบบสอบถามด้วยตัวเองและการประเมินสุขภาพ วิเคราะห์ข้อมูลโดยใช้ ความถี่ ร้อยละ ค่าเฉลี่ย ค่าเบี่ยงเบนมาตรฐาน พิสัย การทดสอบไคสแควร์ การทดสอบฟิชเชอร์และการวิเคราะห์ความสัมพันธ์แบบไบซีเรียล

ผลการศึกษาพบว่าตัวอย่างส่วนใหญ่มีเส้นรอบเอวอยู่ในเกณฑ์ปกติ (ร้อยละ 96.19) ดัชนีมวลกายอยู่ในเกณฑ์ปกติ (ร้อยละ 37.61) มีระดับความดันโลหิตซิสโทลิคและไดแอสโทลิคเหมาะสม (ร้อยละ 57.86, 74.29 ตามลำดับ) แรงบีบมืออยู่ในเกณฑ์ต่ำมาก (ร้อยละ 77.38) แรงยืดเหยียดอยู่ในเกณฑ์ต่ำมาก (ร้อยละ 75.0) ไขมันสะสมในร่างกายอยู่ระดับปานกลาง (ร้อยละ 65.71) ส่วนพฤติกรรมสร้างเสริมสุขภาพ ตัวอย่างมีพฤติกรรมการชั่งน้ำหนักมากที่สุด (ร้อยละ 99.28) รองลงมาเป็นการตรวจวัดความดันโลหิต (ร้อยละ 95.0) ตัวอย่างที่มีพฤติกรรมการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพ ส่วนใหญ่ใช้ด้านอาหาร (ร้อยละ 77.23) และใช้น้อยที่สุด คือ ด้านการใช้ยา (ร้อยละ11.55) ส่วนความถี่ในการเข้าใช้ ส่วนใหญ่เข้าใช้เพียงบางครั้ง (ร้อยละ 28.71)

ปัจจัยส่วนบุคคลในทุกๆด้านไม่มีความสัมพันธ์กับพฤติกรรมการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพ($p > .05$) พฤติกรรมการใช้โมบายแอพพลิเคชั่นด้านอาหารมีความสัมพันธ์กับพฤติกรรมการรับประทานอาหารที่มีคุณค่าทางโภชนาการ ($p = .006$) และไขมันสะสมในร่างกาย ($p = .021$) พฤติกรรมการใช้โมบายแอพพลิเคชั่นด้านการออกกำลังกายมีความสัมพันธ์กับพฤติกรรมการรับประทานอาหารที่มีคุณค่าทางโภชนาการ ($p = .029$) และ พฤติกรรมการใช้โมบายแอพพลิเคชั่นด้านการรักษา/การดูแลตนเองเบื้องต้น มีความสัมพันธ์กับพฤติกรรมการรับประทานอาหารที่มีคุณค่าทางโภชนาการ ($p = .024$) และความดันโลหิตซิสโทลิค ($p = .022$)

ผลการศึกษามีข้อเสนอแนะสำหรับทีมสุขภาพในการพิจารณาเลือกใช้โมบายแอพพลิเคชั่นด้านอาหาร ด้านการออกกำลังกาย และด้านการรักษา/การดูแลตนเอง ในการสร้างเสริมพฤติกรรมสุขภาพและภาวะสุขภาพของผู้ใช้บริการแผนกตรวจสุขภาพของโรงพยาบาลเอกชน

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CHAPTER I
INTRODUCTION

Background and Significance of the Problem

Currently, lifestyles in Thai people have been changing, particularly in urban areas where the people work with minimal physical movement and have adapted to modern technology in their daily lives. Surveys have found Thai people to have low physical activity with overall physical activities amounting to only two hours per day. On the other hand, sedentary activity such as sitting and laying around amount to as many as 13.5 hours each day. Working age people are particularly prone to sedentary habits. It has been found that less than twenty percent of working age people have played sports or exercised in the past month (Division of Physical Activity and Health, Department of Health, 2012).

The aforementioned factors cause overweight and obesity, hypertension, hyperglycemia and hyperlipidemia. For the most part, these health problems are caused by behavioral factors such as smoking, improper food based on nutrition standards, inadequate exercise and alcohol consumption. According to a health status survey in the Thai population from 1991-2009, the number of people aged fifteen years and above who are overweight has doubled from 17.2 percent to 34.7 percent. Moreover, obesity nearly tripled from 3.2 percent to 9.1 percent (Lekuthai et al., 2011).

Therefore, health promotion needs to rely on communication as an essential tool for reordering society. Under current social conditions, online social media has become the most feasible way for obtaining knowledge, because as much as 82.1 percent of the populations use smart phones today. Online social media is best because it can be used without any limitations to age or time, and allows users to choose information in line with their interests and learning needs (Knowles, 1975). Therefore, online social media is a means for the population to access health knowledge and apply information obtained in health promotion.

Advances in technology have caused the government to establish government-cantered applications in an effort to offer greater accessibility, speed and convenience in obtaining useful information. These applications can be accessed at any place or time. Furthermore, the government has attempted to develop and invent the most useful systems for users on health, including medical personnel and ordinary people. The National Electronics and Computer Technology Center (NECTEC) in cooperation with the Thai Health Promotion Foundation (THP), Institute of Nutrition, Mahidol University; the Food and Drug Administration (FDA) and the Department of Health, Ministry of Public health, have developed applications for publishing food and nutrition information. For example, there are applications to help users prepare healthy foods on their own, applications on food safety, food and nutrition magazine, applications and even applications for assistance.

In the present research, the researcher aimed to study healthy people. Therefore, the study was conducted at a health examination center, which is a venue for service recipients to receive health check-ups and screen health status. In addition, based on the researcher's experience working in a public hospital, the majority of service recipients (90%) owned smart phones and were able to look up information based on personal characteristics, which affected decisions to accept innovation based on Rogers' conceptual framework (2003). Nevertheless, the literature review found only limited studies on health status and the use of mobile health applications. Hence, the researcher became interested in conducting a study on mobile health applications on smart phones and placed the aforementioned health applications into the following four general categories: food, exercise, basic self-care and medication use. In addition, the researcher conducted a study on the use of mobile health applications potentially influencing health-promoting behaviors and health status. The findings of the present research can be used as guidelines for developing mobile applications that would provide another means for health promotion leading to good health.

Conceptual Framework

This research study adopted the Health Information Concept, which is a source of information for people in search of personal health tools (U.S. Department of Health and Human Service, 2013). In the present research, this means the use of mobile health applications. The personal factor factors are gender, age, marital status, level of education, occupation and history of sickness linked to the use of mobile health applications. The factors were divided into the following four aspects: food, exercise, basic self-care and medication use. Learning health information through applications is a factor that leads to health-promoting behaviors (nutritious food consumption, avoiding sweet, fatty or salty foods, exercise, abstaining from liquor or alcohol, not smoking, having yearly health check-ups, measuring blood pressure, measuring blood glucose levels, weighing and measuring waist circumference). Furthermore, the use of mobile health applications might affect health status in terms of body mass index, systolic blood pressure, diastolic blood pressure, grip strength, stretch strength and body fat accumulation as shown in Figure 1.1

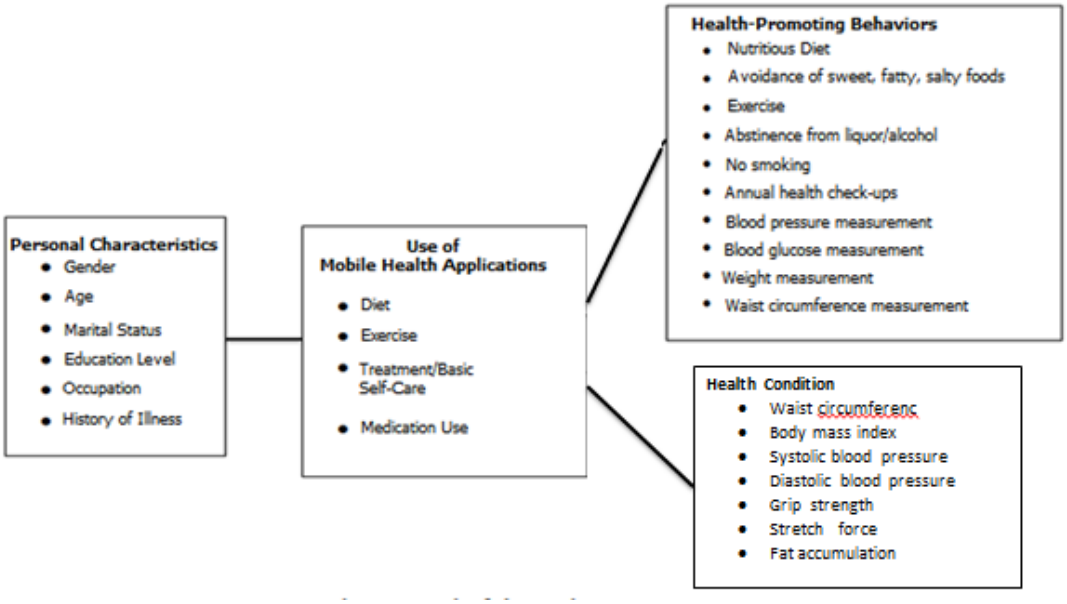

Figure 1.1 Conceptual Framework of the study

Thailand context of social change. Whether it's a social problem. Cultural or technological advances the lifestyle change with it race against time to rush affecting health care. Which cause health problems, especially non-communicable chronic disease such as diabetes, hypertension, heart disease, stroke, etc. The situation of these health problems is likely to rise and affect the cost of care both at the individual, family and national (Srithamma, 2014)

Research Objectives

1. To describe the health status (waist circumference, body mass index, systolic blood pressure, diastolic blood pressure, grip strength, stretch strength and fat accumulation) and the use of mobile health applications (food, exercise, basic self-care and medication use) of service recipients in private hospitals.

2.To investigate the correlations between personal factor factors (gender, age, marital status, education, occupation and history of illness) and the use of mobile health applications (food, exercise, basic self-care and medication use) of service recipients in private hospitals.

3. To investigate the correlations between the use of mobile health applications (food, exercise, basic self-care and medication use) and health-promoting behaviours (nutritious food consumption, avoidance of sweet, fatty and salty foods, exercise, abstaining from liquor or alcohol, not smoking, history of annual health check-ups, blood pressure measurements, blood glucose measurements, weighting and waist circumference measurements) of service recipients in private hospitals.

4.To investigate the correlations between the use of mobile health applications (food, exercise, basic self-care and medication use) on health status (waist circumference, body mass index, systolic blood pressure, diastolic blood pressure, grip strength, stretch strength and body fat accumulation) of service recipients in private hospitals

Hypotheses

1. Personal factors (gender, age, marital status, education, occupation and history of illness) are correlated with the use of mobile health applications (diet, exercise, basic self-care and medication use).

2. The use of mobile health applications (diet, exercise, basic self-care and medication use) is correlated with health-promoting behaviours (nutritious food consumption, avoidance of sweet, fatty and salty foods, exercise, abstaining from liquor or alcohol, not smoking, history of annual health check-ups, blood pressure measurements, blood glucose measurements, weighting and waist circumference measurements).

3. The use of mobile health applications (diet, exercise, basic self-care and medication use) is correlated with health status (waist circumference, body mass index, systolic blood pressure, diastolic blood pressure, grip strength, stretch strength and body fat accumulation) of service recipients in private hospitals.

Scope of Research

This research is descriptive research to describe the use of mobile health applications potentially influencing health-promoting behaviors and health status service users in private hospitals who sought services at check-up centers. In total, 420 subjects were the sample recruited from health check-up centers at two private hospitals. Data collection lasted from February 2015 to April 2015.

Definitions of variables

1. Personal factors mean the personal information of the service users in private hospitals including gender, age, marital status, education, occupation, and history of illness.

2. Use of mobile health application means the frequency at which users access the application via a smart phone health sector. The application is divided into

four functions of the health aspects including diet, exercise, basic self-care and medication use.

3. Health-promoting behaviours mean health behaviors of the service users including nutritious food consumption, avoidance of unhealthy food, exercise, abstaining from liquor or alcohol, smoking, history of annual health check, blood pressure measurement, blood glucose measurement, body weight measurement, waist circumference measurement.

4. Health status means the health condition according to the age and ability of the body to act as a base.

4.1 waist circumference means the index, waist circumference, waist circumference measured at the midpoint between the top of the pelvis and the lower edge of the ribcage. Measured during exhalation The measure parallel to the floor is measured in centimeters. The norms of the waist are less than 90 cm in men and 80 cm in females.

4.2 body mass index means the index that indicates the ratio between weight and height of a person, based on body weight. (Kg) divided by height squared. (m^2) units Kg / m^2. Asians interpret the criteria at 18.5 to 22.9 kg / m^2 for normal level.

4.3 blood pressure means the pressure in the arteries when the heart pumps blood into the arteries compression is called systolic blood pressure and when the heart relaxes room, which is called blood pressure diastolic blood pressure measured in mm Hg, at 120-129 / 80-89 mm Hg for normal level.

4.4 grip strength means the strength of the muscles of the arms and hands. Assessed using a measure muscle cell (Grip Dynamometer) a kilogram, the unit means more pressure for much less means less grip strength.

4.5 stretch force means of stretching the muscles behind the thigh and lower back using a measure of weakness. There odometer is +30 or +35 cm. And -30 cm distance measured in centimeters from "0" to the end of the finger. If you stretch your fingers Toe or zero points He is positive If the toe is negative test three times, the best value.

4.6 body fat accumulation means the amount of body fat mass measured in percentage using body composition measurement, “Inbody”.

CHAPTER II
LITERATURE REVIEW

In the present study, the researcher reviewed literature and related studies covering the following topics:

1. Non-Communicable Diseases
    - 1.1 Definition of Non-Communicable Diseases
    - 1.2 Risk Factors for Non-Communicable Diseases.
2. Health Promotion Behaviors and Health Status
    - 2.1 Definition of Health-promoting Behaviors and Health Status.
    - 2.2 Factors Related to Health-promoting Behaviors
3. Nurses' Health Promotion Roles
4. Use of Health Informatics
    - 4.1 Definition of Health Informatics
    - 4.2 Health Informatics Benefits
    - 4.3 Behaviors in Using Information
    - 4.4 Innovation Adoption Theory
5. Mobile Health Applications
    - 5.1 Definition of Mobile Health Applications
    - 5.2 Types of Mobile Health Applications

2.1 Non-Communicable Diseases

Definition of Non-Communicable Diseases

Non-communicable diseases (NCDs) mean diseases caused by one or more risk factors such as cigarette smoking, disproportionate and nutritionally inappropriate food consumption, lack of exercise with the root cause in unhealthful lifestyles and the environment (Department of Disease Control, 2011).

Rapid changes in environmental, economic and social factors over the past three decades have significantly changed Thai lifestyles with impacts on the overall health of the Thai population. The population has longer lives and fewer illnesses from communicable diseases while illness and death from non-communicable diseases have increased quickly. The factors influencing the occurrence of non-communicable diseases are divided into non-modifiable risk factors such as age, gender and genetics and modifiable risk factors such as cigarette smoking, consumption of alcoholic beverages, lack of exercise, high fat intake, consumption of extremely sweet and salty foods, including insufficient vegetable and fruit intake. According to the latest survey of non-communicable disease and injury risk behaviors among the Thai population aged 15 – 74 years in 2007, the prevalence of the main risk behaviors for general non-communicable diseases was found to be escalating. Some behaviors have lower trends without arriving at sufficient levels for preventing and controlling non-communicable diseases. Overweight people (BMI ≥ 25 kg./m2) were found at 19.1 percent. Overweight people (BMI ≥ 25 kg./m2) were found at 3.7 percent and people with excessive weight circumference (men > 36 inches, women > 32 inches) were found at 21.1 percent. Females with excessive waist circumference were found at 32.2 percent. Consumption of high fat foods was found at 32.2 percent. Consumption of sweet foods was found at 40.9 percent. Smoking was found at 21.5 percent. Consumption of beverages with excessive alcohol was found at 3.6 percent. In the meantime, health behaviors for preventing diseases were found at insufficient levels. For example, vegetable and fruit consumption at sufficient levels was found at only 22.5 percent while exercising three times/week and 30 minutes per time was found at only 37.5 percent (Department of Disease Control, 2011).

At present, non-communicable diseases are a major public health issue for every country worldwide, including Thailand, with impacts in multiple aspects. The World Health Organization reports that 71 percent of all deaths are caused by non-communicable diseases and 29 percent of deaths from non-communicable diseases occur in people aged younger than 60 years with higher likelihood for mortality from cardiovascular disease (27%), cancer (12%), respiratory disease (7%) and diabetes mellitus (6%) (Department of Disease Control, 2011). Without proper care and treatment, patients will have complications, disability and premature death, including care and treatment expenses at the individual, family and national level. Therefore, the government has guidelines to prevent and promote concrete practices to reduce premature death rates.

Risk Factors for Non-Communicable Diseases

A heath survey on the Thai population by the third physical examination in 2003 – 2004 and the fourth physical examination in 2008 – 2009 in addition to a survey of risk behaviors for non-communicable diseases and injuries conducted by the Non-Communicable Disease Information Center, Bureau of Non-Communicable Disease, in the Thai population aged 15 – 74 of 2005 and 2007 by categorizing risk factors for non-communicable diseases found the following:

1. Metabolic Syndrome, Overweight and Obesity – The fourth health survey of the Thai population found higher likelihood, especially for metabolic syndrome in females (45%) and males (18.6%). Mean waist circumference for the group aged 15 years and up was at 79.9 centimeters in males and 79.1 centimeters in females. The normal criteria for males and females are 90 centimeters and 80 centimeters, respectively.

The mean body mass index of the male and female Thai population aged 15 years and up was 23.1 and 24.4 kilograms per square meter, respectively. Higher body mass index increased risk of cardiovascular disease. Obesity in females was at 40.7 percent and 28.4 percent in males. Furthermore, prevalence of obesity increased with age and peaked among the group aged 45 – 59 years. (Ekpalakorn, 2010).

2. Exercise Behavior – Sufficient physical activity at a moderate level or higher was exertion or exercises causing the body to breathe harder with moderately faster heart rates. Furthermore, physical exercise was continued for ten minutes and more per time. The fourth health survey of the Thai population found the prevalence of insufficient physical activity to be 18.5 percent (16.8% in men and 20.2% in women).

3. Daily Vegetable and Fruit Intake Behaviors – According to the fourth health survey of the Thai population from physical examinations, Thais were found to have consumed sufficient vegetables and fruits meeting criteria (more than or equal to five standard parts per day). The ratio for males (16.9%) was slightly lower than females (18.5%) (Ekpalakorn, 2010).

4. Smoking Behavior – Smoking behavior prevalence in the Thai population was found to be 38.7 percent in males and 2.1 percent in females. This concurred with data from the Non-Communicable Disease Information Center (Ekpalakorn, 2010).

Health-promoting Behaviors

Definition of Health-promoting Behaviors

Health promotion is a major factor influencing a person's health status and resulting in good physical and psychological health enabling the person to live happily in society. A number of people have defined health-promoting behaviors as follows:

Palank (1991) defined health-promoting behaviors as behaviors started by people of every age to maintain or increase happiness, achieve goals in life and meet the needs of the aforementioned people. The aforementioned behaviors consist of regular exercise, activities during free time, rest, sufficient nutrition, activities to reduce stress and developments to social support systems.

Pender et al. (2011) stated that health-promoting behaviors consist of activities performed by people with the main goal of raising good living standards and achieving good health goals of individuals, families, communities and society to control and care for health in line with goals and to perform the activity until health-promoting behaviors become a model for living.

Ampon Jindawattana, Surakiat Achananupab and Suranee Pipatrotjanakamon (2008) stated that health promotion means the process of supporting people to increase capacity in controlling and improving personal health to achieve complete physical, psychological and social health along with the ability to respond to personal problems and change or adapt to the environment.

In conclusion, health-promoting behaviors mean the performance of activities such as exercise, food intake and resting, etc., until health performing behaviors become a model for living to control and care for health to achieve goals with positive effects on personal physical, psychological and social health.

The factors correlated with health-promoting behaviors were as follows:

1. Personal Characteristics and Experience

1.1 Gender was a biological factor with direct and indirect influence on the performance of health behaviors via emotions and thoughts specific to that behavior (Pender et al., 2006). Gender is a factor indicative of physical, ideological and belief differences, thereby causing the male and female genders to have different behaviors, including health-promoting behaviors. According to a study conducted by Boonruang Chaisit (2008) who studied public health officials in Ubonratchathani and a study conducted by Jiraporn Kanman (2006) who studied nursing personnel at the Internal Medicine Division, Phramongkutklao Hospital, and studies in other personnel groups such as the study conducted by Nantawan Meka (2007) in personnel at the National Institute of Health of Thailand, females have been found to have better health-promoting behaviors than males. However, some studies have found different genders to have no difference in health-promoting behaviors such as the study conducted by Aem-orn Poprasit (2005) in the personnel of Bang Pae Hospital, the study of Oratai Dangchat (2005) in the personnel of Police General Hospital and a study conducted by Suwipa Anujornpan (2007) in military officers at the Security Center, Royal Thai Armed Forces Headquarters.

1.2 Age is a factor related to health-promoting behaviors because age is a basic factor indicative of differences in physical and cognitive

development. Age is an indicator of maturity or the ability to manage the environment, psychological status and perception. Age influences and can determine a person's self-care ability. A person's self-care ability may increase with age and peaks in adulthood, Furthermore, this ability may be reduced upon entry into senior adulthood (Boonlong, N., 2009). According to previous studies, age was found to be related to health-promoting behaviors. When a person is older, the person will also have more health-promoting ability such as in Nattaporn Paleukpet (2005).

1.3 Marital status is a social role. Spouses have a duty to care for and help each other. When spouses live together with understanding, love and mutual acceptance, spouses do not create conflict with each other. Furthermore, they discuss and solve problems together. Spouses will create a good relationship and create a bond in the family with happiness in married life capable of supporting health-promoting behaviors. Therefore, married people were found to have better health-promoting behaviors than single or widowed people. This concurs with Wanida Korakitwiboon (2006) who studied professional nurses (Chi-square = 14.50, $p < .01$). In addition, a study conducted overseas by Pirincci, Rahman, Durmus and Erdem (2008) who studied 509 colleagues at an educational institute found marital status to be related to health-promoting lifestyles with statistical significance.

1.4 Level of education may influence a person's general understanding (Maville & Huerta, 2008). Level of education is an important base for individuals to have knowledge, understanding and awareness of the importance of health and searches for health promotion guidelines. Therefore, people with high levels of education are more likely to have good health behaviors. This concurs with studies conducted among nursing personnel such as a study conducted by Jiraporn Kanman (2006) in nursing personnel in the Internal Medicine Division, Phramongkutklao Hospital (Chisquare = 41.57, $p < .01$), Nattaporn Paleukpet (2005) who studied nurses at government hospitals in Phatthalung and studies conducted in other groups such as the study conducted by Kongmanee Surawongsin (2008) who studied personnel at the Office of the Permanent Secretary, Ministry of Public Health (chi square = 14.32, $p < .05$). A study conducted overseas by Cao et al., (2012) in 1,012 Chinese male and female senior adults found level of education to be positively

correlated with health-promoting lifestyles with statistical significance ($p < .001$). Similarly, a study conducted by Lee et al., (2006) found senior adults in South Korea to be correlated with health-promoting behaviors with statistical significance ($p < .001$).

Nurses' Health-promoting Roles

The transition from the industrial age to the information age has caused numerous effects on society and made lifestyles more complex. Society has begun to place greater importance on having better health than in the past. The current healthcare service system emphasizes developing service recipients' capacity through more health promotion and disease prevention than illness management. This has resulted in the need for everyone to practice more self-care. The nursing profession is directly related to service recipients at the level of individuals, family and members of society. Nursing roles have also adapted to accept the aforementioned change, especially medical practice roles requiring the development of clinical expertise to perform advanced nursing practices, implementation of knowledge to create maximum benefit for service recipients as a leader in nursing service system improvement along with developing more nursing practice guidelines for specific diseases and groups to achieve desired outcomes to create proper self-care among service recipients of every group.

Significant changes in the healthcare system have helped service recipients become aware of the importance of increased self-care with impacts on the nursing profession and leading to clear role adjustments, especially roles in medical practice, which consist of the following:

1. Definition of Health – Current health practices place importance on prevention, health promotion and building happiness. Current health practices view service recipients as unique and cannot be divided into smaller groups. Furthermore, current health practices view service recipients as having a responsibility to manage themselves and the environment to facilitate good health behaviors. Therefore, health means balanced physical, psychological, emotional, social and spiritual health as a result of components with overall impacts on health such as beliefs, religion, culture,

the economy, society and the environment. Thus, individuals require more healthcare linking treatment, promotion, disease prevention and recovery. For service recipients to achieve good health, individuals need to have consistent and lifelong self-care (Durongrittichai, 2008).

2. Views of the Population – Modern healthcare service systems place importance on the management of risk factors affecting the health of key community population groups such as children, youths, working-aged adults and senior adults, by attempting to provide as much equal access to services for this group as possible because standard public health services are considered an entitlement for the public. Therefore, government public health services have attempted to spread and provide coverage with quality and efficiency in addition to placing importance on physical and social environments as an environmental factor supporting the public to promote personal health behaviors (Durongrittichai, 2008).

3. Information Technology Growth – Rapid development of information technology systems allow service providers and recipients to conveniently access and follow-up on data related to health as needed. This has enabled service providers to develop more knowledge for implementation in service provision. Service recipients are able to search for self-care knowledge and check to determine whether or not the healthcare services received by service recipients are correct (Durongrittichai, 2008).

4. Knowledge About Treatment Outcome – Advances in creating and disseminating knowledge are fast, especially studies of factors and environments influencing health. The knowledge generated has benefits for more effective decision-making ability about treatment in response to service quality policy and lower risk for errors in health service provision (Durongrittichai, 2008).

5. Resource Limitations – At present, society is extremely aware of production cost reduction alongside efforts to discover mechanisms or methods to help with cost-effective health resource utilization in order to reduce higher expenses from advances in health sciences with new inventions of instruments and technology in treatments at all times (Durongrittichai, 2008).

6. Healthcare Service Provision Coordination – Sharing resources and coordinating healthcare service provision is a need of public health management under

limited existing resources, especially teamwork, which will help enhance service provider performance efficiency and increase good health service provision outcomes for service recipients (Durongrittichai, 2008).

7. Expectations in Performing Duties of Health Personnel with Responsibility – Society places importance on quality assurance or service quality control by providing opportunities for accountability from every related party such as service providers and service recipients. In addition, legal measures, policies, standards or rules and regulations of the profession were implemented to regulate and ensure services with maximum quality in addition to clear specifications of expected capacities for each profession (Durongrittichai, 2008).

8. Multi-disciplinary Working – Every person places greater importance on quality of life related to social activities and these activities inevitably affect one another in terms of health, educational, safety and social welfare activities. Thus, service providers have a shared awareness to help service recipients achieve good health in order to improve quality of life. Therefore, multi-disciplinary working is increased to achieve the aforementioned goals (Durongrittichai, 2008).

The nursing profession answered changes in the health service system by viewing service recipients as a center of healthcare, bringing service recipients' needs and dimensions to plan systemic care to enable self-care, promotion of general healthcare when well with no or little dependence on service facilities at appropriate health service levels, even when service recipients are sick. In the past, even though general nursing abilities were able to promote self-care among service recipients, general nursing abilities were insufficient to respond to many and sudden changes. The aforementioned situation requires nurses to clearly play professional roles, develop more knowledge, expand roles by using nursing knowledge to create the maximum benefit for service recipients, display advanced nursing skills and develop nursing service system efficiency as much as possible especially concerning the following issues:

1. In providing healthcare for individuals, family members and community groups, nurses must clearly understand the factors influencing the health of service recipients at every level, especially behavioral factors, health values and

cultural diversity. Nurses must be able to implement knowledge and methods for improving healthcare to truly access the needs of service recipients, families and individual groups. Nurses must be able to create various healthcare options with standards under quality assurance systems. In addition, nurses must be able to work with the people involved to combine various activities in communities to benefit health promotion, disease prevention and community development.

2. Nursing practices need to correspond with service recipients' needs with modern health technology with the ability to select appropriately and cost-effectively in every context of implementation amidst complex changes and rapidly developing health technology.

3. Concerning participation in health service system management, importance placed on health system reforms was aimed at creating good health, emphasizing self-dependence among service recipients to create good quality with miscellaneous services, using health resources frugally, managing risks in the healthcare service system, responding to public health policies with consideration given to community needs and build community participation in developing health. This has caused nurses to change working values and place importance on building interdisciplinary relationships to achieve the aforementioned goals. Furthermore, nurses must place importance on professional ethics to protect the rights of service providers and service recipients.

4. Placing importance on disease prevention and promotion of lifestyles for good health from rising trends in chronic diseases and the number of senior adults in society, including problems about treatment expenses, has helped sick patients be discharged from the hospital more quickly with existing illnesses. This increases the healthcare, home-based and ongoing care needs of individuals, families and communities. Therefore, nurses must create conditions for coordinating and linking relationships of healthcare services at each level. They also need to link healthcare services to other related systems such as coordination between primary, secondary and tertiary service systems, links with alternative medicine, links with social support services and other social services including care for service recipients by linking dimensions of "humanity" consisting of physical, psychosocial, emotional, social and

spiritual dimensions. This can be achieved only when there is an atmosphere of understanding about the relationships between nurses, related professions, service recipients and communities.

5. In persuading and motivating service recipients, families and community groups to participate in making decisions about healthcare services received, nurses must be able to persuade service recipients at every level to participate, make decisions or create health needs by supporting, promoting or creating opportunities to participate in nursing activities and build alternative systems, methods and models to create channels for service recipients to make decisions. Furthermore, mechanisms must be created for service recipients to assess needs, reflect needs, specify models or methods in which the public want to participate or enable the public to specify how the public want nurses to participate in health activities of service recipients.

6. In managing health data and using health data for consistent learning, nurses must have the ability to manage and use knowledge based on principles or scientific knowledge, use information technology and health data of service recipients to develop professional capacity in addition to using knowledge to link with effective performance (Durongrittichai, 2008).

2.2 Use of Health Information

Definition of Health Informatics

Health information is a new innovation for information management to plan health education management in the model of networks with more and wider-ranging service recipients, convenience, speed and ability to meet public health information consumer needs without limitations. Technological advances and environmental factors including health communication from various media have helped the public gain knowledge and understanding with influence on health behaviors. Therefore, various types of strategies need to be used, especially implementation of health information technology to help with providing health

knowledge management learning opportunities for the public in adjusting risk behaviors and building correct health values to reduce risks for disease, enabling the public to have good health and quality of life with sustainability.

Mays (1989) defined health information as the science and art of collecting knowledge about human health, diseases and illnesses and made the aforementioned knowledge applicable to solving problems. Later on, Greenes & Shortliffe (1990) defined medical informatics as a field with specific knowledge and understanding in processing information and communications related to medical service, studies and researches, including the use of science and information technology to support the aforementioned operations.

In 1997, James Turley defined "health informatics" as a science combining the fields of information and computer science to specify information in the form of integrated and comprehensive health science reflecting links in all fields of health science (Institute of Health Sciences, 2005). In medical therapies, information technology was used in working such as in maintaining distance between central therapy units with expert doctors and therapists in the region who consult on therapy guidelines via long distance conferences via monitor screens or "telemedicine". Telemedicine is the implementation of telecommunication advances in sending data and providing medical services by sending signals via media, which may be satellite systems, video conference systems and computer networks. Telemedicine is the exchange of visual and audio data between patients in addition to being similar to consultations between expert doctors from the center to doctors and patients in distant hospitals. At the regional level in the same room, telemedicine can also be used in consistent long distance studies. Furthermore, telemedicine also develops rural public health medical personnel while also reducing traveling expenses.

Health informatics is information related to public health and hygiene, including public health resource information and public health activities. Health informatics are composed of five types of health information including population, economic and social information, health status information, public health resource information, public health activity information and management information. Health informatics creates awareness about health status, health problems and hygiene

problems of the population, problems and obstacles in providing public health services and public health service performance efficiency to use as guidelines to plan public health problem-solving with accuracy and appropriateness.

Health informatics is categorized by mission and divided into three categories consisting of:

1) The public health system for management was prepared for agency management and information management to plan systems that are generally used such as document systems, accounting systems, treasury systems, human resource management systems, salary systems, patient admittance systems, room reservation systems, calculation systems and collection systems for treatments (Maitaotong, 2012).

2) Public health informatics for services related to medical and public health management such as service informatics related to patient management, patient admittance, patient discharging, referral of appointments and clinical informatics such as patients' medical records and medical records of data on diagnosis and prescription (Maitaotong, 2012).

3) Public health systems for academic work related to official and unofficial public health knowledge such as long distance public health academic conferences, community health information networks, health informatics for people disseminating knowledge in the area of diseases, illnesses and self-care and treatment. Public health data were collected from censuses, surveys and registrations (Maitaotong, 2012).

Benefits of Health Informatics

Thailand made efforts to manage chronic non-communicable diseases with clear policies and support for practices. However, efforts are varied in each province. Service models covering every component were unclear and have no supporting systems. In addition, Thailand's efforts to manage chronic non-communicable diseases lack integration and systems for monitoring overall performance of the entire country. Development of information technology and chronic non-communicable diseases lack

integration and lack of performance assessment monitoring systems for the overall view of the country. Development of information technology systems and chronic non-communicable disease management systems must coordinate and integrate with many agencies in addition to needing interagency data exchanges. Therefore, information technology systems have a significant role as evident due to the fact that many countries have developed information technology systems for implementation to care for patients such as the United Kingdom, Canada and Australia, etc., especially in the area of electronic health. However, problems regarding expenses, system responses to being used and patient information safety continue to be found

The necessary and important components in electronic health system development requires supporting infrastructure such as internet connection systems, appropriate programs, equipment and computer readiness, technical agreement standards such as clinical data sharing and the ability to identify people such as patients and doctors who are providing care, information safety and the ability to communicate, exchange information or use programs between systems or various parts of electronic health records.

Information systems used to help make clinical decisions have the following benefits in caring for patients with chronic non-communicable diseases:

1. Systematic warnings such as various laboratory examination orders, appointments with patients who have problems in various areas.

2. Planning of care, treatment and arrange patient-care systems such as monitoring glycemic control in diabetics.

3. Decision-making at times when care is provided for patients such as dosage adjustment, consideration of reactions between medications and prescription orders.

4. Data searches such as information related to diagnosis and treatment.

5. Health team performance assessments such as treatment outcome monitoring

Clinical information technology development is important in supporting doctors and medical personnel to care for patients more effectively. The HOSxP program was used to record the data of patients in hospitals. At present, the program is widely used in government hospitals, private hospitals and sub-district health

promotion hospitals with the goal of supporting medical doctors and personnel in providing services for patients and increasing service quality. At present, according to the research findings on use of the HOSxP program, the program continues to have problems in the area of data connection systems, menu systems unresponsive to use and moderate user satisfaction (Prajusinlapa, 2007).

Information-seeking Behavior

Information-seeking means an activity performed by a person to search for information to meet needs and lead to behaviors. The information-seeking process will begin when a person finds the person to be in need of information to help solve problems or make a decision of any process and this process will end when that person no longer has the aforementioned information needed (Prajusinlapa, 2007). The information-seeking process consists of methods for searching for desired types of information, sources of information requiring instruments to search for information and places used to seek information (Prajusinlapa, 2007).The International Encyclopedia of Information and Library Science (2003) explained information-seeking behaviors were created from two information needs consisting of desired forms of information and search objectives. This will help users express information-seeking behaviors to obtain the desired information.

Prapawadee Suebson (2000) defined information-seeking behaviors as actions expressed by a person when aware of personal information needs. Information-seeking behaviors are composed of information collection, information-seeking, usage and assessment.

In summary, information-seeking behaviors mean actions, methods or behaviors expressed objectively to seek desired information. The obtained information will then be processed for use or to meet personal needs.

The information-seeking behavior model of Ellis (1997) consisted of the following eight steps:

1) Starting is the start of the information-seeking process, which may be a new work, and interest to study and seek knowledge on new topics from asking colleagues, knowledgeable people or reading basic textbooks on that topic.

2) Chaining information from references or bibliographies may be a retroactive chaining from references or bibliographies on existing documents or prospective chaining by linking documents referring to existing documents.

3) Browsing is a search with desired or broadly interested topics. Therefore, information must be surveyed in interested fields to browse differently from specific and direct searches from topics or titles.

4) Differentiating is the categorizing of information searched by using various criteria such as the name of the author and magazines to filter the information being searched.

5) Monitoring literature or new information in fields or academic circles of interest and familiarity such as monitoring from new book lists of publishing houses in that field and communication with researchers.

6) Extracting the desired information from research reports, articles, magazines, books, databases, indices and documents accompanying meetings, which was only part of information on documents where information can be extracted.

7) Verifying is the verification of the information received.

8) Ending is the final step for searching information to collect all searched information to ensure the desired information was obtained.

Objective information-seeking is a result of any need. During information-seeking, the person must interact with information systems. This may be human information systems such as libraries, newspapers or computer information systems such as the World Wide Web, etc. (Wilson, 2000).

Innovation Adoption Theory Concept

According to Rogers' concept (2003), the innovation adoption process is a process where a person studies knowledge about innovations for analysis to process and compare with personal needs, capacity and context, discuss and ask for opinions from surrounding individuals in addition to experimenting with innovations in personal contexts before making decisions. The process starts when the person knows of innovation to acceptance or refusal of innovations. Nevertheless, each person may have different steps in making acceptance decisions. This is dependent on attitude,

experience, needs and necessity including the process of spreading that innovation. According to studies of researchers in the area of spreading innovation, many innovation acceptance steps and processes were found. The widely accepted model is Rogers' concept (2003).

Roger, E.M. (2003) invented and proved the Diffusion of Innovation Theory. This theory emphasizes the belief that social and cultural changes are caused by the dissemination of new things from one society and another and when that society adopts new innovations.

Innovations spread and accepted by people in society are generally composed of two important parts consisting of idea and material parts. For any innovation to be accepted, in addition to relation with the recipient, social systems and communication reception, innovations are important. Easily adopted innovations should have five characteristics contrary to the following five characteristics:

1) Relative advantages of the innovation.

2) Compatibility with work characteristics or user needs.

3) Difficulty or complexity in using innovations.

4) Trial ability.

5) Observability of innovations.

Personal characteristics influencing innovation adoption delays or accelerates based on the concept of Roger, E.M. (2003) consist of the following three personal characteristics:

1) Socioeconomic Status – Individuals who adopt innovations quickly are people who have high education, high social status or the opportunity to improve social status and better economic status than people who adopt innovations late.

2) Personality – People who adopt innovations quickly will be people who can think with others in mind more with greater ability to understand abstract items with more logic, intelligence, good attitude towards change, ability to accept uncertainty and risk more, good attitude toward science, higher ambition, ability to hear opinions of different people and people with more control in life than people who adopt innovations late.

3) Communication Behaviors – Innovation adoption occurs more quickly if the person participates in social activities, have experience with new changes, if the person is more open to public and interpersonal communication channels, high knowledge of innovations, high intellectual leadership, more communication to others and interest in seeking new innovations.

2.3 Mobile Health Application

Definition of Mobile Application

The term, mobile application, is composed of two words, namely, "mobile" and "application" with the following definitions:

A mobile is a portable communication device. In addition to basic telephone functions, mobile phones can also function as computers. Because mobile phones are portable, mobile phones have outstanding characteristics consisting of small size, light weight and low energy consumption. At present, mobile phones are usually used to perform multiple functions with ability to exchange news and information with computers. And, most importantly, mobile phones can increase functions (Makerd, 2011).

Application means software used to assist with user functions. Applications need user interfaces as a moderator for various uses.

Mobile applications are divided into three types (Angkananon, K. 2011) as follows:

1. Native apps are applications developed with the library (command sets) or SDK (instruments used to develop programs or applications) of that specific operating system.

2. Hybrid applications are developed with objective of functionality on every operating system by using frameworks (command sets) to enable functions on every operating system.

3. Web applications are developed as browsers for using web pages modified to show only necessary parts in order to reduce processing resources of smart phones or tablets, making website pages load faster. Furthermore, users can also use smart phones via the internet and intranet at low speed.

Existing applications for download and installation on various models of devices are made by application developers to suit that device. These may be programs, games, command models or conveniences such as weather monitoring, image modification applications. Application developers will upload applications on websites to allow service users to download applications for use. Applications include both paid and free applications for downloading operating systems on portable communication devices. If the Android system is a Google system, applications must be downloaded at play.google.com. In the case of iPhones, iPads and other Apple products, applications must be downloaded from store.apople.com accessible by two channels such as on portable communication devices or downloading via personal computers. If users want to download applications for windows phones, users can download from windowsphone.com/th-th/store or if users want to download Blackberry applications, users can download applications at appworld.blackberry.com (Sornlertlamwanit, 2010) with increased capacity and lower prices of mobile phones and portable devices, current competitions in the mobile phone and portable device market caused mobile phone and portable device manufacturers to develop product capacity to be superior to market competitors in addition to price competitions as evident from the number of models. These devices have a variety of properties to select from. A survey of worldwide smartphone markets during the third quarter (July – September) of 2012 found a total of 444 million sales were made with 40 percent of purchases being smartphone purchases

Mobile device utilization trends have soared over the past few years as a result of mobile application development and telephone technology by telephone producers, especially development of applications on mobile devices by competing companies for excellence in the mobile application market. Application development is divided into operation system development and software applications meeting

functions on devices and, with more applications and increased efficiency, mobile device users have trends of using programs to respond to activities in daily life.

Mobile Application Types

Business and technology research companies stated the future of the application market will penetrate specific customer markets more. Currently used applications are indicators of customer bases with unique values via the use of each type of applications. Trends of applications received higher popularity. Users have different application needs. Therefore, many of new applications were produced and developed as follows:

Table 2.1 – Application Categories

Categories	**Explanation**
Games	Games such as action, puzzle, card and casual games, etc.
Lifestyle and Healthcare	Healthcare programs such as calorie trackers or pedometers and programs related to lifestyles such as photography and traveling, etc.
Educations & Reference	Educational programs and references such as electronic books, etc.
Multimedia & Entertainment	Entertainment programs such as music, movie, television programs or telephone background decoration programs, etc.
Finance & Productivity	Financial programs such as exchange rates and budget management, etc.
Social Networking	Programs facilitating convenience to use online social networks such as Facebook, etc.

Mobile Health Applications

Communication technology creates changes in the areas of speed, time and function models to increase communication efficiency with software and hardware systems such as delivery of news via electronic mail by linking smartphones with software to accelerate and reduce expenses with greater benefit for communication work. Smart phones help facilitate in the area of information search services from various websites via processing on smartphone screens with ability to connect to the

internet. Smartphones are composed of advanced in-built operating systems with high flexibility enabling installation of various programs via the device's operating system.

Suchada Plachaipiromsin (2011) studied mobile application use trends. Trends of mobile device use such as smartphones increased rapidly in recent years as a result of mobile application and mobile device technology development by telephone producers, especially application development on mobile devices by various competing companies to become the number one in the mobile application market. Application development divides application system development and software applications meeting uses on devices. With more numerous and effective applications, mobile device users have trends of using various programs in daily life. Thus, mobile phone businesses place importance on development of programs on mobile phones.

Kanokwan Krinchai (2011) studied the factors influencing application users by 400 iPhone users and found factors in the areas of attitude, satisfaction, perceived carrying convenience, social influence and perceived monetary value to be factors influencing application downloads by iPhone users with statistical significance at .05. Furthermore, different genders also influenced satisfaction and social influence with statistical significance at .05.

Modern technology gives greater importance to healthcare as evident from the fact that humans can use technology to develop and create innovations to promote health with technologies that can be used as channels for the public to access health data. Mobile applications are another channel developed by many agencies and can be downloaded for free such as iOs and Android. The National Science and Technology Development Agency (NSTDA) by the National Electronics and Computer Technology Center (NECTEC) in cooperation with four nutritional agencies consisting of the Thai Health Promotion Foundation (THPH), the Institute of Nutrition, Mahidol University, the Food and Drug Administration (FDA) and the Health Department jointly developed an application called "Food I Eat", a program to help calculate the amount of calories received by the body in each day with appropriate physical activity recommendations. The application was prepared from a project to survey physiologies of the Thai population in 2007 – 2008 by the "Size Thailand" project. The aforementioned survey found one out of three Thais to be more

overweight and obese by 34 percent. This is considered a health problem in developed and developing countries because changes in lifestyle caused most people to consume finished foods, fast foods and high-sugar beverages with less work requiring exertion or exercise to rally for the public to pay more attention to healthcare. Therefore, NECTEC developed the "Food I Eat" application. The application was designed for easy use on mobile phones. The application is able to record food intake behaviors and calculate calories consumed by exercise in addition to providing health recommendations for consumers directly via servers. The application will learn food consumption behaviors and exercise by users in addition to developing other health applications. Four applications have been completed consisting of "Plan money" to make financial plans, "Bike route" to recommend bicycling routes in Bangkok, "Snap'n bite" to help with weight loss and "Doctor Me" to recommend basic remedies.

The development of technologies to build a healthy society is evident from a case study on the use of technological innovations by Japan with major projects to survey and collect all users' health data in order to use the aforementioned data to make healthy living plans (Institute of Thai Health Promotion Foundation., 2012) such as calculation of pregnancy likelihood or sending the husband's food consumption data to the wife at home in order to prepare an appropriate dinner. In the meantime, Thailand provided support in the area of information. In the past, the Thai Health Promotion Foundation (THPH) in cooperation with the Thailand Tech Startup Association hosted a meeting for digital health to exchange vision in developing sustainable health promotion technology with cooperation from associated organizations and health application developers to support Thais to be able to care for personal health and the health of others.

According to the researcher's study of mobile health applications, the researcher was able to categorize applications into the following four groups:

1. Food – Food applications mostly contain data and knowledge, including methods for controlling the amount of calories received. Users can record daily food intake data. Food applications analyze and interpret data for users to know in addition to informing users of methods for modifying food consumption behaviors. Examples

of food applications include “Calorie Counter”, “Calorie Diary” “Food I Eat” , “Lose It”, etc.

2. Exercise – Exercising applications mostly have images or videos for users to clearly see exercising methods and be able to select appropriate exercising methods for users. Some applications can continually monitor user exercising results. Examples of applications include “Run Keeper”, “Caynax A6W” and “Workout Trainer”, etc.

3. Basic Self-Care – Basic self-care applications are applications with knowledge contents used in personal healthcare to prevent or treat basic illnesses. Self-care applications are able to record health data to check preliminary symptoms and enable users to monitor health backgrounds. Application examples include applications such as “Doctor Me”, “Heart Fitness” and “Glucose Buddy”.

4. Medication Use – Applications for using applications are appropriate for people with regular medications or need to know indicators for using medications, methods for taking medications or side-effects of medications. Some applications can warn users about medication adherence and record medications used while also recording time to remind users to take medications according to doctors’ orders in order to support correct and appropriate medication adherence and healthcare, allowing for convenient and quick access to pharmacological and health data. Application examples include “Ya andYou”, “Tumdee drug alert” and “Pill Identifier”, etc.

Applications can be categorized into two types based on user characteristics such as the following:

1. Mobile applications for medical personnel are applications for supporting the personnel of every profession to understand the guidelines for treating various diseases. Examples of applications include “Handbook of Smoking Cessation” used to study therapeutic methods for patients who use tobacco to create a standardized and effective smoking cessation service, “Medical Genomics” helps doctors and medical personnel throughout the country to be able to access basic data and guidelines for diagnosis and treatment of patients with nasal and skin allergies and

“Resus Ultrasound” is for doctors to study or use as an ultrasound handbook in the emergency to enable doctors to learn easy methods for placing hands and reading results and abnormalities. This helps to reduce errors in analyzing patients’ symptoms and doctors’ normal vision, etc.

2. Mobile applications used for the general public have more applications developed in Thai for the general public to allow users to study and use applications easily. Examples of applications include “Press to Know About the Hospital” which provides information about nursing facilities, medical personnel and doctors’ instruments or in emergency cases where users want to receive treatment and “Khun Look” can record children’s development from birth, record doctors’ appointments, vaccination appointments, calculate and determine if children’s growth is appropriate for age and recommend nutrition for children at each age with convenience for carrying, etc.

Prinyaporn Jansri (2008) studied and developed a system to support assessment of hypertension complications via websites and mobile applications. Designs and development of applications for assessing symptoms and monitoring symptoms of hypertensive patients had system analysis and designs using the Unified Modeling Language (UML). Data were displayed in screens via web applications. Based on the findings from interviews, experts provided opinions that the system can support assessment of hypertension complications via websites. In addition, mobile applications have benefits and can be used to meet the needs of distant hypertensive patients who have no convenience in walking to receive checkups whenever doctors schedule appointments. Developed systems consist of two parts, namely, parts allowing hypertensive patients to assess existing symptoms on mobile applications and parts used to display results to treatment service centers via web applications.

Teerawong Laosuwan (2011) studied mobile phone technology and healthcare and found advances in mobile phone technology to not only allow many people to solve problems in daily life but also be able to adjust treatment efficiency for patients, especially chronic diseases reported by the World Health Organization as causes of death among many senior adults. At present, mobile phones have become necessary and will have more roles than normal communication. Many agencies made

efforts to increase significant roles and duties to provide healthcare services to users. Presently, mobile applications are used as programs on mobile phones for healthcare objectives.

Laakko, Leppänen, Lähteenmäki & Nummiaho (2008) studied health and beauty application frameworks on mobile phones with the objective to meet increased needs and joint operations of health and beauty mobile application users. New mobile applications for telemedicine and health applications were found to have become known with connections between medical personnel, patients and measuring devices based on application working frameworks. Mobile phone technologies implement new techniques and methods with variety and reliability in sharing and cooperating with health information systems and personal data storage that can be used as a base for developing new applications for specific objectives.

Eunjoo Jeon (2014) studied and analyzed data quality of South Korean weight loss applications on smartphones with the objective to analyze weight loss applications on smartphones developed in South Korea and the quality of data disseminated on applications. Eunjoo Jeon had the methodology to study weight loss smartphone applications by searching with the following keywords: ‘obesity + management’ ‘weight + management’ ‘weight + loss’ ‘weight + exercise’ ‘weight + diet’ ‘weight + calories’ and ‘diet’. According to the findings, a total of 148 weight loss applications on smartphones were discovered. The main objective of most applications (70.95%) was to provide data regarding management of exercise. Most applications (58.78%) did not charge service fees. Application users rated these applications at a mean of 3.68 out of 5. Quality of data provided by these applications were assessed and found to be at 4.55 out of 9. Data quality as divided into writing (1.79 out of 3), source identification (0.22 out of 2), information disclosure (1.29 out of 2) and proliferation (1.25 out of 2). Only three applications (2.88%) had scores on the Silberg Scale at levels higher than or equal to seven points. The findings indicated the quality of data received from smartphone applications in the healthcare group to urgently require assessments to prevent users due to misunderstandings from the applications.

Ivo Lopes (2010) studied outcomes from health data examinations on mobile phones for weight control because obesity is a severe public health problem in modern society mostly in developed countries. Frequently encountered and important treatments for obesity consist of regular exercise and food control. However, most importantly, each person must have strong discipline, motivation and consistent food control. “Sapo Fitness” is a health application on mobile phones for examining and assessing food control. “Sapo Fitness” was modified for users to store and record personal health data in daily life, including daily food intake and exercise in every day with vital health data used for assessing user nutritional value status. The application continually supports users by examining and sending warnings or messages about users’ food control programs and exercises performed by users. Hence, “Sapo Fitness” was a challenging application on mobile phones and built motivation to start healthy lifestyles.

Connelly (2006) studied mobile phone applications to check health by calculating automatically and receiving results immediately. Researchers at the Security for Ubiquitous Resources Group (SURG), Indiana University, emphasized creating mobile phone applications to help promote personal healthcare. This consisted of DIMA (Dietary Intake Monitoring Application) to help patients with chronic diseases closely monitor food consumption and specify food consumption. The Chick Clique emphasized health promotion among adolescents and studies found development of health application s capable of providing health convenience increased health behavior adjustment efficiency in patients with chronic illnesses and healthy people.

Escoffery et al. (2005) studied health information search behaviors and found female students (77.9%) to have searched for health information on websites more than male students with statistical significance. In addition, most students with high health risk behaviors were found to have lower perception of health information on websites than students with good health behaviors because higher information search experience in groups with healthy behaviors enabled perception of health data and implementation to adjust health behaviors.

Nattanan Sirijarern (2015) studied the use of new media via social media on mobile phones to promote quality of life among senior adults and family members in New Zealand. According to the findings, most of the data providers, especially adolescents, used communication technology via an application called “Wiper” to communicate on general topics and health topics with friends because the communication technology was close to adolescents and known among the group who use the same technology. This created familiarity and skill in using communications with convenience and functional ease. Another important reason was the use of internet signals to use these communication channels was not expensive or free in some cases. In addition, the aforementioned technology was usually used to send general news regarding health such as news and information on current epidemics or diseases and illness at various times. Adolescents used the technique of sharing the aforementioned health data to senior adult family members who were able to access data from mobile phones or computers via applications such as Wiper and Facebook, etc.

Chronic non-communicable diseases such as diabetes mellitus, emphysema, cancer, cerebrovascular disease and cardiovascular disease, obesity and hypertension were mostly caused by risk behaviors such as alcohol consumption, smoking, consumption of sweet, salty or fatty foods and insufficient exercise. Health prevention or promotion was guidelines for reducing illness rates. Each year, the government sector has been found to have spent a mean annual health promotion budget of 20,000 million baht per year while health expenses exceeded 400,000 million baht per year. Nurses have important roles in health promotion, training and education to rally for health behavior adjustment to prevent diseases. These were all original models that were practiced continually. However, technologies now have more roles in daily life as evident from survey findings revealing 25 million Thais accessed the internet to search for information (nearly 40%). This reflected the fact that modern-day Thais have turned to depend on technology to search and access healthcare data more. The government sector such as the Thai Health Promotion Foundation (THPH) and the National Science and Technology Development Agency (NSTDA), Ministry of Science and Technology, recognizes the importance of building good health status among Thais. Therefore, concepts to support and develop modern

communication system technology to use as a channel for health promotion were developed in the hope that these innovation will help promote public health, ease health problems and raise population quality.

When every person places greater importance on personal health and the health of surrounding people, mobile health applications on smartphones became important and are continually developed to benefit medical personnel and the general public. Medical personnel are dependent on wireless technologies without limitations regarding the place, time and usage of data transfers to provide consultation services for health problems via telephone conversations or face-to-face conversations with medical personnel via video conferences in addition to having systems to make appointments to consult with specialist doctors in advance. These benefits have helped to increase care and treatment efficiency. The public who are interested in health can access health data through various mobile health applications based on the "good health with your fingertips" slogan to use innovations in healthcare and health promotion, record health data and instantly process results without time or place limitations.

A limited number of studies have been carried out to study health status and health application use behaviors. Thus, this study emphasized connecting new innovations such as mobile health applications currently developed for healthcare in order to move forward with a dynamic world. Therefore, the researcher recognizes the ability of technological progress in contributing to health protection and promotion among the public as a community nurse working to promote public health. If every person can access and use nearby tools such as smart phone applications in proper self-care, users will benefit to a greater or lesser extent.

CHAPTER III
MATERIALS AND METHODS

This descriptive study aimed to describe 1) health status, health-promoting behaviors, and use of mobile health application among service users in private hospitals, 2) the relationship between personal factors and use of mobile health application, 3) the relationship between use of mobile health application and health-promoting behaviors, and 4) the relationship between health-promoting behaviors and health status in service users in private hospitals.

Population and Sample

The sample included 420 service users at the wellness centers in two private hospitals. Data collection lasted from February 2015 to April 2015. The subjects were selected by using convenience sampling based on the following inclusion criteria:

1) service recipients in private hospitals seeking services in the wellness centers

2) age = 20-59 years,

3) use of smart phones

4) understanding of the Thai language with ability to answer questions.

In determining the size of the sample group in the present research, the researcher employed Kelsey's principles (1986), obtaining a sample of 384.

$$N = \frac{Z^2 \sigma^2}{L^2}$$

Z = Probability of type I error = 1.96

σ^2 = variance = 1

L^2 = acceptable error for the estimation of sample mean (L = .1)

To compensate for incomplete data, the researcher increased the sample group size by five percent, thereby making the final sample of 420.

Research Instrumentation

The research instruments were divided into two parts as follows:

1) Data collection instruments:

1.1 Personal factors Data Questionnaire was developed by the researcher for collecting the personal factors. The questions were composed of seven fill-in-the-blank and multiple-choice questions on gender, age, religion, level of educational, occupation, history of illness and regularly used medications.

1.2 Nutrition Record Form was developed by the researcher including five questions on weight, height, body mass index, waist circumference and blood glucose level.

1.3 Health Promoting Behaviors Questionnaire was developed by the researcher containing questions on nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements. The questionnaire contains ten questions. Respondents were able to choose more than one answer, e.g., rating one point for each behavior.

1.4 Use of Mobile Health Applications Questionnaire was developed by the researcher. The questionnaire contained checklists and five fill-in-the-blank questions on diet, exercise, basic self-care and medication use. The answers were rated based on the following four-level Likert scale: Never (0 points), Sometimes (1 point), Frequent (2 points) and All the Time (3 points).

1.5 Health Status Record Form was developed by the researcher on weight, height, body mass index, waist circumference, blood pressure, grip strength, stretch strength and body fat accumulation.

2) Health Status Evaluation Instruments:

2.1 Body composition analyzer

2.2 weight scale and height measurement instrument

2.3 Automatic blood pressure monitor

2.4 handgrip dynamometer

2.5 plastic measuring tape

2.6 digital flex meter

Quality of the Research Instruments

The instruments in the present research were tested for content validity by three qualified experts. The content validity index (CVI) of the research instruments equaled .85. In addition, the validity score of the Use of Mobile Health Applications Questionnaire was analyzed to obtain test retest reliability of .85.

Protecting the Rights of the Sample

The present research was approved by the Institutional Review Board on Research Involving Human Subjects, Faculty of Medicine, Ramathibodi Hospital, Mahidol University had protocol number was ID 12-57-33 . The researcher conducted the research in compliance with research ethics. The purpose of the research was explained and cooperation was requested from the subjects for data collection. In addition, all answers or data provided by the subjects were kept confidential and used in accordance with the objectives of the present research only. The research findings are presented from an aggregate perspective only.

Data Collection

The researcher collected data in person. In addition, the researcher presented letters of introduction from the Faculty of Graduate Studies, Mahidol

University, to the directors of both private hospitals and carried out the procedures as follows:

1. Preparation of the questionnaires and instruments used to evaluate health status;

2. Selection of the sample group based on set characteristics and explanation of the research information, objectives and methodology to the sample group.

3. Once informed consent had been granted for participation in the research, the researcher requested cooperation to complete the questionnaires by self-administration. Twenty minutes were used to complete the questionnaires. The researcher provided additional explanation on the use of mobile applications concerning the definitions and characteristics of mobile health applications with accompanying illustrations of samples of each type of health application in the study. In addition, the researcher assisted the sample group in sorting health applications on smart phones.

4. The researcher conducted health status assessment in the sample group on stretch strength, grip strength and body composition.

5. Health data on the weight, height, waist circumference and body mass index of the sample group as evaluated by nurses stationed in health departments were recorded in the Health Status Record Form.

6. Data integrity and accuracy were examined before conducting statistical analysis.

Data Analysis

1. The following basic statistical data from the personal factor data were analysed: health behaviours, use of mobile health applications and health status by using descriptive statistics, namely, frequency, percentage, mean, standard deviation and range.

2. The correlations between personal factor factors and the use of mobile health applications and correlations between use of mobile health applications and

health-promoting behaviours were analysed by using Chi-square statistics and Fisher's exact test.

3. The multiple correlation coefficient between the use of mobile health applications and health status of service recipients in private hospitals were analysed using bi-serial correlation coefficient.

CHAPTER IV
RESULTS

This descriptive study aimed to describe 1) health status, health-promoting behaviors, and use of mobile health application among service users in private hospitals, 2) the relationship between personal factors and use of mobile health application, 3) the relationship between use of mobile health application and health-promoting behaviors, and 4) the relationship between health-promoting behaviors and health status in service users in private hospitals. Through convenience sampling with inclusion criteria, the subjects included 420 service users at the wellness centers in two private hospitals. Data were collected using self-reported questionnaires on personal factors data, use of mobile health applications, health promoting behaviors and health assessment on weight, height, body mass index, waist circumference, blood pressure, grip strength, stretch strength and body fat accumulation. The data were then analyzed using frequency, percentage, mean, standard deviation, range, Chi - Square test, Fisher's exact test and Biserial Correlation. The result are divided into seven parts :

Part I Personal Factors Data : gender, age, marital status, level of educational, occupation and history of illness

Part II Health Promoting Behaviors Data : nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements.

Part III Health Status Data : weight, height, body mass index, waist circumference, blood pressure, grip strength, stretch strength and body fat accumulation.

Part IV Use of Mobile Health Applications Data : food, exercise, basic self-care and medication use.

Part V The relationship between personal factors and use of mobile health application.

Past VI The relationship between use of mobile health application and health-promoting behaviors.

Past VII The relationship between health-promoting behaviors and health status in service users in private hospitals.

Part I Personal factors Data of the sample

Approximately half of the sample group was composed of females (51.43%). Most of the subjects were aged 30-39 years (39.76%) (Min – Max = 20-58, Mean = 35.73 SD = 8.67), followed by 20-29 years (28.09%) and 50-59 years (6.24%). Half of the subjects group was married (50.00%). Nearly all of the subjects were Buddhists (96.19%). The majority of the subjects had bachelor's degrees (83.81%). Over half of the subjects worked as employees in private companies (59.76%). Lastly, the majority of the subjects had no history of illness (74.29%) as described in Table 4.1.

Table 4.1 A Number and percentage of samples classified as personal data (n = 420).

	number	**percentage**
Gender		
Male	204	48.57
Female	216	51.43
Age ($\bar{x}$ = 35.73 S.D = 8.67 min-max = 20-58)		
20-29	118	28.09
30-39	167	39.76
40-49	109	26.01
50-59	26	6.24

Table 4.1 A Number and percentage of samples classified as personal data (n = 420) (cont.)

	number	percentage
Marital Status		
Single	209	49.76
Married	210	50.00
Religion		
Buddhists	404	96.19
Christian	16	3.81
Level of education		
Undergrad Degree	51	12.14
Bachelor	352	83.81
Master's	13	3.10
PhD	4	0.95
Occupation		
Student	22	5.24
Employment as employees at private companies	251	59.76
Business	36	8.57
Employment as employees at the government service	39	9.29
Employment as employees at state enterprise	58	13.81
Agriculture	1	0.23
Unemployed / not working	13	3.10
History of illness		
No	345	82.14
Yes	75	17.86

Part II Health Promoting Behaviors Data

The health-promoting behavior practiced by the majority of the subjects was weight monitoring (99.28%), followed by blood pressure monitoring (95.0%) as described in Table 4.2.

Table 4.2 A Number and percentage of samples classified as health-promoting behavior (n = 420).

	number	**percentage**
The health-promoting behavior *		
nutritious food consumption	166	39.95
avoidance of sweet, salty and fatty foods	167	39.76
Exercise	204	48.57
abstaining from liquor or alcohol	183	43.35
not smoking.	191	45.47
annual health check-ups	163	38.80
blood pressure measurements	399	95.00
blood glucose measurements	220	52.38
Weighing	417	99.28
waist circumference measurements	357	85.00
breast Screening by Mammogram	67	15.91
cervical cancer screening	53	12.61

* More than one answer

Part III Health Status Data

The majority of the subjects had normal waist circumferences (96.19%) with body mass index within the normal range (37.62%), followed by Stage 1 Obesity (26.43%). The majority of the subjects had appropriate systolic (57.86%) and diastolic (74.29%) blood pressures. The grip strength of the majority of the subjects, however, was very low (77.38%). Similarly, stretch strength was very low for most of the subjects (75.0%). Meanwhile, body fat accumulation was moderate for most subjects (65.71%) as described in Table 4.3

Table 4.3 Health Status Data (n = 420)

	number	**Percentage**
Waist circumference		
normal	404	96.19
More than usual	16	3.80
Body mass index (kg/m^2)		
Underweight (less than 18.50)	62	14.76
Normal (18.50-22.99)	158	37.62
Overweight (23.00-24.99)	80	19.05
Stage 1 Obesity (25.00-29.99)	111	26.43
Stage 2 Obesity (30.00-34.99)	6	1.43
Stage 3 Obesity (≥35.00)	3	0.71
mean (S.D.) = 24.39 (2.58)		

Table 4.3 Health Status Data (n = 420) (cont.)

	number	percentage
Systolic blood pressures. (mm.Hg)		
Appropriate (90-119)	243	57.86
Normal (120-129)	121	28.81
High (130-139)	43	10.24
Stage 1 (140-159)	13	3.10
Stage 2 (160-179)	-	-
Stage 3 (≥180)	-	-
mean (S.D.) = 118.51 (12.93)		
Diastolic blood pressures. (mm.Hg)		
Appropriate (60-80)	312	74.29
Normal (81-84)	82	19.52
High (85-89)	17	4.05
Stage 1 (90-99)	9	2.14
Stage 2 (100-109)	-	-
Stage 3 (≥110)	-	-
mean (S.D.) = 72.53 (9.11)		
The grip strength (kg/body weight)		
Very good	1	0.24
Good	4	0.95
Fair	25	5.95
Poor	65	15.48
Very Poor	325	77.38
mean (S.D.) = 0.46 (0.05)		

Table 4.3 Health Status Data (n = 420) (cont.)

	number	Percentage
Stretch strength (Cm.)		
Very good	1	0.24
Good	5	1.19
Fair	27	6.43
Poor	72	17.14
Very Poor	315	75.0
mean (S.D.) =-2.48 (5.88)		
Body fat accumulation (%)		
Very good	10	2.38
Good	73	17.38
Fair	276	65.71
Poor	38	9.05
Very Poor	23	5.48
mean (S.D.) = 21.98 (4.82)		

Part IV Use of Mobile Health Applications Data

There were 303 subjects using mobile health applications. Of the aforementioned subjects, the majority was composed of females (76.38%) with a mean age of 34.94 years. Half the subjects were single (50.00%). The majority of the subjects was composed of Buddhists (96.04%) with bachelor's degrees (91.75%) and employment as employees at private companies (59.76%). In addition, most of the subjects had no history of illness (87.46%) and had used smart phones or iPads for over four years (75.24%). Smart phones, iPads or tablets were used for communication the most (43.63%), followed by for entertainment/browsing the internet (34.03%). Health applications were most frequently discovered by websites (58.1%) as described in Table 4.4

Table 4.4 Number and percentage of use of smart phones, iPad or tablet (n=420)

	Number	**Percentage**
Duration of time (years)		
< 1	1	0.22
1-2	13	3.11
2-3	90	21.43
≥ 4	316	75.24
Purpose*		
Communications	418	43.63
Business	61	6.37
Entertainment / Internet	326	34.03
Education	78	8.14
Type of applications health.		
Family members	79	18.81
Friends	92	21.90
Website	244	58.10
Newspaper/Magazine	5	1.19
Level of utilization		
No	19	4.52
Mild	101	24.05
Moderate	298	70.95
Very often	2	0.48
Access*		
Search engine eg Google, Yahoo	415	98.80
Facebook	411	97.85
Twitter	340	80.95
Mobile Health Application	303	72.14

*response with more than one answer

Frequency of mobile health application use

According to the findings, mobile health application use most frequently involved food (76.54%), followed by exercise (77.23%), basic self-care (66.01%) and medication use (30.03%). The majority of the subjects sometimes used mobile health applications on food (77.23%). Similarly, the aforementioned applications were sometimes used on exercise (62.38%). As for basic self-care, the majority none used applications (69.97%). Lastly, the majority of the subjects none used applications on medications use (88.45%) as described in Table 4.5

Table 4.5 A number and percentage of the frequency of mobile health application use (n= 303)

	Food		**Exercise**		**Basic self-care**		**Medication use**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
None	62	20.46	103	33.99	212	69.97	268	88.45
Sometimes	234	77.23	189	62.38	87	28.71	34	11.22
Frequently	6	1.98	10	3.30	3	0.99	1	0.33
Always	1	0.33	1	0.33	1	0.33	-	-

Past V The relationship between personal factors and use of mobile health application.

The male subjects none used or sometimes used for mobile health applications on food, exercise, basic self-care and medication use (98, 97.5, 99, 100%) respectively and have frequently or always used of mobile health applications on exercise, basic self-care and medication use (2, 2.5, 1.0, 0 %) respectively. Female who had none used or sometimes used of mobile health applications on food (98.6, 97.2, 99.1, 99.5 %) respectively and have frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (1.4, 2.8, 0.9, 0.5 %) respectively.

When the relationship between gender and use of mobile health application on food, exercise, basic self-care, and medication. Fisher's exact test found

that gender was not associated with a statistically significant use of mobile health application (p = .717), food (p = 1.000), exercise (p = 1.000), basic self-care (p = 1.000) and medication use (p = 1.000)

The subjects aged 20-39 years none used or sometimes used of mobile health applications on food, exercise, basic self-care and medication use (97.9, 99.2, 98.6, 99.6%) respectively, and have frequently or always used of mobile health applications on exercise, basic self-care and medication use (2.1,2.8, 1.4, 0.4%) respectively, the subjects aged 40-59 years who had none used or sometimes used of mobile health applications on food (99.3, 97.8, 100, 100, %) respectively and had frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (0.7, 2.2, 0, 0.%) respectively.

When the relationship between age and use of mobile health application on food, exercise, basic self-care and medication use. Fisher's exact test found that age was not associated with a statistically significant use of mobile health application on food (p = .437). exercise (p = 1.000), basic self-care (p = .310) and medication use (p = 1.000)

The subjects who were single, widowed or divorced none used or sometimes used of mobile health applications on food, exercise, basic self-care and medication use (97.6, 97.6, 98.6, 100%) respectively, and had frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (2.4, 2.4, 1.4, 0 %) respectively, The subjects were married who have none used or sometimes used of mobile health applications on food (99.0, 97.1, 99.5, 99.5 %) respectively and have frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (1, 2.9, 0.5, 1%) respectively.

The relationships between marital status and use of mobile health application on food, exercise, basic self-care and medication use were analyzed. Fisher's exact test found that marital status was not associated with a statistically significant use of mobile health application on food (p = .449), exercise (p = 1.000), basic self-care(p = .623) and medication use (p = 1.000)

The subjects with low levels of education than a bachelor's degree and bachelor's degree none used or sometimes used of mobile health applications on food, exercise, basic self-care and medication use (98.5, 97.5, 99.1, 99.8 %) respectively,

and have frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (1.5, 2.5, 0.9, 0.2, %) respectively, The subjects were master's and doctoral degree programs who had none used or sometimes used of mobile health applications on food (94.1,94.1,75.0,100 %) respectively and had frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (1.7, 5.9, 2.5,0 %) respectively.

The relationships between education and use of mobile health application on food, exercise, basic self-care and medication use were analyzed. Fisher's exact test found that education was not associated with a statistically significant use of mobile health application on food ($p = .253$), exercise ($p = .369$), basic self-care ($p = .153$) and medication use ($p = 1.000$)

The subjects who were unemployed or not working none used or sometimes used of mobile health applications on food, exercise, basic self-care and medication use (100 %) and none frequently or always used of mobile health applications on food, exercise, basic self-care and medication use. The subjects were employment as employees at private companies, business, employment as employees at the government service, employment as employees at state enterprise and agriculture who had none used or sometimes used of mobile health applications on food (98.2, 97.1, 99.0, 99.7 %) respectively and have frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (1.8, 0.9, 1.0, 0.3. %) respectively.

The relationships between occupation and use of mobile health application on food, exercise, basic self-care and medication use were analyzed. Fisher's exact test found that occupation was not associated with a statistically significant use of mobile health application on food ($p = 1.000$), exercise ($p = .610$), basic self-care ($p = 1.000$) and medication use ($p = 1.000$)

The subjects had history of illness none used or sometimes used of mobile health applications on food, exercise, basic self-care and medication use (100, 99.1, 99.1,100 %) and none frequently or always used of mobile health applications on food, exercise, basic self-care and medication use. The subjects were employment as employees at private companies, business, employment as employees at the government service, employment as employees at state enterprise and agriculture who

have none used or sometimes used of mobile health applications on food (97.8, 96.8, 99, 99.7 %) respectively and have frequently or always used of mobile health applications on food, exercise, basic self-care and medication use (2.2, 3.2, 1, 0.3 %) respectively.

The relationship between the history of illness and use of mobile health application on food, exercise, basic self-care and medication use were analyzed. Fisher's exact test found that history of illness was not associated with a statistically significant use of mobile health application on food ($p = .198$), exercise ($p = .303$), basic self-care($p = 1.000$) and medication use ($p = 1.000$) as described in Table 4.6

Table 4.6 The relationship between personal factors and use of mobile health application. (n = 420)

	Food		x^2	**p**	**Exercise**		x^2	**P**	**Basic Self-care**		x^2	**p**	**Medication use**		x^2	**p**
	none or sometimes used **n(%)**	frequently or always used **n(%)**			none or sometimes used **n(%)**	frequently or always used **n(%)**			none or sometimes used **n(%)**	frequently or always used **n(%)**			none or sometimes used **n(%)**	frequently or always used **n(%)**		
Gender																
Male	200 (98)	4 (2.0)	-	.171[a]	199 (97.0)	5 (2.5)	-	1.000[a]	202 (99.0)	2 (1.0	-	1.000[a]	204 (100.0)	0 (0)	-	1.000[a]
Female	213 (98.6)	3 (1.4)			210 (97.2)	6 (2.8)			214 (99.1)	2 (0.9)			215 (99.5)	1 (0.5)		
Age																
20-39	279 (97.6)	6(2.1)		.473[a]	227 (97.2)	8(2.8)		1.000[a]	281(98.6)	4(4.1)		.310[a]	284(99.6)	1(0.4)		1.000[a]
40-59	134(99.3)	1 (0.7)	-		132 (97.8)	3 (2.2)	-		135(100)	0(0	-		135(100)	0(0)		

a = Fisher's probability test

Table 4.6 The relationship between personal factors and use of mobile health application. (n = 420) (cont.)

	Food		x^2	p	**Exercise**		x^2	P	**Basic Self-care**		x^2	p	**Medication use**		x^2	p
	none or sometimes used **n(%)**	frequently or always used **n(%)**			none or sometimes used **n(%)**	frequently or always used **n(%)**			none or sometimes used **n(%)**	frequently or always used **n(%)**			none or sometimes used **n(%)**	frequently or always used **n(%)**		
Status																
Single/widowed/divorced	205(97.6)	5(2.4)	-	.449[a]	205 (97.6)	5(2.4)	-	1.000[a]	207 (98.6)	3(1.4)	-	.623[a]	210(100)	0(0)	-	1.000[a]
Married	208(99.0)	2(1.0)			204(97.1)	6(2.9)			209(99.5)	1(0.5)			209(99.5)	1(0.5)		
Level of education																
Undergrad/bachelor	397(98.5)	6(1.5)	-	.253[a]	393(97.5)	10(2.5)	-	.369[a]	349(99.1)	3(0.9)	-	.153[a]	402(99.8)	1(0.2)	-	1.000[a]
Master'S/ PhD.	16(94.1)	1(1.7)			16 (94.1)	1(5.9)			16 (94.1)	1(5.9)			17 (100)	0(0)		

a = Fisher's probability test

Table 4.6 The relationship between personal factors and use of mobile health application. (n = 420) (cont.)

	Food		x^2	p	Exercise		x^2	p	Basic Self-care		x^2	p	Medication use		x^2	p
	none or sometimes used n(%)	frequently or always used n(%)			none or sometimes used n(%)	frequently or always used n(%)			none or sometimes used n(%)	frequently or always used n(%)			none or sometimes used n(%)	frequently or always used n(%)		
Occupation																
Not working	36 (100.0)	0(0)			36 (100.0)	0(0)			36 (100.0)	0(0)			36 (100.0)	0(0)		
Employees																
Business	377	7	-	1.000[a]	373	11	-	.610[a]	380	4	-	1.000[a]	382	1	-	1.000[a]
Government	(98.2)	(1.8)			(97.1)	(2.9)			(99.0)	(1.0)			(99.7)	(0.3)		
Farmer																
History of illness																
No	108	0		.198[a]	107	1		.303[a]	107	1		1.000[a]	108	0		1.000[a]
	(100.0)	(0)	-		(99.1)	(0.9)	-		(99.1)	(0.9)	-		(10.0)	(0)	-	
Yes	305	7			302	10			309	1			311 (99.7)	1		
	(97.8)	(2.2)			(96.8)	(3.2)			(99.0)	(0.3)				(0.3)		

a = Fisher's probability test

Past VI The relationship between use of mobile health application and health-promoting behaviors.

The results of relationship between use of mobile health application (food, exercise, basic self-care and medication use and health-promoting behaviors (nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements). Chi-square analysis statistics was found that subjects who had none used or sometimes used of mobile health applications on food who did not health-promoting behaviors that include nutritious food consumption , avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements (60.5, 60, 52.1, 55.9, 54.2, 38, 95.2, 52.3,99.3,84.7 %), respectively and did health-promoting behaviors (39.5,40 ,47.9, 44.1, 45.8, 62 , 4.8 , 47.7 ,0.7, 15.3 %), respectively.

The subjects had frequently or always used of mobile health applications on food who did not health-promoting behaviors that include nutritious food consumption , avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements (57.1, 57.1, 0 ,85.7, 71.4, 71.4 , 100 , 57.1 , 100 ,100 %) , respectively and did health-promoting behaviors (42.9 , 42.9 , 100 ,14.3 ,28.6 , 28.6 ,0 , 42.9 ,0 , 0 %), respectively

The relationships between the use of mobile health application on food and health-promoting behaviors were analyzed. Fisher's exact test found that Use of mobile health application on food was significantly correlated with health-promoting behaviors for nutritious food consumption ($p = .006$)

The subjects who had none used or sometimes used of mobile health applications on exercise did not have health-promoting behaviors including nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference

measurements (61.4 ,59.7 , 51.8 ,56.5 ,54.3 ,38.1,95.1 ,52.3 ,99.3 ,84.8 %) , respectively and did health-promoting behaviors (38.6 , 40.3 ,48.2, 43.5 ,45.7 , 61.9 , 4.9 , 47.7 , 0.7 , 15.2 %), respectively.

The subjects who had frequently or always used mobile health applications on exercise did not health-promoting behaviors including nutritious food consumption , avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements (27.3, 72.7, 27.3 ,54.5, 63.6, 54.5 , 100 , 54.5 , 100 ,90.9 %), respectively and did health-promoting behaviors (72.7 , 27.3 , 72.7 , 45.5 , 36.4 , 45.5 , 0 , 45.5 , 0 ,9.1 %), respectively

The relationships between the use of mobile health application on exercise and health-promoting behaviors were analyzed. Fisher's exact test found that use of mobile health application on exercise was significantly correlated with health promoting behaviors for nutritious food consumption ($p = .029$).

The subjects who none used or sometimes used of mobile health applications on basic self-care did not have health-promoting behaviors including nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements (61.1 ,60.3, 51.7 ,56.0 ,54.1 ,38.2, 95.2 , 51.9 ,99.3 ,84.9%) , respectively and did health-promoting behaviors (38.9 , 39.7 ,48.3, 44.0 ,45.9 , 61.8 , 4.8 , 48.1 , 0.7 , 15.1%), respectively.

The subjects who had frequently or always used of mobile health applications on basic self-care did not have health-promoting behaviors including nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements (0, 25, 0 ,100, 100, 75 , 100 , 100 , 100 ,100 %) , respectively and did health-promoting behaviors (100 , 75 , 100 ,0 ,0 , 25 ,0 , 0 ,0 , 0 %), respectively

The relationships between the use of mobile health application on basic self-care and health-promoting behaviors were analyzed. Fisher's exact test found that

use of mobile health application on basic self-care was significantly correlated with nutritious food consumption behavior (p =.024)

The subjects who had none used or sometimes used of mobile health applications on medication use did not have health-promoting behaviors including nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements (60.4 ,59.9 , 51.3 ,56.3 ,54.7 ,38.4,95.2 ,52.3 ,99.3 ,85.0%) , respectively and did health-promoting behaviors (39.6 , 40.1 ,48.7, 43.7 ,45.3 , 61.6 , 4.8 , 47.7 , 0.7 , 15.0%), respectively.

The subjects had frequently or always used of mobile health applications on medication use who only 1 person did not have health-promoting behaviors including nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements.

The relationships between the use of mobile health application on medication use and health-promoting behaviors were analyzed. Fisher's exact test found that use of mobile health application on medication use was not associated with a statistically significant health-promoting behaviors as described in Table 4.7.

Table 4.7 The relationship between the use of mobile health application and health-promoting behaviors. (n = 420)

	nutritious food consumption		x^2	**p**	avoidance of sweet, salty and fatty foods		x^2	**p**	exercise		x^2	**p**	abstaining from liquor or alcohol		x^2	**p**	not smoking		x^2	**p**
	Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)		
Food																				
none or sometimes used	215 (52.1)	198 (47.9)	-	**.006*[a]**	248 (60.0)	165 (40.0)	-	1.000[a]	250 (60.5)	163 (39.5)	-	1.000[a]	231 (55.9)	182 (44.1)	-	.144[a]	224 (54.2)	189 (45.8)	-	.463[a]
frequently or always used	0 (0)	7 (100.0)			4 (57.1)	3 (42.9)			4 (57.1)	3 (42.9)			6 (85.7)	1 (14.3)			5 (71.4)	2 (28.6)		
Exercise																				
none or sometimes used	251 (61.4)	15 (38.6)	-	**.029*[a]**	244 (59.7)	165 (40.3)	-	.537[a]	212 (51.8)	197 (48.2)	-	.193[a]	231 (56.5)	178 (43.5)	-	1.000[a]	222 (54.3)	187 (45.7)	-	.761[a]
frequently or always used	3 (27.3)	8 (72.7)			8 (72.7)	3 (27.3)			3 (27.3)	8 (72.7)			6 (54.5)	5 (45.5)			7 (63.6)	4 (36.4)		

*p< .05 , a = Fisher's exact probability test

Table 4.7 The relationship between the use of mobile health application and health-promoting behaviors. (n = 420) (cont.)

	annual health check-ups		x^2	**p**	blood pressure measurements		x^2	**P**	blood glucose measurements		x^2	**p**	weighing		x^2	**p**	waist circumference measurements		x^2	**P**
	Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)		
Food																				
none or sometimes used	157 (38.0)	256 (62.0)	-	.113[a]	393 (95.2)	20 (4.8)	-	1.000[a]	216 (52.3)	197 (47.7)	-	1.000[a]	410 (99.3)	3 (0.7)	-	1.000[a]	350 (84.7)	63 (15.3)	-	.604[a]
frequently or always used	5 (71.4)	2 (28.6)			7 (100.0)	0 (0)			4 (57.1)	3 (42.9)			7 (100.0)	0 (0)			7 (100.0)	0 (0)		
Exercise																				
none or sometimes used	156 (38.1)	253 (61.9)	-	.349[a]	389 (95.1)	20 (4.9)	-	1.000[a]	214 (52.3)	195 (47.7)	-	1.000[a]	406 (99.3)	3 (0.7)	-	1.000[a]	347 (84.8)	62 (15.2)	-	1.000[a]
frequently or always used	65 (54.5)	5 (45.5)			11 (100.0)	0 (0)			6 (54.5)	5 (45.5)			11 (100.0)	0 (0)			10 (90.9)	1 (9.1)		

*p< .05

a = Fisher's probability test

Table 4.7 The relationship between the use of mobile health application and health-promoting behaviors. (n = 420) (cont.)

	nutritious food consumption		x^2	**p**	avoidance of sweet, salty and fatty foods		x^2	**p**	exercise		x^2	**p**	abstaining from liquor or alcohol		x^2	**p**	not smoking		x^2	**p**
	Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)		
Basic self-care																				
none or sometimes used	254 (61.1)	162 (38.9)	-	**.024*[a]**	251 (60.3)	165 (39.7)	-	.306[a]	215 (51.7)	201 (48.3)	-	.056[a]	233 (56.0)	183 (44.0)	-	.136[a]	225 (54.1)	191 (45.9)	-	.129[a]
frequently or always used	0 (0)	4 (100.0)			1 (25.0)	3 (75.0)			0 (0)	4 (100.0)			4 (100.0)	0 (0)			4 (100.0)	0 (0)		
Medication use																				
none or sometimes used	253 (60.4)	166 (39.6)	-	1.000[a]	251 (59.9)	168 (40.1)	-	1.000[a]	215 (51.3)	204 (48.7)	-	.488[a]	236 (56.63)	183 (43.7)	-	1.000[a]	229 (54.7)	190 (45.3)	-	.455[a]
frequently or always used	1 (100.0)	0 (0)			1 (100.0)	0 (0)			0 (0)	1 (100.0)			1 (100.0)	0 (0)			0 (0)	1 (100.0)		

*p< .05

a = Fisher's probability test

Table 4.7 The relationship between the use of mobile health application and health-promoting behaviors. (n = 420) (cont.)

	annual health check-ups		x^2	p	blood pressure measurements		x^2	P	blood glucose measurements		x^2	p	weighing		x^2	p	waist circumference measurements		x^2	P
	Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)			Don't n(%)	Do n(%)		
Basic self-care																				
none or sometimes used	159 (38.2)	257 (61.8)	-	.126[a]	396 (95.2)	20 (4.8)	-	1.000[a]	216 (51.9)	200 (48.6)	-	**.125**	413 (99.3)	3 (0.7)	-	1.000[a]	353 (84.9)	63 (15.1)	-	1.000[a]
frequently or always used	3 (75.0)	1 (25.0)			4 (100.0)	0 (0)			4 (100.0)	0 (0)			4 (100.0)	0 (0)			4 (100.0)	0 (0)		
Medication use																				
none or sometimes used	161 (38.4)	258 (61.6)	-	.386[a]	399 (61.6)	20 (4.8)	-	1.000[a]	219 (52.3)	200 (47.7)	-	1.000[a]	416 (99.3)	3 (0.7)	-	1.000[a]	356 (85.0)	63 (15.0)	-	1.000[a]
frequently or always used	1 (100.0)	0 (0)			1 (100.0)	0 (0)			1 (100.0)	0 (0)			1 (100.0)	0 (0)			1 (100.0)	0 (0)		

*p< .05

a = Fisher's exact probability test

Past VII The relationship between health-promoting behaviors and health status in service users in private hospitals.

The relationship between health-promoting behaviors (nutritious food consumption, avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements) and Health Status (weight, height, body mass index, waist circumference, blood pressure, grip strength, stretch strength and body fat accumulation) were analyzed. Biserial Correlation analysis statistics was found that the use of mobile health applications on food was correlated with body fat accumulation ($r = -.113$, $p = .021$), and the use of mobile health applications on basic self-care was correlated with systolic blood pressure ($r = .112$, $p = .022$) as described in Table 4.8

Table 4.8 The relationship between health-promoting behaviors and health status in service users in private hospitals. (n= 420)

Variable	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	.212**	1									
3	.370**	.137	1								
4	.375**	.298	-.005	1							
5	-.006	.064	.050	-.048	1						
6	-.059	-.015	.055	-.041	.623**	1					
7	.043	.004	**.112***	-.071	.251**	.268**	1				
8.	.019	.020	.072	-.069	-.054	-.089	.262**	1			
9	.000	.004	.059	-.064	.030	-.049	.096*	.435**	1		
10	.071	-.026	-.059	-.067	-.070	-.095	.069	.077	.189**	1	
11	**-.113***	-.033	.019	-.023	.195**	.392**	.119**	-.120*	-.315**	-.315**	1

Note: * p <.05, **p <.001 และ 1= Use of Mobile Health Applications on food, 2 = Use of Mobile Health Applications on exercise, 3 = Use of Mobile Health Applications on basic self-care, 4= Use of Mobile Health Applications on medication use, 5= waist circumference , 6 = body mass index , 7 = systolic blood pressure, 8 = diastolic blood pressure, 9 = grip strength, 10 = stretch strength, 11 = body fat accumulation

CHAPTER V
DISCUSSION

The study was a descriptive research. The purposes were to describe health status, health-promoting behaviors, and use of mobile health application among service users in private hospitals, the relationship between personal factors and use of mobile health application, the relationship between use of mobile health application and health-promoting behaviors, and the relationship between health-promoting behaviors and health status in service users in private hospitals.

Each personal factor (gender, age, marital status, education, occupation and history of illness) was not significantly correlated with use of mobile health application ($p > .05$).

The research was based on the theory regarding the population status of an individual in Porama Satavatin (2003) have discussed the specific features of the different audiences and influence into groups according to population (Demographic characteristics) including age, gender, social status and economic, education, religion, marital status, which influence the level of understanding of people in general (Maville & Huerta, 2008), such as level of education. The basic key to making people understand and realize the importance of health and seek to promote health. Individuals with higher levels of education. It is likely to have good health habits. And the findings are consistent with studies of Cao et al. (2012), who studied in elderly Chinese found that the level of education is positively related to lifestyle to promote health ($p <.001$). It is possible that in this study the samples included private hospital users only. It may not be possible to find such a relation.

Use of mobile health application on food was significantly correlated with health promoting behaviors for nutritious food consumption and body fat. Use of mobile health application on exercise was significantly correlated with health promoting behaviors for nutritious food consumption. Moreover, use of mobile health

application on self-care initiatives was significantly correlated with nutritious food consumption behavior and systolic blood pressure can explain the samples in this study. Most with the average age of 35.7 years are in working age. There is seeking information using mobile applications function health sector. The mobile application named "Food I Eat" application functionality is according to Nutrition Institute Mahidol University and the Department of Health. This provides information on the nutritional value of foods and fruits in Thailand. Users can record their food intake. Mobile applications that are used, followed by the exercise, which is an application named "Endomondo Sports Tracker" helps calculate the heart rate. Such factors are important for practical behavioral health, especially nutritious food consumption and exercise regularly to reduce body fat and systolic blood pressure.

In this study, the subjects used mobile health application on food (79.12%) with the use of the application named "Food I Eat" is the most (7.46%) followed by "calorie diary". The application enables users to save data for each meal. The application then calculates and compares the energy consumption of foods. Both diet and exercise help controlling weight and affecting the amount of body fat.

The results in this study are consistent with the research of Chunyanuch Pannin (2011) that studied the dynamics of fat deposition in the Weight Management Clinic at 6th Khon Kaen Health Center. The body fat decreased 9.36% of total body fat before weight reduction with statistical significance. The study of Suriporn Jinakom (2015) also studied the program promoting self-care behaviors in terms of diet and exercise and found a decrease in the body fat in 8 and 12 weeks.

The results of this study are consistent with the research of Teerawong Haosuwan (2011) that studied the Mobile technology and healthcare. The advancement of cellular technology not only helps a lot of people to utilize the health of their daily lives, but also improve their health care. The mobile application nowadays becomes a necessary device for health care services. It is also consistent with the research of Connelly (2006) who studied the applications on mobile phones, which help determine the personal health of users and found that the development of applications can promote health. It can help users to change their behaviors and improve their health through monitoring behavior. Mobile applications can enhance

the health of individuals by providing feedback in real-time and use technology facilities for individuals with chronic illness as well as those who are healthy.

Use of mobile health application on medication use was not related to health-promoting behaviors. Examples of the applications on medication use are "YaandYou", providing information on indication and the side effects, and “Get well kit", offering a reminder for medication taking. However, in this study, the majority of the sample (87%) had no history of illness; therefore, it may not be possible to find such a relation.

CHAPTER VI
CONCLUSION

This descriptive study aimed to describe 1) health status, health-promoting behaviors, and use of mobile health application among service users in private hospitals, 2) the relationship between personal factors and use of mobile health application, 3) the relationship between use of mobile health application and health-promoting behaviors, and 4) the relationship between health-promoting behaviors and health status in service users in private hospitals.

The population for the present research was composed of service users in private hospitals who sought services at wellness centers. In total, 420 subjects were sampled from wellness centers at two private hospitals. Data collection lasted from February 2015 to April 2015. The subjects were selected by using convenience sampling based on the following inclusion criteria: 1) service recipients in private hospitals seeking services in health check-up centers; 2) age = 20-59 years, 3) use of smart phones and 4) understanding of the Thai language with ability to answer questions.

The research instruments were divided into 4 parts as follows: 1) Personal factors Data Questionnaire developed by the researcher for collecting the personal factors data of the sample group. The questions were composed of seven fill-in-the-blank and multiple-choice questions on gender, age, marital status, level of educational, occupation, history of illness. 2) Health Promoting Behaviors Questionnaire developed by the researcher containing questions on nutritious food consumption , avoidance of sweet, salty and fatty foods, exercise, abstaining from liquor or alcohol, not smoking, annual health check-ups, blood pressure measurements, blood glucose measurements, weighing and waist circumference measurements. The questionnaire contains ten questions. Respondents were able to choose more than one answer, e.g., rating one point for each behavior. 3) Use of Mobile Health Applications Questionnaire Developed by the researcher. The questionnaire contained checklists and five fill-in-the-blank questions on diet, exercise, basic self-care and medication use. The answers were rated based on the following four-level Likert scale:

Never (0 points), Sometimes (1 point), Frequent (2 points) and All the Time (3 points). 4) Health Status Record Form developed by the researcher on weight, height, body mass index, waist circumference, blood pressure, grip strength, stretch strength and body fat accumulation. The questionnaire has been prepared by the advisor and qualified third for content validity check and adjust according to the feedback and data collection. The researcher collected data in person. In addition, the researcher presented letters of introduction from the Faculty of Graduate Studies, Mahidol University, to the directors of both private hospitals and carried out the procedures. Preparation of the questionnaires and instruments used to evaluate health status and selection of the sample group based on set characteristics and explanation of the research information, objectives and methodology to the sample group. Once informed consent had been granted for participation in the research, the researcher requested cooperation to complete the questionnaires by self-administration. Twenty minutes were used to complete the questionnaires. The researcher provided additional explanation on the use of mobile applications concerning the definitions and characteristics of mobile health applications with accompanying illustrations of samples of each type of health application in the study. In addition, the researcher assisted the sample group in sorting health applications on smart phones. The researcher conducted health status assessment in the sample group on stretch strength, grip strength and body composition. Health data on the weight, height, waist circumference and body mass index of the sample group as evaluated by nurses stationed in health departments were recorded in the Health Status Record Form. Data integrity and accuracy were examined before conducting statistical analysis.

Data were analyzed by a computer program, presented in the form of descriptive statistics. Analysis basic statistical data from the personal factor data were analyzed: health behaviors, use of mobile health applications and health status by using descriptive statistics, namely, frequency, percentage, mean, standard deviation and range. .The correlations between personal factor factors and the use of mobile health applications and correlations between use of mobile health applications and health-promoting behaviors were analyzed by using Chi-square statistics and Fisher’s exact test. The multiple correlation coefficients between the use of mobile health applications and health status of service recipients in private hospitals were analyzed using biserial correlation coefficient.

The majority of the subjects had normal waist circumferences (96.19%) with body mass index within the normal range (37.62%), followed by Stage 1 Obesity (26.43%). The majority of the subjects had appropriate systolic (57.86%) and diastolic (74.29%) blood pressures. The grip strength of the majority of the subjects, however, was very low (77.38%). Similarly, stretch strength was very low for most of the subjects (75.0%). Meanwhile, body fat accumulation was moderate for most subjects (65.71%).

Mobile Health Application Usage Data

In all, 303 subjects used mobile health applications. Of the aforementioned subjects, the majority was composed of females (76.38%) with a mean age of 34.94 years. Half the subjects were single (50.00%). The majority of the subjects was composed of Buddhists (96.04%) with bachelor's degrees (91.75%) and employment as employees at private companies (59.76%). In addition, most of the subjects had no history of illness (87.46%) and had used smart phones or iPads for over four years (75.24%). Smart phones, iPads or tablets were used for communication the most (43.63%), followed by for entertainment/browsing the internet (34.03%). Health applications were most frequently discovered by websites (58.1%).

According to the findings, mobile health application usage most frequently involved food (76.54%), followed by exercise (77.23%), basic self-care (66.01%) and medication use (30.03%). The majority of the subjects sometimes used mobile health applications on food (77.23%). Similarly, the aforementioned applications were sometimes used on exercise (62.38%). As for basic self-care, the majority none used applications (69.97%). Lastly, the majority of the subjects none used applications on medications (88.45%).

The research found that gender, age, marital status, level of education, occupation and history of illness were not correlated with the use of mobile health applications with statistical significance *($p > .05$)*. The use of mobile health applications on food to be correlated with nutritious food consumption *($p = .006$)*, use of mobile health applications on exercise was correlated with nutritious food consumption *($p = .029$)*, and use of mobile health applications on basic self-care was

correlated with nutritious food consumption *(p = .024).* The use of mobile health applications on food was correlated with body fat accumulation *(r = -.113, p < .021),* and the use of mobile health applications on basic self-care was correlated with systolic blood pressure *(r = .112, p < .022).*

Research Limitations

Since convenience sampling was employed in the present study, the subjects might not have represented the entire population. Thus, the findings might be limited to use as reference only for people with similar characteristics.

Research Recommendations

Nursing practice

Nurses and other health providers can recommend mobile health application usage on food, exercise and basic self-care as a means of promoting the health of service recipients.

Nursing research

1. Next studies should be conducted with coverage of service recipients in both private and public hospitals in order to compare the differences on access to the use of mobile health applications, suitability of health applications for different age groups and assessment of the quality of applications in order to provide information and recommendations to the population.

2. A predictive study should be conducted and a further study on the effects of using mobile health applications on health-promoting behaviors should also be conducted to compare health status before and after programs.

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APPENDIX

APPENDIX A
SAMPLE OF PROTECTING THE RIGHTS OF THE SAMPLE

Sample of Protecting the Rights of the Sample :

1. Informed Consent Form
2. Documentary Proof of Ethical Clearance Committee on Human Rights Related to Research Involving Human Subjects

หนังสือยินยอมโดยได้รับการบอกกล่าวและเต็มใจ

(Informed Consent Form)

ชื่อโครงการ การสำรวจภาวะสุขภาพและพฤติกรรมการใช้โมบายแอพพลิเคชั่นสุขภาพใน ผู้ใช้บริการโรงพยาบาลเอกชน

ชื่อผู้วิจัย นางสาวปนิตา จันทร์ทองสุข
รองศาสตราจารย์ ดร. นพวรรณ เปียซื่อ
ผู้ช่วยศาสตราจารย์ ดร. จุฬารักษ์ กวีวิวิธชัย

*ชื่อผู้เข้าร่วมการวิจัย .....อายุ .....

คำยินยอมของผู้เข้าร่วมการวิจัย

ข้าพเจ้า นาย/นาง/นางสาว ..... ได้ทราบรายละเอียดของโครงการวิจัยตลอดจนประโยชน์ และข้อเสี่ยงที่จะเกิดขึ้นต่อข้าพเจ้าจากผู้วิจัยแล้วอย่างชัดเจน ไม่มีสิ่งใดปิดบังซ่อนเร้นและยินยอมให้ทำการวิจัยในโครงการที่มีชื่อข้างต้น และข้าพเจ้ารู้ว่าถ้ามีปัญหาหรือข้อสงสัยเกิดขึ้นข้าพเจ้าสามารถสอบถามผู้วิจัยได้ และข้าพเจ้าสามารถไม่เข้าร่วมโครงการวิจัยนี้เมื่อใดก็ได้ โดยไม่มีผลกระทบต่อการรักษาที่ข้าพเจ้าพึงได้รับ นอกจากนี้ผู้วิจัยจะเก็บข้อมูลเฉพาะเกี่ยวกับตัวข้าพเจ้าเป็นความลับและจะเปิดเผยได้เฉพาะในรูปที่เป็นสรุปผลการวิจัย การเปิดเผยข้อมูลเกี่ยวกับตัวข้าพเจ้าต่อหน่วยงานต่างๆที่เกี่ยวข้อง กระทำได้เฉพาะกรณีจำเป็นด้วยเหตุผลทางวิชาการเท่านั้น

ลงชื่อ.....(ผู้เข้าร่วมการวิจัย)

.....(พยาน)

.....(พยาน)

วันที่ .....

คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล
๒๗๐ ถนนพระราม ๖ แขวงทุ่งพญาไท เขตราชเทวี กทม. ๑๐๔๐๐
โทร. (๐๒) ๒๐๑-๑๐๐๐

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Documentary Proof of Ethical Clearance
Committee on Human Rights Related to Research Involving Human Subjects
Faculty of Medicine Ramathibodi Hospital, Mahidol University

MURA2014/730

Title of Project (EC_580203)	Survey of Health Status and Use of Mobile Health Application among Health Service Users
Protocol Number	ID 12-57-33
Principal Investigator	Assoc. Prof. Dr. Noppawan Piaseu, Ph.D.
Official Address	Ramathibodi School of Nursing Faculty of Medicine Ramathibodi Hospital Mahidol University

The aforementioned project has been reviewed and approved by the Committee on Human Rights Related to Research Involving Human Subjects, based on the Declaration of Helsinki.

Signature of Chairman Committee on Human Rights Related to Research Involving Human Subjects	Pratak Oprasertsawat Prof. Pratak O-Prasertsawat, M.D.
Date of Approval	February 6, 2015
Duration of Study	1 Months

APPENDIX B
THE RESEARCH INSTRUMENT

ส่วนที่ 1 แบบสอบถามเกี่ยวกับปัจจัยส่วนบุคคล

คำชี้แจง : กรุณาทำเครื่องหมาย ✓ ลงในช่องที่ตรงกับความจริงของตัวท่าน

1) เพศ ❍ 1. ชาย ❍ 2. หญิง

2) อายุ ……..ปี

3) สถานภาพ

❍ 1. โสด ❍ 2. สมรส ❍ 3. หม้าย/ หย่าร้าง/ แยกกันอยู่

4) ศาสนา

❍ 1. พุทธ ❍ 2. คริสต์ ❍ 3. อิสลาม ❍4. อื่นๆ ระบุ……

5) ระดับการศึกษา

❍ 1. ต่ำกว่าปริญญาตรี ❍ 2. ปริญญาตรี ❍ 3. ปริญญาโท ❍ 4. ปริญญาเอก

6) อาชีพ

❍ 1. นักเรียน / นักศึกษา ❍ 2. พนักงานบริษัทเอกชน

❍ 3. ประกอบธุรกิจส่วนตัว ❍ 4. รับราชการ

❍ 5. พนักงานรัฐวิสาหกิจ ❍ 6. เกษตรกรรม

❍ 7. ว่างงาน / ยังไม่ได้ทำงาน

7) ท่านเคยมีประวัติการเจ็บป่วยด้วยโรคดังต่อไปนี้หรือไม่ (ตอบได้มากกว่า 1 ข้อ)

❍ 1. ไม่มีประวัติการเจ็บป่วย ❍ 2. เบาหวาน ❍ 3. ความดันโลหิตสูง

❍ 4. โรคปอด ❍ 5.โรคหัวใจ ❍ 6. โรคตับ ❍ 7. มะเร็ง (โปรดระบุชนิด.....)

❍ 8. โรคที่เกี่ยวกับระบบทางเดินอาหารและลำไส้ ❍ 9. อื่น……

8) ท่านมีพฤติกรรมสุขภาพใดที่ใช้ป้องกันภาวะเสี่ยงต่างๆ (ตอบได้มากกว่า 1 ข้อ)

❍ 1. รับประทานครบ 5 หมู่ ❍ 2. หลีกเลี่ยงอาหารหวาน มัน เค็ม ❍ 3. ตรวจเต้านมด้วยตนเอง

❍ 4. ออกกำลังกายเป็นประจำ ❍ 5. ไม่ดื่มสุรา/แอลกฮอลล์ ❍ 6. ไม่สูบบุหรี่

8) ในรอบ 1 ปีที่ผ่านมา ท่านเคยไปรับการตรวจร่างกายอะไรบ้าง .....

ส่วนที่ 2 แบบสอบถามเกี่ยวกับการใช้โมบายแอพพลิเคชั่นประเภทสุขภาพ

คำชี้แจง : กรุณาทำเครื่องหมาย ✓ ลงในช่องที่ตรงกับความจริงของตัวท่าน

คำถาม	ความถี่ในการใช้ ต่อสัปดาห์				นำไปใช้กับใคร	
	ไม่เคยใช้	บางครั้ง	บ่อยครั้ง	เป็นประจำ	ตนเอง	สมาชิกในครอบครัว*
1.ท่านเข้าถึงข้อมูลสุขภาพผ่านสมาร์ทโฟน เครื่องไอแพด หรือแท็บเล็ตด้วยวิธีใด 1.1 โปรแกรมสืบค้นข้อมูล (search engine) ได้แก่ google ,yahoo						
1.2 เฟสบุ๊ค						
1.3 ทวิสเตอร์						
1.4 โมบายแอพพลิเคชั่นประเภทสุขภาพ**						
2.ท่านเคยใช้โมบายแอพพลิเคชั่นสุขภาพในด้านอาหาร ระบุชื่อApp…….						
3.ท่านเคยใช้โมบายแอพพลิเคชั่น สุขภาพในด้านออกกำลังกาย ระบุชื่อApp…….						
4.ท่านเคยใช้โมบายแอพพลิเคชั่นสุขภาพใน ด้านการรักษา/ ดูแลตนเองเบื้องต้น ระบุชื่อApp…….……						
5.ท่านเคยใช้โมบายแอพพลิเคชั่นสุขภาพในด้านการใช้ยา (เช่น การเตือนการรับประทานยา , ลักษณะยา ,ฤทธิ์ของยา หรืออาการข้างเคียงจากการใช้ยา) ระบุชื่อApp……..						

BIOGRAPHY

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