# Structural Equation Model for Awareness, Accessibility, and Utilization of Thailand Universal Health Coverage System

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## Abstract
Thailand's Universal Health Coverage (UHC) system was implemented in 2002. The system was being reviewed as successful. However, there are some challenges faced, especially issues of awareness, accessibility, and utilization among the beneficiaries. This paper employs a Structural Equation Model-SEM in explaining awareness and accessibility of the system. Main purpose of the study is to explore the effects of awareness and accessibility on level of utilization of the system. Data were collected in 6 areas of the Bangkok metropolitan, each comprising 67 cases, a totaling of 402 cases. Latent variables were constructed using exploratory factor analysis-EFA. The variables then were entered in the SEM. There are eight components found in the EFA procedures, all of which were consistent with theoretical components. From the SEM model, The higher the awareness, the higher the accessibility as well as the utilization of the system. Likewise, an increasing in accessibility also promoted utilization. Although the individual factors such as income, age, and education may not be able to prove relating with the utilization of the system, findings suggested that the specific knowledge of right especially in case of an emergency, right for compensation, and increasing in information flow would help promoting awareness hence accessibility and utilization of the system.
**Keywords:** Universal Health Care, Awareness, Accessibility, Utilization

## Introduction
Keys health security system in Thailand consist of three main schemes; the Social Security Scheme (SSS) for privately employed labors, the Civil Servant Medical Benefit Scheme (CSMBS) for government officers, and the national universal health coverage (UHC) system run by the National Health Security Office (NHSO) for the rest of all Thai nationals. In addition, there are some other systems such as benefits for employees of local administrative bodies namely the Local Administrative Organization Scheme (LAOS), health benefits of employees from local administrative bodies and from State Owned Enterprise. Therefore, there are some differences in rights and benefits offered for these various schemes.
Furthermore, for the fiscal year of 2015, the latest official NHSO annual report, the total Thai population was around 65.58 million people, 99.92% of which were insured by at least one of the health insurance schemes mentioned. For the Universal Health Coverage (UHC), 48.34 from 48.39 million beneficiaries had already registered (99.90% coverage). Despite this

reportedly high coverage, there still are some reasons that the UHC beneficiaries refusing to exercise or utilize their rights. The main reasons (for inpatient not utilizing the UHC benefit package when accessing health services) can be orderly listed as follows: long waiting time or not sure about quality (60.74%), mild illness (22.33%), inconvenience of travelling (8.55), and the service needed not being covered (7.98%).

Consequently, it can be calculated that around one fourth of the UHC beneficiaries or around 12 million people refuse to utilize their rights. Moreover, the evidence showed that 36 percent of the outpatient beneficiaries believe the service needed not being covered. This raises questions that whether the beneficiaries are aware of their true rights, or there are any other factors that may cause the limited accessibility of the system. Therefore, the main research questions focus on level of awareness and accessibility of the system, specifically how would the level of awareness and accessibility of the system explain utilization of the UHC.

## Purpose of the Study

The main purpose of this study is to explore relationships between awareness, accessibility, and level of utilization of the UHC in Thailand.

## Expected Benefits

In knowing relationships between awareness, accessibility, and level of utilization of the UHC in Thailand, prioritization of the policies can be made by considering factors explaining the utilization studied. Therefore the utilization rate of the system can be increased, for the real and full benefits of the beneficiaries.

## Literature Reviews

The concept of Universal Health Coverage, referred as UHC, may be traced back to the WHO's 1948 Constitution declaring that health is a fundamental human right. Then, the UN's Sustainable Development Goals (SDGs 3.8) sets a target to achieve the UHC, including financial risk protection, access to quality essential health care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all. Universal Health Care coverage can also be described by the World Health Organization-WHO's definition; UHC is achieved when "all people and communities can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship." (Verrecchia et al, 2019: e10).

Hence, UHC consists of three key ideas: equity, quality, and affordability. By the year 2023, the WHO set a target of 1 billion more people benefiting from the UHC. For an international awareness towards UHC, since 2017, Dec 12th has been set as an official UN-designated day for International Universal Health Coverage Day raising awareness and signaling to political leaders across the world to deliver access to health care for all. (Editorial, 2019)

Additionally, the universal health coverage (UHC) can be internationally defined as "…means all people receiving the health services they need, including health initiatives designed to promote better health (such as antitobacco policies), prevent illness (such as vaccinations), and to provide treatment, rehabilitation, and palliative care (such as end-of-life care) of sufficient quality to be effective while at the same time ensuring that the use of these services does not expose the user to financial hardship." (World Health Organization and the World Bank (2015; 7).

Also in this report, it was suggested the keys monitoring challenges for the UHC i.e. 1) Reliability of data of health service coverage and financial protection indicators, 2) Availability of disaggregated data to expose coverage inequities, and 3) Effectiveness of the

coverage, which includes services needed, quality of the provided services, and ultimate impacts on health. Therefore, coverage or accessibility of the beneficiaries of the UHC system is vital indicator in evaluating effectiveness of the system.

Turning to the topic of access and utilization of the UHC system, access and utilization of health care services have been the topics explored by health economists and related researchers for few decades ago. Aday and Anderson (1974) purposed the definition of access and utilization of health care services as followed. Access as suggested by earlier literatures can be conceptualized into two main themes. First, access is linked with characteristics of the population (such as family income, insurance coverage, attitudes toward medical care) or of the delivery system (such as the distribution and organization of manpower and facilities). Second, to permit "external validation" of the importance of the system and individual characteristics, access can be evaluated as outcome indicators, such as utilization rates or satisfaction scores.

Meanwhile, utilization of health services can be identified by many dimension such as type, site, purpose, and the time interval involved. Thus, type of utilization refers to the kind of service received and the service provider i.e. hospital, physician, dentist, pharmacist, and others. Also utilization of health care services can be categorized by purposes such as care-preventive, illness-related, or custodian. Also, a framework for the study of access also be purposed as linkages between health policy, characteristics of the health care delivery system, characteristics of the population at risk, utilization of health care services, and consumer satisfaction.

Moreover, regarding accessibility of the system, Savedoff (2009) studied the universal access to healthcare services in Latin America and the Caribbean specifically the expansion in medically-trained professionals, service utilization, and insurance eligibility. By using logit model with 12,000 samples across the countries, it was concluded that people in countries with more doctors have a more positive view of access to healthcare and greater confidence in the healthcare system. Additional factors may include local social networks and a group of wealthy people. Countries with strong social support networks tended to be more optimistic about health care accessibility, reliability, and equity regardless of the real quality provided. Moreover, a group of wealthy people within countries tended to have high expectation towards the system. Thus, they were likely to express comparatively less confidence of the system

Additionally, Levesqus, Harris and Russel (2013) synthesized conceptual frameworks from literatures in explaining health care accessibility. It was found that important dimensions of health care accessibility were existing of the services, prices, and qualities. The review also shows that a number of utilization is used as a proxy to explain accessibility, despite the fact that there are different in potential and realized access. In conclusion, there are 5 key dimensions of access: 1) Approachability 2) Acceptability 3) Availability and accommodation 4) Affordability, and lastly 5) Appropriateness.

Moreover, Garney et al (2014) employed Structural Equation Model (SEM) in exploring relationships between access, accessibility, and health status in the state of Texas USA. For explaining health care access of people living in urban and rural areas of the state, the two area-separated models were then employed. Then, three different hypothesized models were tested. From 5,230 samplings, the selected models found that barriers to health care are the mediators of health related quality of life especially health insurance in the rural areas. Primarily, the US health care access model only based on health insurance, other barriers to access the system were needed to address.

Regarding awareness factor, Emami and Safipour (2013) studied public system acceptance and an assessment of awareness and acceptance of diversity in healthcare institutions in Sweden. In making theoretically valid questionnaire for an assessment of awareness and

acceptance of diversity in healthcare institutions, the systematically multi-steps validity tested of the questionnaire was utilized. Then factor analysis technique was employed. It was concluded that there were six dimensions found; 1) Attitude toward discrimination, 2) Interaction between staff, 3) Stereotypic attitude toward working with a person with a Swedish background, 4) Attitude toward working with a patient with a different background, 5) Attitude toward communication with persons with different backgrounds, and lastly 6) Attitude toward interaction between patients and staff.

Turning to health care utilization, Giruffrida, Iunes and Savedoff (2005) employed SEM in explaining health care status and health care utilization in adult women and men in Brazil. The estimation suggested that a better access to health care (i.e. having a private health insurance and living in urban areas) is a higher level of health care utilization. In addition, health of adult women and men is improved by filtered water and sanitation. Education and wealth were the factors improving health status. In contrary, unemployment, child laboring, and race discrimination were the causes of worsening health status. Moreover, health status of women comparatively worse than men. Women's health status declines at a quicker pace and being much more sensitive to negative factors.

As mentioned, one of the three fundamental idea of UHC is the quality offered. Moses et al (2019) and Wieser and Klaus (2019) concluded that, globally, using Netherlands as reference for a UHC standard of utilization, the additional global cost to meet the standard will be around 1,177.69 Billion International Dollars. During the year 1990-2016, the progress of UHC standard was visibly slow, not including some countries such as China, Indonesia, and Turkey, due to the fact of a substantial increase in outpatient visits and inpatient admissions mainly driven by world population growth and ageing problem.

Turning to reviews regarding UHC in ASEAN member countries, starting with Myanmar, Han et al (2018) assessed the country's UHC by utilizing Myanmar Demographic and Health Survey (2016) and Integrated Household Living Condition Assessment (2010). It can be concluded coverage of health service of Myanmar ranged from 18·4% to 96·2%. Most of the regions, the coverage were still below the target of 80%. There were 2·0% of the non-poor households became poor because of out-of-pocket payments for health. The higher the income quintiles the better the access to health services, a higher chance of financial catastrophe as a result of payments for health care. In conclusion, Fulfilling UHC targets in Myanmar will be very challenging due to the fact of the low health service coverage, high financial risk, and inequalities in access to care across the country. Health service coverage for vulnerable and disadvantaged should be prioritized.

For a case study of Indonesia, Agustina et al (2019) concluded that the centralized UHC program (from the year 1961 to 2001) greatly helped improving many health indicators of Indonesia. However, a new decentralized system, starting from 2004, better addresses complexity and diversity of this vastly different country with 203 million people. Nevertheless, there were still some concerns e.g. low enrollment rate of the middle income groups, children under the age of 4 years old, and high cost of managing non-communicable diseases.

In case of Thailand, Tangcharoensathien et al (2018) found that, using general taxation to finance, Thailand UHC was implemented in 2002. Evidences showed substantial reduction in levels of out-of-pocket payments and thus incidence of catastrophic health spending. The UHC scheme has also reduced provincial gaps in child mortality. Specific treatments saving lives of adults such as antiretroviral therapy and renal replacement were also provided. Effective cost controlling made Thailand UHC financially feasible. Preparing for an ageing society, primary prevention of non-communicable diseases, and law enforcement to prevent road traffic mortality were some of the remaining challenges faced.

## Methodology

Methodology used in this research can be summarized as follows. Firstly, the questionnaire for awareness, accessibility, and utilization of the UHC is developed. Supporting by the reviews, questions for the awareness part consists of three main parts; 1) Knowledge of the system, 2) Attention and Values, and 3) Awareness Stimulation. For the utilization of the UHC, drawn from human rights conceptual framework on health care, there were three components; 1) Physical accessibility, 2) Affordability, and 3) Acceptability. For the UHC utilization, there are questions emphasizing on utilization and coverage of the system e.g. utilization of rights inquiry call center, usage of the universal health care emergency number, usage of no-prepaid emergency health care services, usage and freedom of choices in choosing between modern or traditional medical care, choices of vaccination, and lastly usage of damage compensation scheme.

Secondly, content validity is made by using indexes of item-objective congruence-IOC. Three experts' opinions were gathered to measure whether or not/and in which degree the questionnaire contents were appropriate. The IOC index can be written as: $IOC = \frac{\sum R}{N}$, while $R$ and $N$ denote score for each questionnaire question and number of the scoring experts respectively. The results show that the IOCs for every question are higher than that of the criteria of 0.5.

Thirdly, Cronbach's alpha coefficient for internal consistency is conducted to validate reliability of each item or question in the survey. The alpha coefficient is 0.946 which is greater than the value required (0.85).

Fourthly, the samplings are gathered based on the beneficiaries residing in Bangkok, being work in an informal sectors or being so called freelancers. By using Taro Yamane formula for minimum number of samplings (0.05 margin of error), with 1.309 Million freelancers in the area according to 2016 population census, the sample size must be greater than 400. Data were collected in 6 areas of the Bangkok metropolitan area, each comprising 67 cases, a totaling of 402 cases.

Lastly, from the total of 39 questions regarding awareness, accessibility, and utilization of the UHC, the exploratory factor analysis was made for dimension reduction purpose as well as to construct the three hypothetical unobservable variables; awareness, accessibility, and utilization used in the Structural Equation Model-SEM discussed next.

The SEM employed in this work consisted of two standard parts, measurement models and structural models. Measurement models are to construct 3 latent variables; utilization, accessibility, and awareness. Meanwhile, corresponding to the measurement models, three structural model for utilization, accessibility, and awareness are evaluated with additional exogenous observable variables e.g. ages, incomes, and educational levels.

## Findings

### Descriptive Statistics

A total number of the respondent was 402, which consist of 156 males (38.8%) and 246 females (61.2%). The average age was at 35.5 years old within a range of 13 to 86 years old. The majority of the samples were graduated at level of undergraduate and vocational diplomas. The samplings' occupations mostly farmers (66.9%), followed by working in services (17.9%), manufacturing and sales (10.9%) respectively. For health care rights, all of them holds the Universal Health Care rights. However, some of the respondents hold more than one rights as seen in the table below:

**Table 1** Health care rights held by the samples

| Health Care Rights (can be held more than one) | Number | Percentage |
|---|---|---|
| 1. Universal Health Care | 402 | 100 |
| 2. Social Security | 105 | 26.1 |
| 3. Private-based Health Care System | 59 | 14.7 |
| 4. Government Officers (or alike) Health Care System | 19 | 4.7 |
| 5. Others | 5 | 1.2 |

**Dimension Reduction and Extracted Components**

From the 39 questions asked in the questionnaire, after performing an exploratory factor analysis-EFA, there are 8 components found, with 0.919 Kaiser-Mayer-Olkin Measure of Sampling Adequacy (KMO) and 9286.092 Chi-square for Bartlett's Test of Sphericity (sig.= 0.00). Details of the extracted components can be seen below:

**Table 2** Results from Exploratory Factor Analysis-EFA

| Factor Number Factor Named | Eigen Value | Total Variance Explained (%) | Range of Factor Loadings | Number of Measurable Items | Cronbach's alpha |
|---|---|---|---|---|---|
| 1. Utilization | 12.629 | 32.382 | 0.724-0.909 | 7 | 0.927 |
| 2. Time&Schedule | 3.207 | 8.222 | 0.638-0.939 | 5 | 0.937 |
| 3. Medical Ethics | 2.134 | 5.524 | 0.515-0.928 | 5 | 0.919 |
| 4.Emergency Knowledge | 1.724 | 4.421 | 0.539-0.753 | 4 | 0.748 |
| 5. Extra Expense | 1.513 | 3.880 | 0.704-0.783 | 3 | 0.793 |
| 6. First Priority | 1.420 | 3.640 | 0.642-0.779 | 3 | 0.779 |
| 7. Rights Knowledge | 1.323 | 3.391 | 0.576-0.717 | 3 | 0.654 |
| 8. Information Flow | 1.048 | 2.688 | 0.552-0.828 | 2 | 0.600 |

**Note:** Promax Oblique Rotation (Kappa = 4) Source: Authors

In utilizing the extracted components above for the followed SEM, the components then be categorized into two groups, access and awareness constructs. The access constructs are time&schedule (Access_1), extra expense (Access_2), and medical ethics (Access_3). Meanwhile, the awareness constructs are right knowledge (Aware_1), emergency knowledge (Aware_2), and first priority (Aware_3). In avoiding Heywood case, an extracted factor of information flow with only two observable items will not being used in the SEM. Consequently, the two constructs will be used (as the Lower Order Constructs-LOC in making Higher Order Constructs-HOC of Accessibility and Awareness respectively) in the structural equation model-SEM as seen in the next section.

**Structural Equation Model**

From the latent variables as well as theoretical based methodology aforementioned, the SEM was designed and estimated. The results can be shown below:

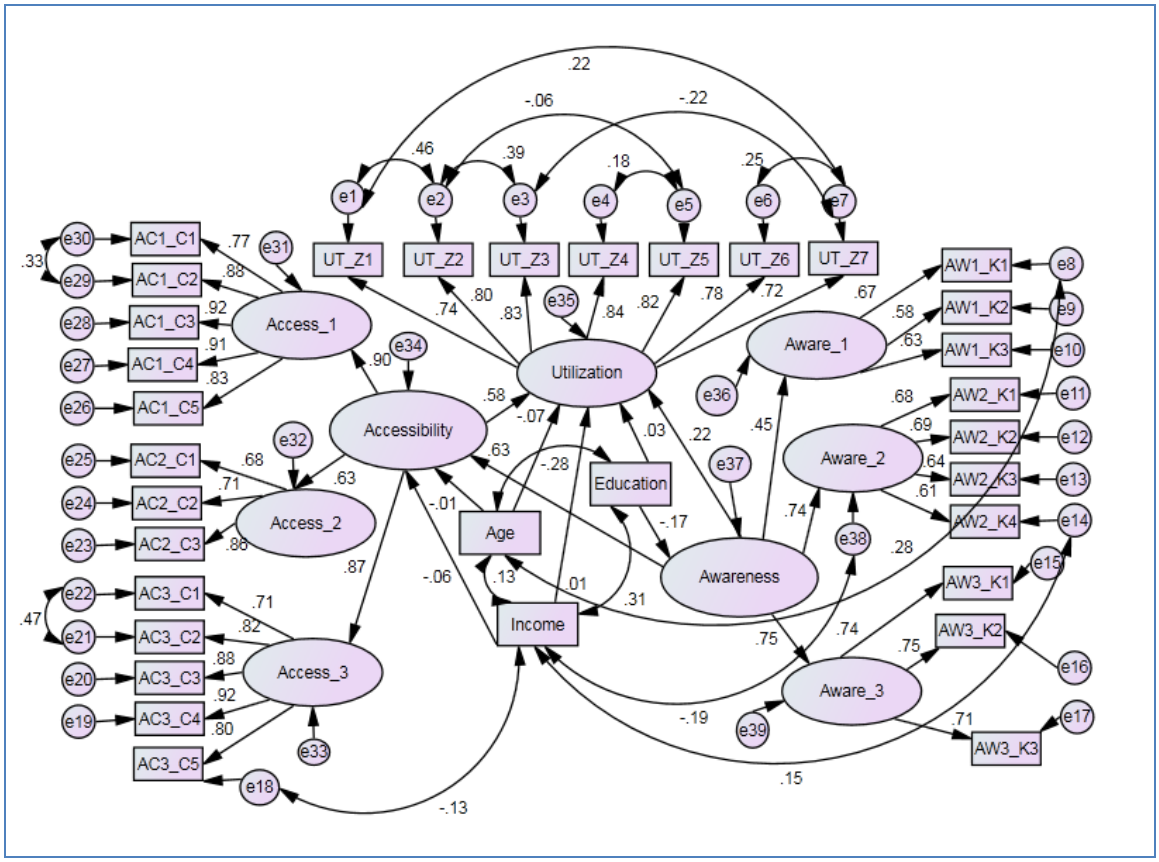


**Figure 1** SEM Standardized Estimated Result

For model fit evaluations, the model yielded a set of reasonably fit indicators; CMIN/DF = 2.0, GFI = 0.9, AGFI = 0.9, NFI = 0.9, TLI = 0.9, CFI = 0.9, and RMSEA = 0.0 (with PCLOSE = 0.6). Estimated parameters and its statistical significance can be seen below;

**Table 3** SEM Estimated Parameters

| | | | **Unstandardized Estimates** | **Standardized Estimates** | **p-Value** |
|---|---|---|---|---|---|
| Structural Model Results | | | | | |
| Accessibility | <--- | Age | 0.0 | 0.0 | 0.80 |
| Utilization | <--- | Age | 0.0 | -0.1 | 0.10 |
| Awareness | <--- | Education | 0.0 | -0.2 | 0.00** |
| Utilization | <--- | Education | 0.0 | 0.0 | 0.50 |
| Accessibility | <--- | Income | 0.0 | -0.1 | 0.20 |
| Utilization | <--- | Income | 0.0 | 0.0 | 0.80 |
| Accessibility | <--- | Awareness | 8.0 | 0.6 | 0.00** |
| Utilization | <--- | Accessibility | 0.6 | 0.6 | 0.00** |
| Utilization | <--- | Awareness | 3.0 | 0.2 | 0.00** |
| Measurement Model for | | | Estimated Results | | |
| Accessibility | | | All estimated parameters for measurement model was positively correlated with the corresponding constructs and significantly different from zero with p-value less than 0.01 | | |
| Awareness | | | | | |
| Utilization | | | | | |

Note: ** Significantly different from zero at 0.01 level

From the table above, the three latent variables i.e. awareness, accessibility, and utilization were significantly positive correlated. The higher the awareness, the higher the accessibility as well as the utilization. Likewise, an increasing in accessibility also promoted utilization. Furthermore, for relationships between observable variables and the latent variables in the model, only education was negatively correlated with awareness. The higher level of education seems not helping level of awareness.

## Conclusions

Awareness and accessibility can explain beneficiaries utilization of the UHC system. In order to promote the full potential of the system and preserve the right of the beneficiaries policy in increasing level of awareness are recommended. Although the individual factors such as income, age, and education may not be able to prove relating with the utilization of the UHC system, the findings suggests that the specific knowledge of right especially in case of an emergency, right for compensation, and increasing in information flow including information enhancing confidence and good attitudes towards the system would help promoting awareness hence accessibility and utilization of Thailand UHC.

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