Accessibility to and Utilization of Healthcare Services Pre- and Post-typhoon Yolanda as Perceived by Senior Citizens in a Rural Area in the Philippines

Arnulfo M. Silvano*

Corresponding author's email address: arnulfo.silvano@yahoo.com

Mater Health Service, Brisbane, Australia.

RESEARCH ARTICLE

Abstract

Background: The problems of accessibility to and utilization of healthcare services are fundamental and constant issues in every country's healthcare system especially among the senior citizens.
Objective: The study investigated the accessibility to and utilization of healthcare services among senior citizens in the Province of Leyte as determined by the predisposing, enabling, and need factors.
Methods: The sample consisted of 496 60 years old and above senior citizens from randomly selected barangays of Districts 1 and 2 of Leyte Province. An interview schedule was designed to gather data through structured interviews. The data were analyzed using descriptive statistics to determine the level of accessibility and utilization, Point-biserial and Pearson product-moment correlation coefficient (Pearson's r) and eta correlation to check significant relationships among variables, and multiple linear regression to identify predictors of accessibility and utilization.
Results: Findings revealed that sex, occupation, primary source of income, health status, medical condition, and disability had weak correlations with accessibility and utilization during pre-typhoon and post-typhoon. Lastly, medical conditions and health status were the best predictors of accessibility and utilization during pre-typhoon and post-typhoon. These findings lead to the development of a local model on the accessibility to and utilization of healthcare services that are more reflective for senior citizens in rural areas in the Philippines.
Conclusion: More research is needed to replicate these results to substantiate the significance of addressing the healthcare needs of the senior citizens in rural areas.

Keywords: *healthcare, accessibility, utilization, senior citizens, rural Philippines*

Introduction

The problems of accessibility to and utilization of healthcare services are fundamental and constant issues in every country's healthcare system, especially for senior citizens. However, these two problems are distinct from each other [1]. Accessibility to healthcare services is a multidimensional process involving the quality of care, geographical accessibility, availability of the right type of care for those in need, financial accessibility, and acceptability of service [1-2], while utilization of healthcare services is related to the availability, quality, and cost of services, as well as the social-economic structure, and personal characteristics of the users [1-3]. Understanding the difference between accessibility to and utilization of healthcare services is crucial in addressing their various barriers.

One of the significant barriers is location. Rural residents often experience obstacles to healthcare, limiting their ability to healthcare services. Sufficient healthcare access in these zones requires necessary, appropriate, and timely services [2].

Distance to health centers is another impediment in rural areas [4]. An investigation identified distance as the most critical factor influencing the utilization of health services in the Ahafo-Ano southern district of Ghana. The inadequacies in the access to health facilities have reduced the life expectancy of rural inhabitants and increased infant mortality [5]. The same study on the Ghanian rural population further asserted that rural people often waste much time trekking to the nearest available healthcare centers because of unreliable means of transportation.

Other factors affecting the administration of proper healthcare in rural areas include low population density, isolation, and fewer economic and workforce resources [7]. In the Philippines, senior citizens are heavy consumers of

healthcare; from out-of-pocket costs, they are considered heavy users of care from medical centers, hospitals, non-hospital health institutions, and rural health units [8]. However, this group of the population often has decreased accessibility to and utilization of healthcare services that specialize in geriatric care [9].

Given the need and frequent use of healthcare services by senior citizens [10-12], several studies have been conducted to address this gap in healthcare services worldwide [13]. Despite the plethora of studies on accessibility to and utilization of healthcare services especially in Western Countries, no specific and extensive studies have been conducted to evaluate it on the senior citizens of the Philippines. In light of these shortcomings, this study's primary objective was to investigate the accessibility to and utilization of healthcare services among senior citizens in the Province of Leyte as determined by the predisposing, enabling, and need factors, using the Andersen's Behavioral Model of Healthcare Services Utilization, and to further compare pre-typhoon and post-typhoon Yolanda effects on these issues. The next goals were to determine the relationships between the profile variables and the two parameters under investigation propose an untested behavioral model based on the limited findings of the study could be useful to policymakers if proven.

The Andersen Behavioral Model applied as a basis for understanding accessibility to and utilization of healthcare services for senior citizens has been validated by studies conducted internationally [15-20]. It states that health services' utilization is a function of three categories: (a) predisposing factors such as age, gender, marital status, educational status, and health beliefs; (b) enabling factors such as income, health insurance, and regular sources of care; and (c) need, which is the most proximate cause of health services utilization [18]. The model assumes that a sequence of factors determines the utilization of health services: the predisposition, the ability, and the need to use services.

Methodology

Research Locale

Leyte is an island in the Philippines located in the Visayas region. The island has two major cities, Ormoc and Tacloban. These two cities were hit hardest by Super Typhoon Yolanda, a powerful tropical cyclone that swept through the central Philippines in early November 2013.

The island of Leyte matched all the characteristics of an area in need of upgrading its healthcare system and mitigating impacting factors (unreliable transportation, poverty, low workforce, and scattered population) for the benefit of senior citizens. Its choice was further justified by the urge to evaluate the impact of the Typhoon catastrophe on an already below par system.

Sampling Design and Sample Size

Senior citizens aged 60 years and older during the conduct of the study and who were also survivors of the Super Typhoon Yolanda were the respondents. The selection was based on the fact that this age group requires constant healthcare and consists of persistent users of the healthcare systems [8]. Senior citizens who are unable to speak were included in the study as long as a reliable family member who serves as a carer is knowledgeable about the condition or situation of the respondent.

Based on the 2010 Population Census, there are 129,321 senior citizens in the Leyte Province [14]. Power analyses for correlation and regression analyses were conducted in G-POWER to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, and a small effect size (f2 = 0.02). Based on these assumptions, the desired sample size is 395.

Multi-stage sampling techniques were employed to choose the participants of this study. The Province of Leyte is composed of five districts with 41 municipalities. Districts 1 and 2 were selected due to their proximity to Tacloban City. From each district, 10% of the municipalities were randomly selected, followed by a random selection of 10% of barangays from each selected municipality. All of the senior citizens in the sampled barangays were included.

Instrument and Study Design

An interview schedule was designed based on the literature review. The first part was the respondent's demographic profile that covers the predisposing factors, enabling factors, and need factors. The second part consisted of the level of accessibility to and utilization of the 24 pre-identified healthcare services for senior citizens; the former was measured based on availability, affordability, and adequacy, and the latter on the frequency of usage of various healthcare services. The last part of the questionnaire was used to generate the perceived factors affecting senior citizens in their level of accessibility to and utilization of healthcare services.

Four panel members including two medical doctors from the Department of Health and Rural Health Unit oversaw content validity, providing comments and suggestions. After the panels' validation of the instrument, a Waray-Waray version, the native language in the region, was created for the pilot test to evaluate the clarity of instructions and items in the questionnaire. Comments and suggestions from 30 pilot respondents, as well as observations from research assistants, were taken into consideration for the improvement of the instrument. A revised form of the questionnaire was critically analyzed again by panel members so it would only measure the intended variable before the actual conduct of the study.

Study Variables

For the objectives of this study, the dependent variables were accessibility to and utilization of pre-identified healthcare services, while the independent variables were the respondents' profiles.

Data Collection Procedure

Research assistants who were nurses with a background in data gathering were recruited and trained by the researcher to use the research instrument. The Waray-Waray version of the interview schedule was used to collect data.

A courtesy call to the Barangay Captain was done, a list of the senior citizens was requested, and a house-to-house interview was carried out. Permissions were obtained from the senior citizens to be interviewed with the assurance of non-retribution for not participating. Absent or non-abiding senior citizens were replaced by members of neighboring barangays.

Data were collected between October and November 2016, almost three years after the typhoon.

Data Processing and Analysis

Data entry and analysis were done using Microsoft Excel 2013 and Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics were generated to present the mean level of accessibility and utilization, as well as the frequency and rank of the perceived factors affecting access to and utilization of healthcare services.

The sum or mean of ordinal variables was taken to create approximately continuous variables for accessibility and utilization.

A point-biserial correlation was conducted to assess potential relationships between profile variables (dichotomous) and accessibility and utilization variables (continuous).

Pearson product-moment r correlation was used to assess the relationship between age, distance, and accessibility and utilization.

On the other hand, a multiple linear regression method – stepwise regression – was conducted to assess if the independent variables predict the dependent variables (criterion). The following regression equation (main effects model) was used:

y = bpredisposing factors * xpredisposing factors + b enabling factors * xenabling factors + b need factors * x need factors +…+ c; where Y = estimated dependent variable, c = constant (which includes the error term), b = regression coefficients and x = each independent variable. Dummy variables were created for profile variables that have more than two categories

The F-test was used to assess whether the set of independent variables collectively predicts the dependent variables. R-squared, `the multiple correlation coefficient of determination, was reported and used to determine how much variance in the dependent variable can be accounted for by the set of independent variables. The t test was used to determine the significance of each predictor, while beta coefficients was used to determine the magnitude of prediction for each independent variable. For every one unit increase in the significant predictors, the dependent variable will increase or decrease by the number of unstandardized beta coefficients. The assumptions of multiple regression – linearity, homoscedasticity and multicollinearity – were assessed. Linearity and homoscedasticity was assessed by examination of a scatter plot, and multicollinearity was assessed using Variance Inflation Factors (VIF). VIF value was under 10 which suggested the absence of multicollinearity. All tests of significance were two-tailed with the alpha level set at 0.05.

Results

Level of accessibility to and utilization of healthcare services pre-typhoon and post-typhoon Yolanda

Table 1 shows that the level of accessibility to healthcare services in terms of availabilities of the pre-identified services at their usual source (healthcare facility) were identical pre-

Table 1. *Mean distribution on the level of accessibility: availability of healthcare services*

Healthcare Services	Pre-Typhoon		Pre-Typhoon	
	Mean	Description	Mean	Description
Medical Consultations	1.62	Not available	1.63	Not available
Anti-Flu Vaccine	1.04	Not available	1.02	Not available
Anti pneumonia vaccine	1.01	Not available	1.22	Not available
Anti hypertension medications	1.34	Not available	1.42	Not available
Anti diabetic medications	1.09	Not available	1.13	Not available
TB DOTS	1.01	Not available	1.01	Not available
Urinalysis	1.02	Not available	1.02	Not available
Stool examination	1.01	Not available	1.01	Not available
Sputum examination	1.02	Not available	1.01	Not available
Blood Typing	1.01	Not available	1.00	Not available
Blood Testing	1.00	Not available	1.00	Not available
X-ray	1.00	Not available	1.00	Not available
CT Scan	1.00	Not available	1.00	Not available
Leprosy Treatment	1.00	Not available	1.01	Not available
Scistosomiasis Treatment	1.16	Not available	1.06	Not available
Issuance of Med Certificate	1.00	Not available	1.00	Not available
Operation timbang	1.22	Not available	1.26	Not available
Health Referrals	1.03	Not available	1.04	Not available
Ambulance Services	1.14	Not available	1.15	Not available
Blood Pressure Checkup	2.37	Sometimes available	2.42	Sometimes available
Dental Checkup (Oral exam)	1.02	Not available	1.02	Not available
Dental_Tooth Extraction	1.10	Not available	1.07	Not available
Dental_Tooth Cleaning	1.00	Not available	1.00	Not available
Dental_Tooth Filling	1.00	Not available	1.00	Not available
Overall mean	**1.13**	**Not available**	**1.14**	**Not Available**

Mean Range: 1.00 – 1.75 = not available; 1.76 – 2.50 = sometimes available; 2.51 – 3.25 = mostly available; 3.26 – 4.00 = available all the time

typhoon and post-typhoon; the overall level of availability absent both times. Only blood pressure check-up was reported to be sometimes available both before and after the typhoon. Other healthcare services were revealed to be unavailable according to the average number of the respondents.

All the pre-identified healthcare services were revealed to be unaffordable according to the average number of the respondents both before and after the typhoon (Table 2).

In terms of adequacy (Table 3), medical consultation and pressure check-up were slightly and moderately adequate, respectively, both before and after the typhoon. However, the rest of the healthcare services were inadequate both times. In general, the overall level of adequacy of the healthcare services at their usual source was inadequate both before and after the typhoon.

Table 4 illustrates the level of utilization of the pre-identified healthcare services at the usual source. Before the typhoon, medical consultation and blood pressure check-up were slightly and moderately utilized, respectively, but these two services became poorly utilized after the typhoon. Other healthcare services were poorly utilized as well before the typhoon. However, utilization of three services increased after the typhoon; anti-flu vaccine and anti-diabetic medications became slightly utilized, and dental oral examination became moderately utilized. Overall, the level of utilization of the pre-identified healthcare services both before and after the typhoon were revealed to be poor.

Perceived Factors Affecting Accessibility to and Utilization of Healthcare Services

Respondents were asked to identify as many factors from the interview schedule starting from what they perceived to be major factors to the lesser factors that affected accessibility to and their utilization of healthcare services (Table 5). Having no money for fare, feeling healthy and having no ailment to require health facilities, and preference for other health facilities were the top three factors affecting accessibility both before and after the typhoon. No money for medicine and self-medication were the other reasons to round up the top five factors hindering accessibility before the typhoon. In addition, the need for a companion to visit a health facility and inadequate supplies of medicines or services were included in the top five factors after Typhoon Yolanda.

Table 2. *Mean distribution on the level of accessibility: affordability of healthcare services*

Healthcare Services	Pre-Typhoon		Post-Typhoon	
	Mean	Description	Mean	Description
Medical Consultations	1.00	Not affordable	1.00	Not affordable
Anti-Flu Vaccine	1.00	Not affordable	1.00	Not affordable
Anti pneumonia vaccine	1.00	Not affordable	1.00	Not affordable
Anti hypertension medications	1.00	Not affordable	1.00	Not affordable
Anti diabetic medications	1.00	Not affordable	1.00	Not affordable
TB DOTS	1.00	Not affordable	1.00	Not affordable
Urinalysis	1.00	Not affordable	1.00	Not affordable
Stool examination	1.00	Not affordable	1.00	Not affordable
Sputum examination	1.00	Not affordable	1.00	Not affordable
Blood Typing	1.00	Not affordable	1.00	Not affordable
Blood Testing	1.00	Not affordable	1.00	Not affordable
X-ray	1.00	Not affordable	1.00	Not affordable
CT Scan	1.00	Not affordable	1.00	Not affordable
Leprosy Treatment	1.00	Not affordable	1.00	Not affordable
Scistosomiasis Treatment	1.00	Not affordable	1.00	Not affordable
Issuance of Med Certificate	1.00	Not affordable	1.00	Not affordable
Operation timbang	1.00	Not affordable	1.00	Not affordable
Health Referrals	1.00	Not affordable	1.00	Not affordable
Ambulance Services	1.00	Not affordable	1.00	Not affordable
Blood Pressure Checkup	1.00	Not affordable	1.00	Not affordable
Dental Checkup (Oral exam)	1.00	Not affordable	1.00	Not affordable
Dental_Tooth Extraction	1.00	Not affordable	1.00	Not affordable
Dental_Tooth Cleaning	1.00	Not affordable	1.00	Not affordable
Dental_Tooth Filling	1.00	Not affordable	1.00	Not affordable
Overall mean	**1.00**	**Not affordable**	**1.00**	**Not affordable**

Mean range: 1.00 – 1.75 = not affordable (the service is very expensive for the respondent); 1.76 – 2.50 = slightly affordable (the service has standard fee, no 20% discount for senior citizen); 2.51 – 3.25 = moderately affordable (the service has minimal fee [20% senior citizen discount]); 3.26 – 4.00 = highly affordable (the service is totally free of charge but asks any amount of donation)

Table 3. *Mean distribution on the level of accessibility: adequacy of healthcare services*

Healthcare Services	Pre-Typhoon		Post-Typhoon	
	Mean	Description	Mean	Description
Medical Consultations	2.08	Slightly adequate	2.11	Slightly adequate
Anti-Flu Vaccine	1.07	Inadequate	1.04	Inadequate
Anti pneumonia vaccine	1.03	Inadequate	1.39	Inadequate
Anti hypertension medications	1.42	Inadequate	1.51	Inadequate
Anti diabetic medications	1.13	Inadequate	1.17	Inadequate
TB DOTS	1.02	Inadequate	1.01	Inadequate
Urinalysis	1.03	Inadequate	1.02	Inadequate
Stool examination	1.02	Inadequate	1.02	Inadequate
Sputum examination	1.01	Inadequate	1.01	Inadequate
Blood Typing	1.01	Inadequate	1.00	Inadequate
Blood Testing	1.00	Inadequate	1.00	Inadequate
X-ray	1.00	Inadequate	1.00	Inadequate
CT Scan	1.00	Inadequate	1.00	Inadequate
Leprosy Treatment	1.00	Inadequate	1.00	Inadequate
Scistosomiasis Treatment	1.22	Inadequate	1.08	Inadequate
Issuance of Med Certificate	1.00	Inadequate	1.00	Inadequate
Operation timbang	1.29	Inadequate	1.34	Inadequate
Health Referrals	1.05	Inadequate	1.06	Inadequate
Ambulance Services	1.24	Inadequate	1.24	Inadequate
Blood Pressure Checkup	2.59	Moderately adequate	2.69	Moderately adequate
Dental Checkup (Oral exam)	1.02	Inadequate	1.00	Moderately adequate
Dental_Tooth Extraction	1.20	Inadequate	1.12	Inadequate
Dental_Tooth Cleaning	1.00	Inadequate	1.00	Inadequate
Dental_Tooth Filling	1.00	Inadequate	1.00	Inadequate
Overall mean	**1.18**	**Inadequate**	**1.20**	**Inadequate**

Mean range: 1.00 – 1.75 = inadequate (the service is not complete); 1.76 – 2.50 = slightly adequate (the service is rarely complete); 2.51 – 3.25 = moderately adequate (the service is sometime complete); 3.26 – 4.00 = highly adequate (the service is almost complete)

Table 4. *Mean distribution on the level of healthcare service utilization*

Healthcare Services	Pre-Typhoon		Post-Typhoon	
	Mean	Description	Mean	Description
Medical Consultations	1.70	Slightly utilized	1.00	Poorly utilized
Anti-Flu Vaccine	1.00	Poorly utilized	1.80	Slightly utilized
Anti pneumonia vaccine	1.00	Poorly utilized	1.00	Poorly utilized
Anti hypertension medications	1.40	Poorly utilized	1.20	Poorly utilized
Anti diabetic medications	1.10	Poorly utilized	1.50	Slightly utilized
TB DOTS	1.00	Poorly utilized	1.10	Poorly utilized
Urinalysis	1.00	Poorly utilized	1.00	Poorly utilized
Stool examination	1.00	Poorly utilized	1.00	Poorly utilized
Sputum examination	1.00	Poorly utilized	1.00	Poorly utilized
Blood Typing	1.00	Poorly utilized	1.00	Poorly utilized
Blood Testing	1.00	Poorly utilized	1.00	Poorly utilized
X-ray	1.00	Poorly utilized	1.00	Poorly utilized
CT Scan	1.00	Poorly utilized	1.00	Poorly utilized
Leprosy Treatment	1.00	Poorly utilized	1.00	Poorly utilized
Scistosomiasis Treatment	1.20	Poorly utilized	1.00	Poorly utilized
Issuance of Med Certificate	1.00	Poorly utilized	1.10	Poorly utilized
Operation timbang	1.30	Poorly utilized	1.00	Poorly utilized
Health Referrals	1.00	Poorly utilized	1.30	Poorly utilized
Ambulance Services	1.10	Poorly utilized	1.00	Poorly utilized
Blood Pressure Checkup	2.60	Moderately utilized	1.20	Poorly utilized
Dental Checkup (Oral exam)	1.00	Poorly utilized	2.60	Moderately utilized
Dental_Tooth Extraction	1.10	Poorly utilized	1.00	Poorly utilized
Dental_Tooth Cleaning	1.00	Poorly utilized	1.10	Poorly utilized
Dental_Tooth Filling	1.00	Poorly utilized	1.00	Poorly utilized
Overall mean	**1.00**	**Poorly utilized**	**1.00**	**Poorly utilized**

Mean Range: 1.00 – 1.75 = poorly utilized (never/not utilized at all); 1.76 – 2.50 = slightly utilized (rarely utilized; used 1-2 times); 2.51 – 3.25 = moderately utilized (sometimes utilized; used 3-4 times); 3.26 – 4.00 = highly utilized (utilized most of the time; used 4-5 times)

Table 5. *Perceived factors affecting accessibility to healthcare services*

Perceived Factors	Accessibility				Utilization			
	Pre-Typhoon		Post-Typhoon		Pre-Typhoon		Post-Typhoon	
	f	Rank	f	Rank	f	Rank	f	Rank
Unaware of healthcare services available	13	12	13	12	13	12	13	12
Prefers to consult a quack doctor	4	18	4	18	4	18	4	18
Prefers another healthcare facility	56	3	58	3	56	3	58	4
No or poor confidence/trust with the staff/facility	6	16	6	16	5	17	5	17
Self-treatment	42	5	42	6	42	5	42	7
Family or peer influence	3	19	3	19	3	19	3	19
Busy at work or with other commitments	35	8	35	8	34	8	34	8
Don't feel the need to visit a healthcare facility	151	2	151	2	151	2	152	3
Preference for transport	16	11	17	10	16	11	17	10
Waiting time for transport	3	19	3	19	3	19	3	19
Difficulty of getting transport vehicle	6	16	6	16	6	16	6	16
Travel difficulty due to rough road or bad weather)	12	13	13	12	12	13	13	12
Too ill to travel or requires assistance from family	38	7	54	4	38	7	53	5
members	185	1	185	1	183	1	183	2
Cost of transport	40	6	40	7	40	6	501	1
Healthcare service fee	8	15	8	15	7	15	7	15
Unavailable staff	48	4	48	5	49	4	49	6
Medication cost	17	10	17	10	17	10	17	10
Inadequate supplies, medicines or services	30	9	30	9	30	9	30	9
Waiting time for healthcare services/staffUnfriendly staff	2	22	2	22	2	22	2	22
Distance to the facility	2	22	2	22	2	22	2	22
Shy	1	24	1	24	1	24	1	24
Afraid of doctor	3	19	3	19	3	19	3	19
Carer of grandchildren	1	24	1	24	1	24	1	24
Laziness	10	14	10	14	10	14	10	14

Note: f = frequency

Table 6. *Correlations between predisposing factors, accessibility and utilization pre-typhoon and post-typhoon Yolanda*

Predisposing Factors	Pre-Typhoon				Post-Typhoon			
	Accessibility		Utilization		Accessibility		Utilization	
	r_{pb}	p	r_{pb}	p	r_{pb}	p	r_{pb}	p
Age[r]	-	-	-	-	0.03	0.476	0.03	0.547
Sex	0.18	0.001	0.18	0.001	-0.11	0.015	-0.11	0.02
Highest educational attainment	0.03	0.533	0.05	0.321	-0.08	0.062	-0.09	0.056
Marital status	0.04	0.427	0.05	0.279	0.02	0.656	0.004	0.925
Place of residence	-0.04	0.35	0.02	0.679	0.02	0.729	-0.02	0.701
Occupation	0.1	0.026	0.1	0.022	-0.11	0.013	-0.1	0.026
Religion	-0.03	0.582	-0.004	0.935	-0.01	0.817	-0.03	0.507
Head of the family	-0.08	0.092	-0.08	0.068	-0.03	0.505	-0.03	0.575
Number of people living with	-0.05	0.297	-0.09	0.049	0.02	0.746	-0.01	0.868
Shelter type	-0.03	0.487	-0.05	0.319	0.08	0.087	0.11	0.017

Note: r_{pb} = Point biserial; p = p-value; r = Pearson's r

Table 7. *Correlations between enabling factors, accessibility and utilization pre and post-typhoon Yolanda*

Enabling Factors	Pre-Typhoon				Post-Typhoon			
	Accessibility		Utilization		Accessibility		Utilization	
	r_{pb}	p	r_{pb}	p	r_{pb}	p	r_{pb}	p
Main source of Income	-0.1	0.05	-0.14	0.002	-0.03	0.47	-0.07	0.131
Estimated monthly income	-0.08	0.079	-0.12	0.007	0.12	0.01	0.12	0.01
Health Insurance	0.07	0.122	0.07	0.153	0.19	0.001	0.15	0.001
Mode of transport to the usual source of healthcare services	-0.04	0.399	0.02	0.637	-0.13	0.004	-0.08	0.091
Distance to the usual source of healthcare services (Km)[r]	0.07	0.14	0.06	0.196	-0.11	0.016	-0.07	0.121

Note: r_{pb} = Point biserial; p = p-value; r = Pearson's r

In terms of the different factors perceived to affect the utilization of healthcare services among senior citizens, financial problems or having no money for transportation was at the top of the list before the occurrence of Typhoon Yolanda. This was followed by the respondents' personality of feeling healthy and having no ailment requiring a visit to a healthcare facility. Preference for other health facilities, no money for medicine, and self-medication were included in the top five factors affecting utilization prior to typhoon Yolanda. On the other hand, the top five factors that affected the utilization of healthcare services after typhoon Yolanda were: healthcare services fee (consultation fee), no money for fare, feeling healthy and having no ailment to require a visit to a health facility, preference for other health facilities, and a need for companion to visit a health facility.

Correlations of Variables Pre-typhoon and Post-typhoon Yolanda

Results (Table 6) of the Pearson's product-moment correlation coefficient (r) show that before the typhoon, there are weak correlations between sex and accessibility and sex and utilization, r = .18, p < .0005; r = .18, p <.0005, respectively; between occupation and accessibility and occupation and utilization, r = .10, p = 0.26; r = .10, p = .022, respectively; and a weak correlation between the number of people living with the patient and utilization, r = .09, p =.049.

Post-typhoon results revealed similar findings: weak correlations between sex and accessibility and sex and utilization, r = -.11, p = .015; r = -.11, p = .020, respectively, as well as between occupation and accessibility and occupation and utilization, r = -.11, p = .013; r = -.10, p = .026, respectively. Likewise, the correlation between shelter type and utilization is weak, r = .11, p = .017.

In Table 7, the relationship between enabling factors with accessibility and utilization pre and post-typhoon Yolanda shows that there are weak correlations between the main source of income, and accessibility and utilization pre-typhoon, r = .10, p =.050; r = .14, p = .002, respectively. Moreover, there is a weak correlation between estimated monthly income and utilization, r = .12, p =.007.

There is a weak correlation between estimated monthly income and accessibility and utilization, r = .12, p = .010 post-typhoon. Also, there are weak correlations between health

Table 8. *Correlation between need factors and accessibility and utilization pre- and post-typhoon Yolanda*

Need Factors	Pre-Typhoon				Post-Typhoon			
	Accessibility		Utilization		Accessibility		Utilization	
	r_{pb}	p	r_{pb}	p	r_{pb}	p	r_{pb}	p
Health Status[a]	0.2	0.001	0.18	0.001	0.19	0.001	0.19	0.001
Medical Condition	-0.24	0.001	-0.23	0.001	-0.23	0.001	-0.23	0.001
Disability	-0.12	0.007	-0.17	0.001	-0.12	0.007	-0.17	0.001

Note: r_{pb} = Point biserial; p = p-value; a = eta correlation

Table 9. *Pearson's r correlation between accessibility to and utilization of healthcare services pre- and post-typhoon Yolanda*

Variable		Pre-Typhoon	Post-Typhoon
		Accessibility	
Utilization	Pearson Correlation	0.9	0.89
	Sig. (2-tailed)	0.001	0.001
	n	485	493

insurance and accessibility and utilization, r = .19, p <.0005, r = .15, p = .001 respectively; between transportation to the usual source of healthcare services and accessibility, and between distance to the usual source of healthcare services and accessibility, r = -.13, p = .004; r = -.11, p = .016 respectively.

Findings also revealed weak correlations between health status, and accessibility and utilization, r = .20, p < .0005; r = .18, p = .001, respectively (Table 8); medical condition and accessibility and utilization, r = -.24, p < .0005; r = -.23, p < .0005, respectively; and between disability, and accessibility and utilization, r = -.12, p = .007; r = -.17, p < .0005, respectively.

Weak correlations were also registered post-typhoon between: health status accessibility and utilization, r = .19, p < .0005; r = .19, p < .0005 respectively; medical condition accessibility and utilization, r = -0.23, p < .0005; r = -0.23, p < .0005, respectively; and disability accessibility and utilization having r = -0.12, p = .007; r = -.17, p < .0005, respectively.

Lastly, there is a strong correlation between utilization and accessibility, r = .90, p < .0005 pre-typhoon (Table 9). A similar result was obtained after the typhoon. The correlation between accessibility and utilization is strong, r = .89, p < .001.

Predictors of Accessibility to and Utilization of Healthcare Services

As shown in Table 10, factors such as medical condition, sex, health status, age, main source of income, and estimated monthly income came out as significant predictors of accessibility pre-typhoon. Together, these variables explain about 11.3% of the total variance of accessibility scores, F (6, 485) = 11.375, p <.0005. Specifically, respondents who have no ailments, who are males, have good, very good, and excellent health status, whose primary source of income comes from salary/business, and whose estimated monthly income is less than five thousand, posted higher accessibility scores before the typhoon. However, the older the respondents are, the lower their accessibility to healthcare services.

After the typhoon, results showed that among these factors, medical condition, health insurance, health status, mode of transport to the usual source of healthcare services, and highest educational attainment came out as significant predictors. Together, these variables explain 12.9% of the total variance of accessibility scores, F (5, 485) = 15.527, p <.0005. Specifically, respondents who have no ailments, have Philhealth insurance, have fair/poor health status, use pedicab as mode of transport, and whose education is above elementary, posted higher accessibility scores after the typhoon.

Before the typhoon, factors such as medical condition, sex, main source of income, estimated monthly income, and health status came out as significant predictors (Table 11). Together, these variables explain 11.1% of the total variance of utilization scores, F (5, 481) = 13.115, p <.0005. Specifically, respondents who have no ailments, who are male, whose primary source of income comes from labor/fishing/farming/family support, whose estimated monthly income is less than five thousand

Table 10. *Factors that predict the accessibility to healthcare services pre- and post-typhoon Yolanda*

Factors	Pre-Typhoon				Post-Typhoon			
	B	***SE$_B$***	***β***	***p***	***B***	***SE$_B$***	***β***	***p***
Medical Condition	-2.903	0.533	-0.239	0.001	-3.082	0.579	-0.234	0.001
Health Status	1.571	0.541	0.126	0.004	-1.718	0.465	0.162	0.001
Sex	1.413	0.415	0.149	0.001	-	-	-	-
Age	-0.075	0.031	-0.106	0.017	-	-	-	-
Main Source of Income	-0.924	0.401	-0.099	0.022	-	-	-	-
Estimated Monthly Income	-1.141	0.527	-0.093	0.031	-	-	-	-
Health Insurance	-	-	-	-	2.103	0.476	0.191	0.001
Mode of transport to the usual source of healthcare services	-	-	-	-	-1.449	0.501	0.123	0.004
Highest educational attainment	-	-	-	-	-1.053	0.525	0.086	0.046
(Constant)	79.139	0.227	-	-	80.868	0.246	-	-

Note: B = unstandardized regression coefficient; SE^B = Standard error of the coefficient; β = standardized coefficient; p = p-value

Table 11. *Factors that predict the accessibility to healthcare services pre- and post-typhoon Yolanda*

Factors	Pre-Typhoon				Post-Typhoon			
	B	***SE$_B$***	***β***	***p-value***	***B***	***SE$_B$***	***β***	***p-value***
Medical Condition	-1.617	0.313	-0.228	0.001	-1.722	0.332	-0.228	0.001
Health Status	0.8	0.242	0.146	0.001	0.939	0.273	0.149	0.001
Sex	-0.754	0.236	-0.139	0.001	-0.928-	0.268	-0.154	0.001
Age	-0.957	0.307	-0.134	0.002	0.679	0.305	-0.097	0.001
Main Source of Income								
Estimated Monthly Income	0.719	0.312	0.1	0.021	-0.535	0.271	-0.092	0.049
Health Status								
(Constant)	28.043	0.132	-	-	28.324	0.14	-	-

Note: B = unstandardized regression coefficient; SE^B = Standard error of the coefficient; β = standardized coefficient

pesos, and whose health status is excellent, very good, or good, posted higher utilization scores before the typhoon.

Similar results were obtained after the typhoon. Medical condition, health insurance, health status, highest educational attainment, and disability came out as significant predictors. Together, these variables explain 10.4% of the total variance of utilization scores, F (5, 486) = 12.364, p <.0005. Specifically, respondents who have no ailments, have Philhealth insurance, whose health status is excellent, very good, or good, whose education is above elementary, and have no disability, posted higher utilization scores after the typhoon.

Discussion

Level of accessibility to and utilization of healthcare services pre and post-typhoon Yolanda

Although anticipated to be poor under normal circumstances due to earlier reported factors, results surprisingly revealed that healthcare services were mostly unavailable, unaffordable, inadequate, and poorly utilized even before the typhoon. The difference between pre and post-typhoon results are not evident, probably due to the recall bias the respondents' responses before the typhoon, which should be considered when interpreting this result. However, the

current result is in agreement with Age International UK's finding that access to appropriate medical care was limited, even before the disaster [21]. HelpAge-COSE in their 2014 report cited limited access to healthcare and medicines as one of the most significant unmet needs of older people that had become worse as a result of the typhoon [21]. Another study conducted utilizing a secondary data from Surveillance in Post Extreme Emergencies and Disasters after typhoon Yolanda also showed a lower rate of consultations for non-communicable diseases among adults [22].

Perceived Factors Affecting Accessibility to and Utilization of Healthcare Services as Ranked by the Respondents

Results of this study revealed that lack of finances for transportation to healthcare centers and buying medications were the main factors why senior citizens could not access healthcare services both pre and post-typhoon. Data in the Philippines show that approximately 80% of older people living alone come from the most impoverished families and are amongst the poorest in the country [24]. In Leyte province alone, poverty levels are known to be high (31.9% in 2012) [25], and while the percentage of elderly-headed households belonging to the poorest income group has increased (15.21% in 1991 to 18.45% in 2003), that of high-income elderly-headed households had decreased (13.42% in 1991 to 9.97% in 2003), showing that the welfare of the elderly-headed households has been deteriorating through the years [26].

Senior citizens do not visit healthcare facilities because once medications are prescribed, they know that it will involve out-of-pocket (OOP) spending. Although studies suggest that the massive OOP spending does not have a significant impact on poverty, it is likely that a high OOP spending is a severe barrier to accessing services in the country [27], especially given that ongoing Filipinos requirements for drugs are not yet included in the Philhealth benefits package [28]. Based on studies carried out by the World Health Organization and Health Action International, the cost of medicines in the Philippines is higher compared with the international market prices [29]. From community consultations and a general impact survey conducted by HelpAge-COSE at the end of January 2014, older people indicated that accessing healthcare and medicines was a significant challenge and unmet need. Older people in the more remote communities reported that transport costs and unavailability of medicines at health centers were also barriers to appropriate healthcare [21].

Senior citizens also revealed that poor access to information also compromise their availment of healthcare services. Seventy-five percent of older people interviewed by HelpAge and UNHCR did not know that free medical services were available [21]. A study carried out by PhilHealth in 2006 among its sponsored members found that the primary reasons for non-use of health centers were lack of healthcare information and inadequate service provision. Approximately 30% did not know what healthcare services were available; 41% did not know that PhilHealth membership was acceptable in health centers, and 29% of respondents were unable to access the services they needed. Also, the utilization of PhilHealth benefits was low among the poor due to lack of awareness about the benefits and the complex administrative requirements for receiving such benefits [27].

Senior citizens generally perceived that RHUs and BHSs provide low-quality health services. Diagnosis is weak, and doctors are seldom on site, resulting in repeat visits. Medicines and supplies are inferior and rarely available. Waiting time is long, schedules are very inconvenient, and facilities are rundown [31]. Because of this, bypassing primary care facilities and lower level hospitals is very common [28]. Results in this study showed that senior citizens have healthcare facility preference as a factor that hinders accessing and utilizing health services in the Leyte Province.

The unexpected revelation of the results of this study is the need for senior citizens to have someone who can help access and utilize healthcare services after the typhoon. The need for companionship may be the psychological impact of the typhoon. WHO estimates that, in humanitarian emergencies, the percentage of people suffering from depression or anxiety disorders can double from a baseline of 10% to about 20%, while the percentage of people with severe mental disorders can increase by up to 50% [32].

Predictors and Correlations of Variables Pre and Post-typhoon Yolanda

Women frequently use healthcare services at the end of life due to greater morbidity and disability [33-35]. Nevertheless, the frequent usage of health services by women is not a constant finding but partly depends the type of service. For instance, preventive and diagnostic services are more commonly used by women, whereas men frequently use emergency services [36]. Also, although women regularly visit a general practitioner more than men [37-44], there is no difference when it comes to hospital admissions [41]. Alternatively, men are hospitalized more frequently than women [45-47]. These reports are in agreement with the findings of this investigation that sex is a predictor of accessibility and utilization.

Education is a predisposing factor that has seen extensive research as a predictor of health services utilization, and the findings of this study are consistent with past literature [48-50]. Studies have shown that the association of the health literacy of rural elderly women (REW) and their healthcare access is significant, which is closely related to a lack of general education and lack of knowledge about health and healthcare among REW [54,55]. Schooling is a statistically significant determinant in REW's access to modern healthcare services (MHS). The REW with formal education are reportedly more likely to visit MHS early and regularly than women with no formal education in low, middle, and high-income countries [56, 57]. In contrast to all the statistics, education attainment among Filipino elderly women showed a weak positive relationship with the utilization of MHS (r = 0.152), with 66.78% having at least a high school level of education [58]. Utilization of MHS by REW increases with the knowledge about health and healthcare services [54,59].

As regards to occupation, results show that senior citizens with no jobs are less likely to access and utilize healthcare services. Higher-income families tend to have higher utilization levels of healthcare services because they can afford the cost. The average income of poor families in the Philippines is 3,460 pesos per month; not enough to comfortably cover all their monthly expenses [14]. In this study, a monthly income of less than five thousand was considered a predictor of accessibility and utilization before the typhoon.

Besides the direct cost of treatment and informal payments, there are also indirect costs that deter the poor from seeking treatment, such as the opportunity cost of time for both the patient and their companion, transportation costs, and expenses on food and lodging. These expenses culminate in undesired consequences, such as expenditure of household finances (catastrophic spending), borrowing money or selling assets (distress financing), all of which can lead to deeper poverty and longer-term debt [62-66].

The number of family members or family size also influenced accessibility and utilization both before and after the typhoon. The utilization of a healthcare facility is reportedly less among larger families because there are enough members with ample time to dedicate to the sick individuals at home, reducing the need to seek healthcare services [61]. Such a family also has less income per capita than a smaller family belonging to the same income level, which may also reduce a large family's level of healthcare service utilization.

Accordingly, the more distant a facility is from potential users, the less likely it is to be visited. This study showed that distance had a positive pre-typhoon correlation and a negative post-typhoon correlation with accessibility and usability. An inverse relationship between distance or travel time to health facilities and the use of health services has been demonstrated before as a significant barrier to access [60,68]. Good roads, often a rarity in the more impoverished areas in the Philippines, are required not only for people to go to health facilities but also for the smooth distribution of drugs and other supplies to health facilities, timely referrals in emergencies, and better supervision of health workers [69].

Philippine Behavioral Model of Accessibility to and Utilization of Healthcare Services for Senior Citizens in Rural Areas

According to Ronald M. Andersen and colleagues' Behavioral Model of Health Services Use, utilization is a function of senior citizens' predisposition to use services, factors that enable or impede use, and their need for care. The proposed untested local behavioral model supports this view.

Figure 1 shows the predisposing characteristics of senior citizens that prompt them to access and utilize healthcare services – age, sex, and education, with the enabling and need factors only showing those that have correlations with accessibility and utilization. Despite so many factors identified by literature under predisposing, enabling, and need elements, the proposed untested local model shows that only the factors below needed to be looked into in assessing the senior citizens' access and utilization of healthcare services at the nearest or preferred facility. The hope is that further studies would unveil the need for the other identified factors. If appropriate steps are taken to establish this putative model, it could yet be the first Philippines behavioral model of accessibility to and utilization of healthcare services. At this point, the deficient model provides a framework that can be replicated or modified based on specific healthcare system status, predisposing characteristics, enabling resources or need of any particular population or province. Nevertheless, as implied throughout, a mixed method study with a broader coverage is recommended to create a model representative of the national status of senior citizens in rural areas.

Conclusion

Three years post-typhoon, the level of accessibility and utilization of healthcare services had not changed. Financial barrier is the main factor perceived by the senior citizens that affects their accessibility and utilization of healthcare service both pre and post-typhoon. Need factors had a strong correlation with accessibility and utilization. Although attempts

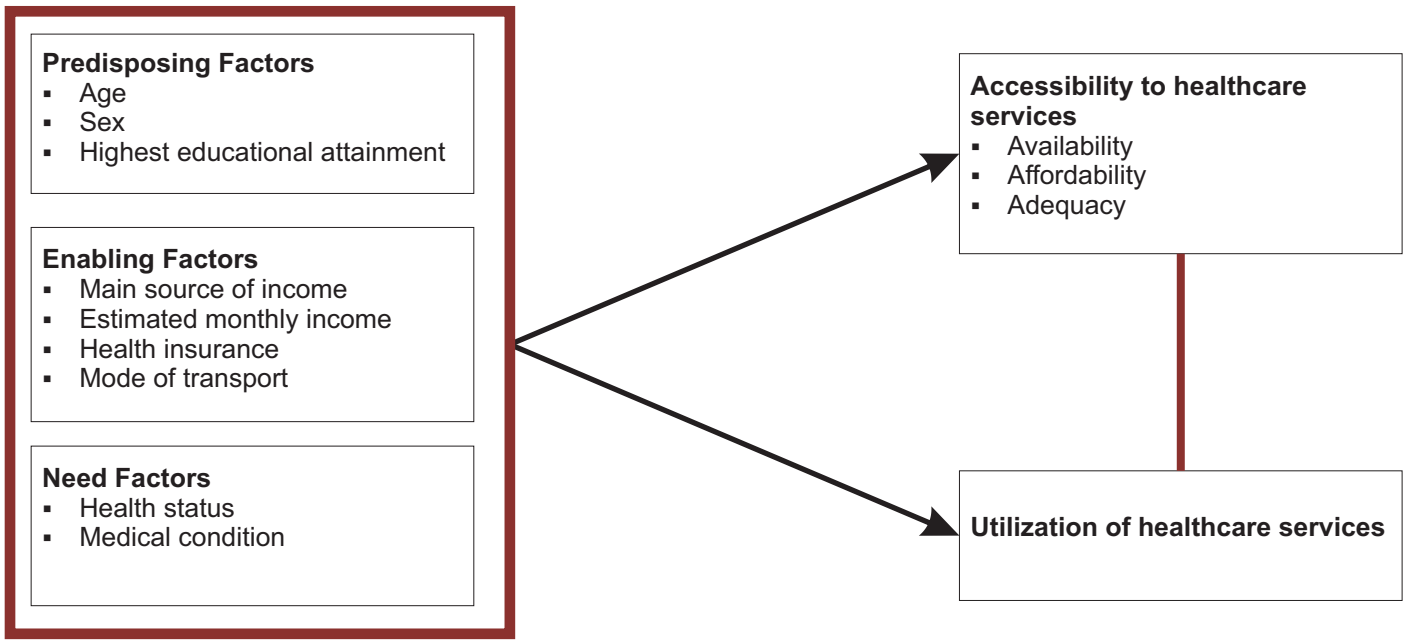

Figure 1. *Philippine Behavioral Model of Accessibility to and Utilization of Healthcare Services for Senior Citizens in Rural Areas*

have been made to remedy the difficulties faced by senior citizens in remote locations, there are still so many obstacles to receiving proper healthcare services. Therefore, the findings of this study, alongside the untested behavioral model, may yet prove useful to policymakers for future health planning and reform in improving the accessibility to and utilization of healthcare services among senior citizens in rural areas.

Declarations

Ethics Approval and Consent to Participate

Research for this work has been conducted in accordance with the Helsinki Declaration. Verbal Consent from respondents were obtained before the conduct of the study. No ethical approval was required from the university in the conduct of this study.

Availability of Data and Materials

The datasets analyzed during the current study are not publicly available because it might create a breach in participants' confidentiality but are available from the corresponding author on reasonable request.

Competing interests

The author has no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony, patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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