Developing a Susceptibility Index for Elderly Care Management in the Philippines: A Systems Perspective

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Abstract

As the longevity and population of older persons increase in many nations, a central question is whether this population aging will be accompanied by sustained or improved health, an improving quality of life, and sufficient social and economic resources. As such, this study aimed at determining an elderly care system that will bridge the gap between the rising needs of the Filipino elderly and the current systems and practices in the delivery of services to the aging population at the basic level – the family and at the institutional level – with local and national government agencies. The study developed a susceptibility index with indicator levels that would correspond to varying categories of elderly care needs determined by universal care policies, family demographics, health risks, and environments of specific target populations, the significance of the factors of which were statistically established from interview and survey results gathered from a representative metropolitan city. Additionally, the study included the bases for the development of a system application in the formulation of effective policies aimed at enhancing the health status, as well as the social and economic well-being, of elderly Filipinos. This model can be emulated at the provincial and regional levels in the country.

Keywords
Population Aging, Elderly Care System, Susceptibility Index,

1. Introduction

As the world's life expectancy is steadily increasing, so is the aging population, which means every country is experiencing growth in its population's older class (United Nations WPA, 2015). This development of the aging population directly impacts family caregivers' availability and the level of satisfaction of the elders' basic needs. (Tao & McRoy, 2015) The impact poses a challenge to the Philippine health care providers' ability to make sure that aging becomes a good experience overall for elders and that institutions that provide elderly care have an efficient structure. The pressing need for an inventive system to aid the elderly cope with their respective daily existences is raised because of this. (Wang & Sun, 2015)

In the Philippines, the elderly are being attended by their families more due to their constitution to care for its elderly members. However, the State may also do so through just programs of social security. In a study by Domingo & Casterline (1992), about 70% were found to co-reside with their immediate family. The addressing of the necessities of elders affects their condition of life. For the elders, the quality of life can be described as aging in place, which means seniors may remain to live in the community without the need to move away or be sent to residential care. (Davey, de Joux, Genesh & Arcus 2004). Successful aging is defined as the satisfaction of three factors: the minimal likelihood of illness and disability due to diseases, elevated intellectual capacity for physical functions, and dynamic engagement with life, as Kahn and Rowe (1997) stated. For this principle to be successfully met, accessibility to services and sites and connection to the living environment must be considered (Granbom, Iwarsson, Kylberg, Petterson, & Slaug, 2016).

Caring for the elderly involves the following: (1) self-care; (2) non-professional caregivers; (3) families; (4) home care aides; (5) professional caregivers; and (6) social workers. (Tao & McRoy, 2015) Hence, the responsibility of elderly quality living rests not only in the elders' hands but also on the family members and care networks. In these

care networks, most elders have resorted to self-care and dependence on their families as care networks. However, as the employment rate of the Filipinos in households increases (PSA, 2018) and the population density progresses with it (PSA, 2015), it is safe to say that Filipinos are getting busier as time passes. Hence, it leaves lesser time and effort expended on elderly care.

The research question for this paper is: What will bridge the gap between the rising needs of elders and the effectiveness of elderly care management? What will the elderly care system be appropriate to cover the aging population in the Philippines? To answer these inquiries, this paper aims to: assess the elderly care systems and practices in the Philippines, determine the significant factors affecting the delivery of elderly care services, and develop a Susceptibility Index that will be the basis of a system for effective delivery and conduct of elderly care management services in the Philippines.

This study's significance to the population is the establishment of a system that will enable members living alone to be connected to any care network available. This is also true to those with care networks from anywhere around the country. This study will also help improve the connectivity and involvement of the family members while being able to perform their daily responsibilities. Another way to support the elders is providing an environment that encourages active aging through using innovative technologies such as the development of a system.

2. Methodology

A conceptual framework shown in figure 1 was established to guide the researchers to answer this study's research question. The study started with assessing the drivers of elderly care management practices. The primary data came from the literature review available papers on elderly care. Another set of data were taken from the review of the government policies in the Philippines. An assessment and review of existing government policies for elders in Metro Manila were conducted to evaluate the impacts on the elderly and their environment. A set of interviews was also conducted to evaluate the implementation of the existing policies in the country. From these data, a risk assessment was conducted to produce an Elderly Susceptibility Index. The index provided the basis in developing an adequate provision of Elderly Care Management through a system that will enable effective elderly care management.
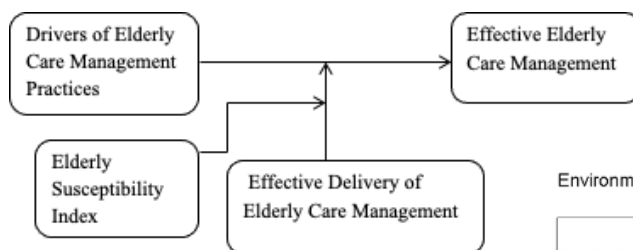

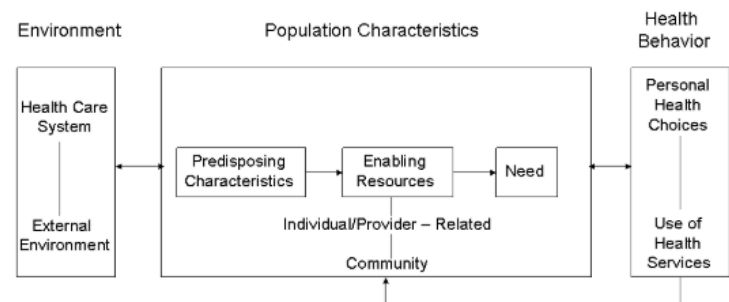Figure 1. Conceptual Framework

Figure 2. Andersen Model for Healthcare Utilization

For the secondary data that is not yet available, data gathering was performed through a survey. The Drivers of Elderly Care Management Practices were determined based on the Andersen Model shown in figure 2 above. The Andersen model was initially designed to explain health service use. However, this is now being used in the general review of the actual use of services among the elderly (Fu, Guo, Bai, & Wing Tak Chui, 2017).

The model shown in figure 3 includes three categories of factors such as predisposing characteristics, enabling factors and need factors and was also used for the hypothesis formulation of this study. Predisposing characteristics such as

age, gender, education, and marital status were discovered to be significant predictors based on previous studies. Enabling Factors such as financial condition, number of children, and care nnetworks including benefits from the government, all affect the choice in elderly care. Need Factors such as Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), as well as diseases, were also shown a substantial influence in previous studies. With these, the Pyschosocial Factors were determined. This became the developed adaptation of the Andersen Model. These factors included social relations, attitude and skill, and apparent control which refers to one's perception that affects his or her choices. In this study, the psychosocial factors considered are unmet care and self-image which were also examined in a study in China. (Fu, Guo, Bai, & Wing Tak Chui, 2017). The three components which were identified by Rowe and Kahn in 1997 as the basis of determining how effective an elderly care management system is are as follows: avoiding disease and disability, high cognitive and physical function, and engagement with life.

Factors of Elderly Care based on the Andersen Model:

Predisposing Characteristics
　　　Age
　　　Gender
　　　Educational Level
　　　Marital Status
　　　Location
Enabling Factors
　　Income
　　Number of Children
　　Care networks
　　Benefits from the government
　　being enjoyed
Need Factors
　　IADL
　　Health Status
Psychosocial Factors
　　Intergenerational Values
　　Self-Image
　　Unmet care service needs

Elderly Care Management System

Elderly Susceptibility Index

Effective Elderly Care Management KSFs:

Successful Aging through

Avoiding Disease and Disability
(No. of deaths/mortality)

High Cognitive and Physical Function
(No. of accidents)

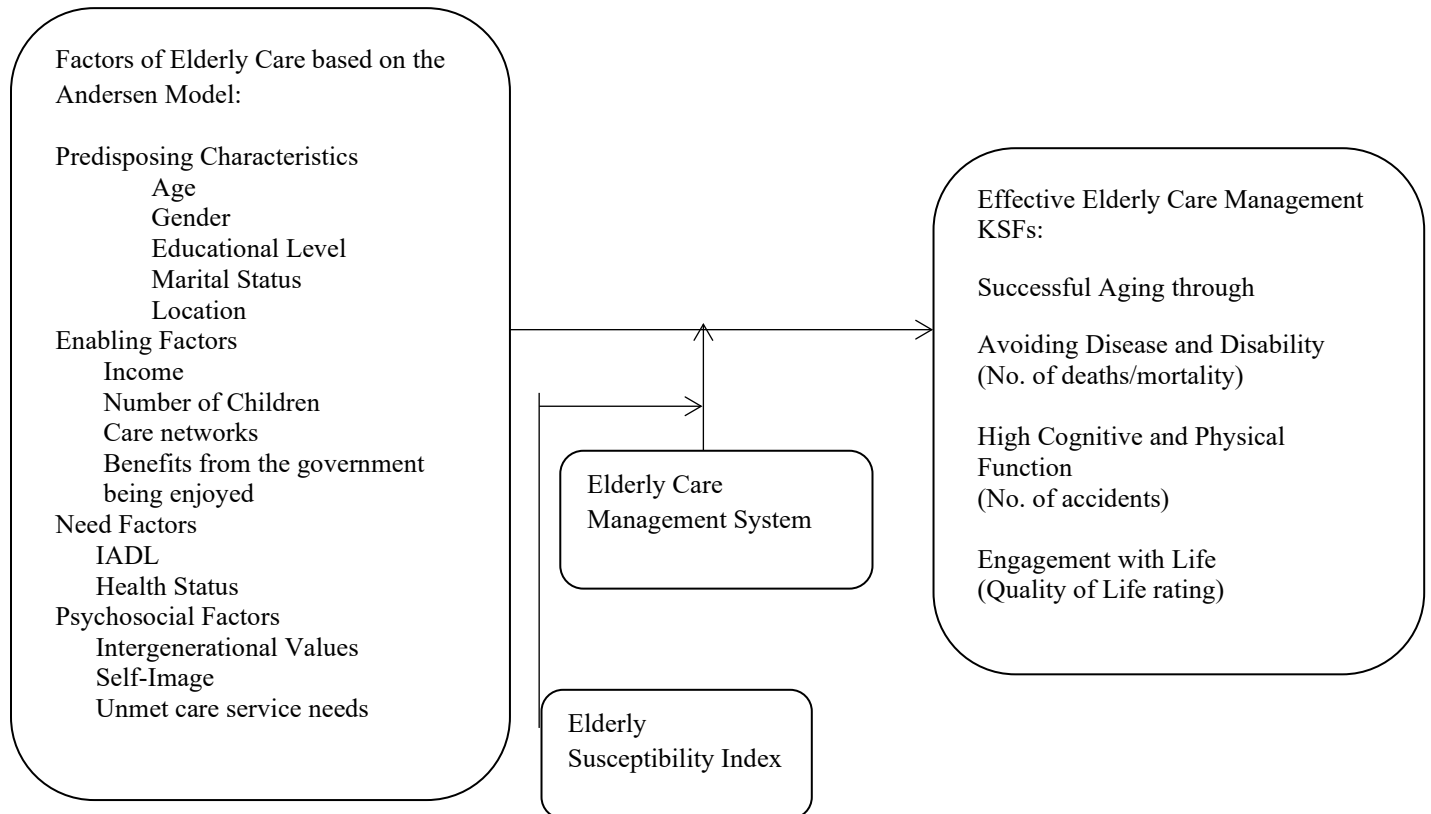Engagement with Life
(Quality of Life rating)

Figure 3. The factors considered in making the hypotheses for the study

The ANOVA was used in examining the hypotheses as stated:

H1o: The factors involved in elderly care have no significant influence on the effectiveness of elderly care management.
H1a: The factors involved in elderly care have a significant influence on the effectiveness of elderly care management.
H2o: The Elderly Care Management System has no significant influence on the effectiveness of elderly care management.
H2a: The Elderly Care Management System has a significant influence on the effectiveness of elderly care management.

Vulnerability for the elderly is has three aspects: human resources, material resources, and social resources. According to this, the best outcome for an individual or household requires high levels of all three resources. (Crooks, 2009). The susceptibility index was based on the conceptual framework and structure by Shi and Stevens, 2005. (Crooks, 2009).

Table 1. Conceptual framework of vulnerability

| DIMENSIONS	INDIVIDUAL LEVEL	ECOLOGICAL LEVEL
Predisposing attributes	Demographic characteristics such as age, gender, health status	Demographic composition, community characteristics, geographic location, political, legal and economic systems, cultural and social values and norms
Enabling attributes	Socioeconomic status, individual human capital assets, and mediating factors such as insurance, access to healthcare, formal social security protection	Income inequality, socioeconomic status of the community, median household income, level of education of population, unemployment rates, quality of the environment, accessibility of healthcare and other services
Need attributes	Illness, poverty, social abandonment, lack of income, homelessness	Community characteristics such as trends in health status and health disparities, health behaviors, mortality and morbidity trends, leading illnesses, ageism and age discrimination
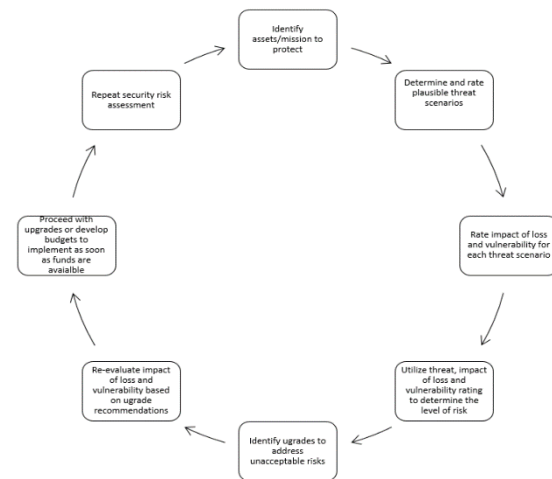
Figure 4. Flowchart Depicting the Basic Risk
Assessment Process

Since there is limited study available on this, the weight was distributed equally with W=.33 for all variables. (Crooks, 2009) Meanwhile, V1 is the average score of the predisposing attributes, V2 is the average score of enabling attributes, and V3 is the average score of need attributes. In this paper, the flowchart as shown in figure 4, depicting the basic risk assessment process as in the study by Renfroe & Smith was applied.

For the mobile application, in order to determine the needs and restrictions of the elderly, the researcher also conducted an accessibility test. An android phone with minimum requirements was used to assess the following factors as referred to the study by Goumopoulos, Papa, and Stavrianos in 2017: text readability, simple layout structure, sharp contrast between background and font color, information accessibility, minimized text input, and continuous assistance. The system development was based on the principles of human-centered design (HCD) (Goumopoulos, Papa, and Stavrianos, 2017)

Aside from the mobile application design, the system includes the suggested improvements on policies and care networks processes, including the role of care networks in maximizing elderly care. The output of this study is a formal system that will provide access and continuity of elderly care, and to enable the majority of elderly to have a successful ageing while remaining at home. The system will bridge the gap between the elders, the care networks, the government and the elder's needs in Metro Manila. This study is beneficial to the community not only to the elders and their care networks, but coordination can also be performed with the government to assist senior citizens further and provide a pool of accredited professionals that will enhance the current situation. This study will not only help elders but also People with Disabilities (PWDs).

3. Results and Discussion

The first objective is to assess the elderly care, the current living situation of senior citizens in different types of dwellings, existing policies and practices in the Philippines. The mode of data gathering is through a series of surveys and interviews with different senior citizens all over the Metro. Part of the survey was to assess the existing policies and practices in the Philippines. From those being surveyed, a random sample consisting of 10 senior citizens were interviewed.

The summary of the impact of the provisions on the elders shows that most of the respondents reported to be either familiar with or experiencing the implementation of the different policies of the country. The respondents were familiar with all the pertinent laws but the implementation and reach needs improvement. As also shown in the survey responses, different respondents experienced various effects of these policies but most reported to enjoy less than half of all these policies. The privilege that most of them reported to enjoy are the priorities in establishments, discounts, and well as free movies. This adds to the enjoyment and daily activities they look forward to. Most noted the need to improve the implementation of the policies, most especially when it came to the free health services, as health is one

of the top priorities for the respondents. These recommendations also came up in the discussion on ways to improve their quality of life: maintenance medicines, more health benefits, and financial support for senior citizens, free medical services, additional social programs, buildings/establishments that are more PWD-friendly, enhanced transport system, strict implementation of traffic etiquette and discipline enforcement among drivers creation of opportunities to senior citizens to be hired as contractual employees in different business establishments, universal benefits all over the country, and unified ID system in a mobile application.

Based on all the surveys and interviews, the respondents were either living with their spouses, members of the families, or helpers. Some of them were also living alone. This means that a majority of Filipino senior citizens, especially in Metro Manila, ought to age with (1) self-care (2) families, and (3) home care aides, instead of joining a pool of professional services or getting professional caregivers. Most respondents have agreed that the quality of life that they are getting from family members, independence acquired at a young age, and availability of funds are the factors that affect their decision on what type of care network they wish to have during their aging process. 23% of the respondents reported to live alone. Daily living costs are taken from the pension they get from the government. Others depend on immediate family members sending them monthly allowances to live on. According to the respondents, it is hard to live alone as different diseases and disabilities come with age, but they have no choice but to grow accustomed to it as they have to face this reality of living alone. 60% of the respondents are being taken care of by their family members. Families were categorized as (1) spouse, (2) children, and (3) grandchildren. Most are being taken care of by their spouses, a few by their children and grandchildren. The respondents are comfortable with their living situation and are generally contented with their quality of life. Aides or helpers are also part of the care networks of senior citizens in the Philippines. Some of the elders retained their helpers from over the years as most of their family members have moved out of their homes and lived nearby or migrated to another city or country. With these data, it can be inferred that there is a great need to improve the elderly care system in the Philippines.

To address the next objective of determining the significant factors affecting the delivery of elderly care services, the rest of the survey answers were plotted and processed using IBM SPSS® software platform & Minitab® 17.1.0. Pearson correlation tests were conducted for the dependent factors to assess if they are independent from one another in order to not cause redundancy in the results as factors with significant impact were to be considered in the susceptibility index.

As the subfactors for Health such as Overall Health Status, Eyesight, Sense of Hearing, Sense of Smell and Oral are all significantly correlated as seen through the Pearson Correlation test, we take them into account as one dependent variable falling into health. Table 2 represents the of p-values for factors and elderly management KSFs using MANOVA & ANOVA.

Table 2. Summary of MANOVA and ANOVA

Factor	Response	P-value	Conclusion
Age	Health	0.000…	Age has a significant impact on the health performance of the elderly.
Age	Quality of Life	0.000…	Age has a significant impact on the quality of life of the elderly.
Age	Health Problems	0.046	Age has a significant impact on the health problems of the elderly.
Age	Chronic Illness	0.049	Age has a significant impact on the chronic illness of the elderly.
Age	Disabilities	0.008	Age has a significant impact on the disabilities of the elderly.
Age	Helper	0.017	Age has a significant impact on the helper needs of the elderly.
Gender	Health	0.000…	Gender has a significant impact on the health status of the elderly.
Religion	Health	0.000…	Religion has a significant impact on the health status of the elderly.
Dwelling	Health	0.000…	Dwelling has a significant impact on the health status of the elderly.
Type of Dwelling	Health	0.000…	Type of Dwelling has a significant impact on the health status of the elderly.
Marital Status	Health	0.000…	Marital Status has a significant impact on the health status of the elderly.

Employment	Health	0.000…	Employment has a significant impact on the health status of the elderly.
Pension	Health	0.000…	Pension has a significant impact on the health status of the elderly.
Educational Attainment	Health	0.000…	Educational Attainment has a significant impact on the health status of the elderly.
Income	Health	0.000…	Income has a significant impact on the health status of the elderly.
Number of Children	Health	0.000…	Number of Children has a significant impact on the health status of the elderly.
Gender	Quality of Life	0.000…	Gender has a significant impact on the quality of life of the elderly.
Religion	Quality of Life	0.000…	Religion has a significant impact on the quality of life of the elderly.
Dwelling	Quality of Life	0.000…	Dwelling has a significant impact on the quality of life of the elderly.
Type of Dwelling	Quality of Life	0.000…	Type of Dwelling has a significant impact on the quality of life of the elderly.
Marital Status	Quality of Life	0.000…	Marital Status has a significant impact on the quality of life of the elderly.
Employment	Quality of Life	0.000…	Employment has a significant impact on the quality of life of the elderly.
Pension	Quality of Life	0.000…	Pension has a significant impact on the quality of life of the elderly.
Educational Attainment	Quality of Life	0.000…	Educational Attainment has a significant impact on the quality of life of the elderly.
Income	Quality of Life	0.000…	Income has a significant impact on the quality of life of the elderly.
Number of Children	Quality of Life	0.000…	Number of Children has a significant impact on the quality of life of the elderly.
Gender	Health Problems	0.083	Gender has no significant impact on the health problems of the elderly.
Religion	Health Problems	0.175	Religion has no significant impact on the health problems of the elderly.
Dwelling	Health Problems	0.000…	Dwelling has a significant impact on the health problems of the elderly.
Type of Dwelling	Health Problems	0.000…	Type of Dwelling has a significant impact on the health problems of the elderly.
Marital Status	Health Problems	0.166	Marital Status has no significant impact on the health problems of the elderly.
Employment	Health Problems	0.015	Employment has a significant impact on the health problems of the elderly.
Pension	Health Problems	0.129	Pension has no significant impact on the health problems of the elderly.
Educational Attainment	Health Problems	0.743	Educational Attainment has no significant impact on the health problems of the elderly.
Income	Health Problems	0.000…	Income has a significant impact on the health problems of the elderly.
Number of Children	Health Problems	0.055	Number of Children has a significant impact on the health problems of the elderly.
Gender	Chronic Illness	0.168	Gender has no significant impact on the chronic illnesses of the elderly.
Religion	Chronic Illness	0.488	Religion has no significant impact on the chronic illnesses of the elderly.
Dwelling	Chronic Illness	0.038	Dwelling has a significant impact on the chronic illnesses of the elderly.
Type of Dwelling	Chronic Illness	0.002	Type of Dwelling has a significant impact on the chronic illnesses of the elderly.
Marital Status	Chronic Illness	0.003	Marital Status has a significant impact on the chronic illnesses of the elderly.
Employment	Chronic Illness	0.000…	Employment has a significant impact on the chronic illnesses of the elderly.
Pension	Chronic Illness	0.027	Pension has a significant impact on the chronic illnesses of the elderly.

Educational Attainment	Chronic Illness	0.38	Educational Attainment has no significant impact on the chronic illnesses of the elderly.
Income	Chronic Illness	0.418	Income has no significant impact on the chronic illnesses of the elderly.
Number of Children	Chronic Illness	0.537	Number of Children has no significant impact on the chronic illnesses of the elderly.
Gender	Disabilities	0.094	Gender has no significant impact on the disabilities of the elderly.
Religion	Disabilities	0.016	Religion has a significant impact on the disabilities of the elderly.
Dwelling	Disabilities	0.000…	Dwelling has a significant impact on the disabilities of the elderly.
Type of Dwelling	Disabilities	0.151	Type of Dwelling has no significant impact on the disabilities of the elderly.
Marital Status	Disabilities	0.000…	Marital Status has a significant impact on the disabilities of the elderly.
Employment	Disabilities	0.225	Employment has no significant impact on the disabilities of the elderly.
Pension	Disabilities	0.178	Pension has no significant impact on the disabilities of the elderly.
Educational Attainment	Disabilities	0.85	Educational Attainment has no significant impact on the disabilities of the elderly.
Income	Disabilities	0.679	Income has no significant impact on the disabilities of the elderly.
Number of Children	Disabilities	0.6	Number of Children has no significant impact on the disabilities of the elderly.
Helper/Care Network	Health	0.000…	Type of care network has a significant impact on the health of the elderly.
Helper/Care Network	Quality of Life	0.000…	Type of care network has a significant impact on the quality of life of the elderly.
Helper/Care Network	Health Problems	0.016	Type of care network has a significant impact on the health problems of the elderly.
Helper/Care Network	Chronic Illness	0.415	Type of care network has no significant impact on the chronic illnesses of the elderly.
Helper/Care Network	Disabilities	0.779	Type of care network has no significant impact on the disabilities of the elderly.

Table 3 shows a summary of the significance of each factor based on its p-value, and whether a particular conclusion were to be accepted or rejected based on such significance.

Table 3. Acceptance of Factors

Factor	Interpretation	Conclusion
Age	All p-values were below .05; based on this, it can be interpreted that age has a significant impact on the KSFs of elderly management.	Accepted
Gender	4 out of 5 p-values were above .05 which means that gender has a small impact on the KSFs of elderly management.	Not accepted
Religion	2 out of 5 p values were below .05 which means it cannot be fully accepted that this factor has a significant effect on elderly management.	Not accepted
Dwelling/Ownership	All p values were below .05, which means that the status of dwelling (whether owned or others) can have a significant impact on the KSFs of elderly management.	Accepted
Type of Dwelling	2 out of 5 p-values were above .05, based on which it can be said that the type of dwelling has a moderate impact on the KSFs of elderly management	Not Accepted
Marital Status	All p values are below .05 which means that the status of dwelling (whether owned or others) has a significant impact on the KSFs of elderly management	Accepted
Employment	All p-values were below .05 which means it can be said that employment has a significant impact on the KSFs of elderly management	Accepted
Pension	All p-values were below .05, based on which it can be said that pension has a significant impact on the KSF's of elderly management	Accepted
Educational attainment	2 out of 5 p values were below .05, which means it cannot be fully accepted that this factor has a significant effect on elderly management	Not accepted

Income	All p-values were below .05, based on which it can be said that income has a significant impact on the KSFs of elderly management	Accepted
Number of Children	2 out of 5 p values were below .05 which means it cannot be fully accepted that this factor has a significant effect on elderly management	Not accepted
Helper/Care Network	2 out of 5 p values are below .05 which means it cannot be fully accepted that this factor has a significant effect on elderly management	Not accepted
Disability	All p values are below .05 which means that disabilities have a significant impact on the KSFs of elderly management	Accepted
Chronic Illness	All p values are below .05 which means that chronic illness has a significant impact on the KSFs of elderly management	Accepted
Accidents experienced in the past month	All p values are below .05 which means that the number of accidents experienced in the past month has a significant impact on the KSFs of elderly management	Accepted

The Principal Components Analysis (PCA) procedure was used to determine the factors that were to be included in the index. As the factors have different units of measurement, these were standardized. Standardization transformed the raw variable scores into z-scores where the actual value was the score on each variable. With this procedure, the indicators were converted to a normal scale with an average of 0 and a standard deviation of 1 (Bernard, 2006). From the variables determined in the susceptibility index, risk assessment was done in order to explore the threats that each variable presents and how one copes with its impact. A random sample of 20 respondents from the 385 respondents were interviewed for their input on the risk assessment for elderlies. The susceptibility criteria with the lower z-score resulted in the pathway showing the exposure, threats, coping and outcome for each criterion.

After assessing the elderly care systems and practices in the Philippines as well as determining the significant factors affecting the delivery of elderly care services including the risk assessment and susceptibility index, the development of system for effective delivery and conduct of elderly care management services in the Philippines was developed. Included in the survey are the services that can improve elderly care. There were 15 respondents from the sample that participated in this assessment. Figure 4 represents the result of the survey for the proposed features.
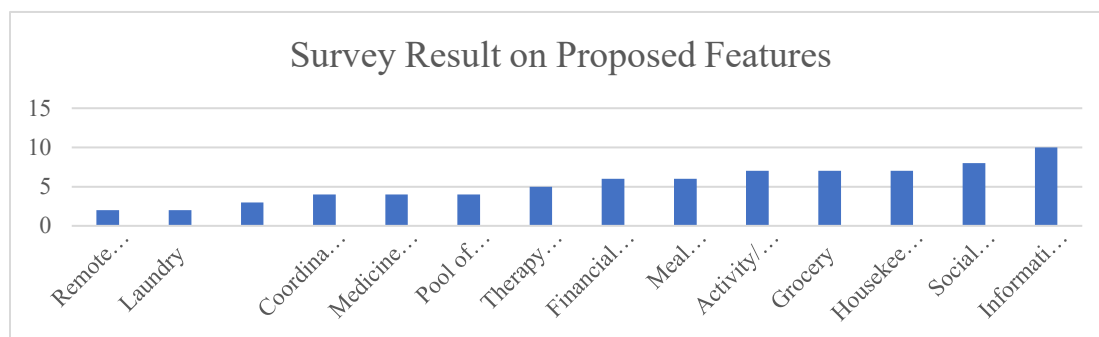

Figure 4. Survey Result on Proposed Features of Elderly Care Management System

In order to determine the hierarchy of features accurately, AHP was done to generate the ranking. Table 5 represents the AHP of the proposed system features. As the ranking shows, grocery shopping, housekeeping, activity/medicine reminder, pool of other professional assistance, maintenance, meal preparation, and therapy services were to be prioritized in the system that was to be used in creating an application. Due to the restriction in time and resources, the simulation to determine the user interface of the application was no longer performed. However, a system was still developed for the effective delivery and conduct of elderly care management services in the Philippines. Programs can further be formulated by the government to address the vulnerability per index basing on the risk assessment. Table 4 represents the programs for each susceptibility criterion.

Table 4. AHP of the Proposed System Features

	Improve health	Improve quality of life	Address health problems	Address chronic illness	Assist with disabilities	Help avoid accidents	AVE	RANK
Remote Physical Monitoring	0.10	0.05	0.19	0.26	0.58	0.81	0.33	11

Laundry		0.05			0.58	0.81	0.48	9
Maintenance		0.08			0.87	1.21	0.72	5
Coordination with care networks	0.21	0.10			1.16		0.49	8
Medicine delivery	0.21	0.10	0.39	0.53	1.16		0.48	10
Pool of other professional assistance		0.10			1.16	1.61	0.96	4
Therapy services		0.13	0.49		1.45		0.69	7
Financial management		0.15					0.15	14
Meal preparation	0.31	0.15	0.58		1.74		0.70	6
Activity/medicine reminder	0.36	0.18	0.68	0.92		2.83	0.99	3
Grocery shopping		0.18			2.03	2.83	1.68	1
Housekeeping		0.18	0.68	0.92	2.03	2.83	1.33	2
Social networking		0.21					0.21	13
Information sharing		0.26					0.26	12

Table 5. Programs for Each Susceptibility Criterion

Susceptibility Criteria	Programs
71 and above	Provide programs that will ensure older people would not live alone Increasing benefits as age increases
Single	Ensure elderly would not live alone Create programs and social activities that would enable the elderly to socialize More leisure opportunities for the elderly with funding from the government
Not owned	Home ownership schemes for the elderly Grant privileges and considerations for senior citizens with no permanent dwelling
Unemployed	Open opportunities such as contractual jobs for able senior citizens Increase funds that are distributed to the elderly Consider implementing a policy that caters to the employment of the elderly
No pension	Increase pension, must be available to all who has reached 60 years of age
<P10,000 income per month	Job opportunities for senior citizen allocation of government funds for the basic needs of elderly
With one or more disability	Mobile application connecting to different service providers More facilities that cater to disabled elderlies, strengthening of PWD/ssenior ccitizens'' privileges
With one or more illnesses	Stronger healthcare system and policies Government allocation for health funds to provide more free medical services as well as medicines for the elderly More health programs in general so that negative health effects would decrease by the time an individual has aged
With one or more accidents in the past month	Strengthening of privileges for the elderly PWD/Senior citizen friendly public places Proper implementation of road traffic rules Accident prevention awareness and seminars

4. Conclusion

The quality of life greatly impacts the health as well as the other KSFs for effective elderly management. This study has confirmed that age, dwelling, marital status, employment, pension, income greatly impact the quality of life and

health of the elderly. This study has also raised awareness regarding the needs of the senior citizens to have an improvement in their health and quality of life, address their health problems and chronic illnesses, assist them with their disabilities, and help them avoid accidents. ANOVA, MANOVA, and Pearson Correlation were effective tools in determining the impact between the factors involved. The Susceptibility Index served a useful tool in evaluating the current situation of the elderly and their susceptibility to their environment. Through this, areas of weaknesses can be easily identified. This facilitates the development of appropriate measures to address these problem areas. AHP is an operative tool that assisted this study in choosing what will be included in the proposed system and which services can greatly improve the overall living situation of senior citizens not only in the Metro but in the whole Philippines. With the results of this study, application developers may be able to customize and create plans and categories in the application that can cater to certain groups of elderly. Based on the results of the study, there is a need for policies that target specific population segments, in addition to the existing universal policies.

This revealed that an effective elderly management system should include grocery shopping, housekeeping, activity/medicine reminder, pool of other professional assistance, maintenance, meal preparation and therapy services aside from the government policies, susceptibility index & care networks which can enhance their overall quality of life. To further enhance the policies, aside from strict implementation, policymakers should also consider the following: maintenance medicines, more health benefits, and financial support for senior citizens, free medical services, additional social programs, buildings/establishments that are more PWD-friendly, enhanced transport system, strict implementation of traffic etiquette and enforcement of discipline among drivers, creation of opportunities to senior citizens to be hired as contractual employees in different business establishments, universal benefits all over the country, and unified ID System in a mobile application. This system can be the basis of an application that can incorporate all these components that will be accessible to senior citizens all over the Philippines at their fingertips.

5. Recommendations

The following are recommended for further studies:

1. An improved index can be explored that may assess the weakness at the individual or community level. As the susceptibility index has limitations due to its quantitative nature, qualitative methods can be explored.
2. A better mobile application can be conceptualized such that its design will include the suggested improvements on policies and care networks processes including the role of care networks to maximize elderly care. The formal system will be able to provide access and continuity of elderly care, and to enable the majority of elderly to have a successful ageing while remaining at home. Testing of user interface cited in this study can be continued as this was not included due to the lack of time and resources of the researcher.
3. Different care networks aside from self-care, family, and aides can be explored to provide input on the elderly system in the Philippines. Other areas in the Philippines can be explored to further expand the basis of the susceptibility index.
4. As different classes or categories of the elderly were not considered in this study, it is recommended to explore these different classes to be included into the susceptibility index.

In closing, another study can be initiated to look into how policymakers can improve the implementation of laws and policies for senior citizens and create corresponding programs in connection with the existing ones to address their deficiencies and points for improvement mentioned by the respondents.

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