Prevalence and Predictors of Food Insecurity in Urban Poor Fishery Households in Vietnam: A Cross-sectional Study

Nguyen Hoang My Thuyen, Noppawan Piaseu,* Sirirat Leelacharas, Viroj Tangcharoensathien

Abstract: Food insecurity is a significant public health problem in Vietnam, and accompanied by poverty results in poor health and nutrition, particularly in vulnerable populations. Urban poor fishery households in coastal cities of Vietnam are striving for a living and are vulnerable to food insecurity. Guided by Bronfenbrenner's Bioecological Theory, this cross-sectional study aimed to determine the prevalence of household food insecurity and identify multi-system factors predicting food insecurity in Vietnam's urban poor fishery households. Through stratified random sampling, 420 eligible households from the two largest cities of a province in South Central Coastal Vietnam were recruited then responded to the structure questionnaires including the Food Insecurity Experience Scale, the Perceived Natural Disaster Influence instrument, the Chronic Health Condition form, the Social Network tool, the modified Social Support Questionnaire, the Short Food Literacy Questionnaire, and a scale of Transportation Quality, Access and Availability Assessment.

Results revealed that 36.2% of the households had food insecurity. A multivariate logistic regression analysis found that overall food literacy, homeownership, number of social networks, and family support together significantly predicted household food insecurity. Before developing a program promoting household food security, the role of food literacy needed to be examined in an age-specific population. The findings suggest approaches to enhance household food security through strengthening social welfare, social networks and family support.

Introduction

Food insecurity (FI) is a global problem. The 2009 World Summit defined that "Food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food, which meets their dietary needs and

Nguyen Hoang My Thuyen, RN, PhD (Candidate), Faculty of Medicine Ramathibodi Hospital and Faculty of Nursing, Mahidol University, Thailand. Faculty of Nursing, Khanh Hoa Medical College, Khanh Hoa province, Vietnam. E-mail: thuyen268@yahoo.com
***Correspondence to: Noppawan Piaseu,** * RN, PhD, Associate Professor, Ramathibodi School of Nursing, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand. E-mail: noppawan.pia@mahidol.ac.th*
***Sirirat Leelacharus**, RN, PhD, Assistant Professor, Ramathibodi School of Nursing, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand. E-mail: sirirat.lee@mahidol.edu*
***Viroj Tangcharoensathien**, MD, PhD. (Health Planning, Financing and Economics), International Health Policy Program, Ministry of Public Health, Thailand. E-mail: viroj@ihpp.thaigov.net*

food preferences for an active and healthy life."[1(p.16)] Thus, FI is insufficiency in the quality and quantity of food[2] and an inadequate ability to access safe and nutritious food for an active and healthy life, normalizing growth and development.[3]

FI is deeply linked with poverty, causing health consequences due to hunger and malnutrition.[2] About 2 billion people globally experience FI, and >820 million experience hunger, negatively affecting the Sustainable Development Goals achievement of zero hunger.[2] FI affects 134 million people in Southeastern Asia.[2,4] Nationally in Vietnam, the prevalence of FI was 14.5% in the whole country,[4] whereas 40% FI was reported in a survey of over 40 communities in 4 provinces[5] and 34.4% in Ho Chi Minh city, the largest southern city.[6] Although the country had a gross domestic product growth >6% and the poverty rate remarkably decreased from 20.8% in 2010 to 9.8 in 2016, FI still exists, particularly in poor households,[7,8] causing underachievement of social and health goals.[2]

Poverty and FI situations are worse in congested communities of Vietnam,[2,9] mainly in urban poor fishery households (UPFHs) in central coastal areas. Despite their contribution to lowering the risk of FI through fishery jobs, the fisher people can only do inshore fishing with their small engine boats. Their significant challenges include natural disasters with frequent storms damaging houses and fishing equipment adding to job insecurity and inadequate incomes.[7] The fish and other seafood they catch are all sold, so natural disasters put poor households at risk of FI.[7] Food insufficiency status has been reported in Vietnam's central coastal area where the fishery sector prevails.[7] Hence, households with hunger or at risk of FI in this area need to be investigated urgently. There may be different impacts and risk factors that aggravate the critical situation of FI. Thus, identifying the prevalence of household food insecurity (HFI) and multiple level factors affecting this is necessary for leaders to understand before seeking practical solutions to reduce or eliminate FI.

Despite the above, nationwide studies identifying prevalence and factors affecting FI among Vietnamese UPFHs are scarce. Besides, a gap of experiential approaches did not reflect the actual context of the country FI, a complicated phenomenon. There is no overview of health and welfare organizations developing social networks or implementing food assistance plans to support this vulnerable population in the national level response. Thus, guided by the Process–Person–Context–Time (PPCT) Model,[10] this study was undertaken to describe HFI prevalence and determine multi–system level factors predicting HFI among the UPFHs in the coastal province, Vietnam. This was done through the perceptions of households' food providers to initiate policies and strategic improvements in a specific field of FI to effect health and nutritional improvement of the vulnerable population.

Conceptual Framework and Literature Review

Bronfenbrenner's PPCT model,[10] was expanded from his Bioecological Model to provide a comprehensive framework to examine multi–system of influencing risks on FI in UPFHs. The PPCT model focuses on proximal processes as engines of development which are progressively complex interactions between a person and his/her environment, rather than focusing on the environment previously described.[10] HFI are induced from the interactive process among the person, households and the larger environment to which they belong.[11] In the PPCT model, "Person" is at the center of the ecological system and interacts with layers of the systems. Specifically, it refers to the individual's biological conditions/perceptions directly influencing households; "Process" is interrelations between individual and others; "Context" represents specific conditions occurring in a hierarchical frame of micro–, meso–, exo– and macro–system context; while "Time" expresses activities and surrounding influences over time.

Thus, this study emphasizes the influencing factors at multi-system levels, including the macro-micro-, meso- and exo-system levels. The macro-system level is the beliefs, traditions, cultures, the social and national policy associated with households and time dimensions beyond the study scope. The micro-level context factors represent the immediate environment directly impacting individuals and their households (household structure,[12] household size,[12,13] number of children,[14] household income,[15-17] homeownership[15,18]). Individual factors within micro-level context are age,[13,19,20] gender,[19,20] marital status,[19] educational attainment,[12,15,20-22] employment status,[12,15,19-21] food literacy,[23,24] self-perceived chronic health condition,[9,20] perceived influences of natural disasters[13] as a bioecological resource affecting HFI. Food literacy refers to a person's ability to access and understand food-related information to appraise, communicate and make decisions in different health circumstances towards optimal health. Food literacy consists of three components: functional food literacy, a capability to access and understand food information and compose a balanced menu for good health; interactive food literacy, a capability to interpret, evaluate and exchange food information to others for good health; and critical food literacy, a capability to critically analyze food information to make decisions about healthy food selection. The meso-level context factors refer to interactions of different settings, including social support,[14,16,25,26] and social networks[17,19] which influence HFI. Social support refers to emotional, instrumental, and informational assistance from family/relatives, friends/neighbors or significant others. A social network represents a chain of individuals and their connection measured through size, proximity, frequency of contact, and social network quality that contribute to HFI management. Finally, the exo-level context factors involve transportation availability, access and quality as external environment affecting HFI.[17,19]

Study Aim

To investigate the prevalence of HFI and the bioecological factors predicting HFI among UPFHs in Vietnam. The bioecological factors include the micro-level factors (household structure, household size, number of children, household income, homeownership), the individual factors (age, gender, marital status, educational attainment, employment status, food literacy, perceived chronic health condition, perceived influences of natural disasters), the meso-level factors (social support and social network) and the exo-level factors (transportation availability, access and quality).

Methods

Research design: A cross-sectional design was used. This report followed STROBE Statement − Checklist of items that should be included in reports of cross-sectional studies.

Study settings and participants: The study settings were the two biggest coastal cities of the province located in South Central Coastal Vietnam with an urban population of 514,700 (41.8%) and a remarkable number of 15,035 poor households (4.95%).[27] Through stratified random with proportional sampling, 12 out of 39 wards in two cities were recruited representing 7 strata (3 strata stratified from the first selected city and 4 strata from the second) based on geographical areas. Each stratum included adjacent wards with homogeneous geographical and economic characteristics. Strata were heterogeneous with each other. Twelve different lists of UPFHs were collected from 12 lists of poor households provided by the corresponding wards' governments. The probability proportional to population size (PPS) method and simple random sampling were used to achieve the estimated eligible UPFHs. UPFHs living there ≥5 years and meeting either of the following monthly per capita income criteria were recruited: 1) ≤ 900,000 VND, 2) >900,000 (39.1 USD) and 3) ≤ 1,300,000

VND (56.5 USD), along with at least 3 out of 10 indicators for urban poor households including adult education level, children's education, access to health service, health insurance, housing quality, floor area per capita, tap water supply, type of toilet/latrine, telecommunication service, and asset serving information access.[28]

Subsequently, participants as household representatives who met all inclusion criteria were recruited: 1) male or female adults, aged ≥18 years, 2) food providers mainly responsible for their household food preparation and cooking, 3) able to verbally communicate in Vietnamese, and 4) ambulatory without mental disorder or cognitive impairment as screened by the 6-item Cognitive Impairment Test (Score ≤ 7).[29] The sample size was determined by G*Power using an effect size of 1.297 from previous studies,[6,19,20] α = .05, power = .8, and probability of FI at 34.4%[6] obtaining a sample of 417. The final sample size was 420.

Ethical Considerations: This study was approved by the Institutional Review Board, Faculty of Medicine Ramathibodi Hospital (COA.No.MURA2019/237) and local governments of the twelve wards' of two cities of the province in Vietnam. All participants were fully informed about the study and their rights protected throughout. Written consents were obtained before data collection.

Measures: Nine instruments were used, and where relevant permission was given for use by the original authors. They were translated from English to Vietnamese and back-translated following Sousa and Rojjanasrirat's guidelines. Five experts in nutrition, nursing and public health reviewed the content using the Content Validity Index (CVI), the relevance of the scale and item-objective content and appropriateness in language, culture and context.[31] In this study, all of the instruments were validated, resulting in good CVIs of 1.0 for all scales. Reliability was pilot-tested among 30 participants.

The researchers developed *a demographic data questionnaire*, asking personal data (gender, age, highest educational attainment, current marital status and employment) and household data, including monthly income, household size and structure, number of children, and homeownership.

The 6-item Cognitive Impairment Test (6-CIT), an abbreviated version of the 26-item Blessed Information-Memory Concentration Scale developed initially by Katzman in 1983, was used for cognitive screening, consisting of three domains with six items measuring individual's temporal orientation, attention, and short-term memory.[29] A score >7 indicated cognitive impairment. High sensitivity (.90) and specificity (.96) were reported.

The 8-item Food Insecurity Experience Scale (FIES),[2] a version referenced for the household level, was used to measure HFI experiences during the last 12 months. It is a global standard scale; hence the severity, thresholds, and prevalence rate of FI are all equivalent across countries.[19] Responses are scored as "1" if affirmative and "0" if negative/refuse to answer/ do not know. An item example is, "Was there a time when you or others in your household ate less than you thought you should because of a lack of money or another resource?" Following FI thresholds defined in the literature,[19,32] interpretation was classified into three categories based on the total score of: food secure (0-3), moderate HFI (4-6), and (3) severe HFI (7-8). A sum of moderate and severe HFI yielded a prevalence of HFI. The KR-20 tool evidenced internal consistency, .83 in the pilot test and .84 in the main study.

The 12-item Short Food Literacy Questionnaire for adults (SFLQ) developed by Krause et al.[24] was employed to assess food literacy as a continuous variable, and includes three subscales: functional (6 items), interactive (2 items), and critical food literacy (4 items), for which the word "Swiss" in items 3, 4 and 5 were switched to "Vietnamese" such as "the Swiss Food Pyramid" to "the Vietnamese Food Pyramid" to respond the study context. An example question was, "How familiar are you with the Vietnamese Food Pyramid?" Responses are given based on sets of questions giving a total score ranging from 7-72. A higher score

indicates higher food literacy. Initially, the construct validity was appropriate.[24] Internal consistency with a Cronbach's alpha of .82 in the pilot test and .85 in the actual study.

The researchers designed the *Self-reported Form of Chronic Health Conditions* (SRCHC) based on the Chronic Health Condition Index by Hanson and Olso.[33] One point was added to the index if a respondent reported acquiring one of the chronic health conditions. The interpretation was categorized into no chronic health condition, lower (≤ 2 chronic health conditions) and high chronic health condition (≥ 3 chronic health conditions).[33]

The researchers also developed the *2-item self-reported form of Perceived Natural Disaster Influence* (SRPNDI) to assess perceived natural disaster influence, a continuous variable. Response ranged from not at all (1) to strong influence (5) based on a set of two questions given a total score ranging from 2-10. An example question was, "How would you perceive the influence of natural disasters (floods, typhoons, drought, and storms) occurring yearly in your community to your family livelihood?" A higher score indicated more perceived influence. Cronbach's alpha was .91 in the pilot test and .89 in the main study.

The 11-item Social Network Tool for Household Food Security (SN-HFS) was modified from Windsor[34] and Kanan et al.[35] translated from Antonucci & Akiyama,[36] to assess social network influence on HFI. The SN-HFS has two dimensions: social network structure (size, proximity, and frequency of contact) and social network quality (frequency of positive and negative interactions). The first five items of the SN-HFS evaluates social network structure[35] including (1) number of the social network involved in HFI management and relationship between the participant to others such as spouse, children, siblings, other family members, or friends *(size)*, (2) distance between residences of the participant and network member *(proximity)* for which higher scores indicate closer distance and (3) how frequent the participant and the network member

are in contact *(Frequency of contact)* for which frequency of contact range from 1 (irregularly) to 5 (daily or living together). Higher scores indicate more frequency of contact. The subscale's intra-rater reliability was good (r = .97) in the pilot test.

The other six items assessed social network quality,[34] a continuous measurement including care and interest (2 items) and criticisms/tensions (4 items). Response scores range from 1 (never) to 5 (always) for positive and reversed for negative statements, giving a total score ranging from 6 to 30. A higher score indicates more social network quality. Cronbach's alpha was .82 and .79 for positive and negative statements, respectively in Windsor's study and .88 and .90 in the pilot test, while .83 and .84 in the main study, reflecting good internal consistency.

Piaseu[37] modified *The 12-item Multidimensional Scale of Perceived Social Support* (MSPSS) from the original version developed by Zimet et al.[38] to identify financial, instrumental, emotional, and informational supports from their family, friends, and others in the HFI context. Thus, social support measured as a continuous variable included three domains: family, friend, and significant others. Responses range from 1 (strongly disagree) to 5 (strongly agree). An example of an item was "Your family and you provide emotional support for each other when you are worried about food and money to buy food." Total scores on the scale ranges from 12 to 60. A higher score reflects high social support. The Cronbach's alpha coefficients were .83, .82, and .81 in Piaseu's study, the pilot test and this actual study, respectively.

The Scale of Transportation Quality, Access, and Availability Assessment (STQAA) was developed by researchers based on Vietnamese households' context where the vehicle, particularly motorcycle, was commonly used and a survey question of public transportation of Korlagunta et al.[39] There were five items with three subscales: availability, access, and quality of public and private transportation. Example questions are "How would you assess the availability of public

transportation means in your place?" and "How would you assess your ability to access public transportation means?" Responses range from 1 (very poor) to 5 (very good). Total scores on the scale range from 5 to 25. A higher score indicates more availability, ability to access, and quality of public and private transportation. Cronbach's alpha coefficients in the pilot test and main study were the same, .85, reflecting good internal consistency.

Data collection: After ethical approval, study details were introduced to local government offices, where data were collected from April to July 2019, assisted by two research assistants and heads of sub-wards of UPFHs. Research assistants were trained for data collection procedures, sample selection, and details of questionnaires. Participants who met the inclusion criteria provided informed consent then made appointments, and data were collected at their homes through structured interviews, lasting approximately 30–40 minutes/participant. A small gift was provided as thanks.

Data analysis: Data were analyzed using descriptive statistics and multivariate logistic regression analysis (MLRA). A significance level was set at .05. Assumptions were met. Multicollinearity was not violated as correlation coefficients <0.8 (ranging from 0.0–0.67); tolerance values >0.2 (0.48–0.95); variance inflation factors<5 (1.05–2.81) while linearity of the logit model was confirmed due to no interaction between continuous independent variables and the log odds of the dependent variable (p >.05). In the MLRA model, HFI as a dependent variable were coded as "0" for food secure (score 0–3) and "1" for food insecure (score 4–8). The categorical independent variables were recoded

into a binary scale, including gender, marital status, educational attainment, homeownership, social network proximity. The reference group was assigned as described in **Table 3**.

Results

Participants' characteristics

The majority of participants were females (73.1%); their mean age was 49.0 ± 11.1 years, ranging from 23–76 years, graduated from junior high school at the highest level (40.5%), were married (71.3%), worked as fishers (20.5%) or in the fishery industry (19.8%) while 17.6% were unemployed **(Table 1)**.

Households' characteristics description

Household members ranged from 2–10. The households with children and older adults were the highest rate (43.1%), following by those with only children (40.7%), with only older adults (9.8%), and neither child nor older adults (6.4%). The number of children >18 years ranged from 0–8 with a median of 2 per household. Most households (76.4%) had per capita income/month ≤900,000 VND (39.1 USD). Main sources of income came from participants (33.8%), their husband/wife (25.6%), or from selling fish or other seafood (21.5%). They rated financial difficulty for their basic family needs without savings (95.7%). Average food expense was $83,380 \pm 28,475$ VND/day (3.6 USD). More than half (55%) did not own a boat. Cost of boat rent/purchase averaged $16,837,837 \pm 5,126,198$ VND (732 ± 222 USD), and fluctuated 3–25 million VND (130–1,087 USD) **(Table 1)**.

Table 1 Demographic characteristics of participants (N = 420)

Characteristics	n	%
Gender		
Male	113	26.9
Female	307	73.1
Age (years)		
≤ 40	105	25.0
41–50	153	36.4

Table 1 Demographic characteristics of participants (N = 420) (Cont.)

Characteristics	n	%
51–60	86	20.5
> 60	76	18.1
Mean = 49.03, SD = 11.15 , Min–Max = 23–76		
Educational level		
None	45	10.7
Primary school	165	39.3
Junior high school	170	40.5
Senior high school and higher	40	9.5
Marital status		
Married	299	71.3
Others (single/widowed/divorced/separated)	121	28.7
Number of family members (household size)		
≤ 5	198	47.1
> 5	222	52.9
Mean = 5.74 , SD = 1.58, Median = 6.0, Mode = 5, Min–Max = 2–10		
Number of total children under 18 years old per household		
(both biological children and others)		
≤ 1	163	38.8
2–4	248	59.1
≥ 5	9	2.1
Mean = 1.84, SD = 1.24, Median = 2.0, Mode = 2, Min–Max = 0–8		
Family type (household structure)		
A family with children	171	40.7
A family with older adults	41	9.8
A family with both children and older adults	181	43.1
A family with neither children nor older adults	27	6.4
Participant's current job		
Fisher person	86	20.5
Employed in the fishery industry	83	19.8
Not working/unemployed	74	17.6
Others	177	42.1
Participant's income (VND/month)		
None	128	30.5
≤ 1,000,000	69	16.4
1,001,000-3,000,000	194	46.2
3,001,000-5,000,000	27	6.4
5,001,000-7,000,000	2	.5
Mean = 1,485,476; SD = 1,348,318; Min–Max = 0–7,000,000		
Median = 1,500,000		
Household income (VND/month)		
≤ 1,000,000 (43.47 USD)	0	0
1,001,000-3,000,000 (43.52–130.43 USD)	100	23.8
3,001,000-5,000,000 (130.47–217.39 USD)	266	63.4

Table 1 Demographic characteristics of participants (N = 420) (Cont.)

Characteristics	n	%
5,001,000–7,000,000 (217.43–304.34 USD)	53	12.6
≥ 7,001,000 (304.39 USD)	1	.2
Mean = 4,365,000; SD = 1,105,891; Min–Max = 1,500,000–8,000,000		
Median = 4,100,000 (178.26 USD)		
Per capital income per month in each household (VND/month/person/household)		
Mean = 785, 119; SD = 182,394; Min–Max = 187,500–1,333,333		
Frequency of urban poor household based on per capital income per month (two financial criteria to classify urban poor household) (VND/month/person)		
900,000 (39.1 USD) and under	321	76.4
901,000–1,300,000 (39.17–56.52 USD)	98	23.4
1,301,000 (56.56 USD) and more (exactly, per capital income/month in this investigated household was approximately 1,334,000 VND (58 USD)	1	.2
Difficulty in meeting basis needs for family (food, clothing, water, sanitation, healthcare, education)		
Yes	402	95.7
No	18	4.3
Homeownership		
Own house	351	83.6
Rented house	69	16.4
Fishing boat ownership		
None	231	55.0
Own boat	166	39.5
Rental boat	20	4.8
Sponsored boat by the government	3	.7

Prevalence of household food insecurity

Total scores aggregated from affirmative response indicated corresponding levels of FI status. **Table 2** showed that moderate and severe FI prevalence in UPFHs were 31.9% and 4.3%, respectively, whereas food-secure households were 63.8%. Summing moderate and severe FI yielded a prevalence of 36.2%.

Table 2 Prevalence of household food insecurity using Food Insecurity Experience Scale (N = 420)

Category labels		Raw score range of affirmative responses to the 8-items Food Insecurity Experiences Scale questions	n	%
Food secure		0–3 affirmative responses indicating a circumstance of sufficient access to food in both quantity and quality	268	63.8
Food insecure	Food insecurity, moderate	4–6 affirmative responses indicating uncertainties about capacity to obtain food and a reduction of food quantity and/or food quality due to lack of money and other resources	134	31.9
	Food insecurity, severe	7–8 affirmative responses indicating a situation of food running out or at worse, no food to eat for an entire day or more due to lack of money and other resources	18	4.3
Total			420	100.0

Mean = 2.95, SD = 1.83, Min–Max = 0–8

Predictors of household food insecurity

All variables were entered into MLRA to yield adjusted odds ratios (AOR) used to determine how likely explanatory/independent variables predicted outcome/dependent variables. Sub-variables having a p-value of <.05 were retained in the final model. Regression coefficient (B) reflected the effect of the individual explanatory variable on the odds of occurrence of the outcome.

The final model indicated four factors, overall food literacy (AOR=1.033, p < .01, B =.032), number of social networks (AOR=2.353, p < .01, B =.855), homeownership (AOR = 1.926, p < .05, B =.656) and family support (AOR = 0.923, p < .05, B = −.08), significantly predicted HFI. They could jointly explain 24% of variation for HFI, the strongest predictor of overall food literacy. In contrast, gender, age, marital status, employment status, educational attainment, perceived chronic health condition, perceived natural disaster influence, household size, number of children, and household income were not statistically significant (Table 3). The model predicted approximately 70% accuracy. A Hosmer and Lemeshow test showed no significance at p = 0.1 suggesting that the model fitted the data well.

Table 3: Multivariate logistic regression analysis on predictors of household food insecurity (N = 420)

Variables	Category	B	AOR	95% CI	p-value
Age	≤ 40	−.057	.944	(.395, 2.257)	.89
	41−50	−.481	.618	(.376, 2.107)	.24
	51−60	−.036	1.036	(.269, 1.325)	.92
	> 60 (Reference category)				
Gender	Male	−.191	.826	(.452, 1.51)	.53
	Female (Reference category)				
Marital status	Unmarried	.545	1.724	(.975, 3.049)	.06
	Married (Reference category)				
Education	None and primary	.07	1.076	(.67, 1.729)	.76
	Junior high school and higher (Reference category)				
Employment status	Fishery	.564	1.758	(.879, 3.514)	.11
	Employed in fishery industry	.127	1.136	(.607, 2.127)	.69
	Not working/ Unemployed	.600	1.822	(.949, 3.498)	.07
	Other jobs (Reference category)				
Food literacy		.032	1.033[**]	(1.009, 1.057)	< .01
Perceived chronic health condition	None burden	−.063	.939	(.443, 1.99)	.86
	Low burden	.034	1.035	(.561, 1.911)	.91
	High burden (Reference category)				
Perceived influences of natural disasters		.062	1.064	(.925, 1.225)	.38
Household structure	Family with children	−.806	.446	(.163, 1.22)	.11
	Family with older adults	−.584	.558	(.175, 1.775)	.32
	Family with both children and older adults	−.919	.399	(.143, 1.111)	.07
	Family with neither children nor older adults (Reference category)				
Household size		−.003	.997	(.813, 1.222)	.97

Table 3: Multivariate logistic regression analysis on predictors of household food insecurity (N = 420) (Cont.)

Variables	Category	B	AOR	95% CI	p-value
Number of children		.017	1.017	(.79, 1.309)	.89
Homeownership	**Rented house**	**.656**	**1.926**	**(1.052, 3.52)**	**<.05**
	Own house (Reference category)				
Household income		.00	1.00	(1.00, 1.00)	.10
Number of social network (SN)		**.855**	**2.353**	**(1.245, 4.445)**	**<.01**
Number of people from SN		−.184	.832	(.654, 1.058)	.13
Social network contribution to HFI management		.021	1.021	(.93, 1.11)	.65
SN proximity–how long someone could come to help when you need		−.001	.999	(.993, 1.005)	.73
SN proximity–	None	−.019	.981	(.469, 2.053)	.96
whether a person	Yes (Reference category)				
helps within an hour					
SN proximity–number of people come to help within an hour		.057	1.059	(.81, 1.37)	.67
Frequency of	Irregularly	−.018	.982	(.47, 2.03)	.96
contact	Weekly, monthly, or yearly	.142	1.153	(.62, 2.12)	.64
	Daily or living together (Reference category)				
Social network quality		−.023	.977	(.90, 1.05)	.52
Family support		**−.080**	**.923**	**(.86, .99)**	**<.05**
Overall transportation influence		−.008	.992	(.909, 1.082)	.85
Constant		−1.750			

The findings revealed that UPFHs with food providers having a higher score of food literacy or UPFHs receiving a greater number of social networks in HFI management had a higher likelihood of experiencing FI. Likewise, UPFHs renting houses were more likely to experience FI than those owning houses. Meanwhile, households receiving more family support experienced a lower likelihood of FI by 7.7%.

Discussion

Results revealed that 31.9% and 4.3% of households experienced moderate and severe FI, respectively, obtaining an overall HFI prevalence of 36.2%. Compared with existing Vietnamese data, this was much higher than the 14.5% reported for the whole country,[4] but slightly lower than 40% in a prior study conducted in 40 communes of 4 provinces[5] whereas slightly higher than 34.4% observed in the general population in urban southern areas.[6] National and international literature indicates that FI is more prevalent among households in urban areas,[6,12,21] whereas FI rate in this study differed from others. A potential explanation is that UPFHs have a distinct livelihood, food sources and eating habits than general households. Poverty and rudimentary fishing led to low fish yields. All expenditures depended on fishing, selling all the fish, unstable jobs and poor living conditions, and worries about the local food quality pushing these people into further cycles of FI. Additionally, the high rate of households with older people or children under 18 (~94%) exhibited a high dependency ratio among those households that increases the likelihood of HFI.[14]

The magnitude of sample size can influence detecting FI cases in a risky sample. The sample size

in this study was 420 households, more than 250 reported by Vuong et al.[6] and much lower than 3075 in Ali et al.[5] This study revealed four significant factors predicting HFI, including overall food literacy, the number of social networks, family support, and homeownership. However, overall food literacy positively predicted HFI. This finding was inconsistent with a previous study reporting that food literacy was negatively associated with FI due to unawareness of the value of proper food choice and less understanding of food information.[23] It could be explained that among three subscales, critical food literacy was low. This indicated that participants could read but could not critically analyze information regarding a proper food choice. In addition, the high rate of participants with low education in this study made it difficult for them to search for high-income jobs to overcome their FI status. Moreover, food literacy was different in different age groups; therefore, the roles of food literacy need to be further examined in an age-specific context.

Social network and family support representing the mesosystem level of ecological influences significantly predicted HFI. Specifically, an increase in the number of social networks increased the likelihood of being FI in those UPFHs, whereas the social support–related finding was the opposite. This indicated that UPFHs receiving more family support were less likely to experience FI. These findings theoretically confirmed the important role of meso-system factors in interrelations with the micro-systems. The specific interactions between food providers and other social networks in the environment could be family members/relatives/friends/neighbors/ significant others in their community.[10]

Regarding the finding of social networks, a previous study[26] concurred that although households received food support from two public networks, including government and charity institutions, they still experience FI. Smith et al.[19] indicated that a robust social network decreased the likelihood of experiencing FI by 3.3%.

In terms of family support, this study finding was similar to previous studies, reporting that households obtaining social support had a lower risk of being, remaining, and becoming FI[25] or helped to improve their household FI status and emotional distress.[16] Support from family members, including mother, sister, and children, played an essential role for participants and UPFHs to overcome financial problems and difficulty, particularly food depletion and money shortage.[40] Noticeably, support from friends or significant others was not found in a relationship with HFI. This difference in this study's findings could be explained from regional living contexts of local Vietnamese who believed in close blood relationships as family members to share their troubles and perceived that a family member could thoroughly understand and share with their sadness/problems without worrying about swings of bad news, especially financial problems. Moreover, a qualitative community-based study found that urban people tended to have less open interaction with other non-family members and habituated a closed lifestyle within their homes.[40] The participants attempted to manage their FI status by reducing living expenditure, carefully buying essentials, receiving food or financial donations from their mother or sister, while few reported borrowing food (especially rice) from their neighbor. Another possible explanation is that the UPFHs may never receive support from the local public organization and their cultural norm was "afraid of bothering non-family members."[40] Statistically, the majority (90.5%) rated a family member as the only social network assisting their HFI management. However, the remaining participants reported engaging in more than one social network participation, so it is assumed that more social networks might result in subjective dependence on their behavior and thinking. A few public organizations came to assist them at hard times, such as during floods and typhoons, but they rarely acted. Hence, there was more substantial support from social networks of friends or neighbors regarding FI,

particularly when public organization assistance was interrupted or not present.

This study also found a significant prediction of homeownership on FI that confirmed the Bioecological Model's ability to help identify different-level factors contributing to HFI. For example, participants owning a home were less likely to experience FI than living in a rental house. This is consistent with an earlier study, revealing that FI was higher in the house renters than owners.[18] Homeownership, an external factor in the micro-level, directly influenced food and the finance of UPFHs. Foods were often firstly reduced as the participants perceived that eating less did not affect physical status and health. Living in congested areas caused high land prices, which eliminated owning a larger block of land area. Meanwhile, monthly rental cost was high compared with income, so allocating funds to buy more food was not easy. In this study, UPFHs receiving government-by-sponsored houses were few (1.2%). This finding is relevant to inform policymakers about the impact of homeownership on HFI among UPFHs. The optimal solution is to accelerate assistance to renters to achieve national Sustainable Development Goals.

Demographic factors were non-significant predictors for FI. Many previous studies showed similar findings without significant influence between FI and gender, age, educational level, unemployment, and marital status.[13,15,22,23] Although literature indicated these demographic factors significantly explained FI,[12,19-21] this was not found in the present study. FI raised with age, but also decreased with advancing age.[19] Age was thus not a predictor of HFI. Correspondingly, perceived chronic health condition was not a significant predictor, contrary to literature indicating that enduring chronic health conditions increased risk and proportion of FI.[9,33] Becoming ill often requires a special diet following advice from physicians and health teams, increasing the need to diversify typical food provided in households and adding to food costs.

Poverty, a significant cause of FI, was assessed through income.[2,13] In this study, household income was not significantly associated with HFI. This was inconsistent with others reporting that low household income was more likely to experience HFI.[15,17,19] A difference could be due to the inherent existence of poverty in all the UPFHs, experiencing chronic poverty and coping with trying to manage HFI.[40]

Although household structure, household size and number of children were significant predictors for HFI,[12,13] those factors were not significant in this study. It could be explained that the total number of family members per household varied from 2-10 persons; almost half (47.1%) had household size ≤ 5, perceiving that probably did not cause a burden on household food status. Besides, descriptive data of household type, frequencies of households without both or either older adults or children under 18 still were substantial (6.4%, 40.7% or 9.8%, respectively). Also, households with no or one dependent person were approximately 40% so could lower perceived FI burden for those households because high dependency ratio increased likelihood for FI.[14] However, the socio-demographic characteristics, livelihood and living conditions of UPFHs ruled over the association between those factors with HFI, resulting in a non-significant relationship.

Limitations

Evidence from this study is valuable for further research on this group, especially intervention research to address FI. This study has limitations. Most respondents were females. Thus findings reflected typical perceptions of female food providers. Perhaps, the cross-sectional approach might result in recall bias for HFI information in the past 12 months. Furthermore, undesirable living problems over a long time might be underreported, which limited the outcome of interest.

Conclusion and Implication for Community and Nursing Practice

The Process-Person-Context-Time model provided crucial guidance to identify predictors of HFI

at different levels. Results from MLRA indicated that homeownership (micro-level factor), food literacy (individual factor within the micro-level), size-number of social networks and family support (meso-level factors) jointly predicted HFI. Food literacy was found as the strongest predictor. These findings emphasize the significant direct effect of modifiable variables such as food literacy, social network and social support on HFI in UPFHs under overarching guidance of the Bioecological Model. This offers a practical approach to handle factors for an intervention strategy to address FI in this population.

HFI problems are evidence for policy advocacy on food security for vulnerable groups in the south-central coastal region of Vietnam. However, the findings also suggest approaches for community nurses to enhance HFI through strengthening social welfare, social networks, and family support for the UPFHs.

Acknowledgements

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ความชุกและปัจจัยทำนายความไม่มั่นคงทางอาหารในครัวเรือนชาวประมงเขตเมืองของเวียดนาม: การศึกษาภาคตัดขวาง

Nguyen Hoang My Thuyen นพวรรณ เปียซื่อ* สิริรัตน์ ลีลาจรัส วิโรจน์ ตั้งเจริญเสถียร

บทคัดย่อ: ความไม่มั่นคงทางอาหารเป็นปัญหาทางสาธารณสุขของเวียดนาม ประกอบกับความยากจน นำไปสู่ปัญหาโภชนาการและสุขภาพโดยเฉพาะในประชากรกลุ่มเปราะบาง ซึ่งครัวเรือนชาวประมง ในเขตเมืองชายฝั่งของเวียดนามมีความเสี่ยงต่อความไม่มั่นคงทางอาหาร การศึกษาภาคตัดขวางในครั้งนี้ มีวัตถุประสงค์เพื่อศึกษาความชุกของความไม่มั่นคงทางอาหารในครัวเรือนและปัจจัยทำนายความไม่มั่นคง ทางอาหารในครัวเรือนชาวเวียดนามโดยใช้กรอบแนวคิดเชิงชีวนิเวศน์วิทยาของบรอนเฟนเบนเนอร์ สุ่มตัวอย่างแบบแบ่งชั้นจากครัวเรือนในเมืองใหญ่ 2 แห่งตอนกลางทางใต้ของเวียดนาม ได้ตัวอย่างจำนวน 420 ครัวเรือน เก็บรวบรวมข้อมูลโดยใช้แบบสอบถามประสบการณ์ความไม่มั่นคงทางอาหาร การรับรู้ ผลจากภัยพิบัติทางธรรมชาติ ภาวะโรคเรื้อรัง เครือข่ายทางสังคม แรงสนับสนุนทางสังคมฉบับปรับปรุง ความรอบรู้ด้านอาหารฉบับย่อ และการประเมินการเข้าถึงและคุณภาพของการคมนาคมขนส่ง

ผลการศึกษาพบว่า ร้อยละ 36.2 ของครัวเรือนมีความไม่มั่นคงทางอาหาร การวิเคราะห์ถดถอย พหุแบบลอจิสติกพบว่า ความรอบรู้ด้านอาหารโดยรวม การเป็นเจ้าของบ้าน จำนวนเครือข่ายทางสังคม และการสนับสนุนของครอบครัว ร่วมกันทำนายความไม่มั่นคงทางอาหารของครัวเรือนอย่างมีนัยสำคัญ ทางสถิติ ผลการศึกษาเป็นแนวทางในการสร้างเสริมความมั่นคงทางอาหารโดยส่งเสริมสวัสดิการทาง สังคม เครือข่ายทางสังคมและการสนับสนุนของครอบครัว อย่างไรก็ตามเนื่องจากความรอบรู้ด้านอาหาร มีความเฉพาะกับอายุ จึงควรศึกษาบทบาทของความรอบรู้ด้านอาหารตามกลุ่มอายุในการศึกษาครั้งต่อไป

คำสำคัญ: ทฤษฎีชีวนิเวศน์วิทยา การสนับสนุนของครอบครัว ความไม่มั่นคงทางอาหาร ความรอบรู้ ด้านอาหาร ครัวเรือนชาวประมง ความยากจนในเขตเมือง ประเทศเวียดนาม

Nguyen Hoang My Thuyen *นักศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต สาขา การพยาบาล (หลักสูตรนานาชาติและหลักสูตรร่วมกับมหาวิทยาลัยในต่างประเทศ) โครงการร่วมคณะแพทยศาสตร์โรงพยาบาลรามาธิบดีและคณะพยาบาลศาสตร์ มหาวิทยาลัยมหิดล E-mail: thuyen268@yahoo.com*
ติดต่อที่: นพวรรณ เปียซื่อ *รองศาสตราจารย์ โรงเรียนพยาบาลรามาธิบดี คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล*
E-mail: noppawan.pia@mahidol.ac.th
สิริรัตน์ ลีลาจรัส *ผู้ช่วยศาสตราจารย์ โรงเรียนพยาบาลรามาธิบดี คณะแพทยศาสตร์ โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล E-mail: sirirat.lee@mahidol.edu*
วิโรจน์ ตั้งเจริญเสถียร *ที่ปรึกษา สำนักงานพัฒนานโยบายสุขภาพระหว่างประเทศ E-mail: viroj@ihpp.thaigov.net*