Catastrophic health spending, impoverishing health spending, and unmet need: Japan Household Panel Survey

Purposes

- Estimate the prevalence of financial hardship and unmet need disaggregated by household age structure
- Age disaggregation
  - Financial hardship: household with all 64 or younger vs. household with at least one member aged 65 or older
  - Unmet need: respondents aged 64 or younger vs. respondents aged 65 or older
- Assess determinants and consequences of financial hardship and unmet need and heterogeneity by age

Literature review

(1) Financial hardship: Catastrophic health expenditure (CHE):

Purpose of review

To understand how to measure CHE, and determinants and consequences of CHE.

Search strategy

- Searched the related literature in PubMed using the following keywords: *Financial hardship, catastrophic health expenditure/spending, and impoverishing health expenditure/spending.*

What have been found so far

- In most of the previous studies, CHE is measured as health expenditure exceeding a certain level (i.e. 10% or 25%) of the total consumption or income.
- As the determinants of CHE, demographic factors (e.g. age, gender/sex, living together with older members, and place of residence), socioeconomic status (e.g. education, income, and wealth), and health status are identified so far.

Next steps

- Continue to search and review relevant studies on the determinants and consequences of financial hardship due to health spending.

(2) Unmet need:

Purpose of review

To understand how to measure unmet need, and determinants and consequences of

unmet need.

Search strategy

- Searched the related literature in PubMed using the keywords of *unmet need and forgone care.*

What have been found so far

- In many studies, unmet need is defined as a self-reported experience of forgone/unmet/delayed health care needs during a given period.
- As the determinants of unmet need, demographic (e.g. age and sex/gender) and socioeconomic factors (e.g. education and income) are identified.
- Some studies assess health consequences of unmet need, suggesting that unmet need is associated with subsequent deteriorated health outcomes.

Next steps

- Continue to search and review relevant studies on the definitions, determinants, and consequences of unmet need for health care.

Methods

Data

Data for this study come from the Japan Household Panel Survey (JHPS/KHPS), which is an annual national representative survey of the Japanese aged 20 or over. JHPS/KHPS is the unification of KHPS (Keio Household Panel Survey) and JHPS (Japan Household Panel Survey), which were originally separate but have many common questionnaires including household structure, individual attributes, academic background, employment status, and economic conditions. Both surveys adopt a stratified two-stage random sampling that uses 24 regional and city classifications with the number of survey subjects in each classification in accordance with their population size as the first stage of sampling, and selects subjects from basic resident registers based on designated numbers and sampling intervals as the second stage. KHPS has been conducted since 2004 with approximately 7,000 individuals by about 4,000 households, adding new samples in 2007 and 2012, whereas JHPS has been conducted since 2009 with 4,000 individuals, implementing a new sample in 2019.

Key variable definitions

(1) Financial hardship due to health expenditure

To define financial hardship, we use two measures of catastrophic health expenditure (CHE) and impoverishing health spending (IHE), which are obtained from the

JHPS/KHPS questionnaire on respondents' household consumption last month. Following the definition of the previous studies as well as the indicator for monitoring SDG 3.8.2 (1-4), CHE is defined as health spending beyond 10% and 25% thresholds of the total consumption.

IHE is measured as changes in poverty headcount for equalised household income with and without out-of-pocket spending (5). We use the country poverty line in each year from the national government (6) and impute it by linear interpolation when the poverty lines are not provided by the government.

(2) Unmet need

The JHPS/KHPS asks the question, 'During the past one year, did you receive a treatment, such as outpatient and inpatient services?' with six response options: 1. Did nothing as healthy; 2. Did nothing despite having symptoms; 3. Went to a hospital/clinic; 4. Hospitalised; 5. Purchased a patent medicine; 6. Others. To define unmet health care need of respondents, we created a dichotomised variable, coded as 1 if the answer is 'Did nothing despite having symptoms' or 0 otherwise, excluding those who did not need health care services because they were healthy.

Formerly, it has been reported that self-assessed unmet need partly reflects true unmet needs (7); thus, the self-reported status of health need should be useful to understand unmet health needs of respondents.

Empirical strategies

(1) Financial hardship

Prevalence

To illustrate how many respondents undergo financial hardship due to health spending, we first calculate the prevalence of CHE and IHE in each year of the survey. Additionally, the prevalence of younger people aged 64 or younger and older people aged 65 or over is obtained to understand the potential heterogeneity across age, since older people may more likely experience financial hardship due to their increasing health needs. To measure heterogeneity across age, households with at least one member aged 65 or older are compared to households whose members are all 64 or younger.

We utilised cross-sectional weights and longitudinal weights: To correct for biases due to non-response at baseline, we calculate cross-sectional weights by factors (i.e. age, sex, marital status, education, employment status, and residential regions) from the closest national surveys conducted by the Japanese government. Furthermore, to mitigate biases caused by sample attrition during follow-ups, we calculated longitudinal weights estimated as probabilities of responding to each wave

conditional on age, sex, marital status, education, employment status, and residential regions of respondents at baseline.

Determinants

We assess the determinants of those experiencing financial hardship by estimating the following equation:

$$E(y_{it}|\boldsymbol{X_{it}}) = \Pr(y_{it} = 1|\boldsymbol{X}_{it}) = \alpha \boldsymbol{X}_{it} + u_i + \varepsilon_{it}$$

where y_{it} denotes the financial hardship status of a household i, $\boldsymbol{X}_{it}$ is a vector of the predictors comprising demographic, socioeconomic, and health variables of respondents, u_i indicates individual-fixed-effects, and ε_{it} is a stochastic disturbance. Here, we adopted a linear probability model to evaluate the determinants of financial hardship.

Consequence

Even though older adults may experience financial hardship due to health spending more frequently than younger counterparts, its financial consequence can diverge since the ability-to-pay between younger and older people can be different. To understand disparities in the ability-to-pay between younger and older people, we will further investigate disparities in income/wealth/assets possessions across age groups. Furthermore, we estimate the following equation:

$$F_{it} = \gamma y_{it-1} + \delta \boldsymbol{X}_{it} + \nu_i + \epsilon_{it}$$

where the association of financial hardship or health spending of household i in year t-1 (y_{it-1}) with household income and wealth/assets in year t (F_{it}) is assessed.

(2) Unmet need

Prevalence

As with the prevalence estimate for financial hardship, the individual-level prevalence of respondents undergoing unmet need is estimated. We additionally estimate heterogeneity across age. As unmet health need is calculated with individuals as the unit, respondents who are 65 or older are compared to respondents who are 20-64 years old. The same weights are utilised to estimate the prevalence of unmet needs.

Determinants

To assess the determinants of unmet need, it is important to include both *need variables*, which directly affect one's health need, and n*on-need variables*, which indirectly affect one's need (8).

Therefore, the probability of reporting unmet need is estimated as:

$$E(Unmet_{it}|\boldsymbol{Z_{it}}) = \Pr(y_{it} = 1|\boldsymbol{Z}_{it}) = \boldsymbol{\beta Z_{it}} + u_i + \varepsilon_{it} = \beta_1 Need_{it} + \beta_2 Non - need_{it} + u_i + \varepsilon_{it}$$

where $Need_{it}$ denotes need variables of individual i in year t and $Non - need_{it}$ represents non-need variables. The model is estimated by a linear probability model, controlling for individual-fixed-effects.

Need variables and non-need variables to be used: To be determined based on literature review.

- This should include demographic, socioeconomic, and health variables

Health consequence

Due to unmet health need, individuals may experience subsequent health deterioration. Similar to the analysis on the consequence of financial hardship, we assess associations between unmet need in year t-1 and health outcomes in year t.

Major health outcomes available in the JHPS/KHPS

- Self-rated health
- Mental health score
- Chronic conditions

Control variables

For more details, to be determined based on literature review.

- This should include demographic, socioeconomic, and health variables

Heterogeneity by age

For determinants and consequences of CHE, we will assess heterogeneity across age, by comparing household with and without members 65 or older. For unmet need, we will assess heterogeneity across age, by comparing respondents aged 64 or younger and 65 or older.

Results

We present descriptive tables for the prevalence of financial hardship and unmet need.

(1) Financial hardship

Prevalence

Table 1. Catastrophic health spending comparing JHPS/KHPS and official government estimates using different thresholds

	JHPS/KHPS			National estimates	
year	10% threshold	25% threshold	N	10% threshold	25% threshold
2004	8.9%	1.4%	3,433		
2005	9.8%	1.1%	3,003		
2006	10.4%	1.5%	2,758		
2007	12.4%	1.6%	3,824		
2008	11.2%	1.4%	3,500		
2009	8.6%	1.7%	6,708		
2010	9.7%	1.3%	6,067	9.1%	1.6%
2011	9.5%	1.9%	5,751	9.2%	1.6%
2012	10.3%	2.0%	6,215	9.3%	1.7%
2013	9.3%	1.1%	5,775	9.1%	1.6%
2014	9.5%	1.8%	5,251	9.1%	1.6%
2015	8.1%	2.2%	4,905	9.2%	1.6%
2016	9.4%	1.6%	4,617	9.4%	1.6%
2017	8.6%	1.4%	4,221	9.6%	1.6%
2018	8.6%	1.6%	3,861	9.7%	1.7%
2019	8.0%	2.0%	5,272	10.5%	1.9%

Note: Weighted by cross-sectional and longitudinal weights; Official government estimates were obtained from https://www.mofa.go.jp/mofaj/gaiko/oda/sdgs/statistics/goal3.html

Table 2. Catastrophic health spending by age of household members

	All 64 or younger			At least one person, 65 or older		
year	10% threshold	25% threshold	N	10% threshold	25% threshold	N
2004	6.9%	1.2%	2,814	19.5%	2.3%	619
2005	8.5%	0.8%	2,424	15.5%	2.2%	579
2006	8.2%	0.9%	2,148	20.2%	4.2%	610
2007	9.9%	1.0%	2,986	22.9%	4.1%	838
2008	9.9%	1.1%	2,655	15.8%	2.6%	845
2009	6.0%	1.1%	4,761	14.0%	3.1%	1,947
2010	6.7%	0.7%	4,214	15.2%	2.4%	1,853
2011	7.3%	1.4%	3,922	13.8%	2.7%	1,829
2012	8.0%	1.3%	4,206	14.7%	3.6%	2,009
2013	6.5%	0.7%	3,779	14.7%	1.9%	1,996
2014	6.5%	0.9%	3,285	14.6%	3.4%	1,966
2015	5.4%	1.5%	2,968	12.8%	3.3%	1,937
2016	5.2%	0.8%	2,697	16.2%	2.8%	1,920
2017	6.3%	1.0%	2,729	14.8%	2.5%	1,492
2018	6.4%	1.1%	2,421	14.1%	2.8%	1,440
2019	5.5%	1.0%	3,382	10.8%	3.1%	1,890

Note: Households were categorised by the age of the oldest co-residing family members, including respondents themselves; Weighted by cross-sectional and longitudinal weights.

Table 3. Impoverishing health spending by age of household members

	Whole sample		All 64 or younger		At least one person, 65 or older	
year	Incidence	N	Incidence	N	Incidence	N
2004	0.7%	3,340	0.6%	2,734	1.2%	606
2005	0.9%	2,804	0.5%	2,288	2.5%	516
2006	1.3%	2,570	0.7%	2,015	4.0%	555
2007	1.1%	3,557	0.7%	2,777	2.7%	780
2008	0.8%	3,289	0.6%	2,504	1.5%	785
2009	1.8%	6,198	1.3%	4,438	3.0%	1,760
2010	1.1%	5,700	0.5%	3,981	2.1%	1,719
2011	1.0%	5,377	0.3%	3,692	2.2%	1,685
2012	1.2%	5,813	0.7%	3,975	2.2%	1,838
2013	0.8%	5,416	0.6%	3,589	1.3%	1,827
2014	0.9%	4,972	0.3%	3,146	1.8%	1,826
2015	1.0%	4,663	0.7%	2,862	1.3%	1,801
2016	0.8%	4,353	0.2%	2,574	1.8%	1,779
2017	1.1%	3,873	0.6%	2,547	2.5%	1,326
2018	1.1%	3,674	0.6%	2,341	2.5%	1,333
2019	-	-	-	-	-	-

Note: Weighted by cross-sectional and longitudinal weights; In 2019, the poverty line was not imputed because the poverty line after 2018 was not proved by the national government.

(2) Unmet need

Prevalence

Table 4. Unmet health care need by age of respondent

	Whole		64 or younger		65 or older	
year	Proportion	N	Proportion	N	Proportion	N
2004						
2005	11.3%	2,157	12.3%	1,865	3.9%	292
2006	13.1%	1,963	14.7%	1,666	3.3%	297
2007						
2008	10.0%	2,414	11.0%	1,972	4.5%	442
2009	9.2%	2,333	10.2%	1,860	4.2%	473
2010	10.0%	2,224	11.4%	1,718	4.8%	506
2011	10.2%	2,101	11.8%	1,592	5.0%	509
2012	9.0%	2,698	10.1%	2,082	5.4%	616
2013	7.8%	2,494	8.8%	1,852	4.7%	642
2014	8.7%	4,075	10.6%	2,767	4.2%	1,308
2015	9.6%	3,861	11.8%	2,528	4.7%	1,333
2016	9.3%	3,631	11.8%	2,309	3.9%	1,322
2017	7.2%	3,397	8.7%	2,136	3.7%	1,261
2018	5.2%	3,431	6.3%	2,177	2.5%	1,254
2019	5.1%	4,781	7.2%	3,214	2.6%	1,567

Note: *Unmet needs* excludes those who did not experience forgone care because they were healthy; In 2004 and 2007, the question on unmet health need was not asked; Weighted by cross-sectional and longitudinal weights; Age group categorisation is based on age of survey respondents.

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