A Cluster Analysis to Identify Predictors and Profiles of Financial Hardship Among Cancer Patients in the United States

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INTRODUCTION

- Information about groups of individuals diagnosed with cancer who are more likely to experience **financial hardship (FH)** is limited.
- Information to characterize vulnerable groups can streamline the delivery of financial support services.

OBJECTIVE

- This study aims to identify clusters and determine the prevalence of FH among individuals diagnosed with cancer.

METHODS

- A cross-sectional study was conducted using data from the 2011, 2016, and 2017 Medical Expenditure Panel Survey (MEPS), during which the Cancer Self-Administered Questionnaire (CSAQ) was administered.
- We identified adults with a cancer diagnosis who were treated or last treated within one year of completing the CSAQ.
- We collected three types of **FH measurements** from CSAQ questions:
  - **Material:** had to borrow money or go into debt, filed for bankruptcy, unable to cover medical bills, sacrificed basic spending/savings/living situation.
  - **Psychological:** ever worried about medical bill/family financial stability/income.
  - **Behavioral:** did not get all medical care/treatments because could not afford care, ever delayed/forewent/made changes to visit to specialist/treatment/follow-up care because of cost.
- We calculated catastrophic health expenditure (CHE) as out-of-pocket costs > 10% of annual household income.
- Multivariable logistic regression was used to identify predictors of a composite FH measure (based on the three FH types).
- Agglomerative hierarchical cluster analysis was used to determine clusters using Ward's method.
- The number of clusters was determined from the inspection of the dendrogram.
- We calculated the prevalence of FH for each cluster using the individual measures and a composite of the three FH types.

- We identified 847 individuals for analysis (**Figure 1**).
- The mean (SD) age, in years, was 65 (13) and 51% of patients were female (**Table 1**).
- Age, race, ethnicity, and household income were selected for cluster analysis as these variables were statistically significantly associated with composite FH in the regression (**Table 2**).
- The cluster analysis yielded 3 groups (**Table 1**):
  - Group 1: **"High income and white"**
  - Group 2: **"Young, female, and low comorbidity"**
  - Group 3: **"Racially diverse, low income, and publicly insured"**
- The prevalence of the composite FH (76%) was highest in group 2 (**Table 3**).
- The prevalence of CHE (21%) was highest in group 3 (**Table 3**).

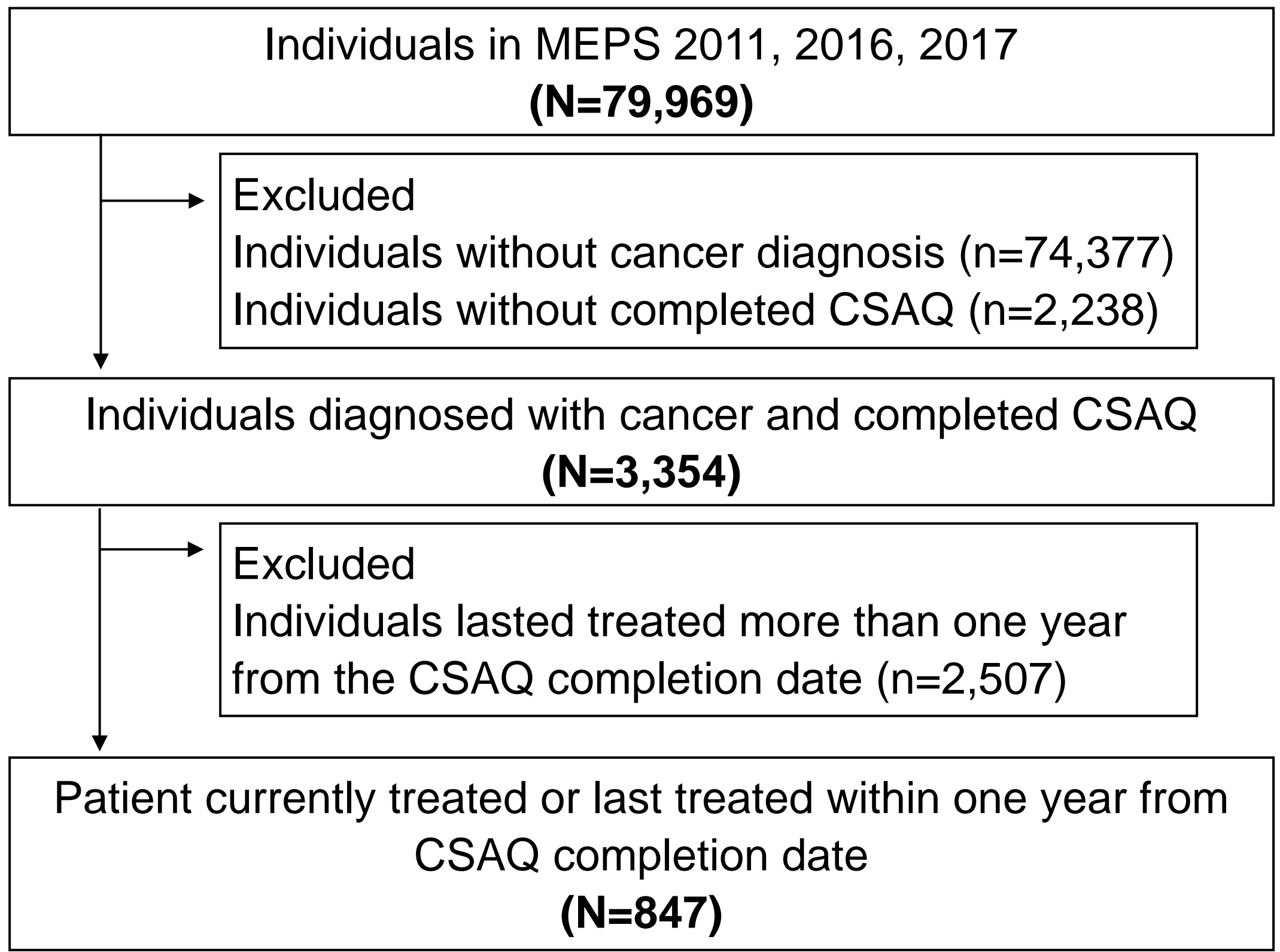### Figure 1. Selection Flow of Study Population

Individuals in MEPS 2011, 2016, 2017
(N=79,969)

Excluded
Individuals without cancer diagnosis (n=74,377)
Individuals without completed CSAQ (n=2,238)

Individuals diagnosed with cancer and completed CSAQ
(N=3,354)

Excluded
Individuals lasted treated more than one year from the CSAQ completion date (n=2,507)

Patient currently treated or last treated within one year from CSAQ completion date
(N=847)

Table 2. Multivariable Logistic Regression of Factors Associated with Composite Financial Hardship

	Odds Ratio (95% CI)
Age 18-54 vs 75+ years	0.18 (0.11-0.29)*
Age 55-64 vs 75+ years	0.28 (0.19-0.44)*
Age 65-74 vs 75+ years	0.70 (0.47-1.04)
Non-White vs White	0.49 (0.34-0.71)*
Poor to Low Income vs High Income	0.51 (0.34-0.76)*
Middle Income vs High Income	0.73 (0.49-1.09)

CI: confidence interval
* p-value < 0.05
Factors were not significant: sex, education level, marriage status, number of comorbidities

RESULTS

Table 1. Characteristics of Study Population

	All	Group 1	Group 2	Group 3
N (%)	847 (100)	375 (100)	162 (100)	310 (100)
Age				
Mean (SD)	65.4 (13)	70.1 (8.5)	45.4 (7.9)	70.1 (9.0)
Median (Q1-Q3)	67 (58 - 75)	69 (63 - 77)	48 (42 - 51)	70 (62 - 78)
Sex (%)				
Male	413 (49)	210 (56)	55 (34)	148 (48)
Female	434 (51)	165 (44)	107 (66)	162 (52)
Race and Ethnicity (%)				
White	633 (75)	375 (100)	103 (64)	155 (50)
Non-White	214 (25)	0 (0)	59 (36)	155 (50)
Highest Education (%)				
Less Than High School Diploma	167 (20)	32 (9)	25 (15)	110 (35)
High School Diploma	339 (40)	148 (39)	67 (41)	124 (40)
College or More and Other Professional	341 (40)	195 (52)	70 (43)	76 (25)
Marital Status (%)				
Married	480 (57)	233 (62)	96 (59)	151 (49)
Not-Married/No Spouse	367 (43)	142 (38)	66 (41)	159 (51)
Household Income Status				
Poor to Low Income	302 (36)	0 (0)	63 (39)	239 (77)
Middle Income	194 (23)	120 (32)	40 (25)	34 (11)
High Income	351 (41)	255 (68)	59 (36)	37 (12)
Insurer (%)				
Any Private	504 (60)	272 (73)	110 (68)	122 (39)
Public Only	323 (38)	102 (27)	42 (26)	179 (58)
Uninsured	20 (2)	1 (0)	10 (6)	9 (3)
Cancer Type (%)				
Solid Cancer	783 (92)	345 (92)	151 (93)	287 (93)
Blood Cancer	64 (8)	30 (8)	11 (7)	23 (7)
Number of Comorbidities (%)				
0-1	278 (33)	108 (29)	101 (62)	69 (22)
2-3	361 (43)	172 (46)	40 (25)	149 (48)
4+	208 (25)	95 (25)	21 (13)	92 (30)

Table 3. Prevalence of Financial Hardship by Type

	All	Group 1	Group 2	Group 3
Composite Financial Hardship (%)	440 (52)	141 (38)	123 (76)	176 (57)
Material Financial Hardship (%)	357 (42)	105 (28)	107 (66)	145 (47)
Psychological Financial Hardship (%)	273 (32)	77 (21)	87 (54)	109 (35)
Behavioral Financial Hardship (%)	159 (19)	49 (13)	44 (27)	66 (21)
Catastrophic Health Expenditure (%)	95 (11)	14 (4)	17 (10)	64 (21)

CONCLUSION

- Financial hardship was highest among the cluster distinguished by youth, female gender, and low comorbidity status while CHE was highest in a racially diverse, publicly insured, and low-income group.
- This study can inform the development and delivery of tailored strategies to support patients experiencing financial hardship.

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