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Impact of financial barriers on health status, healthcare utilisation and economic burden among individuals with cognitive impairment: a national cross-sectional survey

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ABSTRACT

Objective To study the impact of financial barriers to healthcare on health status, healthcare utilisation and costs among patients with cognitive impairment.

Design Cross-sectional.

Setting National Health Interview Survey (NHIS), 2011–2017.

Participants Patients with cognitive impairment aged 18 years or older.

Interventions Financial barriers to healthcare were identified using a series of NHIS prompts asking about the affordability of healthcare services.

Primary outcome measures Health status was based on a survey prompt about respondents' general health. Healthcare utilisation included office visits, home healthcare visits, hospital stays and emergency department (ED) visits. Economic burden was based on the family spending on medical care. Logistic regression models were used to examine the impact of financial barriers to healthcare access on health status, home healthcare visits, office visits, hospital stays and ED visits, respectively.

Results Compared with cognitively impaired respondents without financial barriers to healthcare access, those with financial barriers were more likely to be unhealthy (OR 0.64, 95% CI 0.57 to 0.72). Cognitively impaired respondents with financial barriers were less likely to have home healthcare (OR 0.69, 95% CI 0.48 to 0.99) and more likely to have hospital stays (OR 1.33, 95% CI 1.19 to 1.48) and ED visits (OR 1.50, 95% CI 1.35 to 1.67). In addition, compared with cognitively impaired respondents without financial barriers to healthcare access, those with the barriers were more likely to have an increased economic burden (OR=1.85, 95% CI 1.65 to 2.07).

Conclusion Financial barriers to healthcare worsened health status and increased use of ED, hospitalisation and economic burden. Policy decision-makers, providers and individuals with cognitive impairment should be aware of the impact of financial barriers and take corresponding actions to reduce the impact.

BACKGROUND

Cognitive impairment refers to mental decline characterised by the difficulty that

Strengths and limitations of this study

⇒ Strengths of this study include nationally representative samples and weight analysis used to generate national estimates.
⇒ This study used a cross-sectional design that could not determine causality.
⇒ This study might be subject to recall bias since the study population might be unconscious or unclear of the questions asked to them.
⇒ The impact of financial barriers to healthcare access on individuals with mild and severe cognitive impairment might be different.

an individual experiences in thinking and remembering.[1 2] Approximately 6 million Americans were affected by cognitive impairment, including clinical Alzheimer's disease (AD), which is the most well-known cognitive impairment, and mild cognitive impairment in 2017.[3] Due to the rapid increase in the ageing population, it is estimated that the number of individuals with AD would rise to 13.8 million by 2050.[4] In addition, cognitive impairment is associated with a heavy economic burden. A study found that individuals with mild cognitive impairment had an average annual medical cost of $6784, and individuals with dementia had the cost of $11 678.[5]

As healthcare spending increases in the USA, more individuals face financial barriers to accessing healthcare services they need.[6 7] Financial barriers to healthcare access are defined by needing to receive healthcare and being unable to do so because of the monetary cost.[8] A study published in 2018 shows that 16 million people in the USA have delayed or abandoned healthcare services because of financial barriers, regardless of whether they have healthcare insurance.[9]
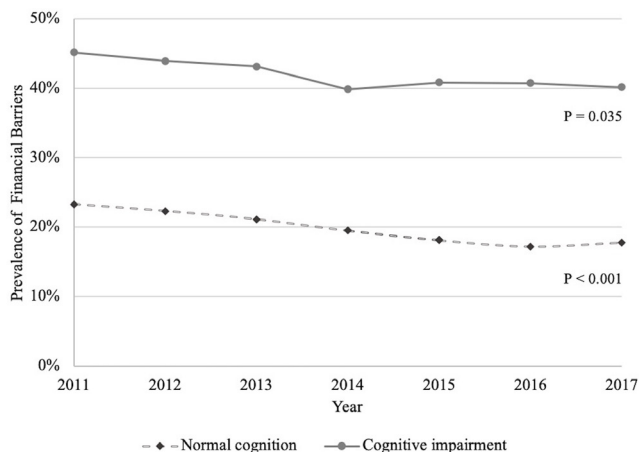
Figure 1 Trend of financial barriers among individuals with cognitive impairment and normal cognition between 2011 and 2017*. *Weighted percent estimate for the US population.

When individuals are faced with financial barriers to healthcare access, they are less likely to see healthcare providers for preventative visits, which may then lead to a decline in their general health, causing an increase in emergency room (ER) visits and inpatient visits after they have developed a disease that could have otherwise been prevented.[10] Financial concerns are found to be positively associated with reporting emergency department (ED) visits as a usual source of care and financial barriers to healthcare access increased the risk of disability and mortality.[11] In addition, deteriorating cognition may cause individuals to have a heavier economic burden.[5 12]

At the moment, no treatment is available to reverse the progression of cognitive impairment.[13 14] Cognitive impairment could reduce a person's life expectancy. Those experiencing severe cognitive decline were twice as likely to die as unimpaired persons, while those who were mildly impaired were also at an increased risk.[15] This suggests that if individuals are able to prevent or slow the progression of cognitive decline, they will be at a lower risk of mortality. It demonstrates the importance of acknowledging and addressing barriers that might prevent a person from accessing healthcare leading to cognitive impairment. In addition, evidence shows that the overall health insurance coverage in the USA had increased following the implementation of the Patient Protection and Affordable Care Act (ACA), with more than 1 million fewer Americans uninsured, which might further lead to a decrease in financial barriers.[16] However, little is known about the prevalence of financial barriers among individuals with cognitive impairment. Meanwhile, how financial barriers related to health status, healthcare utilisation and economic burden also remain unknown among individuals with cognitive impairment.

To fill the gap in the literature, we conducted a retrospective cross-sectional study using the data from the National Health Interview Survey (NHIS). The objectives of the study were (1) to examine the trend of prevalence of financial barriers to healthcare access among

individuals with cognitive impairment from 2011 through 2017 and (2) to determine the association between financial barriers with health status, healthcare utilisation and economic burden among individuals with cognitive impairment.

METHODS
Study design and population
A retrospective cross-sectional study was conducted using data from the NHIS between 2011 and 2017. The NHIS is an annually cross-sectional household-based interview survey conducted by the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC).[17 18] The NHIS is nationally representative by using a multistage area probability sampling design intended to represent the civilian non-institutionalised US population. Data collected include demographic/social characteristics, health conditions, health risk factors, health behaviours and healthcare utilisation.[19] The NHIS includes weight variables, with which the results can be generalised to a national level.[17 19] NHIS is publicly available and can be accessed downloaded from the CDC NHIS website (https://nhis.ipums.org/nhis/).[19] This study included cognitively impaired respondents aged 18 years or older in the NHIS from 2011 to 2017. Respondents with missing data on financial barriers to healthcare access were excluded in this study.

Measures
Respondents were classified based on a survey question asking them if they were limited in any way because of difficulty remembering or because of experiencing periods of confusion, and according to NHIS's Field Representative's Manual for 1997 forward, the term 'In any way' refers to activities that are normal for most people of that age.[20] Financial barriers to healthcare access were identified if respondents answered a 'yes' to any of the following NHIS survey prompts: needed but could not afford medical care, dental care, eyeglasses, mental healthcare, follow-up care and specialists in the past 12 months. The health status of respondents was based on a survey prompt asking 'Would you say your health in general is excellent, very good, good, fair, or poor?' Specifically, health status including 'excellent,' 'very good' and 'good' were labelled as healthy in our study. Healthcare utilisation measured in the study included office visits, home healthcare visits, hospital stays and ED visits. Economic burden was categorised as four levels (0, $1–$1999, $2000–$4999, ≥$5000) based on the family spending on the medical care in the past 12 months. Covariates considered in the study included five demographic variables: age (18–29, 30–44, 45–64 and ≥65), gender (male and female), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic and others), marital status (non-single and single), and census region (Northeast, North, Central/Midwest, South and West); three socioeconomic variables: education attainment (below high

Table 1 Baseline characteristics of individuals with cognitive impairment with or without financial access barriers

Characteristics	Without barriers N=15 002 192*	With barriers N=20 771 094*	P value
Year			0.048
2011	13.70%	15.60%	
2012	12.60%	13.70%	
2013	13.80%	14.50%	
2014	13.90%	12.80%	
2015	14.20%	13.60%	
2016	15.40%	14.60%	
2017	16.50%	15.30%	
Age			<0.001
≥18 and <30	4.90%	7.20%	
≥30 and <45	9.40%	17.20%	
≥45 and <65	29.00%	55.30%	
≥65	56.70%	20.20%	
Gender			0.018
Female	45.10%	42.70%	
Male	54.90%	57.30%	
Marital status			0.007
Married	27.80%	25.20%	
Non-married	72.20%	74.80%	
Race/ethnicity			<0.001
Non-Hispanic whites	69.50%	64.00%	
Non-Hispanic blacks	15.50%	18.50%	
Hispanics	9.90%	11.60%	
Others	5.10%	5.90%	
Living region			<0.001
Northeast	19.00%	12.20%	
North Central/Midwest	22.90%	22.20%	
South	37.70%	41.80%	
West	20.40%	23.80%	
Education			0.003
Below high school	30.30%	29.30%	
High school graduate	29.80%	27.30%	
Above high school	39.90%	43.40%	
Family income			<0.001
<$50 000	75.90%	87.10%	
≥$50 000 and <$100 000	17.30%	10.80%	
≥$100 000	6.80%	2.20%	
BMI			<0.001
<18.5	3.80%	2.10%	
≥18.5 and <25	32.30%	26.80%	
≥25 and <30	29.50%	28.90%	
≥30	34.50%	42.20%	
Health insurance			<0.001
No	32.90%	44.30%	

Table 1 Continued

Characteristics	Without barriers N=15 002 192*	With barriers N=20 771 094*	P value
Yes	67.10%	55.70%	
Health status			<0.001
Poor or fair	56.60%	72.00%	
Good or very good	43.40%	28.00%	
Amount family spent for medical care			<0.001
$0	20.70%	14.00%	
$1–$1999	67.30%	70.50%	
$2000–$4999	5.20%	5.70%	
≥ $5000	6.90%	9.90%	
Office visits			0.837
No	6.70%	6.80%	
Yes	93.30%	93.20%	
Home healthcare			<0.001
No	6.50%	11.50%	
Yes	93.50%	88.50%	
Hospital nights			<0.001
No	73.50%	70.70%	
Yes	26.50%	29.30%	
ED visits			<0.001
No	59.70%	48.80%	
Yes	40.30%	51.20%	

*Weighted percent estimate for the US population.
BMI, body mass index; ED, emergency department.

school, high school, above high school), family income (<$50 000, $50 000–$99 999, ≥$100 000), and healthcare insurance (yes and no); and a physical health-related variable: body mass index (BMI) (<18.5, 18.5–24.9, 25–29.9 and ≥30).[21–23]

Statistical analysis

We compared baseline characteristics between respondents with cognitive impairment who reported financial barriers to healthcare access and those who did not. χ^2 tests were used to compare categorical variables. The prevalence of financial barriers was measured using the number of respondents who reported the barriers divided by the number of respondents who had information on the question regarding the barriers. Linear regression models were used to identify if there was a significant trend of the prevalence of financial barriers by using the prevalence as the dependent variable and the year as the independent variable. Five logistic regression models were used to examine the impact of financial barriers to healthcare access on health status, home healthcare visits, office visits, hospital stays and ED visits, respectively. We also used an ordinal logistic regression model to determine the impact of financial barriers to

healthcare access on economic burden. The results of the logistic regression models were reported as OR) with 95% CIs. All analyses were performed using SAS V.9.4 software (SAS Institute). Stratification, clustering and sampling weight variables were used to generate a nationally representative result.

Patient and public involvement

The participants and members included in the NHIS dataset were not directly involved in this study. The study population was limited to the deidentified records in the NHIS database.

RESULTS

The number of participants of each year ranged from 78 132 to 101 875, and the average number of participants was 100 491. During the overall study period, among 966 882 952 weighted respondents with normal cognition, 192 427 229 (19.9%) had financial barriers in the past 12 months, while among 35 773 286 weighted respondents with cognitive impairment, 15 002 192 (41.9%) reported financial barriers in the past 12 months. The trend of the prevalence of financial barriers to healthcare access

showed that respondents with cognitive impairment reported a higher prevalence of financial barriers than those with normal cognition at any year between 2011 and 2017 (figure 1). In addition, the prevalence declined over time among those with and without cognitive impairments (p=0.035 and p<0.001).

Table 1 demonstrates the differences in baseline characteristics between cognitively impaired respondents with and without financial barriers to healthcare access. All covariates were significantly different between the two groups. Specifically, among cognitively impaired respondents with financial barriers, we found home healthcare use was 5.0% less compared with those without financial barriers. On the other hand, an additional 2.8% hospital stays and an additional 10.9% ED visits were observed among individuals with financial barriers compared with those without. In addition, among cognitively impaired respondents with financial barriers, 15.4% less individuals reported a good or very good health status compared with those without financial barriers.

On the multivariable analysis after adjusting for covariates, we found that compared with cognitively impaired respondents without financial barriers to healthcare access, those with financial barriers were more likely to be unhealthy (OR 0.64, 95% CI 0.57 to 0.72) (table 2).

Cognitively impaired respondents with financial barriers were less likely to have home healthcare (OR 0.69, 95% CI 0.48 to 0.99) and more likely to have hospital stays (OR 1.33, 95% CI 1.19 to 1.48) and ED visits (OR 1.50, 95% CI 1.35 to 1.67) (table 3). In addition, compared with cognitively impaired respondents without financial barriers to healthcare access, those with the barriers were more likely to have economic burden (OR=1.85, 95% CI 1.65 to 2.07) (table 4).

DISCUSSION

This study examined the trend of financial barriers to healthcare in the USA and the association between the financial barriers and health status, healthcare utilisation and economic burden among individuals with cognitive impairment using a nationally representative dataset. Our findings indicate a significant decreasing trend in the self-reported financial barriers to healthcare access throughout the study period in both the population with normal cognition and the population with cognitive impairment. The significant decreasing trend might be a result of a higher insured rate of the American population after the establishment of the ACA) In 2014, most of the substantial changes of ACA were nationally implemented, and the uninsured rate decreased remarkably between 2013 and 2015.[24] Based on the NHIS dataset, the annual health insurance coverage rate increased from 90.9% in 2011 to 95.5% in 2017 among patients with cognitive impairment. Therefore, there might be an association between the implementation of ACA and the drop in the prevalence of financial barriers.

Table 2 The impact of financial barriers on health status among individuals with cognitive impairment

Factors	OR*	95% CI*
Financial access barrier		
No	Ref.	
Yes	0.64	0.57 to 0.72
Age		
≥18 and <30	Ref.	
≥30 and <45	0.47	0.37 to 0.6
≥45 and <65	0.24	0.2 to 0.3
≥65	0.43	0.35 to 0.54
Sex		
Female	Ref.	
Male	0.99	0.9 to 1.1
Marital status		
Married	Ref.	
Non-married	1.34	1.17 to 1.53
Race		
Non-Hispanic white	Ref.	
Non-Hispanic black	0.76	0.66 to 0.88
Hispanic	0.7	0.59 to 0.83
Others	0.78	0.63 to 0.96
Living region		
Northeast	Ref.	
North Central/Midwest	1.05	0.88 to 1.25
South	0.82	0.7 to 0.95
West	1.03	0.87 to 1.21
Education		
Below high school	Ref.	
High school graduate	1.34	1.16 to 1.55
Above high school	1.69	1.48 to 1.93
Family income		
<$50 000	Ref.	
≥$50 000 and <$100 000	1.4	1.19 to 1.64
≥$100 000	1.41	1.11 to 1.79
BMI		
<18.5	Ref.	
≥18.5 and <25	0.7	0.53 to 0.94
≥25 and <30	0.86	0.75 to 0.99
≥30	0.57	0.5 to 0.64
Health insurance		
No	Ref.	
Yes	0.95	0.86 to 1.06

*Weighted estimate for the US population.
BMI, body mass index.

The results also show that financial barriers to healthcare access are significantly associated with worse health status, which is consistent with previous studies. Several studies have shown that financial barriers are associated with adverse patient outcomes among patients with

Table 3 The impact of financial barriers on healthcare utilisation among individuals with cognitive impairment

	Home healthcare		Office visits		Hospital stays		ED visits	
	OR*	95% CI*	OR*	95% CI*	OR*	95% CI*	OR*	95% CI*
Financial access barriers								
No	Ref.		Ref.		Ref.		Ref.	
Yes	0.69	0.48 to 0.99	1.02	0.82 to 1.27	1.33	1.19 to 1.48	1.5	1.35 to 1.67
Age								
18–29	Ref.		Ref.		Ref.		Ref.	
30–44	2.52	0.69 to 9.24	1.69	1.11 to 2.58	1.49	1.1 to 2.02	1.24	0.97 to 1.6
45–64	2.31	0.71 to 7.52	2.42	1.66 to 3.51	1.72	1.32 to 2.25	1.16	0.92 to 1.44
≥65	3.36	1.06 to 10.69	2.11	1.46 to 3.05	2.14	1.66 to 2.77	1.07	0.85 to 1.33
Gender								
Female	Ref.		Ref.		Ref.		Ref.	
Male	0.95	0.64 to 1.41	0.92	0.75 to 1.12	1.06	0.95 to 1.18	1.15	1.05 to 1.27
Marital status								
Married	Ref.		Ref.		Ref.		Ref.	
Non-married	1.44	0.93 to 2.23	0.77	0.59 to 1.02	0.89	0.79 to 1.01	0.94	0.84 to 1.05
Race								
Non-Hispanic white	Ref.		Ref.		Ref.		Ref.	
Non-Hispanic black	0.77	0.5 to 1.19	0.89	0.69 to 1.14	1.16	1.02 to 1.32	1.28	1.13 to 1.44
Hispanic	0.76	0.41 to 1.39	0.91	0.65 to 1.28	0.88	0.74 to 1.04	0.96	0.82 to 1.12
Others	1.27	0.53 to 3.03	0.9	0.62 to 1.31	0.89	0.72 to 1.11	1	0.83 to 1.22
Living region								
Northeast	Ref.		Ref.		Ref.		Ref.	
North Central/Midwest	0.88	0.46 to 1.68	1	0.72 to 1.39	0.9	0.76 to 1.07	0.94	0.8 to 1.1
South	0.78	0.45 to 1.33	1.01	0.75 to 1.37	0.85	0.72 to 1	0.86	0.74 to 0.99
West	0.96	0.5 to 1.86	0.71	0.51 to 0.99	0.71	0.59 to 0.86	0.87	0.74 to 1.01
Education								
Below high school	Ref.		Ref.		Ref.		Ref.	
High school graduate	1.01	0.62 to 1.65	0.88	0.67 to 1.16	0.91	0.79 to 1.05	0.86	0.76 to 0.98
Above high school	0.76	0.51 to 1.15	1.18	0.92 to 1.51	1.02	0.9 to 1.16	1.01	0.9 to 1.14
Family income								
<$50 000	Ref.		Ref.		Ref.		Ref.	
$50 000–$99 999	1.42	0.77 to 2.61	0.88	0.67 to 1.16	1.1	0.94 to 1.3	0.91	0.78 to 1.07
≥$100 000	1.5	0.58 to 3.89	1.18	0.92 to 1.51	1.06	0.81 to 1.4	0.99	0.79 to 1.26
BMI								
18.5–24.9	Ref.		Ref.		Ref.		Ref.	
<18.5	0.91	0.42 to 1.98	1.05	0.61 to 1.78	1.26	0.95 to 1.68	0.99	0.76 to 1.29
25–29.9	0.91	0.57 to 1.44	1.06	0.84 to 1.35	1.09	0.95 to 1.24	1.01	0.89 to 1.14
≥30	1.03	0.66 to 1.61	1.82	1.41 to 2.35	1.05	0.93 to 1.2	0.99	0.88 to 1.11
Health insurance								
No	Ref.		Ref.		Ref.		Ref.	
Yes	1.38	0.92 to 2.08	1.72	1.41 to 2.09	1.17	1.05 to 1.31	1.17	1.05 to 1.3

*Weighted percent estimate for the US population.
BMI, body mass index.

diabetes and cardiovascular-related chronic diseases.[25–27] In addition, although there was no significant association between financial barriers to healthcare and doctor visits, our results showed that patients with cognitive impairment were less likely to have home healthcare. However, compared with those without financial barriers, cognitively impaired individuals with the barriers are more likely to have hospital stays and ER visits that are

Table 4 The impact of financial barriers on economic burden among individuals with cognitive impairment

Factors	OR*	95% CI*
Financial access barrier		
No	Ref.	
Yes	1.85	1.65 to 2.07
Age		
≥18 and <30	Ref.	
≥30 and <45	1.35	1.06 to 1.71
≥45 and <65	1.06	0.83 to 1.35
≥65	0.85	0.64 to 1.12
Sex		
Female	Ref.	
Male	1.22	1.09 to 1.37
Marital status		
Married	Ref.	
Non-married	0.44	0.38 to 0.5
Race		
Non-Hispanic white	Ref.	
Non-Hispanic black	0.57	0.46 to 0.72
Hispanic	0.61	0.5 to 0.74
Others	0.51	0.44 to 0.59
Living region		
Northeast	Ref.	
North Central/Midwest	1.01	0.85 to 1.21
South	1.37	1.16 to 1.61
West	1.28	1.06 to 1.54
Education		
Below high school	Ref.	
High school graduate	1.71	1.49 to 1.95
Above high school	1.2	1.05 to 1.36
Family income		
<$50 000	Ref.	
$50 000–$99 999	4.16	3.23 to 5.36
≥$100 000	3.11	2.64 to 3.66
BMI		
<18.5	Ref.	
≥18.5 and <25	1.02	0.89 to 1.15
≥25 and <30	1.08	0.95 to 1.23
≥30	1.34	1.01 to 1.78
Health insurance		
No	Ref.	
Yes	0.86	0.77 to 0.97

*Weighted percent estimate for the US population.
BMI, body mass index.

relatively expensive. Insufficient home healthcare might cause patients to lack basic preventive care and prevent them from detecting cognitive impairment at an early stage, which might lead patients to a more rapid disease progression. Since cognitive impairment diagnosis is based on symptoms, rather than specific biomarkers, there is an importance for seeking preventative care more. In addition, the delay or the lack of preventive care among cognitively impaired individuals may worsen the cognition situation and lead to more expensive healthcare utilisation and a heavier economic burden.[28] Thus, it is important that individuals with cognitive impairment can be detected at an early stage. Policies providing routine free or inexpensive preventive care in screening cognitive function for individuals with financial barriers to healthcare access are critical for cognitively impaired individuals.

Clinicians must consider the patient's financial barriers when deciding on a treatment plan for the patient. The provider could consider using pharmacological treatments with generic options. If patients can afford their medications and treatments, they will be more likely to be adherent to their regimen, which will, in turn, improve the patients' health status.[23] Furthermore, individuals with cognitive impairment typically require a caregiver, which can be costly. If the provider is aware that the patients face financial barriers, the provider can assist in identifying an affordable option, as well as communicate with the caregiver to ensure that the patients are receiving the necessary attention to monitoring their function and syndrome, knowing that the patients are at an increased risk of lower health status.[24] The intervention of the healthcare providers is a crucial first step in mitigating the patient's health status and quality of life when considering their financial barriers.

There is a considerable role in the patients' understanding of the implications that their financial barriers can have on their health status considering that they have cognitive impairment. If the patients are aware that their predispositions put them at a greater risk for the poor health status, they might be more driven to take action on the management of their condition. One controllable aspect for the patient that should be considered is ensuring that their cognitive function is monitored routinely by a healthcare provider. Similarly, if the patients are aware that older age is associated with an increased risk of developing cognitive impairment, they should be aware that the older they get, the more they should be screened for a decline in mental function. Along with ensuring that cognitive impairment is detected early, the patients will then have the opportunity to get treatment earlier, in which they can take immediate action if mild cognitive impairment is suspected. To help cognitively impaired patients, providers, especially physicians, could provide relevant education to patients when they have their routine check-ups. Meanwhile, since the majority of patients with cognitive impairment are elderly, Medicare could provide some free programmes for additional healthcare services to cognitively impaired patients with financial barriers to reduce the likelihood of negative outcomes. At the government level, educational campaigns could also be conducted to help patients understand the associated

negative outcomes of unintended consequences for saving money.

There are some strengths to this study. To our knowledge, this is the first study to examine the trend of financial barriers and the impact of the barriers on health status, healthcare utilisation and economic burden in the cognitive impairment population. In addition, we used the NHIS, a nationally representative dataset, to generate a national estimate, which enhanced the generalisation of the results. This study has some limitations. First, because we used a cross-sectional study, we cannot make a causal inference. In addition, future studies are warranted to identify if the association is unidirectional or bidirectional. Second, our study was subject to recall bias. Finally, the NHIS does not provide data on severity and the stage of cognitive impairment. The impact of financial barriers to healthcare access on individuals with mild and severe cognitive impairment might be different.

CONCLUSIONS

Our research finds that between 2011 and 2017, the prevalence of financial barriers to healthcare among individuals with cognitive impairment decreased. Financial barriers to healthcare worsened the health status and increased ED visits and hospitalisations, along with a heavier economic burden. Policies for cognitively impaired individuals with financial barriers to healthcare access need to be implemented to reduce their financial burden. Policy decision-makers, providers and individuals with cognitive impairment should be aware of the impact of financial barriers and take corresponding actions to reduce the impact.

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