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Authors

Degenholtz, HB
Park, M
Kang, Y
et al.

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Howard B. Degenholtz¹, Mijung Park²,
Yihuang Kang³, and Pamela Nadash⁴

Abstract

Older people with complex health issues and needs for functional support are increasingly living in different types of residential care environments as alternatives to nursing homes. This study aims to compare the demographics and health-care expenditures of Medicare beneficiaries by the setting in which they live: nursing homes, residential care settings, and at home using data from the 2002 to 2010 Medicare Current Beneficiary Study (MCBS), a nationally representative survey of the Medicare population. All Medicare beneficiaries aged 65 years or older who participated in the fall MCBS

¹ Department of Health Policy and Management, Graduate School of Public Health, Center for Bioethics and Health Law, University of Pittsburgh, Pittsburgh, PA, USA

² Department of Health and Community Systems, School of Nursing, University of Pittsburgh, Pittsburgh, PA, USA

³ Department of Information Management, National Sun Yat-sen University, Kaohsiung, Taiwan

⁴ Department of Gerontology, McCormack Graduate School of Policy and Global Studies, University of Massachusetts, Boston, MA, USA

Corresponding Author:

Howard B. Degenholtz, Department of Health Policy and Management, Graduate School of Public Health, Center for Bioethics and Health Law, University of Pittsburgh, 130 DeSoto St, Pittsburgh, PA 15213, USA.

Email: degen@pitt.edu

interview (years 2002–2010) and were alive for the full year ($N = 83,507$) were included in the sample. We found that there is a gradient in health status, physical and cognitive functioning, and health-care use and spending across settings. Minority elderly are overrepresented in facilities and underrepresented in alternative living settings.

Keywords

Medicare, housing, health services use, expenditures, long-term services and supports, health status

Introduction

As the elderly population grows, there is considerable policy and clinical interest in the population with cognitive impairment and physical disability. This tends to be a high-cost, high-utilization group, often with multiple chronic conditions requiring careful clinical management. Although nursing homes have been the default setting for this population, they are widely disliked and expensive. For example, in 2012, a semiprivate room cost an average of US\$81,000 a year (Mature Market Institute, 2012). Consequently, a variety of nursing home alternatives has become increasingly available (consistent with state and federal policies encouraging this trend), including services in the home as well as in “supportive housing” options such as adult foster care, board and care, and assisted living. Thus, it is important for medical professionals to appreciate the range of populations living in these different residential settings and the variability in health-care expenditures that they experience.

Although the growth of residential alternatives to nursing homes as options for elderly people who are not able to live independently has been dramatic, our understanding of this shift and its consequences is incomplete (Wysocki et al., 2012). One factor contributing to this shift has been the efforts of state Medicaid programs that have sought to “rebalance” their spending on long-term services and supports (LTSS) away from nursing homes toward home- and community-based options. These programs grew from 2.1 million participants in 2000 to 3.2 million in 2010 (Ng, Harrington, Musumeci, & Reaves, 2014). Most studies have examined only one or two settings (e.g., community dwelling, assisted living, or facility only; Amaral, 2010; Caffrey et al., 2012; Frytak, Kane, Finch, Kane, & Maude-Griffin, 2001; Kane, Homyak, Bershadsky, Flood, & Zhang, 2004; Zimmerman, Sloane, & Reed, 2014) been focused on a single state (Frytak et al., 2001),

fail to distinguish among residential settings (Jacobson, Neuman, & D'amico, 2010), or rely on relatively limited data (Harris-Kojetin, Sengupta, Park-Lee, & Valverde, 2013; The SCAN Foundation, 2012). Others have focused on residential settings that meet particular regulatory requirements (Caffrey et al., 2012). Spillman and Black (2006) examined the size and characteristics of the residential care population using the 2002 MCBS but did not look at health-care spending.

This study uses the Medicare Current Beneficiary Study (MCBS) to provide a national, longitudinal analysis of health status and health-care use among the elderly, comparing across different living arrangements. The data set enables us to provide information on health-care expenditures unavailable from other sources, combined with detailed information about health status and functional ability.

Method

The data for this pooled cross-sectional study are from the 2002 to 2010 MCBS cost and use files. The MCBS is a nationally representative rotating-panel survey of aged, disabled, and institutionalized Medicare beneficiaries sponsored by the Centers for Medicare and Medicaid Services (CMS), which provides a detailed description of the data collection methodology (CMS, 2014). The stratified, three-stage area probability sample represents the Medicare population as a whole and within age-groups and contains interview data that are linked to Medicare claims files. Each participant is followed for up to 4 years. However, the cost and use files omit data from the first year of participation. Each fall, community-dwelling Medicare beneficiaries are interviewed in their homes about their health status and health-care experiences (referred to as a “community” interview). For the fall interview, Medicare beneficiaries’ institutional settings do not have an in-person interview: A separate “facility” interview is conducted with a representative of their residence. Although the survey instrument parallels the in-person interview, responses are drawn from the beneficiary’s medical record and the representative’s assessment. Our analytic sample included all beneficiaries aged 65 years or older who participated in the fall interview and were alive for the full year ($N = 83,507$). When analyzing medical expenditures, we excluded Medicare Advantage members because their claims data are not available. Overall MCBS response rates (over the years) range from 69.5% to 71.4%. This study was approved by the University of Pittsburgh institutional review board.

Study Variables

Housing type. We grouped individuals into three types of housing based on how they described their place of residence at the time of the fall interview: community, community plus services, or nursing home. The community plus services setting was broadly defined to distinguish people living in their own homes from those living in places that provide LTSS. Data from both the community and the facility interviews were used to group cases using two interview items: whether or not their personal care was available (in the community interview) and facility description (in the facility interview). Respondents in the community interview who described their housing as a retirement community, senior citizens housing, assisted living, continuing care community, stages living community, retirement apartment, church-provided housing, or a personal care home were asked whether the place where they lived had any of the following personal care services available: personal care, prepared meals, cleaning, laundry, medication assistance, transportation, or recreation. These individuals were considered to be living in “community plus services.” All other respondents living in the community were classified as community. Second, respondents in the facility interview were asked to describe the place where they lived. Respondents living in places described as assisted living, board and care, personal care home, domiciliary care, rest home, adult or group home, or a retirement community were considered community plus services. Finally, people living in a nursing home, rehabilitation facility, hospital, or mental health/mental retardation facility were considered to be living in a nursing home.

Physical and cognitive function. As a measure of physical function, we constructed a count of basic activities of daily living (ADLs) and instrumental activities of daily living (IADLs) where the beneficiary received assistance or supervision. Measurement of ADLs tasks was identical in the community and facility interviews, which used walking, dressing, toileting, eating, and bathing. Respondents could have 0–5 ADL needs. However, the only IADLs items collected in common across the two types of interviews were using the telephone, paying bills, and making purchases. The range for this item was 0–3. These variables were combined to create a single index that captures no difficulty, limitation in 1–2 IADLs, limitation in 1–2 ADLs, or limitation in 3 or more ADLs. Mobility difficulty was measured using a subset of 5 items from the Nagi (1976) scale that were included in the MCBS: difficulty stooping or kneeling, lifting, reaching, grasping or writing, or walking a quarter mile. The individual items range from 1 (*no difficulty*) to 5 (*unable*)

to perform the task). The summary score was rescaled to a 1–5 range. To address cognitive function, we summed 3 items that were measured for both samples: memory loss, trouble making decisions, or a diagnosis of Alzheimer's disease or other dementia. Although this cognitive impairment score could theoretically range from 0 to 3, preliminary analysis found that there were no nursing home residents with both high levels of cognitive impairment and no IADLs limitations. Thus, to avoid computational problems, we recoded the score as 0, 1, 2, or higher.

Sociodemographics. Respondent age is reported in years and converted to *z* score for multivariate analysis. As measures of poverty and access to care, we include indicators for any Medicaid enrollment throughout the year and annual income lower than US\$25,000. Educational attainment was coded as a dichotomous variable where 1 = *high school completion or greater*. In addition, we include an indicator for living in a metropolitan statistical area. Race and ethnicity were coded as non-Hispanic White, non-Hispanic African American, Hispanic, Asian or Pacific Islander, and other (including American Indian, multiple races).

Health status. For ease of interpretation, we dichotomized the single-item measure of health-related quality of life (How would you rate your health compared to others your age?) as “excellent or very good” versus “good, fair, or poor.” Each year of the MCBS survey, subjects are asked whether they had been told by a physician that they had any chronic diseases using a list of options. We calculated the count of 13 diseases collected consistently for all study years in both the community and facility interviews: high blood pressure, myocardial infarction, coronary heart disease, stroke, skin cancer, other forms of cancer, diabetes, rheumatoid arthritis, osteoarthritis, osteoporosis, hip fracture, Parkinson disease, and emphysema/chronic obstructive pulmonary disease. The existence of each of these disease conditions was assessed by single-item question “Have you ever been told that you have (name of the condition)?” The count variable was top coded at four chronic diseases since the frequency in each category gets sparse at higher levels.

Medical use and expenditures. Only full year fee-for-service Medicare beneficiaries are analyzed due to the lack of medical care use and cost data available for individuals enrolled in managed care plans (Medicare Advantage). For fee-for-service enrollees, we examined total annual medical care expenditures from all payment sources (e.g., Medicare, Medicaid, Veterans Affairs, and private plans). A secondary analysis was conducted using just

Medicare expenditures. We used the personal health-care index published by the CMS Office of the Actuary to adjust health-care spending to US\$2010 (Agency for Healthcare Research and Quality, 2015; CMS, 2013).

Analysis

We report descriptive and bivariate statistics that are weighted to represent the population of aged Medicare beneficiaries alive for the entire year. Data from years 2002 to 2010 were combined to create a pooled cross-sectional analysis. As noted earlier, the same individuals can appear in up to three consecutive years of the MCBS cost and use files. The descriptive analysis of housing type treated each year of data as a separate cross-sectional analysis, weighted to represent the population of Medicare beneficiaries that year. There was a small amount of missing data (<5% of observations). The descriptive results were calculated for the full sample, and listwise deletion was used for multivariate analysis.

To facilitate comparison of health care spending across settings and by levels of physical function, we estimated a multivariate regression model that adjusted for covariates described earlier. The analysis of health-care spending was conducted two ways. First, using survey weights and second using repeated measures. The results were consistent, hence only the weighted analysis is presented. The predicted mean expenditures were computed at the means of the covariates for the population. All analyses were conducted using Stata SE 13.1 (2013).

Results

Figure 1 shows the growth in community-based alternatives to institutional care from 2002 through 2010 and illustrates the shift that has taken place over this time period. Although the overall proportion of older people living in community plus services settings increased modestly, from about 4.17% to 4.61%, the proportion living in nursing homes decreased considerably, from 4.06% to 2.74%. Overall, despite an increase of roughly 3.6 million in the elderly population over this time period, the number of nursing home residents declined by about 300,000.

In Table 1, differences among populations in the different settings are shown. Nursing home residents are generally older and have a higher prevalence of poverty than those living in other settings. They are also much more likely to be enrolled in Medicaid, with 73% of the nursing home residents

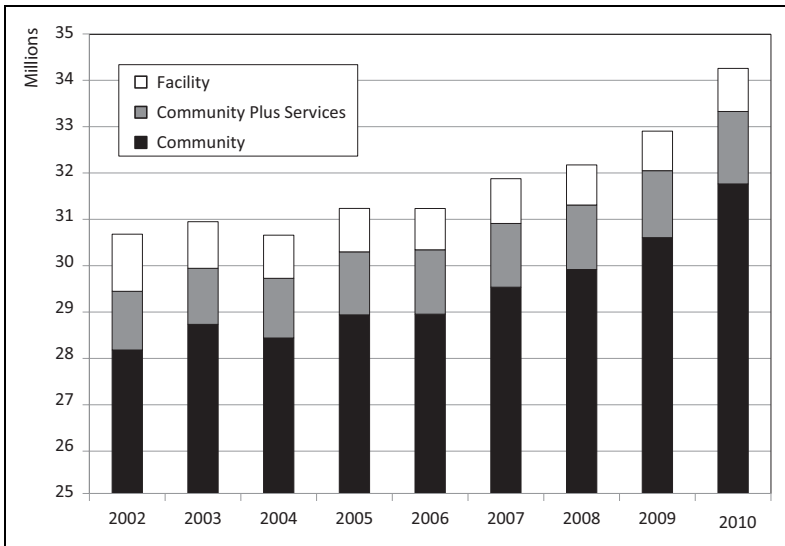


Figure 1. Population of elderly Medicare beneficiaries by type of housing (2002–2010).

enrolled, compared to 22% of the community plus services group and only 12% of the community only group. Nursing homes are about 82% Caucasian and 11% non-Hispanic Black. Racial and ethnic minorities appear to be underrepresented in the community plus services category, making up 11% of this category compared to 20% of people living in the community and 18% of those in nursing homes. Indicators of health and functional status showed that nursing home residents are more impaired than those in other settings, and they are also significantly more likely to have high levels of ADLs and IADLs needs, to not be cognitively intact, and to have higher mobility needs, and are less likely to have excellent health-related quality of life: Only 10% of institutional residents rated their health as excellent, while 38% of the community plus services group and nearly half (47%) of community residents did. However, nursing home residents were less likely to have multiple comorbidities than those in other settings were. Those living in the community and the community plus services group had similar patterns of comorbidity, with over half having three or more chronic conditions, compared to about a third of the nursing home residents.

Health-care expenditures differed significantly among the three settings. Those in the community plus services group had about 40% higher medical expenditures than the community residents had—US\$21,259 compared to

Table 1. Demographics and Health Status of the Elderly Medicare Beneficiaries by Type of Housing (2002–2010).

	All (N = 83,507)	Community (n = 74,266)	Community Plus Services (n = 4,282)	Nursing Home (n = 4,959)
Age	76.4	75.9	82.0	84.1
Gender (female)	58%	56%	71%	73%
Race				
Non-Hispanic White	81%	80%	89%	82%
Non-Hispanic Black	8%	8%	6%	11%
Hispanic	7%	8%	3%	5%
Asian/Pacific Islander	2%	2%	1%	1%
Other	2%	2%	1%	1%
Low income ($\leq 25,000$)	53%	51%	61%	85%
Medicaid	15%	12%	22%	73%
Physical function				
No limitations	77%	80%	56%	3%
1–2 IADLs only	9%	9%	16%	4%
1–2 ADLs limitations	7%	7%	15%	16%
3 or more ADLs limitations	7%	4%	13%	76%
Mobility difficulty	2.01	1.93	2.41	3.73
Health-related quality of life	45%	47%	38%	10%
Cognitively intact	84%	87%	65%	11%
Comorbidities (≥ 4)				
None	7%	7%	9%	16%
One	16%	16%	16%	25%
Two	23%	23%	21%	26%
Three	23%	23%	22%	18%
Four or more	31%	32%	33%	15%

Note. Sample $N = 83,507$. Weighted sample represents a population of approximately 28.6 million elderly Medicare beneficiaries pa. Cognitively intact means no problems with memory, decision making, and no diagnosis of Alzheimer's disease or other dementia. Mobility difficulty measured from 0 to 5, where 0 is no difficulty and 5 is unable to perform bending, reaching, grasping, stooping, or walking. Health-related quality of life defined as excellent or very good versus good, fair, or poor. Actual sample sizes for variables with missing data: physical function ($n = 80,259$), race (83,393), mobility difficulty (82,666), cognitive function (83,105) and health-related quality of life (82,910). ADLs = activities of daily living (bathing, dressing, toileting, walking, and eating); IADLs = instrumental activities of daily living (telephoning, shopping, and paying bills).

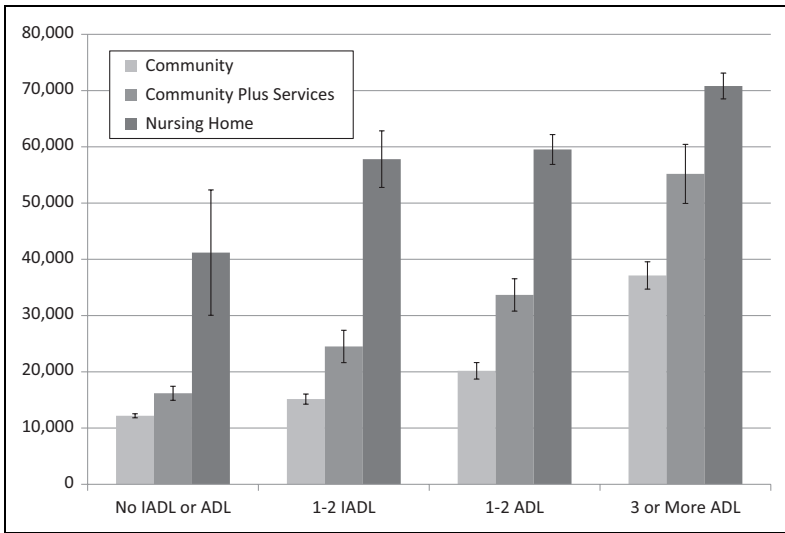


Figure 2. Adjusted annual expenditures by type of housing and physical function. Adjusted for age, gender, race, Hispanic ethnicity, low income, Medicaid, physical function, mobility difficulty, health-related quality of life, cognitive function, and count of chronic conditions.

US\$14,963—while the nursing home residents had vastly higher expenditures at US\$44,383. Figure 2 presents the adjusted total expenditures by setting and level of physical function. At every level of physical function, there is a gradient in spending across the three types of settings. Within each type of setting, physical function is associated with higher levels of spending. In a subanalysis of just Medicare expenditures, the same pattern emerges, with nursing home residents costing an average of US\$13,240, community plus services US\$10,589, and community residents costing US\$9,085.

Discussion

Over the period from 2002 to 2010, the elderly Medicare population grew by an estimated 11.8%. During this time, the number and percentage living in facilities declined moderately, while the population living in community settings that provide personal care services increased slightly. As anticipated, there is a gradient in health status and function across settings: Facilities serve with the poorest health and the most significant impairment, and community plus services are intermediate and the community sample is the

healthiest and least impaired. There is also a socioeconomic gradient: Facilities serve the poorest as well as the highest proportion of non-Hispanic African Americans. However, there is a dramatic racial and ethnic disparity in the use of community plus services, with only 11% from minority groups in this type of setting compared to 18–20% in community and nursing homes. These findings suggest that minority older adults, especially non-Hispanic African Americans and Hispanic, are less able to remain in their preferred setting when faced with clinical needs and functional disabilities, and when they do, they do so with fewer formal services and supports.

Substantial differences in health-care expenditures emerged across housing type and across levels of functional limitation. People living in community plus services type settings have 1.4 times higher average total expenditures than people living in the community, while those in facilities generate 3.1 times as much spending. However, health-care expenditures for nursing home residents covered by Medicaid (73% of all nursing home residents in this study) include the cost of accommodations as well as medical care, whereas the cost of accommodation is not included for people living in other settings. We therefore conducted a subanalysis of just Medicare expenditures to focus on spending for ambulatory, acute, and postacute care. In this analysis, people living in the community and those in community plus services had similar levels of Medicare only expenditures (US\$9,085 and US\$10,589, respectively), while nursing home residents had an average of US\$13,240. This suggests that the higher level of total spending for the community plus services group is due to services covered by Medicaid, out of pocket, and other sources.

Our findings are consistent with recent reports by the U.S. Census and others (65+ in the United States: 2010) which found that from 2000 to 2010, the number and proportion of elderly living in facilities declined while the overall population of elderly grew. Caffrey et al., (2012) reported similar rates of Medicaid use among people living in community plus services settings. Their estimate of the number of people living in state-licensed residential care facilities (RCFs) is lower than ours, likely due to our use of a broader definition of such settings. Similarly, we used a more inclusive definition of community plus services than Spillman and Black (2006), leading to a higher estimate of the proportion of elderly living in these settings. Specifically, in contrast to Spillman et al., we based our definition of community plus services on the description of the facility, whereas Spillman excluded RCFs that had any certified beds (i.e., only facilities with no certified beds were considered RCFs). Our definition is therefore broader, but no more heterogeneous, and our findings with regard to health-related quality of life and physical function are comparable.

This study has several important implications. First, policy makers and health-care providers should be alert to the high level of health-care expenditures among elderly living in community plus services settings. This is a growing segment of the elderly population with substantial levels of physical and cognitive disability as well as acute needs. Further research is needed to examine the factors associated with hospitalization and other medical care in this population, and whether appropriate care—in particular, sufficient preventive care, postacute care, and chronic disease management—is being provided in these comparatively unregulated settings. These settings, which range from senior apartment buildings to continuing care retirement communities, vary in the medical sophistication of the staff. High levels of cognitive impairment among residents raise particular concerns regarding the ability of providers to adequately care for this challenging population.

Several limitations should be noted. Our estimate of the size of the elderly population is slightly lower than the 2010 U.S. Census, most likely because we excluded people who die during each year. The MCBS collects health status data during the fall interview. Thus, people who were not alive throughout the entire year were not included in this component of the data collection. In addition, the MCBS sample does not represent people who are ineligible for Medicare. Those who become eligible during a calendar may be included in the MCBS but are not interviewed and are excluded from this study. Our definition of community plus services is broader than that used by other researchers. This is because we relied on the description of the place, rather than whether the facility had certified beds. Since it is not possible to determine whether an individual respondent is in a certified bed or not, we treated people living in places described as “retirement communities” as being in a community plus services setting even if some beds were Medicare, Medicaid, or state licensed. The lower comorbidity rate among nursing home residents is likely due to the way nursing facilities are paid under state Medicaid and Medicare case-mix adjustment programs, which are based on physical function and rehabilitation potential, rather than on residents’ medical conditions (Feng, Grabowski, Intrator, & Mor, 2006). This payment method reduces incentives to thoroughly document diagnoses, compared to hospital settings. In addition, Alzheimer’s disease and other dementias are highly prevalent but not included in the comorbidity variable (but included in the “cognitively intact” item). Some MCBS participants may appear in more than 1 year of data. To account for the possibility that repeated observations on the same individuals might bias the findings, we reestimated the expenditure model using a cross-sectional time series model. The estimate of overall expenditures was slightly higher (within about 6%), but the pattern of difference

by setting and physical function was consistent. We restricted the sample to people who were alive and covered by Medicare for the full calendar year. This can introduce a healthy survivor bias. On average, 26.5%, 7.2%, and 4.1% of participants die each year in nursing home, community plus services, and community settings, respectively. A secondary analysis of monthly Medicare expenditures found that decedents in nursing homes, community plus services, and community settings were 2.2, 4.3, and 5.8 times more expensive than survivors. A full exploration of the factors associated with expenditures during the last year of life in different long-term care settings is an important avenue for future research (Jacobson et al., 2010). This study was not able to observe preferences for living arrangements. Although it is widely assumed that most people prefer to live in community settings, a recent study by Guo, Konetzka, Magett, and Dale (2015) found that the preference for home care over institutional care in a predominantly African American sample declined with increasing levels of physical disability. Finally, the MCBS does not consistently capture use of or spending on supportive services, such as personal care, that are not covered by Medicare. Thus, we were unable to identify whether individuals in the community or community plus services settings, such as personal care, receive such services (e.g., through Medicaid home and community-based services waivers, state-financed programs or out of pocket).

Conclusion

Recent changes in policy and individual preference have resulted in a shift away from nursing homes among older people needing supportive services. This study shows the extent of this shift in the elderly Medicare population and highlights the range of alternative residential settings that have evolved to serve them as well as the health and functional status of those living in these settings. The well-established status of the nursing home within our health-care system means that medical professionals understand well the population and their medical needs. However, the nursing home population has changed, becoming smaller (both in number and in proportion), sicker, and poorer, compared to other elderly people with support needs. Moreover, individuals who previously received care in a nursing home may now be living in an alternative residential setting. Assuring the ongoing, quality care for these at-risk populations is becoming ever more complex yet remains essential.

Declaration of Conflicting Interests

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Author Biographies

Howard B. Degenholtz, PhD, is associate professor in the Department of Health Policy and Management in the Graduate School of Public Health at the University of Pittsburgh. His research examines cost, use and quality of life in long-term care. Email: degen@pitt.edu

Mijung Park, PhD, is assistant professor in the Department of Health and Community Systems in the School of Nursing at the University of Pittsburgh. Her research focuses on caregiving, mental and medical comorbidities in later life. Email: mpark@pitt.edu

Yihuang Kang, PhD, is assistant professor in the Department of Information Management at the National Sun Yat-sen University, Taiwan. His research focuses is on machine learning. At the time this research was conducted he was a research associate in the Division of Geriatrics in the School of Medicine at the University of Pittsburgh. Email: ykang@mis.nsysu.edu.tw

Pamela Nadash, PhD, is associate professor in the Department of Gerontology in the McCormack Graduate School at University of Massachusetts Boston. Her work centers on policies that enable people with long-term care needs to live in the community. Email: pamela.nadash@umb.edu