

Caregiving for Older Adults with Obesity in the United States

Claire K. Ankuda, MD, MPH,^{*†} John Harris, MD, MS,[‡] Katherine Ornstein, PhD, MPH,[§]
Deborah A. Levine, MD, MPH,^{||#**††} Kenneth M. Langa, MD, PhD,^{##*†††}
and Amy S. Kelley, MD, MSHS[§]

OBJECTIVES: To determine the difference in receipt of activity of daily living (ADL) assistance between obese and normal-weight older adults.

DESIGN: Retrospective cohort study.

SETTING: National Health and Aging Trends Study, 2011–2015.

PARTICIPANTS: U.S. adults aged 65 and older with ADL disability and a body mass index (BMI) of 18.5 kg/m² or greater (N = 5,612)

MEASUREMENTS: BMI was classified as normal weight (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²), or obese (≥30.0 kg/m²). Primary outcome was self-reported receipt of help with specific ADLs. Models were adjusted for demographic characteristics (age, sex, race), degree of need (self-reported general health, severity of disability), household resources (income, marriage, people in household, number of children), and cognitive status (dementia, proxy respondent).

RESULTS: Obese with disabilities had lower rates of receiving assistance with walking inside (odds ratio (OR) = 0.63, 95% confidence interval (CI) = 0.50–0.81), walking outside (OR = 0.76, 95% CI = 0.59–0.97), toileting (OR = 0.68, 95% CI = 0.52–0.89), and getting in and out of bed (OR = 0.67, 95% CI = 0.50–0.87) than normal-weight older adults after adjustment for respondent demographic characteristics. Level of need and cognitive status partially explained the associations. In fully adjusted models, older adults with obesity still had significantly

lower odds of receiving assistance in getting in and out of bed than normal weight adults (OR = 0.69, 95% CI = 0.49–0.98).

CONCLUSION: Older adults with obesity are less likely to receive assistance for ADL disabilities than their normal-weight counterparts—an important concern because of ongoing demographic changes in the United States. *J Am Geriatr Soc* 65:1939–1945, 2017.

Key words: obesity; caregiving; disability; aging

In the coming decades, there are troubling medical, societal, and economic implications in the increasing prevalence and absolute number of older adults with obesity. From 2000 to 2014, the prevalence of obesity in adults aged 60 and older in the United States rose from 30.5% to 37.7%.¹ At the same time, the projected growth in numbers of older adults in the United States, from 46 million in 2014 to 74 million in 2030, suggests that the number of older adults with obesity will continue to grow significantly.² The costs of health care and caregiving for disabled older adults with obesity in the Baby Boomer generation is estimated at \$68 billion for long-term care alone.³ One of the many challenges of these changing demographic trends is that older adults with obesity have higher rates of disability than their normal-weight counterparts and the prevalence of disability in this population is increasing over time,^{4–7} yet little is known about the particular barriers to caregiving and assistance with disabilities that older adults with obesity and disability face.

Obesity makes things difficult for caregivers by making it more difficult to provide assistance with mobility, skin care, and personal hygiene to people with activity of daily living (ADL) impairments.⁸ In the inpatient setting, morbidly obese individuals require a mean of 4.5 individuals to assist them with walking, as opposed to 1.9 individuals for nonobese adults.⁹ Similar work has demonstrated greater personnel needs for care of obese adults in nursing homes.^{10–13} Obesity has been linked to high rates of musculoskeletal injuries in nurses and

From the *Robert Wood Johnson Foundation Clinical Scholars Program;

[†]Department of Family Medicine, School of Medicine, University of Michigan, Ann Arbor, Michigan; [‡]Department of Obstetrics, Gynecology, and Reproductive Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania; [§]Brookdale Department of Geriatrics and Palliative Medicine, Icahn School of Medicine at Mount Sinai, New York City, New York; ^{||}Department of Neurology; [#]Department of Internal Medicine, School of Medicine, University of Michigan; ^{**}Veterans Affairs Center for Clinical Management Research; ^{††}Institute for Healthcare Policy and Innovation; and ^{‡‡}Institute for Social Research, University of Michigan, Ann Arbor, Michigan.

Address correspondence to Claire K. Ankuda, RWJF Clinical Scholars Program at the University of Michigan, 2800 Plymouth Road, Building 10- Room G016, Ann Arbor, MI 48109. E-mail: cankuda@umich.edu

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nursing assistants¹⁴; these rates are surpassed only by those of firefighters, psychiatric aides, and waste collectors in the United States.¹⁵

The absence of appropriate levels of assistance is a possible explanation for the association between obesity and lower quality of care at home for disabled adults. People with obesity are more likely to be admitted to a nursing home¹⁶⁻¹⁹ and more likely to fall.²⁰ It is unclear whether people with obesity in all care settings receive the same amount of assistance with ADL difficulties as normal-weight older adults. A single study demonstrated that obese adults of all ages with disability had lower rates of paid help than nonobese adults, but differences in the younger age of the disabled obese people explained this association, and the analyses did not examine individual types of disability deficits.²¹

It was hypothesized that there may be several reasons that older adults with obesity receive less assistance with ADLs such as bathing, dressing, walking, and toileting than normal-weight adults (Figure 1). First, they may have barriers to receiving the assistance they need. Obese disabled individuals, who are generally younger than normal-weight disabled individuals, may have fewer nonworking family members and may be less likely to ask for assistance. Difficulty providing assistance, especially with physically demanding caregiving such as mobility and personal care, may make it more difficult to find an available, qualified, capable caregiver than for a similar normal-weight individual.²² Personal factors such as poverty²³ or the absence of factors such as dementia²⁴ may make accessing assistance more difficult or less preferred. Stigma surrounding obesity may make it more difficult to request assistance, and potential caregivers may have a bias against helping obese adults needing assistance because they are seen as less frail and more capable of caring for themselves.²²

Alternatively, older disabled adults with obesity may have less need for assistance than their normal-weight counterparts. The nature (type or severity) of the disabilities that obese people have may allow them to better compensate and so require less assistance. Given the younger age of onset of disability for obese adults, they may be physically healthier with less comorbid neurological disease, allowing them to manage mild disability with more independence.⁷ The goal of the current study was therefore to assess the differences in receipt of assistance for ADL impairments between normal-weight and obese older adults and to explore the mediating pathways leading to these differences.

METHODS

Data

Survey data from the annual survey waves of the National Health and Aging Trends Study (NHATS), a nationally representative study of Americans aged 65 and older, from 2011 to 2015 were used.²⁵ NHATS relies on the Medicare enrollment database as its sampling frame and, in 2011, enrolled 8,245 adults, achieving response rates from 71% in 2011 to 90% in 2014.²⁶ NHATS conducts annual in-person surveys with proxy respondents if the participant is unable to respond. The cohort was refreshed in 2015 to maintain representativeness. All NHATS data used were deidentified, and all respondents provided informed consent under procedures that the Johns Hopkins institutional review board approved.

Cohort

Any observation in which the respondent reported any difficulty, despite accommodations (e.g., using devices such as walkers and grab bars), in performing ADLs (dressing,

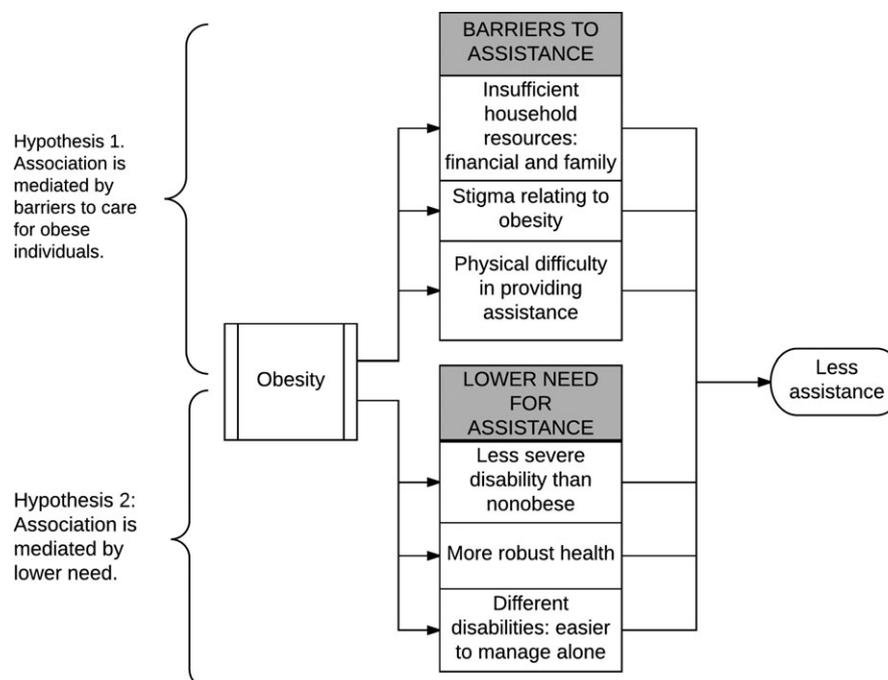


Figure 1. Hypotheses for association between obesity and lower rates of assistance.

eating, bathing, toileting, walking inside, walking outside, getting in and out of bed) was included. Observations missing covariate data were excluded. Individuals with a BMI of less than 18.5 kg/m² were excluded because of potential reverse confounding, seeing as underweight individuals have higher levels of underlying illness and mortality risk.²⁷

Measures

NHATS assesses several measures of ADL performance to consider a spectrum of disability and participation restriction.²⁸ The primary dependent variable was participant-reported receipt of assistance for an ADL that they had any level of difficulty performing, for example, the rate of reporting assistance with bathing for all those who reported difficulty bathing. The primary independent variable was BMI, classified as normal weight (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²), or obese (≥ 30.0 kg/m²) using World Health Organization classifications.

Covariates included proxy respondent status, age, sex, race and ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), self-reported general health (excellent, good, average, below average, poor),²⁹ self-reported cancer and dementia diagnoses, total household income, marital status (married or not), number of people in the household, and number of living children. In addition, the level of difficulty that respondents reported in performing each ADL on a 3-point scale (a little, some, a lot of difficulty) was included.

Analysis

Demographic characteristics and prevalence of medical comorbidities for those in the cohort were reported classified according to BMI as normal weight, overweight, or obese, and chi-square and t-tests were used to determine significant differences between BMI groups. The prevalence of specific ADL disabilities for all individuals in each BMI group were then compared.

Multivariable logistic regression models were used to determine the association between BMI class and odds of receiving assistance with a specific ADL for those reporting disability in that ADL and the effect of potential mediating factors and confounders on the overall association. The initial model was unadjusted. Clusters of potential mediator covariates were sequentially added in further models. Mediators were determined from the hypothesized theory and prior evidence regarding the role of demographic characteristics, stigma, household resources, and physical challenges in caregiving (Figure 1). The second model adjusted for age, race, and sex. Covariates that assess the severity of need for assistance, including general health and level of difficulty with performing the impaired ADL, were added in the third model. Covariates that assess personal resources, including total household income, marital status, number of people in the house, and number of children were added in the fourth model. Covariates that assess cognitive status and whether the respondent was a proxy were added in the fifth model. With each added cluster of variables, the odds ratio capturing the association of obesity with receipt of assistance was assessed for

statistical significance and effect size compared to the prior model.

Survey weights³⁰ were applied in all models, and sampling strategy was accounted for. Sensitivity analyses included a hierarchical mixed-effects model to account for repeated measures for individuals, as well as modeling BMI as a fractional polynomial to allow it to be a continuous variable with flexibility of shape in relation to receipt of assistance. In addition, some alternative approaches were used to quantify the relative mediation effects of variable clusters. First, the coefficients were standardized without survey weights applied, and then the indirect effects were computed as the product of the coefficients. Finally, bootstrapping was used to compute standard errors of the indirect effects of covariates and direct effect of BMI class.³¹ The University of Michigan institutional review board assessed this study and determined that it was exempt from review.

RESULTS

Between 2010 and 2015, there were 11,359 observations of NHATS respondents reporting difficulty despite accommodations in performing any ADLs. Four hundred thirty-six observations (3.8%) missing BMI measurement for the individual during the current or prior survey wave, 375 observations (3.4%) with underweight BMI, and 13 observations with missing covariates (1.0%) were excluded. The final cohort was 10,535 observations of 5,639 individuals, given that some (2,440) individuals were followed for multiple survey waves.

Demographic characteristics and comorbidities varied between individuals in different BMI classes (Table 1). Obese adults were younger, more likely to be female, more likely to be Hispanic or non-Hispanic black, less likely to report excellent or very good health, and less likely to have a proxy respondent than normal-weight individuals (all $P < .05$). Obese individuals had different comorbidities than normal-weight adults, with lower rates of dementia but higher rates of heart disease, hypertension, and diabetes mellitus.

Figure 2 demonstrates the rates of specific ADL disabilities in adults aged 65 and older with BMI measurements collected by NHATS. Obese older adults reported higher rates of any ADL disability (39.7%) than overweight (28.3%) and normal-weight older adults (31.2%). Rates of disability in eating and toileting were similar, but obese adults reported higher rates of difficulty getting in and out of bed (21.9% vs 15.30% of normal-weight older adults), walking inside (17.3% vs 13.6%), dressing (17.3% vs 13.0%), and walking outside (15.5% vs 10.8%).

In the initial unadjusted logistic regression model (Table 2), obese older adults with difficulty walking inside had have the odds of receiving assistance (odds ratio (OR) = 0.50, 95% confidence interval (CI) = 0.41–0.60) as those who were normal weight. Obese older adults with disability had lower rates of assistance in walking outside (OR = 0.57, 95% CI = 0.47–0.69), toileting (OR = 0.58, 95% CI = 0.46–0.73), getting in and out of bed (OR = 0.61, 95% CI = 0.49–0.77), bathing (OR = 0.61, 95% CI = 0.48–0.77), and eating (OR = 0.64, 95%

Table 1. Baseline Characteristics of Adults Aged 65 and Older with Activity of Daily Living Disability Included in the Cohort

Characteristic	%			P-Value
	Normal Weight, n = 1,919	Overweight, n = 1,948	Obese, n = 1,772	
Age				
65–69	14.3	21.2	32.5	<.001
70–74	17.9	20.7	27.7	
75–59	15.7	22.3	19.5	
80–84	21.6	17.0	11.5	
85–89	17.6	12.4	6.4	
≥90	13.0	6.5	2.4	
Sex				
Male	38.6	47.9	37.6	<.001
Female	61.4	52.1	62.4	
Race				
Non-Hispanic white	77.1	78.2	74.4	<.001
Non-Hispanic black	7.7	8.5	11.9	
Hispanic	7.4	7.8	9.0	
Other	7.8	5.5	4.7	
Self-reported health				
Excellent	5.6	7.1	2.8	<.001
Very good	19.8	21.4	18.0	
Good	33.0	35.1	35.3	
Fair	27.9	26.6	30.9	
Poor	13.7	9.9	13.1	
Proxy responder	13.7	8.5	4.8	<.001
Medical conditions				
Dementia	12.5	8.1	4.5	<.001
Heart disease	23.3	22.0	25.6	.04
Hypertension	62.9	71.7	81.1	<.001
Diabetes mellitus	18.9	29.2	45.6	<.001
Osteoarthritis	31.4	24.7	22.3	<.001
Lung disease	19.4	18.5	24.2	.001
Cancer	21.4	21.8	20.8	.81

Group percentages weighted according to National Health and Aging Trends Study analytical weights.

CI = 0.47–0.86). There was no significant difference in assistance for those with difficulty dressing (OR = 1.06, 95% CI = 0.89–1.25).

Clusters of covariates were sequentially added to the model to test the mediating role of different factors described in the conceptual model (Table 2). Adjusting for demographic differences between obese and normal-weight individuals (age, race, sex) reduced the association between obesity and assistance, although there were still significant differences in assistance with all ADLs other than bathing and eating. Adding covariates for degree of need, which included general health and severity of disability, reduced the association between obesity and assistance walking outside (from OR = 0.76 in prior model to 0.85). Adding covariates for home resources, which included total income, marital status, number of people in household, and number of children, did not change the association between obesity and assistance. Adding covariates for cognitive status (dementia and proxy respondent) reduced the association between obesity and several ADLs to the degree that they were no longer statistically significant: assistance for walking inside (OR = 0.64 in prior model, 0.78 when adjusting for cognitive status), toileting (OR = 0.64 in prior model, 0.76 when adjusting for cognitive status). The association with getting in and out of bed remained statistically significant (OR = 0.59 in prior model, 0.69 when adjusting for cognitive status, 95% CI = 0.49–0.98).

Additional attempts to assess for mediation in this logistic regression model found that BMI had a significant direct effect on help walking inside and getting out of bed, despite full adjustments, and that cognitive status and demographic characteristics had the greatest mediating effects on the association (Table S1). To account for repeated observations, the full model was tested using a hierarchical modeling approach, and results did not differ (results not shown). To account for the range of BMIs as opposed to the standard categorization, BMI was modeled as a fractional polynomial while adjusting for all covariates including age. In these models, there were decreasing rates of assistance for walking inside, walking outside,

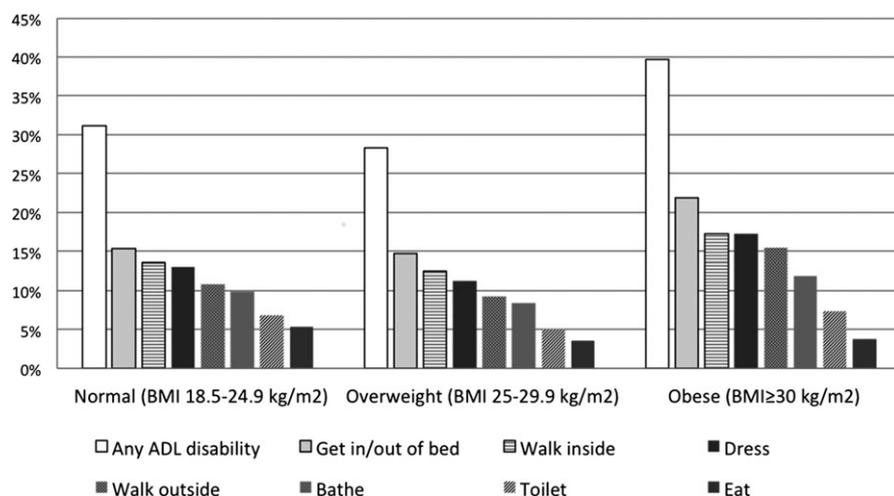


Figure 2. Prevalence of specific activity of daily living (ADL) disabilities in adults aged 65 and older according to body mass index (BMI).

Table 2. Odds of Receipt of Assistance with Specific Activity of Daily Living Impairments According to Body Mass Index Classification (Reference Normal Weight)

Model	Odds Ratio (95% Confidence Interval)	
	Overweight	Obese
Model 1: Unadjusted		
Walking inside	0.57 (0.48–0.68)	0.50 (0.41–0.60)
Walking outside	0.74 (0.62–0.89)	0.57 (0.47–0.69)
Toileting	0.79 (0.62–1.01)	0.58 (0.46–0.73)
Getting in and out of bed	0.67 (0.55–0.81)	0.61 (0.49–0.77)
Bathing	0.70 (0.57–0.84)	0.61 (0.48–0.77)
Eating	0.72 (0.56–0.92)	0.64 (0.47–0.86)
Dressing	0.84 (0.69–1.03)	1.06 (0.89–1.25)
Model 2: Adjusted for age, race, and sex		
Walking inside	0.63 (0.51–0.77)	0.63 (0.50–0.81)
Walking outside	0.83 (0.68–1.01)	0.76 (0.59–0.97)
Toileting	0.89 (0.65–1.21)	0.68 (0.52–0.89)
Getting in and out of bed	0.71 (0.59–0.86)	0.67 (0.50–0.87)
Bathing	0.85 (0.69–1.05)	0.91 (0.69–1.21)
Eating	0.77 (0.59–1.00)	0.73 (0.52–1.03)
Model 3: Adjusted for covariates from model above plus covariates for degree of need: general health and severity of disability		
Walking inside	0.65 (0.51–0.82)	0.65 (0.50–0.85)
Walking outside	0.87 (0.68–1.10)	0.85 (0.64–1.12)
Toileting	0.90 (0.65–1.25)	0.64 (0.45–0.91)
Getting in and out of bed	0.72 (0.56–0.93)	0.60 (0.43–0.83)
Bathing	1.13 (0.84–1.52)	1.23 (0.88–1.72)
Eating	0.91 (0.70–1.19)	0.92 (0.64–1.31)
Model 4: Adjusted for covariates from models above plus covariates for home resources: total income, married, number of people in household, number of children		
Walking inside	0.65 (0.51–0.82)	0.64 (0.49–0.84)
Walking outside	0.87 (0.69–1.11)	0.83 (0.63–1.09)
Toileting	0.90 (0.65–1.25)	0.64 (0.45–0.90)
Getting in and out of bed	0.71 (0.55–0.93)	0.59 (0.43–0.83)
Bathing	1.13 (0.84–1.54)	1.22 (0.87–1.71)
Eating	0.88 (0.67–1.15)	0.87 (0.61–1.24)
Model 5: Adjusted for covariates from models above plus covariates for cognitive status: dementia, proxy respondent		
Walking inside	0.73 (0.57–0.94)	0.78 (0.58–1.05)
Walking outside	0.91 (0.70–1.17)	0.87 (0.65–1.17)
Toileting	1.05 (0.76–1.45)	0.76 (0.53–1.08)
Getting in and out of bed	0.82 (0.63–1.07)	0.69 (0.49–0.98)
Bathing	1.20 (0.90–1.60)	1.39 (0.97–1.98)
Eating	0.98 (0.69–1.39)	1.04 (0.72–1.52)

toileting, and getting in and out of bed as BMI rose beyond a normal range of 18.5 to 24.9 kg/m² (Figure S1).

DISCUSSION

In a nationally representative cohort of older adults in the United States with ADL impairments, this study demonstrated that older adults with obesity had higher rates of ADL impairments and lower rates of assistance than their normal-weight counterparts. These gaps in assistance were largest for assistance with mobility and transfers. This has significant policy and healthcare implications given the predicted growing population of older adults with obesity. Although severity of disability and cognitive status explained part of the gap in assistance, even in the fully

adjusted models, obese individuals reported significantly less assistance with walking indoors.

As expected, the association between obesity and lack of assistance with ADLs was particularly strong for mobility-related ADLs, for which providing assistance is more physically demanding. Unlike prior research,²¹ the finding persisted after adjusting for demographic characteristics. Potential mediating factors were then explored to determine whether the lack of assistance was due to barriers to assistance or less need for assistance. The analysis found that degree of need partially mediated the difference, indicating that barriers to assistance may play a role, but it was not found that insufficient household resources in terms of assets or people to assist mediated the association, as was hypothesized. Cognition appeared to have the largest effect on the association, although still as a partial and not complete mediator. This indicates that further research into the contributions of stigma and the physical challenges of obesity caregiving will be important next steps.

The factors that explained the greatest proportion of the difference in receipt of care between obese and normal-weight individuals was dementia and need for a proxy respondent, a related measure of cognitive impairment. There are two hypotheses for this finding. One is that older adults without cognitive impairment have greater ability to rally support from family or even gain access to nursing home care. An alternative explanation is that the lower prevalence of cognitive impairment in older adults with obesity enables them to devise independent solutions at home alone despite disability and to avoid the complexity of entering into a care recipient role, which may not be preferred despite the hardships of unmet needs. Therefore, dementia may indicate greater need for assistance, explaining this gap. Further research with more in-depth surveying and interviews is needed to establish whether this is occurring and whether it is a desired response to lack of assistance of older adults with intact cognition.

This study has several limitations. The data were analyzed in a cross-sectional analysis, and further longitudinal analysis will be important to understand causal relationships. The study relied on BMI because it is the most widely accepted and available measure of obesity, but obesity subtypes, such as sarcopenic obesity, were not differentiated.³² The reliability of responses from proxy respondents may be lower, especially regarding absent assistance and unmet needs in cases in which they are the primary caregiver, although there is some evidence from other studies that this is not the case.³³ Although the degree of difficulty that individuals report in performing an ADL and whether they have had to go without that ADL can be captured, there would ideally be more information as to the level of needs that individuals have. Furthermore, there were no measures of the results of lack caregiving, in terms of physical (pressure ulcers, poor hygiene, infections) and psychological (social isolation, perceiving weight bias, ADL-specific anxiety) effects. Despite these limitations, the strength of this study is that it captured a nationally representative population, the analysis was based on a conceptual theory, and data captured surveyed factors and measured BMI.

Research is needed to examine the implications of the lower rates of assistance that the growing population of

older adults with obesity and disability receives. Although the challenges for nurses of assisting obese individuals have been established,¹⁶ little is known about the experience of the individual and family. Even obese individuals with family members available to assist them might require extra help with safe transfers and mobility assistance. Given that Medicare and Medicaid generally do not reimburse for additional home health aides for obese individuals, research should assess whether additional personal aide funding for this population might offset high-cost nursing home care. Similarly, the possible ramifications of inadequate nursing and custodial assistance for this population, such as poorer physical function; higher rates of medical complications, including depression, social isolation, infection, falls, malnutrition, and pressure ulcers; and higher costs of care, hospitalizations, and emergency department visits are not well understood. Intervention and cost-effectiveness studies focusing on obese disabled individuals should consider assessing the effects of enriched home-based personal aides and medical equipment such as lifts, bariatric walkers, and commodes, as well as no-lift policies in hospitals and nursing homes to increase use of mechanical lifts.³⁴

This deficit in caregiving has policy implications given the cost of long-term care and the high use of health care of obese disabled older adults. Further work needs to be done to understand the evolving capacity of formal and informal long-term care to serve the needs of obese individuals. Addressing these questions will only become more pressing as older adults increasingly find themselves struggling with obesity and disability.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Figure S1. Partial residual plots of the association of BMI modeled as a fractional polynomial and activity of daily living assistance for disabled older adults.

Table S1. Estimated indirect and direct effects of covariates with help with each ADL.

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