

**Supplemental Table 1.** Comparing caregiver demographics between those in the study sample vs. the full sample, 2010.

Caregiver Demographics	Cohabited Caregivers from Study Sample ( <i>n</i> = 212)	All Cohabited Caregivers from the Registry Subsample ( <i>n</i> = 224)
	<i>N</i> (Percentage)	<i>N</i> (Percentage)
CESD score, mean (S.D.)	10.2 ± 6.31	10.2 ± 6.4
ZBI score, mean (S.D.)	5.9 ± 3.9	5.8 ± 3.9
NPI-Q-CD, mean (S.D.)	12.1 ± 10.4	12.3 ± 10.6
Age, mean (S.D.)	58.9 ± 11.1	58.8 ± 10.2
Sex/Gender		
Male	31 (14.6)	33 (14.8)
Female	181 (85.3)	191 (85.2)
Race/Ethnicity		
Non-Hispanic Black	117 (55.1)	124 (55.1)
Other <sup>a</sup>	95 (44.8)	100 (44.8)
Employment		
Employed	70 (33.0)	72 (32.2)
Retired/Unemployed	113 (53.3)	120 (53.9)
Other <sup>b</sup>	29 (13.6)	32 (13.9)
Relationship to the Care Recipient		
Spouse	35 (16.5)	36 (16.1)
Child	144 (67.9)	152 (67.7)
Other <sup>c</sup>	33 (15.5)	36 (16.1)

<sup>a</sup> “Other” race/ethnicity included non-Hispanic white, Hispanic/Latinx, and Asian.

<sup>b</sup> Retired and unemployed included fully retired, unemployed, and homemaker, and employed included employed full time, employed part time, and retired but working part time.

<sup>c</sup> “Other” relationship to care recipient included daughter-in-law, sister, brother, grandchild, niece or nephew, and other.

NPI-Q-CD: Neuropsychiatric Inventory Questionnaire- Caregiver Distress, CESD: Center for Epidemiologic Studies Depression Scale, ZBI: Zarit Burden Interview.

**Supplemental Table 2.** Instruments used to measure the caregivers' mental health outcomes.

<b>Instrument</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Range</b>
Center for Epidemiologic Studies Depression Scale–Revised	Rarely/ None of the time	Some of the time	Occasion ally	Most of the time	n/a	n/a	0– 30
Zarit Burden Interview	Never	Rarel y	Sometim es	Quite frequen tly	Near ly alwa ys	n/a	0– 16
Neuro-Psychiatric Inventory Questionnaire Caregiver Distress	Not distressin g at all	Mini mal	Mild	Modera te	Seve re	Extrem e or very severe	0– 60

**Supplemental Table 3.** Mean scores of the NPI-Q domains in care recipients with Alzheimer's disease, 2010 ( $n = 212$ ).<sup>a</sup>

<b>NPI Domain</b>	<b>Mean <math>\pm</math> S.D.<sup>b</sup></b>
NPI total score	26.3 $\pm$ 22.3
Delusions	1.8 $\pm$ 3.1
Hallucinations	1.9 $\pm$ 3.1
Agitation/aggression	3.1 $\pm$ 3.5
Depression/dysphoria	2.3 $\pm$ 3.5
Anxiety	1.7 $\pm$ 3.1
Euphoria/elation	0.7 $\pm$ 1.7
Apathy	2.8 $\pm$ 3.7
Disinhibition	1.3 $\pm$ 2.7
Irritability	2.8 $\pm$ 3.7
Motor disturbances	2.8 $\pm$ 3.7
Sleep and nighttime disturbances	2.7 $\pm$ 3.8
Appetite/eating change	1.9 $\pm$ 3.3

<sup>a</sup> NPI-Q is the Neuropsychiatric Inventory Questionnaire that assesses neuropsychiatric symptoms.

<sup>b</sup> S.D.: standard deviation.

**Supplemental Table 4.** Unadjusted and adjusted prevalence ratios (PRs) of caregiver depressive symptoms by neighborhood characteristics as defined at the 3-mile buffer, 2010.

Variable	Severe Neuropsychiatric Symptoms ( <i>n</i> = 112) <sup>c</sup>		Non-Severe Neuropsychiatric Symptoms ( <i>n</i> = 100) <sup>c</sup>	
	Unadjusted PR	Adjusted PR <sup>d</sup>	Unadjusted PR	Adjusted PR <sup>d</sup>
	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Rurality <sup>a</sup>				
Rural	1.05 (0.83–1.35)	0.98 (0.75–1.27)	0.88 (0.65–1.22)	0.98 (0.69–1.39)
Small urban	0.89 (0.66–1.19)	0.96 (0.71–1.28)	0.89 (0.62–1.28)	1.02 (0.68–1.51)
Large urban	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>
Percent moved 1 year ago	1.03 (0.95–1.12)	1.04 (0.95–1.12)	0.98 (0.89–1.09)	0.98 (0.89–1.09)
Median household income <sup>b</sup>				
Low	1.18 (0.91–1.53)	1.33 (1.00–1.78)	0.82 (0.59–1.14)	0.80 (0.56–1.17)
Medium	1.19 (0.93–1.54)	1.25 (0.97–1.61)	0.74 (0.53–1.05)	0.77 (0.53–1.12)
High	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$34,352, “medium” was \$34,352–41,927, and “high” was >\$41,927.

<sup>c</sup> Severe neuropsychiatric symptoms among those with AD were defined as >median.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

<sup>e</sup> Reference category.

**Supplemental Table 5.** Unadjusted and adjusted prevalence ratios of caregiver burden by neighborhood characteristics as defined at the 3-mile buffer, 2010.

Variable	Severe Neuropsychiatric Symptoms ( <i>n</i> = 112) <sup>c</sup>		Non-Severe Neuropsychiatric Symptoms ( <i>n</i> = 100) <sup>c</sup>	
	Unadjusted PR	Adjusted PR <sup>d</sup>	Unadjusted PR	Adjusted PR <sup>d</sup>
	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Rurality <sup>a</sup>				
Rural	0.87 (0.67–1.12)	0.87 (0.65–1.17)	0.89 (0.60–1.32)	0.99 (0.65–1.51)
Small urban	0.93 (0.68–1.25)	1.02 (0.74–1.40)	0.86 (0.55–1.36)	0.94 (0.59–1.50)
Large urban	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>
Percent moved 1 year ago	1.03 (0.95–1.11)	1.02 (0.94–1.11)	0.96 (0.85–1.09)	0.95 (0.83–1.07)
Median household income <sup>b</sup>				
Low	0.91 (0.70–1.19)	1.05 (0.77–1.33)	0.88 (0.59–1.33)	0.90 (0.57–1.44)
Medium	0.94 (0.72–1.22)	1.01 (0.77–1.33)	0.65 (0.42–1.00)	0.74 (0.47–1.17)
High	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$34,352, “medium” was \$34,352–41,927, and “high” was >\$41,927.

<sup>c</sup> Severe neuropsychiatric symptoms among those with AD were defined as >median.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

<sup>e</sup> Reference category.

**Supplemental Table 6.** Unadjusted and adjusted prevalence ratios of caregiver distress by neighborhood characteristics as defined at the 3-mile buffer, 2010.

Variable	Severe Neuropsychiatric Symptoms ( <i>n</i> = 112) <sup>c</sup>		Non-Severe Neuropsychiatric Symptoms ( <i>n</i> = 100) <sup>c</sup>	
	Unadjusted PR (95% CI)	Adjusted PR <sup>d</sup> (95% CI)	Unadjusted PR (95% CI)	Adjusted PR <sup>d</sup> (95% CI)
Rurality <sup>a</sup>				
Rural	0.87 (0.67–1.12)	0.76 (0.61–0.95)	0.89 (0.59–1.32)	0.53 (0.29–1.01)
Small urban	0.93 (0.68–1.25)	0.89 (0.70–1.15)	0.87 (0.55–1.36)	0.63 (0.31–1.27)
Large urban	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>
Percent moved 1 year ago	1.02 (0.95–1.11)	0.99 (0.92–1.05)	0.96 (0.85–1.09)	0.93 (0.78–1.11)
Median household income <sup>b</sup>				
Low	0.91 (0.69–1.19)	<b>1.61 (1.26–2.04)</b>	0.88 (0.59–1.33)	1.50 (0.73–3.08)
Medium	0.94 (0.72–1.22)	<b>1.45 (1.17–1.78)</b>	0.65 (0.42–0.99)	1.20 (0.63–2.28)
High	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>	1.00 <sup>e</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$34,352, “medium” was \$34,352–41,927, and “high” was >\$41,927.

<sup>c</sup> Severe neuropsychiatric symptoms among those with AD was defined as >median.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

<sup>e</sup> Reference category.

Bolded estimates indicate statistical significance.

**Supplemental Table 7.** Unadjusted and adjusted prevalence ratios of caregiver depressive symptoms by neighborhood characteristics as defined at the 1-mile buffer, 2010.

<b>Variable</b>	<b>Unadjusted PR (95% CI)</b>	<b>Adjusted PR (95% CI) <sup>d</sup></b>
Rurality <sup>a</sup>		
Rural	0.96 (0.78–1.17)	0.97 (0.77–1.21)
Small urban	0.86 (0.68–1.09)	0.91 (0.71–1.16)
Large urban	1.00 <sup>c</sup>	1.00 <sup>c</sup>
Percent moved 1 year ago	1.01 (0.94–1.08)	1.00 (0.94–1.07)
Median household income <sup>b</sup>		
Low	0.99 (0.80–1.23)	1.04 (0.83–1.32)
Medium	0.99 (0.79–1.23)	1.04 (0.83–1.30)
High	1.00 <sup>c</sup>	1.00 <sup>c</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$31,000, “medium” was \$31,000–40,758, and “high” was >\$40,758.

<sup>c</sup> Reference category.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

**Supplemental Table 8.** Unadjusted and adjusted prevalence ratios of caregiver burden by neighborhood characteristics as defined at the 1-mile buffer, 2010.

<b>Variable</b>	<b>Unadjusted PR (95% CI)</b>	<b>Adjusted PR (95% CI)<sup>d</sup></b>
Rurality <sup>a</sup>		
Rural	0.84 (0.67–1.06)	0.89 (0.69–1.15)
Small urban	0.86 (0.65–1.13)	0.93 (0.70–1.22)
Large urban	1.00 <sup>c</sup>	1.00 <sup>c</sup>
Percent moved 1 year ago	1.00 (0.93–1.07)	0.98 (0.91–1.05)
Median household income <sup>b</sup>		
Low	0.88 (0.69–1.12)	1.00 (0.77–1.31)
Medium	0.82 (0.64–1.05)	0.94 (0.73–1.21)
High	1.00 <sup>c</sup>	1.00 <sup>c</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural area” was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$31,000, “medium” was \$31,000–40,758, and “high” was >\$40,758.

<sup>c</sup> Reference category.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status



**Supplemental Table 9.** Unadjusted and adjusted prevalence ratios of caregiver distress by neighborhood characteristics as defined at the 1-mile buffer, 2010.

Variable	Unadjusted PR (95% CI)	Adjusted PR (95% CI) <sup>d</sup>
Rurality <sup>a</sup>		
Rural	0.78 (0.57–1.07)	0.65 (0.45–0.94)
Small urban	0.78 (0.53–1.12)	0.71 (0.48–1.03)
Large urban	1.00 <sup>c</sup>	1.00 <sup>c</sup>
Percent moved 1 year ago	0.98 (0.88–1.09)	0.94 (0.84–1.04)
Median household income <sup>b</sup>		
Low	1.14 (0.81–1.60)	<b>1.55 (1.05–2.28)</b>
Medium	1.14 (0.81–1.59)	<b>1.49 (1.05–2.11)</b>
High	1.00 <sup>c</sup>	1.00 <sup>c</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$31,000, “medium” was \$31,000–40,758, and “high” was >\$40,758.

<sup>c</sup> Reference category.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

Bolded estimates indicate statistical significance.

**Supplemental Table 10.** Unadjusted and adjusted prevalence ratios of caregiver depressive symptoms by neighborhood characteristics defined at the 3-mile buffer, 2010.

<b>Variable</b>	<b>Unadjusted PR (95% CI)</b>	<b>Adjusted PR (95% CI)<sup>d</sup></b>
Rurality <sup>a</sup>		
Rural	0.96 (0.78–1.17)	0.97 (0.77–1.21)
Small urban	0.86 (0.68–1.09)	0.91 (0.71–1.16)
Large urban	1.00 <sup>c</sup>	1.00 <sup>c</sup>
Percent moved 1 year ago	1.01 (0.94–1.08)	1.00 (0.94–1.07)
Median household income <sup>b</sup>		
Low	0.99 (0.80–1.23)	1.05 (0.83–1.32)
Medium	0.99 (0.79–1.23)	1.04 (0.83–1.30)
High	1.00 <sup>c</sup>	1.00 <sup>c</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$34,352, “medium” was \$34,352–41,927, and “high” was >\$41,927.

<sup>c</sup> Reference category.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

**Supplemental Table 11.** Unadjusted and adjusted prevalence ratios of caregiver burden by neighborhood characteristics as defined at the 3-mile buffer, 2010.

Variable	Unadjusted PR (95% CI)	Adjusted PR (95% CI) <sup>d</sup>
Rurality <sup>a</sup>		
Rural	0.84 (0.67–1.06)	0.89 (0.69–1.15)
Small urban	0.86 (0.65–1.13)	0.93 (0.70–1.22)
Large urban	1.00 <sup>c</sup>	1.00 <sup>c</sup>
Percent moved 1 year ago	0.99 (0.93–1.08)	0.98 (0.91–1.05)
Median household income <sup>b</sup>		
Low	0.88 (0.69–1.12)	1.00 (0.77–1.31)
Medium	0.82 (0.64–1.05)	0.94 (0.73–1.21)
High	1.00 <sup>c</sup>	1.00 <sup>c</sup>

<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$34,352, “medium” was \$34,352–41,927, and “high” was >\$41,927.

<sup>c</sup> Reference category.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

**Supplemental Table 12.** Unadjusted and adjusted prevalence ratios of caregiver distress by neighborhood characteristics defined at the 3-mile buffer, 2010.

Variable	Unadjusted PR (95% CI)	Adjusted PR (95% CI) <sup>d</sup>
Rurality <sup>a</sup>		
Rural	0.77 (0.57–1.07)	0.65 (0.45–0.94)
Small urban	0.77 (0.53–1.12)	0.71 (0.48–1.03)
Large urban	1.00 <sup>c</sup>	1.00 <sup>c</sup>
Percent moved 1 year ago	0.98 (0.88–1.09)	0.94 (0.84–1.04)
Median household income <sup>b</sup>		
Low	1.14 (0.81–1.59)	<b>1.55 (1.05–2.28)</b>
Medium	1.14 (0.81–1.59)	<b>1.49 (1.05–2.11)</b>
High	1.00 <sup>c</sup>	1.00 <sup>c</sup>

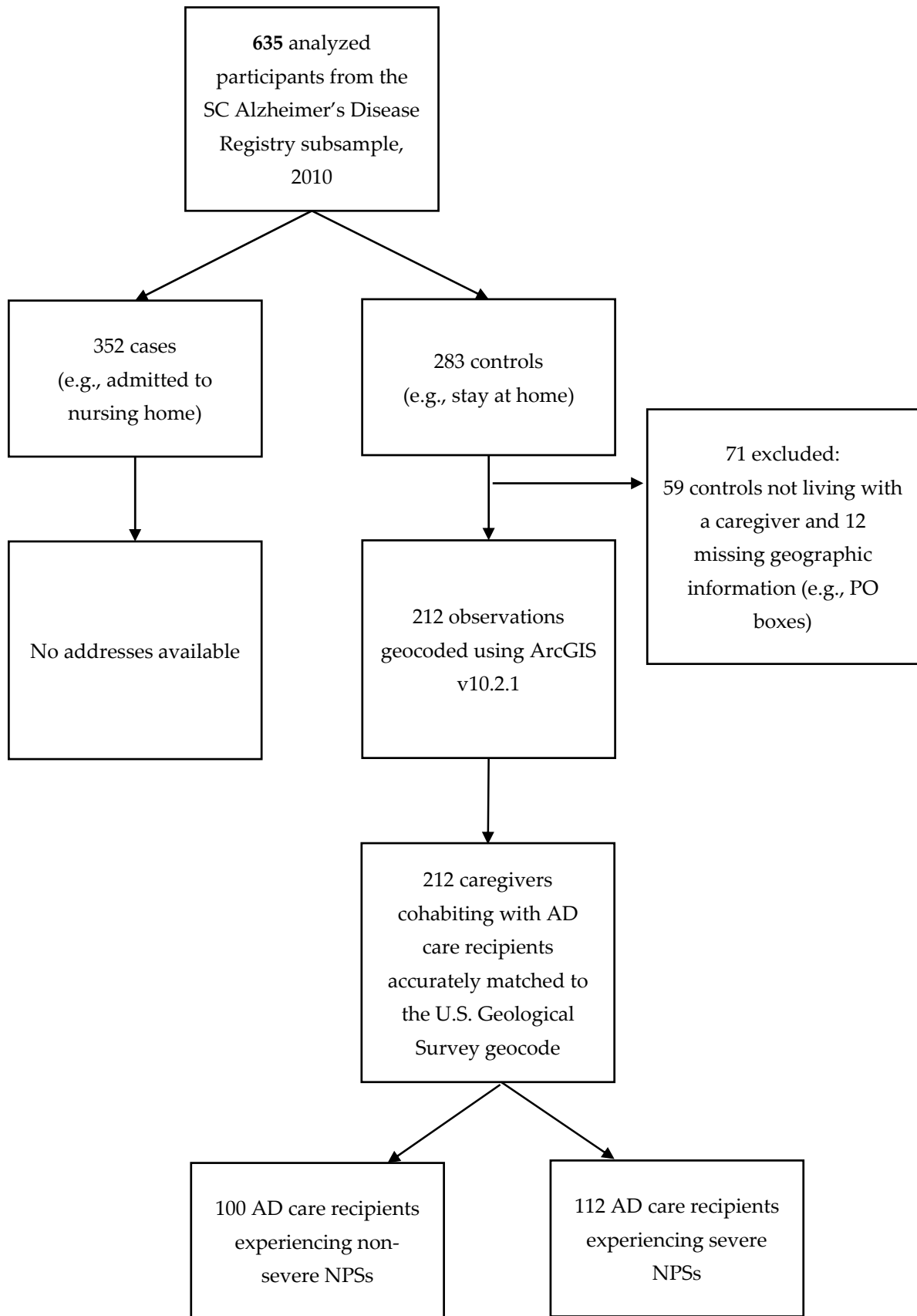
<sup>a</sup> Rurality was measured based on the RUCA (Rural-Urban Commuting Area codes). A “large urban” area was defined as a metropolitan area; a “small urban” area was defined as a metropolitan area with high commuting or a metropolitan area with low commuting; a “rural” area was defined as a micropolitan area core, micropolitan area with high commuting, micropolitan area with low commuting, small town core, small town with high commuting, small town with low commuting, or rural areas.

<sup>b</sup> Median household income categories were based on tertiles, where “low” was <\$34,352, “medium” was \$34,352–41,927, and “high” was >\$41,927.

<sup>c</sup> Reference category.

<sup>d</sup> Model was adjusted for caregiver age, sex/gender, race/ethnicity, employment, relationship to the care recipient, and sandwich caregiver status.

Bolded estimates indicate statistical significance.



**Supplemental Figure 1.** Flowchart of the caregiver case selection, 2010. NPS: neuropsychiatric symptom.