



Treatment and Outcomes Among Rural and Urban  
Nursing Home Residents with Depression

# **Treatment and Outcomes Among Rural and Urban Nursing Home Residents with Depression**

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## EXECUTIVE SUMMARY

Untreated depression can lower life expectancy and increase levels of functional and cognitive impairment. Among nursing facility residents, depression is a widely recognized problem that has been shown to increase use of facility resources. Nonetheless, the mental health needs of nursing homes are widely reported to be unmet, and the types of services available to nursing home residents are known to vary by location and type of facility. Specifically, nursing facility residents in metropolitan areas are more likely to have access to mental health specialists than are residents in non-metropolitan areas.

To better understand if limitations in access to mental health specialists affect rural nursing facility residents with depression, this study examines differences in the diagnosis, treatment and health outcomes of both rural and urban nursing home residents with depression.

Multivariate analyses controlling for resident and facility characteristics suggest that rural residents of facilities where staff have formal training on depression are more likely to receive effective treatment compared with urban residents or rural residents in facilities without trained staff. Rural residents were also found to be at significantly greater risk than urban residents for loss of physical function and were less than half as likely to have improved cognitive function as urban residents, controlling for other resident and facility characteristics. Urban residents and residents of facilities with formal agreements for mental health specialist support were more likely to have improved cognitive function at the end of one year as compared with rural residents and those in facilities without employment or contractual agreements with mental health specialists. Residents receiving effective treatment were also significantly more likely to have improved cognitive function and less likely to lose physical function, regardless of urban-rural residence.

This research suggests that rural facilities with staff formally trained in the care of older adults with depression have greater success in their treatment of residents with depression. Policy initiatives targeting staff training in rural areas and improved access to mental health specialists for nursing facility residents must be encouraged through thoughtfully developed policy incentives and professional development programs. Combined with greater attention to the diagnosis and active treatment of residents with symptoms of depression, such efforts likely will be rewarded by improved functional capacity (or avoidance of hastened functional decline) and reduced resident reliance on nursing facility staff.

## INTRODUCTION

While no urban-rural differences in the prevalence of depression have been found (Johnson, Hendricks, Turner et al. 1988), depression appears to be more prevalent in the nursing home population than among the older adults residing in the community (Parmelee, Katz and Lawton 1989). Although depression is a significant, though treatable, problem for older adults in nursing homes, the literature suggests that mental illness in this population has been largely untreated (Lebowitz et al. 1997).

Based on the 1985 National Nursing Home Survey, Burns, Wagner and Taube (1993)<sup>1</sup> found considerable disparity between the estimated two-thirds of residents with diagnosed mental disorders, and the 4.5 percent of residents who received any mental health services<sup>2</sup>. Further, compared with metropolitan residents with mental health needs, non-metropolitan residents are less likely to receive services from mental health specialists (Burns, Wagner and Taube 1993). Based on the Medical Outcomes Study (Wells et al. 1989), we know that persons with depression treated by generalist physicians have lower costs but poorer outcomes than those treated by psychiatrists.

Little is known about how rural facilities have responded to the implementation of Omnibus Reconciliation Act (OBRA) '87<sup>3</sup>; nor is there much in the literature concerning the diagnosis, treatment and outcomes of rural nursing facility residents with depression. On the one hand, the highly effective drugs for the treatment of depression have made treatment options for this disease much more accessible for rural primary care providers. However, the complexities of treating older nursing home residents, most of whom receive other prescription medications, requires a degree of expertise and experience with depression and treatment that many rural primary care physicians may lack. These physicians are likely to experience difficulty accessing appropriate counseling services and arranging for counseling visits with residents because of the limited supply of specialty mental health services and the transportation barriers in most rural areas.

Based on the literature, we anticipate that rural nursing facilities and clinicians face a number of critical barriers in arranging for and providing appropriate services to

nursing facility residents. Such barriers may include challenges in both the detection and treatment of nursing facility residents with depression. To better understand if limitations in access to mental health specialists affects rural nursing facility residents with depression, this research uses nursing facility resident assessment and Medicaid claims data to examine four questions:

- 1) Are rural nursing facility residents with symptoms of depression less likely to have a diagnosis of depression than their urban counterparts?
- 2) Compared with urban residents, are rural residents with depression less likely to receive effective treatment?
- 3) Are functional outcomes for residents with depression significantly poorer in rural areas than in urban areas?
- 4) Are negative health service use and discharge outcomes, (defined by an acute hospital stay and discharge due to death or discharge to lower levels of care) more frequent among residents with depression in rural facilities than residents in urban facilities?

## **BACKGROUND**

### ***Why are diagnosis and treatment of depression important for older adults?***

Depression among older adults contributes to physical decline (Penninx, Guralnik, Ferrucci et al. 1998) and higher rates of health service use, including both acute care hospital admissions and general health care visits (Lambert, Agger and Bolda 1998). Nursing facility residents with depression use more facility resources than do non-depressed residents (Fries, Mehr, Schneider, Foley and Burke 1993).

Estimates of the prevalence of depression among nursing home residents range from 12 to over 50 percent, (Lombardo, Fogel Robinson and Weiss 1996). This wide range in estimated prevalence can be attributed to variations in sample selection, use of different definitions of depression, including major and/or minor symptoms of depression, and use of different methods for establishing the presence of depression such as clinical evaluation versus use of stated diagnoses.

Under-diagnosis of depression is a recognized problem for all age groups and is particularly problematic with older adults. Among older adults, the challenge of diagnosing depression is exacerbated by the interactive effects of dementia, medications, functional limitations, and physical illness.<sup>4</sup>

Nonetheless, there is growing evidence that depression among older adults can be successfully treated (Lebowitz et al. 1997; Lombardo, Fogel, Robinson and Weiss 1996). Successful treatment has recently been documented for depressed residents with and without concomitant cognitive impairments (Singh, Clements and Fiatarone 1997; Teri, Logsdon, Uomoto and McCurry 1997; Mossey, Knott, Higgins, and Talerico 1996).

***Do nursing facility residents have access to treatment?***

Shea, Streit and Smyer (1997) found that older residents and those with more ADL limitations were less likely to receive mental health specialist services than were younger, less impaired residents. Residents with depression, schizophrenia, psychoses or agitation were the most likely to see a mental health specialist. Overall, Shea, Streit and Smyer (1997) estimate that nursing home residents with mental health problems, on average, have less than a 10 percent probability of receiving professional mental health services.

***Is access to services more limited in rural areas? In certain types of facilities?***

The type of mental health services available to nursing home residents varies by location and type of facility. From previous research we know that the supply of mental health specialists generally is lower in rural communities (Bureau of Health Professions 1993). This lower supply has been suggested as an obstacle to access for rural nursing facility resident services (Verricchio and Taylor 1987).

Compared with non-metropolitan residents, residents with mental health needs who live in metropolitan facilities or facilities with a higher percentage of private-pay residents are more likely to receive services from mental health specialists (Burns, Wagner and Taube 1993). Such differences do not appear to be explained by differences

in the demand for services, since previous research has found no urban-rural differences in the prevalence of depression among (community-dwelling) older adults (Lambert et al. 1998; Johnson et al. 1988). Rather, these findings suggest that rural nursing home residents with depression may be at greater risk for poorer health than their urban counterparts. This premise is supported by findings that depressed persons served by primary care providers rather than mental health specialists have poorer outcomes (Wells et al. 1989).

### ***Summary: What we know***

Diagnosing and treating older adults with depression present significant challenges, regardless of care setting. A recent nursing facility survey in Maine indicates that rural facilities are less likely to employ or contract with mental health specialty providers than their urban counterparts (Bolda, Dushuttle, Keith, Coburn, Bridges 1998). Fewer rural facilities (40 percent) than urban facilities (60 percent) report having mental health specialty support. Rural facilities were significantly more likely than urban facilities to report logistical barriers to mental health specialty care including long waits for appointments, services being too far away, and lack of available services. Urban facilities, in contrast, were significantly more likely to report problems accessing mental health specialty support due to provider reluctance to accept Medicare or Medicaid patients, a concern that may be viewed as secondary to service availability and access issues in rural facilities.

## **METHODS**

### **Data Sources**

Data for this study were obtained from four principal sources: (1) the Maine Nursing Home Resident Assessment and Discharge Log Files, (2) Medicaid claims data; (3) the state's Nursing Facility File, and (4) a telephone survey of all Directors of Nursing of licensed nursing facilities.

### Maine Resident Assessment File.

The Maine Resident Assessment File contains data on all individuals cared for in Maine nursing homes (n=145) as contained in the MDS+ (Minimum Data Set, plus). The MDS is a federally prescribed, resident assessment system that has been developed and implemented by the states following extensive testing (Morris, Fries, Mehr et al. 1994). In Maine, resident assessments using the MDS+ are completed by nursing facility staff at the time of resident admission, and at least quarterly thereafter. Additional assessments are conducted when significant changes occur in a resident's health status or care needs. Data on resident discharge, including date of discharge and discharge destination, are drawn from the MDS+ Discharge Log file.

### Maine Medicaid Claims Data

The Maine Medicaid Claims Data file contains patient-level data for each covered service billed to Medicaid, as well as for Medicare covered services for which Medicaid is responsible for a co-payment or deductible.

### Maine Nursing Facility File

Nursing home characteristic data are contained in the Maine Nursing Facility File maintained by the Muskie School. Data in this file include information on licensed nursing home ownership, chain or hospital affiliation, bed size, and urban-rural location.

### Availability of Mental Health Services in Nursing Facilities

Data used to characterize the availability of mental health services in nursing facilities in Maine were obtained through telephone surveys of nursing facility Directors of Nursing (n=121, 91 percent response rate). The telephone surveys gathered information on each facility's use of screens to detect depression and assessment instruments for depression used by facilities. Other questions concerned the formal training and experience of facility staff in working with depressed older adults, the number and types of mental health professionals available to the facility either as employees, contractors or

through referral, and perceived barriers to mental health specialist access for facility residents. Findings from this survey are reported elsewhere (Bolda et al. 1998).

## **Sample Construction**

The initial sample frame included a cohort of all residents who were in a nursing facility during the period July 1, 1933 to September 30, 1994 drawn from the Maine nursing facility MDS+ data set. For each of the 10,221 residents served during this period, assessment data for an 18-month period were reviewed to identify residents with depression. Criteria used to define depression included: (1) diagnosis of depression; (2) use of antidepressants; or (3) symptoms of depression. Details on sample construction and definitions are available from the authors. From these data, no significant differences in the prevalence of residents with depression was found for rural and urban residents, 40 percent of rural residents and 41 percent of urban residents had an indication of depression.

In addition to the cohort of residents with depression identified through the MDS+, a small number of additional residents, not identified through the MDS+ data, were identified through the Medicaid claims data. These residents were identified by concurrent claims for nursing facility services and use of anti-depressant medications during the study period.

The final sample was constructed to include all Medicaid beneficiaries who had an indication of depression in either data set. Residents were excluded from the final sample if they had an explicit terminal prognosis, were under age 65, had an indication of mental retardation or developmental disability, or had a nursing facility stay of less than 30 days. The final sample included 2,594 Medicaid beneficiaries age 65 and older, who were in a nursing facility on July 1, 1993 and who had an indication of depression. Residents admitted to a nursing facility after July 1, 1993 are excluded from the analyses reported here. This decision was based on urban-rural differences in the frequencies of reported diagnosis and treatment at the time of admission which appear to be more

indicative of service use prior to admission than services in the nursing facility. Thus, no sample members were admitted to the facility during their baseline quarter.

### ***Analytic Approach and Study Variables***

Bivariate analyses were used to describe differences in patient characteristics, indicators of depression, service use, and functional outcomes for NF residents from rural and urban communities in Maine. Multivariate logistic regression models were then tested to estimate the effects of urban-rural residence and mental health service capacity on resident functional outcomes, controlling for resident characteristics at baseline. The individual nursing home resident is the unit of analysis in this study.

### ***Measures***

Table 1 defines the indicators of depression and the treatment of depression used here.

#### Diagnosis of Depression

No compelling evidence was found for preferential use of data from one data set or the other for other measures contained in both files. Of particular interest was the consistency of diagnostic data from the two data sources. Data on diagnoses of depression in each data set were determined to be equally viewed as valid, thus a diagnosis in either data set resulted in a resident being classified as having a diagnosis of depression diagnosed. (These analyses are reported in detail in the Technical Appendix, which is available from the authors).

#### Symptoms of Depression

Data from the MDS+ were used to construct indicators of symptoms of depression using criteria developed by the authors of the MDS+ (Fries et al. 1993). While recognized as an imperfect measure, there is no reason to believe that this index of symptoms of depression will vary geographically. The composite index of symptoms of depression (Fries et al. 1993) classifies residents as to the relative severity of their

<b>Table 1: Definition of Indicators of Depression</b>		
<b>Variable</b>	<b>Type</b>	<b>Definition (unless otherwise noted quarterly values were available for each measure)</b>
<b>Diagnosis</b>	Dichotomous	MDS+ disease/diagnosis/health conditions checklist, other current diagnoses ICD-9 code, or Medicaid claims data diagnostic ICD-9 code identify resident as having depression = 1.
<b>Symptoms</b>	Dichotomous	Symptoms of depression are classified using Fries et al. (1993) two-level classification system encompassing resident weight loss; early morning mood, agitation, withdrawn, distressed behaviors, suicidal thoughts or persistent sad or anxious mood data (from the MDS+). Residents identified as having either level of symptoms of depression = 1.
<b>Treatment:</b>		
Psychotherapy	Dichotomous	Medicaid claim submitted for psychotherapy = 1.
Anti-depressant Use	Dichotomous	Anti-depressant use was defined using the anti-depressant quality indicator medications list developed by Zimmerman 1996 Medicaid claim for anti-depressant medications = 1.

symptoms (Fries et al. 1993). For resident profiling, a dichotomous indicator of the presence or absence of symptoms was constructed for each quarter during which the resident was assessed.

To consider the possibility that this indicator of presence of depression could be including residents whose functional or medical conditions mimic the symptoms of depression, yet who are not truly depressed, sub-analyses were conducted to establish the proportion of residents for whom symptoms were the only indicator of depression. These sub-analyses confirmed that fewer than 7 percent of residents in the sample had symptoms of depression with no diagnosis and no claims for antidepressants during the study period (see Technical Appendix for details).

### Anti-Depressant Use

Analyses were conducted to assure that sample members were not receiving anti-depressants for reasons other than the treatment of depression and to confirm the consistency of reported use of anti-depressants and diagnoses in the MDS+ and Medicaid claims data. These analyses showed that medications data from the Medicaid claims files were more reliable, and the decision was made to exclude medication data reported on the MDS+ from further analyses.

### ***Dependent Variables***

#### Resident Outcomes

Resident outcomes are defined by changes in resident functional status. Of particular interest are changes in self-performance of activities of daily living and changes in level of cognitive impairment. Dependent variable definitions are presented in Table 2.

*Changes in Physical Function:* Activities of daily living (ADL) are measured by a composite score reflecting the number of activities and level of assistance with each activity required by individual residents. ADL scores range from 4 (independence) to 18 (total dependence) on others for assistance in performing ADLs. For each resident, quarterly ADL scores were computed, with net positive or negative change between fourth quarter and baseline ADL scores serving as the ADL outcome measures. Two dummy variable indicators were defined, the first indicating improved function (ADL score is lower than baseline), the second indicating deterioration (ADL score is higher at end of year than at baseline).

**Table 2: Dependent Variable Definitions**

Variable	Type	Definition
<b>Functional Status</b>		
Activities of Daily Living (ADL),	ADL Score: Range 4-18	The ADL scale is the sum of self-performance and support values for bed mobility, transfer, locomotion, dressing, eating, toilet use, personal hygiene, and bathing from MDS+ resident assessments. ADL scores were tabulated quarterly.
ADL Decline or Improvement	Dichotomous	Dummy variables represent improvement or decline based on the ADL Score for the fourth quarter less the baseline ADL score. ADL Decline = 1 if the ADL score difference was $\geq 1$ ; ADL Improvement = 1 if the ADL score difference was $\leq -1$
Cognitive Performance	CPS Score: Range 0=6	The Cognitive Performance Scale (CPS) is a tested measure defined for use with MDS+ data and scores resident cognitive impairment on a 6 point scale, where 0 = cognitively intact and 6 = severely cognitively impaired. CPS scores were tabulated quarterly.
Change in cognitive status	Dichotomous	Dummy variables represent improvement or decline based on the CPS Score for the fourth quarter less the baseline CPS score. Cognitive Decline = 1 if the CPS score difference was $\geq 1$ ; Cognitive Improvement = 1 if the CPS score difference was $\leq -1$
"Effective Treatment"	Dichotomous	Resident had a diagnosis of depression, received anti-depressants during each quarter and remained symptom-free throughout the study year = 1.
<b>Discharge Status:</b>		
Due to Death	Dichotomous	MDS+ discharge log data indicate the resident was discharged due to death during the study year = 1
To lower care	Dichotomous	MDS+ discharge log data indicate the resident was discharged home or to a non-medical residential care facility during the study year = 1.
<b>Acute Care Admission</b>	Dichotomous	Medicaid claims data indicate a claim for an acute care stay was submitted for services during the study year = 1.

Changes in Cognitive Function: The Cognitive Performance Scale (CPS) developed by Morris et al. (1994) serves as the measure of level of cognitive impairment for depressed residents. CPS scores range from 0, cognitively intact, to 6, severely cognitively impaired. As with ADL outcomes, cognitive impairment outcomes were defined by 2 dichotomous variables. One dummy variable represents improved cognitive function (CPS score is lower at quarter 4 than at baseline) and one represents worsening cognitive function (CPS score is higher at quarter 4 than at baseline).

#### Discharge Status

Discharges to lower care setting (home or non-medical residential care facility) and discharges due to death were defined as dummy variables. Any discharge to home or to a residential care home was coded “1” for the discharge to lower care variable. Residents who died during the study period were coded “1” for the discharge due to death variable.

#### Hospital Use

Medicaid claims data were used to identify a resident admission to an acute care facility. A dichotomous indicator of hospitalization was constructed with “1” indicating at least one claim for an acute care hospital stay during the study year.

### ***Mental Health Service Access and Facility Characteristics***

Of central interest to this research are the differences in access to mental health services for urban and rural residents with depression. Measures used to describe the availability of facility staff with formal training in care for older adults with depression, facility agreements with mental health professionals, and facility bed size are included in Table 3.

<b>Table 3: Definition of Facility Characteristics</b>		
<b>Variable</b>	<b>Type</b>	<b>Definition</b>
Facility Employs/ Contracts with MH Specialist	Dichotomous	Facility Director of Nursing reported that facility employs or contracts with one or more mental health professionals=1.
Facility Has Trained Staff	Dichotomous	Facility Director of Nursing reported one or more staff with formal training in caring for older residents with depression=1.
Small NF Facility	Dichotomous	Nursing facilities with 60 or fewer licensed NF beds =1.

### ***Resident Characteristics***

Residence: Each resident's nursing facility address is classified as either rural or urban. Traditional ways of distinguishing rural from urban areas do not work well in Maine for several reasons.<sup>5</sup> For example, Maine's largest county covers more area than the entirety of several other New England states; in several of the state's northern counties, 40 percent-75 percent of the land area consists of "unorganized territories" with average population densities of less than 1 person per square mile.

In order to develop a classification scheme to reflect more accurately the geographic diversity in Maine, each resident was assigned to one of the 31 designated Hospital Analysis Areas (HAAs). Assignment was based on the town in which the nursing facility was located. HAAs were then designated as either rural or urban based on total population and population density. Rural HAAs were defined as either having a total population of less than 50,000 or a population density of less than 50 people per square mile. HAAs classified as 'urban' had a total population of at least 50,000 or an average of at least 50 people per square mile. These definitions have the effect of counting as urban, several small cities which are urbanized, but do not fall within a formally designated Metropolitan Statistical Area.

Other Socio-Demographic and Health Indicators: Definitions and data sources for resident age, marital status, prior living arrangement and contact with friends and family are described below in Table 4. These data, along with data on residents' medical problems, mental health care history and related behaviors are included in these analyses to control for potential differences in medical and mental health co-morbidities and life-situations of urban and rural residents with depression.

<b>Table 4: Definition of Socio-Demographic and Health Indicators</b>		
<b>Variable</b>	<b>Type</b>	<b>Definition (unless otherwise noted quarterly values were available for each measure)</b>
Rural Residence	Dichotomous	Resident of a nursing facility located in a hospital analysis areas with less than 50,000 people or with a population density of fewer than 50 people per square mile = 1.
Age	Continuous	Resident age derived from MDS+ data on date of birth.
	Dichotomous	Separate dummy variables were created for 5-year intervals beginning at age 75 through 90+, coded "1" for residents within the defined age interval, "0" for all others.
Married	Dichotomous	MDS+, residents is married at baseline = 1.
From Home	Dichotomous	MDS+, resident lived at home prior to admission = 1.
<b>Health History:</b>		
Congestive Heart Failure	Dichotomous	MDS+ disease/diagnosis/health conditions checklist identified resident as having congestive heart failure = 1.
History of Stroke	Dichotomous	MDS+ disease/diagnosis/health conditions checklist identified resident as having had a cerebrovascular accident = 1.
Inpatient Psychiatric Stay	Dichotomous	MDS+, resident had an inpatient stay in a mental health care facility = 1.
<b>Other Behaviors:</b>		
Aggressive	Dichotomous	MDS+, resident was verbally or physically abusive behaviors at time assessment = 1.
Agitated	Dichotomous	MDS+, resident was agitated at time of assessment = 1.
Hallucinations	Dichotomous	MDS+, resident hallucinations at time of assessment = 1.
Daily Contact with Family/Friends	Dichotomous	MDS+, resident had daily contact with family or friends at time of assessment = 1.

## FINDINGS

### *Resident Characteristics*

Socio-demographics: Rural and urban nursing facility residents with depression differ in a number of respects (Table 5). On average, rural residents with depression were less cognitively impaired than were urban residents. Rural residents were also more likely to be married, to have daily contact with family or friends, and to have moved to a nursing facility from home.

<b>Table 5: Sample Resident Socio-Demographics</b>				
	<b>Urban (n = 1,715)</b>		<b>Rural (n = 876)</b>	
<b>Resident Characteristics:</b>	<b>Mean/ %</b>	<b>Std Dev</b>	<b>Mean/%</b>	<b>Std Dev</b>
<b>Average Age (range 65-105 years)</b>	83.9	7.9060	83.9	7.5778
<b>**Married</b>	0.149	0.3540	0.178	0.3828
<b>***Daily Contact with Family/Friends</b>	0.504	0.5001	0.603	0.4896
<b>**From Home</b>	0.279	0.4486	0.325	0.4687

t-test of rural-urban differences \*\*p<0.01 \*\*\*p<0.001

Functional Status and Health History at Baseline: Rural residents in our sample were less impaired in their self-performance of activities of daily living than were urban residents (Table 6). In contrast, rural sample residents were more likely to have a diagnosis of congestive heart failure than were urban sample residents. No differences were found in the prevalence of history of stroke among sample residents.

<b>TABLE 6: Resident Functional Status at Baseline</b>			
<b>Resident Characteristics:</b>	<b>Urban</b>	<b>Rural</b>	<b>p &lt; value *</b>
<b>Average ADL Score (range 4-18 pts)</b>	10.1	9.8	0.05
<b>Average CPS Score (range 0-6 pts)</b>	3.1	2.8	0.001
<b>Congestive Heart Failure</b>	21.0%	25.3%	0.01
<b>Cardio Vascular Accident (Stroke)</b>	23.8%	24.7%	NS
<b>Aggressive</b>	30.9%	24.6%	0.001
<b>Agitated</b>	24.0%	22.9%	NS
<b>Hallucinations</b>	11.8%	9.5%	NS
<b>History of Inpt. Psychiatric Stay</b>	2.1%	1.5%	NS

\* t-test of rural/urban differences

Table 6 describes resident behaviors and mental health history that may be associated with depression or use of mental health services--resident aggression, agitation, hallucinations and history of inpatient psychiatric care. With the exception that urban residents were more likely to be described as aggressive than were their rural counterparts ( $p < 0.001$ ), rural and urban residents were generally similar with regard to these behaviors.

## **Research Questions**

### ***Are rural nursing facility residents with symptoms of depression less likely to have a diagnosis of depression than their urban counterparts?***

The percentage of residents with symptoms of depression in rural facilities was significantly lower at baseline (33 percent) when compared with urban residents (40.9 percent, at  $p < 0.001$ ). The proportion of residents diagnosed at baseline as depressed, however, does not vary significantly for urban and rural residents (from Table 7).

<b>Table 7: Percentage of Residents with Symptoms and Diagnosis At Baseline</b>			
<b>Resident Characteristics</b>	<b>Urban n = 1,718</b>	<b>Rural n = 876</b>	<b>p &lt; value*</b>
<b>Symptoms of Depression</b>	40.9%	33.0%	.001
<b>Diagnosis of Depression</b>	42.3%	43.5%	NS
<b>With Symptoms and Diagnosis of Depression</b>	13.8%	12.0%	NS
<b>With Symptoms and No Diagnosis of Depression</b>	27.1%	21.0%	.001

\* t-test of rural-urban differences

Considered together, no urban-rural differences were found in the proportion of residents with symptoms of depression who also had a diagnosis of depression. Interestingly, significantly fewer rural residents with symptoms of depression were *not* diagnosed at baseline with depression (21 percent) compared with urban residents (27 percent,  $p < 0.001$ ). These data suggest that rural residents are less likely to have active symptoms of depression, and among those with such symptoms, fewer are undiagnosed than in urban areas.

***Compared with urban residents, are rural residents with depression less likely to receive (effective) treatment?***

In addition to considering the proportion of residents receiving treatment at a point in time (baseline), this question was analyzed by considering the effect of treatment for a 12-month period.

Treatment at Baseline: At baseline, no significant urban-rural differences were found in the proportion of residents receiving anti-depressants or receiving psychotherapy services billed to Medicaid (see Table 8). Anti-depressant medications were used by approximately 85 percent of residents with depression at baseline; only 1.2 and 0.6 percent of urban and rural residents, respectively, received psychotherapy services billed

to Medicaid. (Due to the infrequent occurrence of psychotherapy services billed to Medicaid, further analyses of such treatment are not reported here.)

Consideration of treatment for depression is complicated by the very nature of depression. Symptoms of depression may be either cyclical or persistent, thus the presence or absence of symptoms in isolation provides only limited information. For example, the presence of symptoms among residents receiving anti-depressants may indicate that the medications are not (yet) having the desired impact on symptoms. Alternatively, the absence of symptoms among persons receiving anti-depressants may suggest that the medications may be alleviating symptoms. Thus it is important to consider symptoms and treatment simultaneously.

Compared with urban residents, significantly fewer symptomatic rural residents were receiving anti-depressants ( $p < 0.001$ ); in contrast significantly more asymptomatic rural residents were receiving anti-depressants ( $p < 0.001$ ) (Table 8). At the same time, no urban-rural differences were found in the proportions of residents with or without symptoms who were *not* receiving anti-depressants

<b>Table 8: Treatment for Depression at Baseline</b>			
<b>Resident Characteristics</b>	<b>Urban (n = 1,718)</b>	<b>Rural (n = 876)</b>	<b>p &lt; value*</b>
<b>Received Antidepressants</b>	84.6%	85.7%	NS
<b>Psychotherapy Pd. by Medicaid</b>	1.2%	0.06%	0.0754
<b><i>With Symptoms and Receiving Anti-Depressants Not Receiving Anti-Depressants</i></b>	34.6% 6.2%	27.9% 5.1%	0.001 NS
<b><i>Symptom-Free and Receiving Anti-Depressants Not Receiving Anti-Depressants</i></b>	50.1% 9.1%	57.9% 9.1%	0.001 NS

\* t-test of rural-urban differences

Treatment Effectiveness (12 Month): The impact of treatment on symptoms alone does not consider whether anti-depressants may be prescribed for treatment of other than

depression, or the possibility that the symptoms of depression are associated with chronic illness and simply mimic the symptoms of depression. To address this issue, a conservatively defined composite indicator “Effective Treatment” was constructed. This indicator identifies only those residents who a) had a diagnosis of depression at some time during the study period, b) received anti-depressants during each of the 4 calendar quarters, and c) remained symptom-free throughout the year. For residents who remained in a nursing facility throughout the study year, data for the Effective Treatment indicator and the component indicators (diagnosis, use of anti-depressants and absence of symptoms) are presented in Table 9.

As with baseline comparisons between urban and rural residents, rural residents were slightly more likely to have been diagnosed as depressed at some time during the year. Significantly more rural residents were symptom-free all year compared with urban residents. No significant urban-rural differences were detected for the percentages using anti-depressants during all 4 quarters.

<b>Table 9: Percentage of Residents with a Diagnosis of Depression Who Receive Anti-depressants and Are Symptom-Free Throughout the Year</b>			
<b>Resident Characteristics</b>	<b>Urban (n = 1,237)</b>	<b>Rural (n = 641)</b>	<b>P&lt; value</b>
<b>Diagnosis of Depression During Study Year</b>	55.0%	58.0%	NS
<b>Symptom-Free all Year</b>	56.1%	62.2%	0.01
<b>Receive Anti-Depressants During All 4 Quarters</b>	77.0%	80.3%	NS
<b>Effective Treatment</b>	28.9%	33.8%	0.02

\* t-test of rural-urban differences

Interestingly, urban and rural differences are found in the conservatively defined indicator “Effective Treatment.” Considering only residents with a diagnosis of depression, among rural residents fully one-third of the rural residents were symptom-

free throughout the year while taking anti-depressants. This is a significantly higher proportion than among urban residents, of whom 28.9 percent were symptom-free and taking anti-depressants throughout the year.

***Are functional outcomes for residents with depression significantly poorer in rural areas than in urban areas?***

Changes in physical function: Rural and urban residents still in a nursing facility at the end of the study period, showed similar rates of improved physical function at the end of the study year. In contrast, significantly more rural residents with depression (50.6 percent) experienced decline in their capacity to self-perform activities of daily living (ADLs) compared with urban residents (45.7 percent) (Table 10).

<b>Table 10: Functional Status Outcomes for Residents Still In Nursing Facilities at 4<sup>th</sup> Quarter</b>			
<b>Functional Status:</b>	<b>Urban (n = 1,210)</b>	<b>Rural (n = 619)</b>	<b>p &lt; value*</b>
<b>ADL Improvement</b>	15.4%	16.8%	NS
<b>ADL Decline</b>	45.7%	50.6%	0.05
<b>Cognitive Improvement</b>	10.6%	4.4%	0.0001
<b>Cognitive Decline</b>	29.7%	31.8%	NS

\* t-test of rural-urban differences

Changes in cognitive function: Rural residents with depression remaining in a nursing home throughout the year were also significantly less likely to have improved cognitive performance when compared with urban residents. Among rural residents, fewer than 4.5 percent of residents experienced improved cognitive function at the end of the year, while over 10 percent of urban residents had improved cognition during the same period (see Table 10). No urban-rural differences were found in the proportion of residents experiencing cognitive decline.

***Are negative health service use and discharge outcomes more frequent among residents with depression in rural facilities than residents in urban facilities?***

Rural residence was not associated with more negative outcomes in bivariate analysis of discharges due to death or to a lower care setting. While approximately one-quarter of residents with an indication of depression were discharged due to death, fewer than one-percent of sample residents moved out of nursing homes to less restrictive living arrangements during the year. Similarly, equal percentages of residents in rural and urban areas were still in a nursing facility at the end of the study year. On average, nearly three-quarters (72.2 percent) of residents were in a nursing facility for the full year. Although approximately 20 percent of residents had an acute hospital stay, no urban/rural differences in hospitalizations were observed (see Table 11).

<b>Table 11: Discharge Status and Health Service Use Outcomes</b>			
<b>Service Use/Outcome:</b>	<b>Urban (n = 1,718)</b>	<b>Rural (n=876)</b>	<b>p &lt; value*</b>
Discharged Due to Death	25.6%	24.9%	NS
Discharged to Lower Care Setting	0.6%	0.3%	NS
Still in NF	72.0%	73.2%	NS
Acute Hospital Stay	20.0%	21.2%	NS

\* t-test of rural-urban differences

## ***Multivariate Analyses***

Multivariate analyses were conducted to determine whether urban-rural differences in treatment effectiveness and functional status changes observed in bivariate analyses could be attributed to differences in access to mental health services, controlling for other resident and facility characteristics. Separate models were tested to analyze urban-rural differentials for residents experiencing (1) "effective treatment," (2) decline in their self-performance of activities of daily living, and (3) improved cognitive function. Dependent variables for logistic models of changes in functional status represent differences in functional status as measured at baseline and on the assessment conducted during the fourth quarter.

The likelihood of receiving "effective treatment" or experiencing functional changes was estimated as a function of resident access to trained facility staff, facility arrangements with mental health specialists and rural residence, while controlling for resident socio-demographic, health and medical characteristics and facility bed size.<sup>6</sup> The composite indicator for "effective treatment" (diagnosed as depressed, symptom-free and use of anti-depressants throughout the year) was also included as an explanatory variable in models estimating of the probability of functional changes. Medical conditions including resident history of stroke and congestive heart failure were included in the model for "effective treatment", but were excluded from the final models for functional change reported here as they did not contribute to improved fit of the models. Since data on facility characteristics were missing for survey non-respondents, the available sample of residents still in a nursing facility during quarter 4 is somewhat reduced. Readers are reminded that odds ratios greater than "1" are interpreted as increasing the likelihood of the occurrence of the event of interest and odds ratios of less than "1" represent reduced likelihood of occurrence.

### "Effective Treatment"

When controlling for baseline resident characteristics and facility mental health services urban-rural differences in the percentages of residents with depression receiving "effective treatment" disappear (Table 12). The direct effects of rural residence

are not significant controlling for other resident and facility characteristics. However, residents with depression in facilities with staff trained in the treatment of depression were significantly less likely to be identified as receiving "effective treatment." This negative effect of having trained staff is counter-intuitive. To better understand the negative impact of staff training on "effective treatment", an interaction term for rural facilities with trained staff was included in the model to consider potential differential effects of staff training in urban and rural facilities. As can be seen in Table 12, this interaction term is both significant and positive. Based on the parameter estimates for the main effects (rural and trained staff) and the interaction term, rural residents in facilities with trained staff were more likely to be effectively treated (controlling for other characteristics) when compared with the referent group--residents in urban facilities with no trained staff.

Interestingly, the only other characteristic positively and significantly associated with "effective treatment" was having a history of inpatient psychiatric care. Having a history of stroke was positively associated with increased likelihood of "effective

<b>Table 12: Logistic Regression Model of "Effective Treatment"</b>			
<b>Variable</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>Pr&gt;Chi-sq.</b>
Rural Residence	0.859	0.637-1.160	NS
Facility Has Agreement with MH Specialist	1.088	0.857-1.381	NS
Facility Staff Receive Training	0.599	0.441-0.812	0.001
Interaction Rural * Trained	2.239	1.352-3.709	0.001
Baseline ADL Score	0.995	0.967-1.024	NS
Baseline CPS Score	0.811	0.753-0.873	0.0001
Age 90+	0.445	0.295-0.673	0.0001
Age 85-89	0.509	0.343-0.754	0.001
Age 80-84	0.542	0.364-0.807	0.01
Age 75-79	0.808	0.530-1.229	NS

Aggressive at Baseline	0.603	0.451-0.807	0.001
Small Facility (Under 60 Beds)	1.146	0.843-1.559	NS
History of Inpt. Psychiatric Stay	2.833	1.298-6.182	0.01
Congestive Heart Failure	1.143	0.856-1.525	NS
Stroke	1.264	0.955-1.672	0.10
Married	0.668	0.474-0.940	0.05

**GOODNESS-OF-FIT STATISTICS:**

Chi-Square for Covariates:	
-2 Log L	126.426, 16 d.f. p=0.0001
Score	122.149, 12 d.f. p=0.0001
Pearson	1350.8,1337 d.f. p=0.3899
Hosmer and Lemeshow Stat	3.5095, 8 d.f. p=0.8985

treatment," although this effect was only marginally statistically significant. Resident characteristics associated with a reduced likelihood of "effective treatment" included: having a higher level of cognitive impairment, being age 80 or older, and being married.

**Decline in Physical Function**

Controlling for baseline ADL performance and other resident and facility characteristics, rural residents with depression were 33 percent more likely to experience deterioration in their self-performance of ADL than were urban residents (see Table 13). Other resident characteristics that significantly increased the probability of worsening ADL function included: older age, greater impairment in cognitive function or aggressive behavior at baseline. Residents in the “effective treatment” group and those with higher levels of dependence in their performance of ADL at baseline were significantly less likely to have declined in self-performance of activities of daily living at the end of the year. Residence in a facility with trained staff or in a facility with an agreement for mental health specialist support did not have a significant influence on residents’ likelihood of being less able to self-perform activities of daily living at the end of the study period.

<b>Table 13: Logistic Regression Model of Decline in Self-Performance of Activities of Daily Living</b>			
<b>Variable</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>Pr&gt;Chi-sq.</b>
Rural Residence	1.337	1.066-1.677	0.012

Facility Has Agreement with MH Specialist	0.990	0.797-1.230	NS
Facility Staff Receive Training	1.071	0.860-1.335	NS
Baseline ADL Score	0.931	0.907-0.956	0.0001
Baseline CPS Score	1.117	1.044-1.195	0.001
Diagnosed and Symptom-free with claim(s) for anti-depressants quarterly	0.750	0.592-0.952	0.01
Age 90+	1.699	1.160-2.487	0.01
Age 85-89	1.560	1.075-2.264	0.05
Age 80-84	1.390	0.950-2.035	0.10
Age 75-79	1.152	0.763-1.739	NS
Aggressive at Baseline	1.454	1.135-1.863	0.01
Small Facility (Under 60 Beds)	0.814	0.614-1.077	NS

**GOODNESS-OF-FIT STATISTICS:**

Chi-Square for Covariates:	
-2 Log L Score	73.296, 12 d.f. p=0.0001
Pearson	71.388, 12 d.f. p=0.0001
Hosmer and Lemeshow Stat	1271.5, 1252 d.f. p=0.3442
	4.7253, 8 d.f. p=0.7865

**Improved Cognitive Performance**

Residents in rural nursing facilities were less than half as likely to have improved cognitive function as were urban residents (Table 14), controlling for other resident and facility characteristics. Other factors contributing to a reduced likelihood of improved cognitive function were higher levels of dependence in the performance of ADLs and aggressive behavior at baseline. Compared with those in larger facilities, residents of smaller facilities were also significantly less likely to show improvement in cognitive function.

The likelihood of improved cognitive function was enhanced for residents of facilities that employ or contract with a mental health professional and for residents identified as receiving "effective treatment." Residents in facilities that had agreements with mental health professionals were 46 percent more likely to have improved

**Table 14: Logistic Regression Model of Improvement in Cognitive Function**

<b>Variable</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>Pr&gt;Chi-sq.</b>
Rural Residence	0.406	0.248-0.665	0.001
Facility Has Agreement with MH Specialist	1.464	0.975-2.220	0.10
Facility Staff Receive Training	1.313	0.888-1.941	NS
Baseline ADL Score	0.945	0.091-0.992	0.05
Baseline CPS Score	1.465	1.288-1.667	0.0001
Diagnosed and Symptom-free with claim(s) for anti-depressants quarterly	1.546	1.008-2.372	0.05
Age 90+	0.809	0.423-1.548	NS
Age 85-89	0.907	0.487-1.690	NS
Age 80-84	0.730	0.376-1.416	NS
Age 75-79	0.740	0.353-1.552	NS
Aggressive at Baseline	0.635	0.402-1.002	0.05
Small Facility (Under 60 Beds)	0.601	0.327-1.105	0.10

**GOODNESS-OF-FIT STATISTICS:**

Chi-Square for Covariates:  
-2 Log L Score 68.882, 12 d.f. p=0.0001  
Pearson 65.125, 12 d.f. p=0.0001  
Hosmer and Lemeshow Stat 1316.9, 1251d.f. p=0.0955  
14.172, 8 d.f. p=0.0774

cognitive function than were residents in facilities without such agreements (statistically significant at  $p < 0.10$ ). Compared with other residents, those receiving “effective treatment” were nearly 50 percent more likely to have improved cognitive function at the end of the year ( $p < 0.05$ ). Finally, those with lower cognitive function at baseline were significantly more likely to have improved cognitive function at the end of the year.

***Limitations***

This research describes nursing home residents in a single state, and as such, may not be generalizable to residents in other states. In addition, the measure of symptoms of depression used here has been subject to criticism. Thus, findings from this research must be viewed cautiously until a more robust measure of symptoms of depression has been developed for use with MDS+ data. Alternately, primary data

collection on resident symptoms of depression (and their severity over time), recorded for a similar cohort of residents could address these concerns. The small number of residents in this sample receiving psychotherapy likely results in an underestimation of any effects attributable to psychotherapy.

For this research, treatment effectiveness is narrowly defined due to reliance on secondary data. As such, effectiveness of treatment is not considered for residents with undiagnosed depression, nor is treatment effectiveness described for residents with onset of depression during the study year. Nonetheless, this conservative indicator does appear to be suggestive given the relatively high rates of anti-depressant use at baseline (85 percent) and the relatively infrequent occurrence of anti-depressant use as the sole indicator of resident depression.

Finally, the survey on nursing facility staff training was limited to staff perceptions and may have suffered from the effects of poor recall. Further, the survey did not adequately probe the types of staff who have had training, or the type and frequency of such training.

## ***Discussion***

This study identified urban-rural differences in the effectiveness of treatment and functional outcomes for Maine nursing facility residents with depression. Rural residents in facilities with staff trained in the treatment of depression were more likely to receive "effective treatment" than were other residents (either in urban facilities or rural facilities without trained staff), controlling for other resident and facility characteristics. This finding is based on a somewhat crude, and conservatively defined, indicator of treatment effectiveness limited to residents with a diagnosis of depression.

In contrast, urban residents in facilities with trained staff were less likely to be identified as receiving effective treatment than were urban residents in facilities without staff trained in the treatment of depression. This seemingly counterintuitive finding has several possible explanations that could not be disentangled with the existing data.

Regardless, the positive impact of staff training on treatment effectiveness in rural facilities remains as an important finding.

Other resident characteristics influencing the likelihood of receiving "effective treatment" parallel previously reported findings relative to the likelihood of nursing facility residents receiving services from a mental health specialist (Shea, Streit and Smyer 1997). Specifically, older residents, and those with higher levels of cognitive impairment at baseline were significantly less likely to receive "effective treatment" than were younger and less cognitively impaired residents with depression. Residents with a history of inpatient psychiatric care were also more likely to receive "effective treatment," a finding that is consistent with reported increases in the likelihood of receiving mental health services for residents with schizophrenia or psychoses (Shea, Streit and Smyer 1997). In contrast with the findings of Shea and his colleagues (1997), level of impairment in activities of daily living did not make a significant difference in the likelihood of receiving "effective treatment." This inconsistency may be attributable to differences in the definition of activity of daily living impairment levels.

In addition to urban-rural differences in the impact of staff training on treatment effectiveness, and the indirect effect of these urban-rural differences on functional outcomes, direct urban-rural differences were also observed for residents' functional outcomes. Controlling for treatment effectiveness and other resident and facility characteristics, compared with urban residents, rural residents were significantly more likely to have poorer physical functioning and significantly less likely to have improved cognitive function at the end of the study year compared with their baseline functional status.

Residents in facilities that employ or contract with mental health specialists were also more likely to show improvement in cognitive function than were residents in facilities without agreements with mental health specialists. No significant urban and rural differences were detected in the impact of mental health specialist agreements on residents' functional changes.

## ***Conclusions***

This research suggests that rural facilities with staff formally trained in the care of older adults with depression have greater success in their treatment of residents with depression. Not surprisingly, residents with depression who receive "effective treatment" appear to enjoy more positive physical and cognitive function outcomes than do residents who receive less "effective treatment." In both urban and rural facilities, agreements with mental health specialists contribute significantly to the likelihood that residents with depression will regain at least some of their loss of cognitive function. Thus, policy initiatives targeting staff training in rural areas and improved access to mental health specialists for nursing facility residents must be encouraged through thoughtfully developed policy incentives and professional development programs. Combined with greater attention to the diagnosis and active treatment of residents with symptoms of depression, such efforts likely will be rewarded by improved functional capacity (or avoidance of hastened functional decline) and reduced resident reliance on nursing facility staff.

The potential value of psychotherapy, while not well described by data available for this study merits greater attention in future research. As psychotherapy becomes more prevalent as a treatment for nursing facility residents, the questions of urban-rural differentials in the identification, treatment and outcomes of nursing facility residents with depression must be revisited to assess the impact of psychotherapist supply, an effect that could not be tested here.

Finally, future research using primary data is needed to confirm the findings reported here. Specifically, research is needed to assure that the prolonged treatment with anti-depressant medications for residents with diagnosed depression is indicated for continued symptom remission.

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## ENDNOTES

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<sup>1</sup> Burns et al. (1993) found that slightly more than 2 percent of nursing home residents had contact with a mental health professional and an equal proportion were seen by a general physician for mental health needs in a one-month period.

<sup>2</sup> This high level of apparent unmet need is corroborated by other research. Smyer, Shea and Streit (1994), using data from 1987 National Medical Expenditure Survey (NMES) found that, although 75 percent of the residents with mental disorders lived in a nursing home that offered some mental health services, less than 20 percent received any mental health service from the facility. Smyer and colleagues' (1994) analysis also found that less than 60 percent of the nation's nursing homes provided counseling or psychotherapy.

<sup>3</sup> An important component of the Nursing Home Reform Act passed in 1987, as part of the Omnibus Reconciliation Act (OBRA 87), recognized that the mental health needs of the elderly in long term care facilities were not being addressed adequately. To comply with OBRA 87, nursing homes must screen all applicants and residents for mental health problems and must either provide active treatment to residents with mental illness or refer them to treatment at a psychiatric facility. State and federal agencies and individual long term care facilities have mobilized over the last decade to implement the provisions of the law so that elderly residents with mental illness can be identified and treated.

<sup>4</sup> Recognizing and diagnosing depression among older adults is made more difficult because of the challenges encountered in differentiating between depression and dementia (Jenike 1988). This is not an insubstantial problem in view of research suggesting that among older adults with symptoms of major depression, up to 50 percent also had an indication of significant cognitive impairment (Parmelee, Katz and Lawton 1989). Further complicating the distinction between depression and dementia are findings that depression may contribute to cognitive impairments (Lichtenberg, Ross, Millis and Manning 1995). Medications prescribed for physical illnesses may further complicate the evaluation and treatment of depression and can even perpetuate or worsen the condition (Fitten et al. 1989). In addition, functional limitations and sequelae

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of physical illness common among older people often parallel the symptoms of depression and such similarities can obscure the symptoms of depression thus reducing the likelihood of diagnosis and treatment (Leibowitz, Pearson, Schneider et al. 1997). Finally, as with younger people, older adults are often reluctant to disclose their symptoms to their health care provider (Thompson, Futterman and Gallagher 1988). Despite the difficulties in diagnosing depression among older adults, there is considerable agreement that depression is the most common psychiatric disorder among older adults.

<sup>5</sup> The three Census-defined Metropolitan Statistical Area (MSAs) in the state do not include several cities and/or urbanized areas that do not possess the typical characteristics of rural areas (i.e. small, low density populations). The sixteen Maine counties, on the other hand, are too large and geographically diverse to use as the unit of analysis.

<sup>6</sup> The bivariate correlation between rural residence and small facility size was significant. However, the Pearson's correlation coefficient of 0.168 was viewed as within an acceptable range permitting inclusion of both variables in the logistic models tested here.



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