



Impacts of nutrition and human services interventions on the health of elderly and disabled persons in public housing

A study of the HUD ROSS-RSDM - Elderly and Persons with Disabilities grant funded programs in the Seattle Housing Authority's Low Income Public Housing program

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Abstract

This article presents the results of a quasi-experimental study of the effects of certain federally funded nutrition and human services interventions on the health outcomes of seniors and people with disabilities in Seattle public housing. The interventions studied are those funded by the US Department of Housing and Urban Development's Resident Opportunities and Self Sufficiency (ROSS) Resident Service Delivery Models – Elderly and Persons with Disabilities grant program in the Seattle Housing Authority's Low Income Public Housing program. Funded interventions include grocery delivery, resource referral, and case management services, communal activities and events, and health and wellness programming.

The health outcomes of a treatment and control group were compared. The interventions funded by the ROSS Resident Service Delivery Models – Elderly and Persons with Disabilities grant program significantly increased social interaction among residents of all age groups, decreased the percentage of those going without treatment for certain conditions, and decrease the percentage of evictions that result in the tenant's having to leave from the public housing community.

Additional findings include a high prevalence of barriers to accessing healthy foods, low fruit and vegetable intake, and a high rate of chronic conditions across treatment and control groups.

A secondary analysis of clients of a grocery delivery service, one of the main components of the funded interventions, versus non-clients shows the grocery delivery service increased vaccinations against influenza, the percentage of women 50 years or older who had a mammography screening within the past two years, decreased visits to the emergency room, and decreased social isolation of residents.

Keywords: elderly; disabled; public housing; nutrition; human services; US Department of Housing and Urban Development; Resident Opportunities and Self Sufficiency grant program

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Executive Summary

Introduction

The Resident Opportunities and Self Sufficiency Resident Service Delivery Models – Elderly and Persons with disabilities grant program funds supportive services in public housing communities. Services funded through the grant program facilitate and allow the independent living of the elderly and persons with disabilities.

In Seattle, three organizations have received the grant: Solid Ground, Neighborhood House, and the Community Psychiatric Clinic. The organizations provide resource referral, health and wellness programming, group activities, case management, mental health case management, and general translation services.

Research Question

What are the impacts of the Resident Opportunities and Self Sufficiency Resident Service Delivery Models – Elderly and Persons with disabilities grant program funded services on the health outcomes of seniors and people with disabilities in Seattle public housing?

This study examines the impact of the services funded by the grant program on the health outcomes of elderly and persons with disabilities in the Seattle Housing Authority's Low Income Public Housing program. A quasi-experimental design compares the health outcomes of a treatment with a control group. Data for the comparisons come from a proprietary health survey, conducted in December 2008 to January 2009, and evictions records and critical incidents reports from the Seattle Housing Authority for the 2002 and 2004 to 2008 period, respectively.

Study Highlights

Major findings of this study include:

- The ROSS programs significantly decrease the social isolation of residents
- The ROSS programs significantly decrease the percentage of people who go without treatment for their chronic conditions
- The ROSS programs significantly decrease the percentage of evictions proceedings that result in the tenant having to leave his/her unit

Additional findings:

- A high proportion of residents do not have treatment for their chronic conditions
- Cost is the most commonly cited barrier to obtaining healthy foods
- One-fifth of people in the treatment and control groups report shrinking portion sizes and/or skipping meals to obtain healthy foods
- More than 95% of residents consume less than half the recommended daily intake of fruits and vegetables

A secondary analysis of clients of a grocery delivery program finds:

- The grocery delivery service appropriately targets those with functional limitations
- Grocery delivery service users still struggle with barriers to obtaining healthy foods
- Grocery delivery significantly reduces social isolation of residents
- Grocery delivery significantly reduces the percentage of residents who go to the emergency room
- Grocery delivery significantly increases the percentage of people who are vaccinated against influenza
- Grocery delivery significantly increases the percentage of women who have a mammography screening

Conclusions

We find evidence that the Resident Opportunities and Self Sufficiency Resident Service Delivery Models – Elderly and Persons with Disabilities grant funded services improve the health outcomes of residents over several measures of health indicators. However, residents of the treatment group still show a high prevalence of chronic conditions, experience barriers to obtaining healthy foods, and have an inadequate daily intake of fruits and vegetables. Overall, the quality of life of residents who live in the treatment group, where the Resident Opportunities and Self Sufficiency Resident Service Delivery Models – Elderly and Persons with Disabilities grant funded services are available, is diminished, according to our examination of health indicators.

Introduction

This paper presents the results of a quasi-experimental study of the impacts of certain federally funded nutrition and human services interventions on the health outcomes of seniors and people with disabilities in the Seattle Housing Authority's Low Income Public Housing (LIPH) program. The programs examined are funded by the US Department of Housing and Urban Development's (HUD) Resident Opportunities and Self Sufficiency (ROSS) Resident Service Delivery Models (RSDM) – Elderly and Persons with Disabilities (EPD) grant program. The RSDM – EPD is one of five ROSS funding categories (Elderly Housing: Federal Housing Programs and Supportive Services, 2005, p. 7).

Since 2001, the ROSS RSDM – EPD program has awarded three-year grants to public housing authorities, resident organizations and non-profits around the country. These grants fund supportive services to elderly and disabled persons to facilitate and allow their independent living in public housing facilities. In fiscal year 2007, over \$16 million in grants were awarded (US Department of Housing and Urban Development, 2008b).

In the city of Seattle, three non-profit organizations have been recipients of ROSS RSDM – EPD grants: Solid Ground (formerly the Fremont Public Association), Neighborhood House, and the Community Psychiatric Clinic. All organizations provide their ROSS RSDM – EPD funded services to elderly persons and people with disabilities in select high-rise communities of the Seattle Housing Authority's (SHA) Low Income Public Housing program. Neighborhood House also receives funding through the ROSS RSDM – EPPD grant to provide services to residents in SHA's LIPH with Family Units program and to residents of the King County Housing Authority's housing programs. Table 1 shows the year and amount of ROSS RSDM – EPD grants received by all three organizations.

Table 1. ROSS RSDM - EPD grants in the Seattle Housing Authority's LIPH program¹

Fiscal Year	Organization	Amount
2001	Neighborhood House, Inc.	\$300,000
2003	Community Psychiatric Clinic	\$300,000
2004	--	
2005	Solid Ground, Inc. (formerly the Fremont Public Association)	\$375,000
2006	Neighborhood House, Inc.	\$250,000
2007	Community Psychiatric Clinic	\$300,000

Source: US Department of Housing and Urban Development (2003, December 17; 2005a, February 4; 2005b, December 20; 2007, January 18; 2008b, March 4)

The services provided through the ROSS RSDM – EPD grant are intended to facilitate the independent living of seniors and people with disabilities in public housing. Solid Ground

¹ Grants are awarded for three-year periods; none were awarded in 2004

provides resource referral, grocery delivery¹, health and wellness programming, and group activities services. Neighborhood House has a similar focus and provides medical and resource referral, health and wellness programming, group activities, case management, and general translation help for clients with an emphasis on serving the foreign language-speaking community. The Community Psychiatric Clinic primarily provides mental health case management services and focuses its efforts on those with mental illnesses.

Linking Housing and Supportive Services

The concept of linking housing and supportive services is not new. In establishing the Congregate Housing Services Program (CHSP) in 1978, the US Congress noted that “congregate housing, coordinated with the delivery of supportive services, offers an innovative, proven, and cost-effective means of enabling temporarily disabled or handicapped individuals to maintain their dignity and independence and to avoid costly and unnecessary institutionalization” (Public Law 95-557).

HUD currently funds three programs that provide supportive services to the elderly and disabled in public housing contexts which are similar to those provided under the ROSS RSDM – EPD grant program: the Congregate Housing Services program (CHSP), Service Coordinator Program (SCP), and the ROSS – Service Coordinators program, which replaces the ROSS RSDM – EPD as of fiscal year 2008. Whereas the CHSP serves the elderly exclusively, the other programs serve the elderly and non-elderly disabled (US Government Accountability Office, 2005; US Department of Housing and Urban Development, 2008a).

Despite the Congressional claim of firm research backing the effectiveness of the supportive services upon establishing the CHSP, a review of existing literature produces scant research on the effects of supportive services on the health of elderly or disabled residents in public housing. The CHSP and SCP have undergone HUD evaluation, but we found no studies of the ROSS RSDM - EPD.

The CHSP provides on-site supportive services to the elderly and those with significant functional limitations in federally assisted housing with the goal of helping them to remain living in the community as long as possible. In a 1996 evaluation, the Research Triangle Institute asked participants to rate housework, congregate meal, transportation, in-home health care, home-delivered meal, and personal grooming services provided. The majority of CHSP participants, over 80%, indicated they were satisfied with the services they received (p. 37).

¹ The ROSS RSDM – EPD pays for staff salaries, but not the groceries.

Similar to the CHSP, the SCP funds service coordinators in public housing facilities who are responsible for connecting residents with specific supportive services they need to continue living independently. The KRA Corporation (1996) interviewed SCP clients and property managers in whose buildings the programs were located and determined that the SCP positively increased resident physical and emotional well-being, access to services, social interaction between residents, and reduced the number of residents who required nursing home placements (p. 71-74).

Sheehan (1999) provides a more rigorous assessment of the service coordinator model. Her qualitative study of the Resident Services Coordinator demonstration program at the Connecticut Housing Finance Authority found a generally positive impact of the program on frail elderly residents' health, functional ability, social participation, and psychosocial well-being, over a two-year period, compared to a control group where a service coordinator was not available and which made no progress.

We believe the present study is the first quasi-experimental examination of the ROSS RSDM – EPD grant program. The ROSS RSDM – EPD uses a similar set of strategies as the Service Coordinator Program (SCP) and the Congregate Housing Services Program (CHSP), as shown in Table 2. However, it does so without reliance on an assisted living setting, making the service coordinator position in the ROSS programs a seemingly more important connection to services. This article thus contributes to the literature by examining a federal program whose impacts and component parts have not before been assessed.

Table 2. A side-by-side look at the ROSS RSDM – EPD grant program services, the Service Coordinator Program (SCP) the Congregate Housing Services Program (CHSP).

ROSS RSDM – EPD	Service Coordinator Program (SCP)	Congregate Housing Services Program (CHSP)
Service Coordinator Grocery delivery	Service coordinator	Service coordinator Meals Assisted Living

Methodology

Quasi-experimental Design

The Seattle Housing Authority's Low Income Public Housing program consists of 28 high-rise complexes scattered throughout the city of Seattle (See Appendix A for a map of approximate locations). Of these 28 high-rises, Solid Ground provides ROSS RSDM – EPD funded services to 4 communities, Neighborhood House to 1 and the Community Psychiatric Clinic to all 28 (Table 2).

Table 3. Seattle Housing Authority LIPH communities serviced by Solid Ground, Neighborhood House, and the Community Psychiatric Clinic as of October 2008.

Solid Ground	Neighborhood House	Community Psychiatric Clinic
Bell Tower Harvard Court Olive Ridge	Jefferson Terrace	All 28 communities

Source: Solid Ground, Neighborhood House, and Community Psychiatric Clinic

A quasi-experimental study design was selected in which health outcomes of a treatment and a control group were be measured and compared. The treatment group was defined as those communities receiving services, excluding buildings serviced by the Community Psychiatric Clinic, because the organization provides services to all 28 buildings. The resulting treatment group consisted of the 4 communities serviced by Solid Ground and Neighborhood House. The control group consisted of 4 communities matched to each of the treatment group communities, selected on the basis of similar demographic characteristics (See Appendix B).

Table 4. Study Treatment and Control Groups

Treatment Group	Control Group
Bell Tower Harvard Court Jefferson Terrace Olive Ridge	Denny Terrace Capitol Park Cedarvale House Lictonwood

Characteristics that we theorized would affect health outcome measures formed the basis of control group matches for the treatment group. These characteristics were: resident age, percentage of elderly residents, percentage of very elderly residents, percentage of disabled residents, percentage of foreign language households, and the racial composition of communities. While income would normally be considered, these differences were controlled for by the fact that all residents in the LIPH program all are below the level qualifying them for public housing assistance. Building size, measured by the number of units in a community, was controlled for through group selection, yielding similar sized groups (590 units in the treatment group versus 540 in the control group). Lastly, communities where special non-ROSS RSDM – EPD funded services were made available to residents were excluded from consideration for inclusion in the control group.

Data Sources

The study relied upon three data sources: two secondary and one primary. Critical Incident Reports, which describe emergencies occurring in LIPH communities, and eviction files are collected, and were provided to us by the Seattle Housing Authority. Primary data on health status, preventative health, and risk behaviors were collected for this research. These are

described below, and their availability is presented on the Data Source and Study Timeline (Table 4).

Table 5. Data Source and Study Timeline

Date	Activity
02/2001 - 02/2004	Neighborhood House ROSS services at Jefferson Terrace, Olive Ridge
2002 - 10/2008	Time period covered by Critical Incident Reports
2004 - 10/2008	Time period covered by evictions data
04/2006 - 03/2009	Solid Ground ROSS services at Bell Tower, Harvard Court, Denny Terrace
05/2007 - 05/2010	Neighborhood House ROSS services at Jefferson Terrace
06/2007	Solid Ground begins ROSS services at Olive Ridge
07/2007	Solid Ground ends ROSS services at Denny Terrace (but continues grocery delivery)
11/2008	Solid Ground begins grocery delivery at Jefferson Terrace (no other services)
12/2008 - 01/2009	Community Health Survey 2008 data collection

**Evictions and Critical Incident Reports data were requested for as far back as possible*

Sources: Solid Ground, Neighborhood House

1. *Client Evictions Files.* Evictions processes are begun for non-compliance (violations of SHA policies governing behavior, safety, or cleanliness) or for non-payment of rent (late rent payments or non-payment). Evictions notices are issued and residents are given time to request a grievance hearing. The hearings officer may dismiss or settle the case at the grievance hearing. If the resident fails to respond to the notice, a summons and complaint is served and a case is filed with the county court. The court may either dismiss the eviction proceeding, legally allow SHA to repossess the resident's unit, or the resident may enter into an agreement with SHA to come into compliance with policies. Stipulations are legally binding agreements between SHA and residents and are offered by SHA at its discretion. Information collected included evictions type (non-compliance with SHA policies or non-payment of rent), date of issuance of eviction notice, outcome (physical eviction, stipulation to move out, vacancy or dismissal of evictions proceeding), and the date of the outcome. Data available included evictions proceedings initiated between 2004 and October 2008. However, data is recorded by hand and sometimes inconsistently.
2. *Critical Incident Reports.* SHA employees are required to report incidents that occur on SHA property that involve "property damage, injury or death, and harmful or dangerous situations which could have serious consequences" ¹. Critical incidents

¹ See the Housing Authority of the City of Seattle's "Manual of Operations"

measure the physical safety and health of residents in their communities. Critical incident data were obtained for the 2002 to October 2008 period. Similar to the evictions files, the completeness of the critical incident reports is questionable.

According to SHA policies, reported critical incidents include:

- Arrests on SHA property
 - Assault
 - Harassing behavior
 - Bomb/explosion
 - Break-ins
 - Death
 - Drugs/Alcohol
 - Environmental spills/leaks
 - Fire/arson
 - Homicide
 - Injury
 - Property damage
 - Sexual assault
 - Shooting/drive by
 - Structural damage
 - Suicide/suicide threats
 - Threats of physical harm
 - Vandalism
 - Vehicle accident injury
 - Verbal or physical abuse
 - Vicious dog or other animal
 - Weapons/discharging a firearm
 - Weapons in the work site
3. *Community Health Survey 2008*. A 2-page, 12-question health survey was designed and modeled on indicators in the Federal Interagency Forum on Aging Related Statistics' *Older Americans 2008: Key Indicators of Well-Being* (2008) (see Appendix C for English version of the survey). The survey was translated into Chinese, Vietnamese, Korean, Spanish, and Polish after language needs and volunteer translation capacity were assessed. Surveys were distributed in person to each unit in treatment and control group buildings on December 16, 2008. Survey collection boxes were left with the City of Seattle's Human Services Department Aging and Disability Services case managers. Clear instructions for residents on how to submit surveys were posted on community and lobby bulletin boards and at elevators. Survey collection boxes were retrieved between December 23, 2008 and January 7, 2009. Participation was encouraged by advertising that eight \$20 gift cards to a local supermarket chain would be awarded in random drawings from submitted surveys.

Of 1,130 surveys distributed, 326 were returned. The treatment and control groups returned 167 (28%) and 159 (29%) surveys, respectively.

Measuring the Impact of the ROSS RSDM - EPD Grant Funded Services

The Solid Ground and Neighborhood House ROSS RSDM – EPD grant funded services (henceforth ROSS programs) work at a variety of levels. Thus, we hypothesized that the programs' impact might be observable over a range of health, safety, and housing stability measures. Tests of significance at the 10% level ($\alpha=0.1$) were used to establish statistically significant differences in health outcomes between the treatment and control groups.

Analysis and Discussion

This section details our findings, which can be generally summarized as follows: The ROSS programs seem to decrease the social isolation of residents, the percentage of people who go without treatment for their chronic conditions, and decrease the percentage of evictions proceedings that result in the tenant having to leave his or her unit. In addition, we noted that all respondents seem to have difficulties accessing healthy foods, most consume less than half the recommended daily intake of fruits and vegetables, and a high proportion go without treatment for their chronic conditions, whether or not they were in the treatment or control groups.

We focus the primary analysis on variables that were found to be statistically significant. Measures that did not have statistical significance, which include critical incident reports and most evictions measures, are presented in Appendix D. We question the completeness of reporting structures that generated the evictions and critical incidents reports records: more complete and detailed data may have yielded different results in our analysis.

A secondary analysis of health outcomes by clients and non-clients of grocery delivery services, which is a primary component of the Solid Ground ROSS program, finds grocery delivery reduces social isolation of residents, the percentage of residents who go to the emergency room, and increases vaccination against influenza and the percentage of women who have a mammography screening as part of their preventative healthcare.

Comparison of Health Outcomes Between the Treatment and Control Groups

Indicator 1: Access to Healthy Foods

A healthy diet is essential to maintaining good health and preventing the onset of chronic diseases (US Department of Health and Human Services and the US Department of Agriculture, 2005). Recent studies of hunger in the SHA's Low Income Public Housing program reveals that the elderly and people with disabilities have significant barriers to obtaining healthy foods. One third of respondents in the Gilmore Research Group (2003) study "said they have to skip at least some meals every month because they don't have enough food" (p. 24). Johnson (2008) found 54.8% of households in his study were food insecure at some point in the year¹ (p. 8). The Community Health Survey 2008 builds on this research by asking respondents what barriers they encountered and how they overcome these barriers to access healthy foods.

¹ Johnson uses the United States Department of Agriculture's definition of food insecurity: households were uncertain of having or unable to acquire enough food at some point because of insufficient money or a lack of resources for food.

Table 6. Percentage of people who reported encountering barriers to obtain healthy foods, by barrier.

Barrier	Treatment (n=167)	Control (n=159)	P-value
None	19.16%	26.42%	p=0.118
Can't walk far	25.75%	16.98%	p=0.054
Cost	61.68%	62.26%	p=0.913
Time	6.59%	2.52%	p=0.079
Transportation	22.16%	11.32%	p=0.009

Overall, cost is the greatest barrier for residents of treatment and control groups in obtaining healthy foods. About 62% of both groups cite it as a barrier. A significantly higher percentage of respondents in the treatment group report not being able to walk far, transportation, and time to be additional difficulties, however the percentage of people reporting time as a difficulty is very small (6.59%). Overall, about 40% of respondents in the treatment group and 25% in the control group said physical access ("Can't walk far" and/or "Transportation") was a barrier to their accessing food.

Table 7. Percentage of people who reported using certain strategies to access healthy foods, by strategy.

	Strategies	Treatment (n=167)	Control (n=159)	P-value
Food Access	Bus	34.73%	27.67%	p=0.170
	Chore worker	12.57%	4.40%	p=0.008
	Food Stamps	61.08%	69.18%	p=0.125
	Grocery delivery	23.95%	11.32%	p=0.003
	Drive	4.19%	10.06%	p=0.039
	Ride/carpool	5.99%	6.92%	p=0.732
Hunger Mitigation	Borrow from family/friends	10.18%	9.43%	p=0.821
	Meals with friends	16.77%	11.95%	p=0.216
	Shrinking portion sizes	21.56%	17.61%	p=0.370
	Skipping meals	19.76%	23.27%	p=0.440
	Other	20.36%	10.69%	p=0.016

A high proportion (around 20%) of residents shrink portion sizes and skip meals in order to access healthy foods, which is an indication of the severity of hunger across both groups. A significantly higher proportion of residents in the treatment group rely on chore workers (service provided through the City of Seattle), grocery delivery, and "Other" strategies to access healthy foods. 11 (6.59%) residents in the treatment group and nine (5.67%) in the control group reported using a food bank to access healthy foods under the "Other" response.

Both treatment and control groups are using the same strategies to access food at similar rates: bus, food stamps, ride/carpool, borrow food from family or friends, and meals with

friends in addition to shrinking portion sizes and skipping meals. Most residents are not able to access food by driving or carpooling, as just 4% to 10% of residents drive or carpool.

The percentage of people who reported encountering “None” barriers to obtain healthy foods may be difficult to interpret, because it could be understood as asking whether the barrier exists before or after using certain strategies (contained in the following table) to access those foods.

Indicator 2: Diet Quality

Poor diet quality is a major cause of morbidity and mortality in the United States. People who consume more fruits and vegetables as part of a healthful diet have a reduced risk of chronic disease including stroke, cardiovascular disease, type 2 diabetes, cancers of the oral cavity, pharynx, larynx, lung, esophagus, stomach, and colon-rectum. Most Americans could benefit from increased intake of fruits and vegetables. The US Department of Agriculture and the US Department of Health and Human Services (2005) recommend a daily intake of 8 servings (4.5 cups) of fruits and vegetables for a 2,000-calorie level diet.

Table 8. Percentage of people who reported consuming fruits and vegetables daily, by daily intake.

Daily Intake	Treatment (n=162)	Control (n=157)	P-value
None	6.79%	9.55%	p=0.367
1-4 servings	88.27%	84.71%	p=0.352
5 or more servings	3.09%	5.73%	p=0.752

There is no statistically significant difference between the proportion of each group that consumes no, 1-4 servings, and 5 or more servings of fruits and vegetables daily (Table 7). More than 95% of residents in both groups consume less than 5 or more servings of fruits and vegetables daily, which is just half of the recommended daily intake. Moreover, 7% of residents in the treatment group and 10 % of residents in the control group have no fruits and vegetables in their daily diets.

Indicator 3: Social Interaction

Bassuk et al. (1999) finds that social engagement including monthly visual contact with friends or relatives, group membership, and regular social activities helps prevent cognitive decline in elderly persons. Those with no social ties are at increased risk for cognitive decline compared to those with five or six ties, after adjustment for age, sex, ethnicity, education, income, housing type, physical disability, cardiovascular profile, sensory impairment, symptoms of depression, smoking, alcohol use, and level of physical activity.

Table 9. Percentage of people who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.

Frequency	Treatment (n=156)	Control (n=159)	P-value
Rarely/never	51.28%	64.15%	p=0.021
1-2 times	30.13%	25.79%	p=0.390
3-4 times	10.90%	6.29%	p=0.144
5-7 times	7.69%	3.77%	p=0.134

The proportion of residents in the treatment group who report rarely or never meeting with other residents in their building is significantly less than the proportion of residents in the control group who do the same (Table 8). It appears that the ROSS programs decrease the social isolation of residents from their neighbors by almost 13%. On the other hand, the proportion of people who rarely or never meet with other residents in their building is still high at about 50% and 65% for the treatment and control groups, respectively.

Further analysis of the social interaction measure by age group shows that the ROSS programs significantly decrease social isolation for the 18-61 years old and 62-69 years old groups, but the social isolation of people aged 70 years or older in the treatment group is no different from the same age group in the control group (Table 9).

Table 10. Percentage of people of each age group who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.

18-61 years old Frequency	Treatment (n=101)	Control (n=100)	P-value
Rarely/never	58.42%	72.00%	p=0.043
1-2 times	28.71%	20.00%	p=0.150
3-4 times	5.94%	5.00%	p=0.769
5-7 times	6.93%	3.00%	p=0.200
62-69 years old Frequency	(n=33)	(n=33)	
Rarely/never	33.33%	54.55%	p=0.083
1-2 times	36.36%	33.33%	p=0.796
3-4 times	18.18%	6.06%	p=0.131
5-7 times	12.12%	6.06%	p=0.392
70 years old or more Frequency	(n=21)	(n=21)	
Rarely/never	42.86%	42.86%	p=1.000
1-2 times	28.57%	42.86%	p=0.334
3-4 times	23.81%	9.52%	p=0.214
5-7 times	4.76%	4.76%	p=1.000

Indicator 4: Chronic Health Conditions, Sensory Impairments, and Oral Health

The prolonged nature of illness and disability from chronic disease results in pain and suffering and decreased quality of life for those afflicted. Cardiovascular disease (heart disease), cancer, and diabetes are among the most costly of health problems and require special treatment and care. They are moreover risk factors for developing other conditions (Federal Interagency Forum on Aging Related Statistics, 2008; Centers for Disease Control and Prevention, 2008).

Visual and hearing impairments and oral health can often result in debilitating physical and social effects for older people. Measurements of these indicators were included in the Community Health Survey (Federal Interagency Forum on Aging Related Statistics, 2008).

Table 11. Percentage of people who reported having selected conditions, by condition.

Condition	Treatment (n=144)	Control (n=141)	P-value
Arthritis	27.78%	38.30%	p=0.059
Asthma, chronic bronchitis, or emphysema	25.69%	29.79%	p=0.440
Cancer	6.94%	4.96%	p=0.480
Depression	46.53%	54.61%	p=0.172
Diabetes	15.97%	22.70%	p=0.150
Heart disease, hypertension, or stroke	39.58%	34.75%	p=0.399
No natural teeth	25.69%	20.57%	p=0.305
Trouble hearing	16.67%	22.70%	p=0.200
Trouble seeing	34.03%	38.30%	p=0.453

The percentage of residents who reported having selected conditions (Table 10) reveals that both the treatment and control groups are very high-needs populations. Depression is the most common condition among all residents, where 47% and 55% of residents in the treatment and control groups, respectively, reported having the condition. Heart disease, hypertension, or stroke (40% and 35%) and trouble seeing (34% and 38%) are the second most reported conditions among the treatment and control groups. We find evidence that the ROSS programs decrease the rate of people with arthritis, with just 28% of residents in the treatment group reporting the condition versus 38% in the control group. The pathways through which the programs decrease the prevalence of this condition are not clear.

Table 12. Percentage of people who reported a number of untreated conditions, by number of conditions.

Number of Conditions	Treatment (n=144)	Control (n=141)	P-value
1 or more	23.61%	39.72%	p=0.003

2 or more	14.29%	19.86%	p=0.091
3 or more	6.25%	9.93%	p=0.254

Moreover, the proportion of people in the treatment and control groups who reported having 1 or more and 2 or more untreated conditions is statistically different, indicating that the ROSS programs increase the percentage of people who receive treatment for their conditions overall (Table 11). The difference is substantial: for people with 1 or more conditions, the ROSS programs decrease untreated conditions by 16% and for people with 2 or more conditions, by 5%.

Table 13. Percentage of people who reported having an untreated condition, by condition.

Condition	Treatment (n=144)	Control (n=141)	P-value
Arthritis	2.78%	13.48%	p=0.001
Asthma, chronic bronchitis, or emphysema	2.78%	4.96%	p=0.338
Cancer	1.39%	2.13%	p=0.635
Depression	4.86%	9.22%	p=0.150
Diabetes	0.69%	2.84%	p=0.168
Heart disease, hypertension, or stroke	2.78%	5.67%	p=0.224
No natural teeth	10.42%	11.35%	p=0.801
Trouble hearing	9.72%	14.18%	p=0.245
Trouble seeing	9.72%	14.89%	p=0.184

However, for specific conditions, we find evidence that the ROSS programs increase the percentage of people who receive treatment only for arthritis, but not for any other condition (Table 12).

Indicator 5: Evictions Proceedings

Eviction is a health concern because it threatens the immediate ability of a person to care for himself/herself. Eviction puts the physical and mental health and physical safety of a person in jeopardy. It was measured in this study because we hypothesized that the effect of the connection the ROSS programs provide to other services including legal help and tenant counseling might be observable over a baseline comparison with the control group.

Table 14. Number of evictions proceedings begun over the number of units during the 2004 to October 2008 period.

	Treatment (n=590)	Control (n=540)	P-value
	0.1356	0.1093	p=0.17609

We found no statistically significant difference between the number of evictions proceedings begun over the number of units during the 2004 to October 2008 period for the treatment and control groups (Table 13). Evictions proceedings are started against residents in the treatment and control groups at about the same rates.

Table 15. Percentage of evictions processes begun that resulted in the tenant's leaving.

	Treatment (n=80)	Control (n=59)	P-value
Yes	53.75%	61.02%	p=0.09294

However, once the eviction proceedings have begun, the rate at which tenants are forced to leave their Low Income Public Housing units is lower for the treatment group than for the control group (Table 14). It appears that the ROSS programs decrease the rate at which tenants must leave their units (either by forceful eviction by a sheriff or vacating before the eviction date) and increase the rate at which tenants already engaged in evictions proceedings are permitted to stay (either through dismissal of the case by the court or entering into a stipulation with SHA).

Comparison of Health Outcomes Between Grocery Delivery Service Users and Non-Users

The grocery delivery service is one of the main components of the Solid Ground program under the ROSS RSDM – EPD grant. We hypothesized that users of the grocery delivery service were more connected to the ROSS programs than all residents in the treatment group as a whole and extended our data analysis to compare health outcomes of users and non-users of grocery delivery services.

It should be noted that no distinction was made between users of the Solid Ground grocery delivery and the grocery delivery services of other organizations. Of 310 valid survey respondents, 48 (15.48%) are users of a grocery delivery service, including some individuals in the control group. Several organizations in Seattle operate grocery delivery services in the city, including Meals on Wheels, the Life-long AIDS Alliance's Chicken Soup Brigade, and St. Mary's Food bank. These services are available to everyone who qualifies for the programs, and are not limited to specific LIPH communities.

Indicator 1: Access to Healthy Foods

Table 16. Percentage of people who reported encountering barriers to obtain healthy foods, by barrier.

Barrier	Users (n=58)	Non-users (n=268)	P-value
None	10.34%	25.37%	p=0.013

Can't walk far	46.55%	16.04%	p=0.000
Cost	63.79%	61.57%	p=0.752
Time	5.17%	4.48%	p=0.819
Transportation	27.59%	14.55%	p=0.016

Compared to non-users of the grocery delivery service, users report a statistically significant difference in reporting not being able to walk far and transportation as barriers to accessing healthy foods (Table 15). About 30% more users than non-users report not being able to walk far and 13% more users than non-users report transportation as difficulties. These are indications that the grocery delivery service is correctly targeting those individuals with functional limitations and physical barriers in accessing healthy foods.

The difference in the proportion of users versus non-users who indicated they encountered no barriers in accessing healthy foods is statistically significant. 20% less users than non users reported no barriers. Even with the assistance of the grocery delivery, users remain needy. The weekly grocery delivery is not intended to fulfill all of a person's weekly nutritional needs, only supplement them, and this may account for that result.

Table 17. Percentage of people who reported using certain strategies to access healthy foods, by strategy

	Strategy	Users (n=58)	Non-Users (n=268)	P-value
Food Access	Bus	34.48%	30.60%	p=0.563
	Chore worker	24.14%	5.22%	p=0.000
	Food Stamps	68.97%	64.18%	p=0.488
	Drive	6.90%	7.09%	p=0.958
	Ride/carpool	5.17%	6.72%	p=0.664
Hunger Mitigation	Borrow from family/friends	13.79%	8.96%	p=0.262
	Meals with friends	17.24%	13.81%	p=0.499
	Shrinking portion sizes	17.24%	20.15%	p=0.613
	Skipping meals	29.31%	20.90%	p=0.586
	Other	12.07%	16.42%	p=0.408

With respect to the strategies that users of the grocery delivery service versus non users employ, there is no statistically significant difference between rates of usage of different strategies except for one (Table 16). Users of the grocery delivery service are almost 20% more likely to rely on a chore worker to fulfill their nutritional needs, but again this is probably an indication of the functional limitations of the users and not a causal effect of the grocery delivery service. Furthermore, the relatively equal rates of usage of food access and hunger mitigation strategies should not be surprising. Both groups of people have difficulties accessing healthy foods and use, with or without the grocery delivery, and use the same strategies to feed themselves.

Indicator 2: Diet Quality

Table 18. Percentage of people who reported consuming fruits and vegetables daily, by daily intake.

Daily Intake	Users (n=57)	Non-Users (n=262)	P-value
None	5.26%	8.78%	p=0.379
1-4 servings	85.96%	86.64%	p=0.892
5 or more servings	8.77%	4.58%	p=0.202

While not statistically significant, Community Health Survey data indicate that about 4% more grocery delivery users get 5 or more servings of fruits and vegetables daily and about 3% less users consume no fruits and vegetables daily (Table 17). The percentage of people across both groups who do not consume the recommend daily intake of fruits and vegetables (8 servings or 4.5 cups) is worrisome. Despite the inclusion of fresh fruit and vegetables in the Solid Ground and other delivery services available in the city, they do not appear to have any effect in this measure.

Indicator 3: Social Interaction

Table 19. Percentage of people who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.

Frequency	Users (n=58)	Non-Users (n=257)	P-value
Rarely/never	44.83%	60.70%	p=0.027
1-2 times	32.76%	26.85%	p=0.365
3-4 times	12.07%	7.78%	p=0.292
5-7 times	10.34%	4.67%	p=0.093

The grocery delivery service is correlated with a 16% decline in the percentage of people who report rarely or never meeting with other residents in their building in organized or unorganized social activities (Table 18). The grocery delivery is also correlated with a 6% increase in the percentage of people who say they meet with other residents 5-7 times per week. While not statistically significant, a higher percentage of grocery delivery service users report meeting with other residents 1-2 times and 3-4 times per week.

Indicator 6: Emergency Room Visits

Table 20. Percentage of people who reported having gone to the emergency room in the past year, by frequency of visits.

Frequency	Users (n=53)	Non-Users (n=262)	P-value
None	37.74%	50.76%	p=0.084
Once	24.53%	27.48%	p=0.659

2-5 times	37.74%	20.99%	p=0.009
6 times or more	0.00%	0.76%	p=0.523

Users of the grocery delivery service more frequently report not having gone to the emergency room in the past year. The grocery delivery service decreases visits to the emergency room by 13%. The pathways through which this impact results may be explained by the connection to services that the ROSS programs provide to residents as well as the high quality foods provided by the grocery delivery.

Indicator 7: Vaccination Against Influenza

The Centers for Disease Control and Prevention (2007) recommends vaccination against influenza for all persons 50 years old or older and for those with medical conditions that place them at increased risk for complications from influenza. The Committee notes that the rates of serious illness and death are highest among those 65 years of age or older. Vaccination against influenza helps prevent hospitalization for pneumonia and influenza, reduces the frequency of secondary complications, and reduces the risk of influenza-related hospitalizations and death among older Americans (p.12).

Table 21. Percentage of people who reported being vaccinated against influenza in the last 2 years.

	Users (n=57)	Non-Users (n=259)	P-value
Yes	84.21%	62.16%	p=0.001

Grocery delivery service users report higher rates of vaccination against influenza than their non-user counterparts (Table 20). The grocery delivery service increases the vaccination against influenza by 22%. This result is statistically significant and again we theorize that this impact results from users' connection to other services through the ROSS programs.

Table 22. Percentage people within each age group who were vaccinated against influenza in the last 2 years.

Age Group	Treatment (n=30)	Control (n=174)	P-value
18-61 years	86.67%	58.62%	p=0.003
62-69 years	75.00%	65.31%	p=0.472
70 years or more	88.89%	71.88%	p=0.294

Refining this analysis further by age group, the grocery delivery increases the vaccination against influenza by almost 30% for the 18-61 years old age group. Although not statistically significant, grocery delivery service users in the 62-69 years old and 70 years or more age groups report higher rates of vaccination than their counterparts who are non-users.

Indicator 8: Mammography

Mammography screening for women every 1 to 2 years can help prevent or detect breast cancer in early, treatable stages. The United States Preventative Services Taskforce finds fair evidence that mammography screening every 12 to 33 months “significantly reduces mortality from breast cancer.” Evidence is strongest for women aged 50-69 and can be generalized for women aged 70 or older, who face a higher risk of breast cancer (2001).

Table 23. Percentage of women 50 years old or older who reported having a mammography screening within the last 2 years.

	Users (n=30)	Non-Users (n=119)	P-value
Yes	100.00%	68.07%	p=0.000

Table 24. Percentage of women within each age group who reported having a mammography screening within the last 2 years.

	Users	Non-Users	P-value
	(n=11)	(n=74)	
50-61 years	100.00%	72.97%	p=0.049
	(n=11)	(n=25)	
62-69 years	100.00%	60.00%	p=0.014
	(n=8)	(n=20)	
70 years or more	100.00%	60.00%	p=0.034

The grocery delivery service is highly effective in increasing the rate of mammography screening among women aged 50 years and older (Tables 22 and 23). We find statistically significant differences between grocery delivery service users and non-users when examining all females as a whole and females in each age group. Of the 30 women 50 years old and older who are grocery delivery service users, all of them reported having a mammography screening within the last 2 years. Overall, it appears the grocery delivery increases mammography screenings by 40% for women 50 years old and older. Again we believe that the users' connection to the ROSS programs, not the grocery delivery service, is responsible for these results.

Limitations and Conclusions

This quasi-experimental examination of the ROSS programs in the SHA's LIPH communities finds evidence that they are effective in improving the health outcomes of residents (increasing social interaction with other residents, decreasing the number of

residents with chronic conditions who go without treatment for their conditions, and decreasing the percentage of evictions proceedings that result in the tenant having to leave). However, several limitations must be acknowledged in the study design that limit generalizations regarding the programs' impact.

First, the study design is not purely quasi-experimental because it was not able to control for all services which duplicate the impact of the ROSS funded services. The study was not able to control for the legacy of service providers which left communities and non-ROSS grocery delivery services provided by Meals on Wheels, the Life-Long AIDS Alliance's Chicken Soup Brigade, and Saint Mary's Food Bank. All three organizations make services available to residents around the city, including residents in the SHA's LIPH program. Neither could the study control for the enthusiasm and support offered by the SHA employees and City of Seattle Aging and Disability Services case managers, who have day-to-day contact with residents.

Second, data collection was hampered by problems relating to the Community Health Survey 2008 design and distribution. The survey instrument was not pretested and limited the usefulness of certain data collected. Moreover, inadequate volunteer translation capacity limited the study to surveying speakers of 6 of 22 languages. It is not known how many residents of languages for which translators were not available returned their English version surveys.

Third, the study was designed to measure health outcomes of all residents in the treatment and control groups and assumed that the impacts of the ROSS programs, which target the elderly and non-elderly disabled, would affect the health outcomes of the group overall. In fact, when we isolated the group of grocery delivery users, we found more evidence of the programs' impact across more measures than comparing the treatment and control groups. This suggests that a more targeted design focusing on the health outcomes of just the target population of the ROSS services may be a better approach of observing the impacts of the services on health outcomes.

Finally, the time period over which outcomes were assessed may have been inadequate. In several communities, ROSS services began just a few years before the collection of health survey data. In fact, in the case of Olive Ridge, it was just one year. An insufficient amount of time may have elapsed before data collection for the programs to show any significant effects on residents.

Despite these acknowledged limitations, there is evidence that the ROSS programs have a positive impact on the health outcomes of residents over several measures of health indicators. However, residents of the treatment group (and control group) still show a high prevalence of chronic conditions, experience barriers to obtaining healthy foods, and have an inadequate daily intake of fruits and vegetables. The quality of life of residents, whether or not they receive the ROSS services, is diminished.

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Appendices

Appendix A: Map of SHA LIPH High-Rise Communities



Source: Seattle Housing Authority

Appendix B: Demographic Characteristics of Treatment and Control Group Communities

Community	Number of Units	Household Mean Income (\$)	Household Median Income (\$)	Mean of Resident Total Income (\$)	Median of Resident Total Income (\$)	Mean Resident Age (Years)	Median Resident Age (Years)	% Elderly Residents (62+)(Years)	% Very Elderly Residents (70+)(Years)	% Disabled Residents	% Foreign Language Households	% Caucasian	% Black/ African American	% Alaska Native/ American Indian	% Asian/ Asian American	% Native Hawaiian/ Pacific Islander	% Blank
Bell Tower	118	9384	7885	8984	7884	54	55	23	08	74	11	62	29	03	06	00	00
Denny Terrace	218	10317	8172	9653	8028	51	53	20	08	65	08	52	36	05	07	00	00
Harvard Court	80	9388	7889	9375	7884	52	54	17	08	80	16	70	17	00	12	00	01
Capitol Park	124	9797	8257	9442	8209	55	56	22	11	82	08	74	22	00	04	00	00
Jefferson Terrace	287	9175	7644	8484	7644	57	57	35	17	57	31	43	31	02	23	00	01
Cedarvale House	118	9610	8196	8646	7896	57	56	39	21	52	22	67	21	03	09	00	00
Olive Ridge	105	10719	9084	9902	8436	52	53	27	14	73	07	58	30	04	07	00	01
Lictonwood	80	10704	9436	10030	8430	58	55	27	15	72	06	74	16	02	00	00	07

**Treatment Group communities are shown in bold and Control Group matches immediately follow*

Source: Seattle Housing Authority

Appendix C: Community Health Survey 2008



Please fill out our anonymous health survey
ALL INFORMATION REMAINS CONFIDENTIAL

My name is Collin Siu and I am a researcher at the Congressional Hunger Center in Washington DC conducting a survey to assess the health needs of residents in your building. All responses are confidential and survey forms will be shredded once data has been entered. This survey will take 5 minutes to complete. When you are finished, return the survey to the Community Health Survey box in the Social Services Office to be entered in a drawing for a \$20 QFC gift card.

1. Have you been vaccinated against the flu in the last 2 years? ☐ No ☐ Yes

2. How many servings of fruits and vegetables do you eat daily?

☐ None ☐ 1-2 ☐ 3-4 ☐ 5 or more

3. What difficulties do you have to get healthy foods?

☐ None ☐ Cost ☐ Can't walk far ☐ Transportation
☐ Time ☐ Other _____

Which of the following helps you overcome these difficulties (check all that apply)?

☐ Food stamps ☐ Borrow from family/friends ☐ Meals with friends ☐ Bus
☐ Ride/carpool ☐ I drive ☐ Chore worker ☐ Grocery delivery
☐ Skipping Meals ☐ Shrinking Portion Sizes ☐ Other _____

4. How often do you do physical activity (walking, dancing, etc.) each week?

☐ Rarely/Never ☐ 1-2 times ☐ 3-4 times ☐ 5 or more times

5. Do you smoke? ☐ No ☐ Yes

6. How often do you meet with other building residents in organized (such as community meetings) or unorganized/social activities in a given week?

☐ Rarely/Never ☐ 1-2 times ☐ 3-4 times ☐ 5-7 times

At each activity, how long do you spend with other residents?

☐ I don't meet with others ☐ Less than 30 minutes ☐ 30 minutes or more

7. How would you rate your own health? ☐ Poor ☐ Fair ☐ Good ☐ Excellent

8. Have you gone to the hospital emergency room in the past year?

☐ No, none ☐ Once ☐ 2 to 5 times ☐ 6 times or more

9. Have you spent one night or more in the hospital in the past year?

☐ No, none ☐ Once ☐ 2 to 5 times ☐ 6 times or more

10. Do you have and are you being treated for any of the following conditions?

	Have	Receiving Treatment?	
		Yes	No
Heart disease, hypertension, or stroke			
Diabetes			
Arthritis			
Cancer			
Asthma, chronic bronchitis, or emphysema			
Depression			
Trouble hearing			
Trouble Seeing			
No natural teeth			

11. What is your gender? ☐ Female ☐ Male

Race: ☐ African ☐ Asian ☐ European/Scandinavian
 ☐ Hawaiian/Pacific Islander ☐ Indian/Middle Eastern
 ☐ Mexican/South American ☐ Native American/Eskimo ☐ Other

Age: ☐ 18-61 years ☐ 62-69 years ☐ 70 years or older

12. FOR WOMEN OVER 50 ONLY:

Have you had a mammogram in the past two years? ☐ No ☐ Yes

You're done! Thank you for your participation in this survey!

To be entered in the QFC gift card drawing, keep one raffle ticket and return your survey to the Community Health Survey box in your Social Services Office before 12/23/08. The winning number will be announced on 12/24/08 in a flyer in the lobby with instructions on how to claim your prize. Direct questions or comments to Collin Siu, Emerson National Hunger Fellow, (206) 694-6835.

**Appendix D: Health Outcomes Measures for Which No Evidence of the ROSS RSDM
- EPD Grant Funded Programs' Impact Was Found**

Measure/Values	Treatment Group	Control Group	P-value
Percentage of people who reported being vaccinated against influenza in the last 2 years. Yes	(n=161) 68.32%	(n= 155) 63.87%	p=0.403
Percentage of people within each age group who were vaccinated against influenza in the last 2 years.			
18-61 years	(n=108) 65.74%	(n=96) 59.38%	p=0.348
62-69 years	(n=32) 71.88%	(n=33) 63.64%	p=0.329
70 years or more	(n=20) 75.00%	(n=21) 76.19%	p=0.929
Percentage of women 50 years old or older who reported having a mammography screening within the last 2 years. Yes	(n=71) 77.46%	(n=78) 71.79%	p=0.428
Percentage of women within each age group who reported having a mammography screening within the last 2 years.			
50-61 years	(n=39) 74.36%	(n=46) 78.26%	p=0.673
62-69 years	(n=20) 80.00%	(n=16) 62.50%	p=0.244
70 years or more	(n=12) 83.33%	(n=16) 62.50%	p=0.227
Percentage of people who smoke. Yes	(n=161) 35.40%	(n=155) 29.03%	p=0.226
Percentage of people within each group who smoke.			
18-61 years	(n=109) 40.19%	(n=98) 30.61%	p=0.153
62-69 years	(n=33) 27.27%	(n=31) 35.48%	p=0.479
70 years or more	(n=20) 25.00%	(n=21) 4.76%	p=0.067
Percentage of people who reported engaging in weekly physical activity.			
Rarely/never	(n=162) 11.73%	(n=158) 10.76%	p=0.784
1-2 times	27.16%	32.28%	p=0.316
3-4 times	33.33%	27.85%	p=0.287
5 or more times	27.78%	29.11%	p=0.791
Percentage of people who reported encountering barriers to obtain healthy foods, by barrier.			
None	(n=167) 19.16%	(n=159) 26.42%	p=0.118
Can't walk far	25.75%	16.98%	p=0.054
Cost	61.68%	62.26%	p=0.913
Time	6.59%	2.52%	p=0.079
Transportation	22.16%	11.32%	p=0.009

Percentage of people who reported using certain strategies to access healthy foods, by strategy	(n=167)	(n=159)	
Bus	34.73%	27.67%	p=0.170
Chore worker	12.57%	4.40%	p=0.008
Food Stamps	61.08%	69.18%	p=0.125
Grocery delivery	23.95%	11.32%	p=0.003
Drive	4.19%	10.06%	p=0.039
Ride/carpool	5.99%	6.92%	p=0.732
Borrow from family/friends	10.18%	9.43%	p=0.821
Meals with friends	16.77%	11.95%	p=0.216
Shrinking portion sizes	21.56%	17.61%	p=0.370
Skipping meals	19.76%	23.27%	p=0.440
Other	20.36%	10.69%	p=0.016
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Percentage of people who reported consuming fruits and vegetables daily, by daily intake.	(n=162)	(n=157)	
None	6.79%	9.55%	p=0.367
1-4 servings	88.27%	84.71%	p=0.352
5 or more servings	3.09%	5.73%	p=0.752
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Percentage of women who reported consuming fruits and vegetables daily, by daily intake.	(n=87)	(n=89)	
None	4.60%	8.99%	p=0.248
1-4 servings	90.80%	86.52%	p=0.370
5 or more servings	4.60%	4.49%	p=0.974
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Percentage of men who reported consuming fruits and vegetables daily, by daily intake.	(n=72)	(n=63)	
None	9.72%	11.11%	p=0.792
1-4 servings	86.11%	80.95%	p=0.418
5 or more servings	4.17%	7.94%	p=0.355
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Percentage of people 18-61 years old who reported consuming fruits and vegetables, by age.	(n=106)	(n=98)	
None	8.49%	11.22%	p=0.512
1-4 servings	86.79%	83.67%	p=0.530
5 or more servings	4.72%	5.10%	p=0.899
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Percentage of people 62-69 years old who reported consuming fruits and vegetables, by age.	(n=34)	(n=33)	
None	5.88%	9.09%	p=0.617
1-4 servings	88.24%	81.82%	p=0.461
5 or more servings	5.88%	9.09%	p=0.617
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Percentage of people 70 years old or more who reported consuming fruits and vegetables, by age.	(n=21)	(n=21)	
None	0.00%	0.00%	
1-4 servings	100.00%	95.24%	p=0.311
5 or more servings	0.00%	4.76%	p=0.311
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Percentage of people who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.	(n=156)	(n=159)	
Rarely/never	51.28%	64.15%	p=0.021
1-2 times	30.13%	25.79%	p=0.390
3-4 times	10.90%	6.29%	p=0.144
5-7 times	7.69%	3.77%	p=0.134
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Percentage of people 18-61 years old who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.	(n=101)	(n=100)	

Rarely/never	58.42%	72.00%	p=0.043
1-2 times	28.71%	20.00%	p=0.150
3-4 times	5.94%	5.00%	p=0.769
5-7 times	6.93%	3.00%	p=0.200
Percentage of people 62-69 years old who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.			
	(n=33)	(n=33)	
Rarely/never	33.33%	54.55%	p=0.083
1-2 times	36.36%	33.33%	p=0.796
3-4 times	18.18%	6.06%	p=0.131
5-7 times	12.12%	6.06%	p=0.392
Percentage of people 70 years old or more who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.			
	(n=21)	(n=21)	
Rarely/never	42.86%	42.86%	p=1.000
1-2 times	28.57%	42.86%	p=0.334
3-4 times	23.81%	9.52%	p=0.214
5-7 times	4.76%	4.76%	p=1.000
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Social interaction time at each activity of people who Rarely/never meet other residents in their building in a given week.			
	(n=77)	(n=100)	
None; does not meet with others	61.04%	59.00%	p=0.784
Less than 30 minutes	24.68%	29.00%	p=0.521
30 minutes or more	14.29%	12.00%	p=0.654
Social interaction time at each activity of people who meet other residents in their building 1-2 times in a given week.			
	(n=46)	(n=41)	
None; does not meet with others	4.35%	7.32%	p=0.553
Less than 30 minutes	63.04%	58.54%	p=0.667
30 minutes or more	32.61%	34.15%	p=0.879
Social interaction time at each activity of people who meet other residents in their building 3-4 times in a given week.			
	(n=17)	(n=10)	
None; does not meet with others	0.00%	0.00%	
Less than 30 minutes	58.82%	40.00%	p=0.440
30 minutes or more	41.18%	60.00%	p=0.440
Social interaction time at each activity of people who meet other residents in their building 5-7 times in a given week.			
	(n=12)	(n=6)	
None; does not meet with others	0.00%	0.00%	
Less than 30 minutes	33.33%	0.00%	p=0.245
30 minutes or more	66.67%	100.00%	p=0.245
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Percentage of people who reported having poor to excellent health, by respondent-assessed rating.			
	(n=164)	(n=157)	
Poor	16.46%	14.65%	p=0.654
Fair	50.00%	47.77%	p=0.690
Good	30.49%	31.85%	p=0.793
Excellent	3.05%	5.73%	p=0.239
Percentage of people 18-61 years old who reported having poor to excellent health, by respondent-assessed rating.			
	(n=108)	(n=98)	
Poor	13.89%	14.29%	p=0.935
Fair	48.15%	46.94%	p=0.862
Good	35.19%	32.65%	p=0.702
Excellent	2.78%	6.12%	p=0.241

Percentage of people 62-69 years old who reported having poor to excellent health, by respondent-assessed rating.			
	(n=35)	(n=33)	
Poor	25.71%	12.12%	p=0.154
Fair	45.71%	51.52%	p=0.632
Good	22.86%	27.27%	p=0.674
Excellent	5.71%	9.09%	p=0.594
Percentage of people 70 years old or more who reported having poor to excellent health, by respondent-assessed rating.			
	(n=20)	(n=21)	
Poor	15.00%	19.05%	p=0.731
Fair	65.00%	47.62%	p=0.262
Good	20.00%	33.33%	p=0.335
Excellent	0.00%	0.00%	
Percentage of people who reported having selected conditions, by condition.			
	(n=144)	(n=141)	
Arthritis	27.78%	38.30%	p=0.059
Asthma, chronic bronchitis, or emphysema	25.69%	29.79%	p=0.440
Cancer	6.94%	4.96%	p=0.480
Depression	46.53%	54.61%	p=0.172
Diabetes	15.97%	22.70%	p=0.150
Heart disease, hypertension, or stroke	39.58%	34.75%	p=0.399
No natural teeth	25.69%	20.57%	p=0.305
Trouble hearing	16.67%	22.70%	p=0.200
Trouble seeing	34.03%	38.30%	p=0.453
Percentage of people who reported having an untreated condition, by condition.			
	(n=144)	(n=141)	
Arthritis	2.78%	13.48%	p=0.001
Asthma, chronic bronchitis, or emphysema	2.78%	4.96%	p=0.338
Cancer	1.39%	2.13%	p=0.635
Depression	4.86%	9.22%	p=0.150
Diabetes	0.69%	2.84%	p=0.168
Heart disease, hypertension, or stroke	2.78%	5.67%	p=0.224
No natural teeth	10.42%	11.35%	p=0.801
Trouble hearing	9.72%	14.18%	p=0.245
Trouble seeing	9.72%	14.89%	p=0.184
Percentage of people who reported a number of untreated conditions, by number of conditions.			
	(n=144)	(n=141)	
1 or more	23.61%	39.72%	p=0.003
2 or more	14.29%	19.86%	p=0.091
3 or more	6.25%	9.93%	p=0.254
Percentage of people who reported having gone to the emergency room in the past year, by frequency of visits.			
	(n=156)	(n=159)	
None	44.23%	52.83%	p=0.127
Once	30.13%	23.90%	p=0.213
2-5 times	24.36%	23.27%	p=0.821
6 times or more	1.28%	0.00%	p=0.152
Percentage of people who reported having spent one night or more in the hospital within the past year, by frequency of hospitalization.			
	(n=154)	(n=157)	
None	72.08%	73.89%	p=0.720
Once	20.78%	17.83%	p=0.511
2-5 times	5.19%	8.28%	p=0.278
6 times or more	1.95%	0.00%	p=0.079
Number of critical incidents reported over the number of	(n=590)	(n=540)	

units during the 2002 to October 2008 period.

	5.25%	5.00%	p=0.84644
Number of evictions proceedings begun over the number of units during the 2004 to October 2008 period	(n=590) 0.1356	(n=540) 0.1093	p=0.17609
Percentage of evictions processes begun that resulted in the tenant's leaving.	(n=80) 53.75%	(n=59) 61.02%	p=0.09294
Percentage of evictions processes begun that resulted in the tenant's staying.	(n=80) 46.25%	(n=59) 38.98%	p=0.86007

Comparing Health Outcomes Measures for Grocery Delivery Users and Non-Users

Measure/Values	Users	Non-Users	P-value
Percentage of people who reported being vaccinated against influenza in the last 2 years.			
Yes	(n=57) 84.21%	(n=259) 62.16%	p=0.001
Percentage people within each age group who were vaccinated against influenza in the last 2 years.			
18-61 years	(n=30) 86.67%	(n=174) 58.62%	p=0.003
62-69 years	(n=16) 75.00%	(n=49) 65.31%	p=0.472
70 years or more	(n=9) 88.89%	(n=32) 71.88%	p=0.294
Percentage of women 50 years old or older who reported having a mammography screening within the last 2 years.			
Yes	(n=30) 100.00%	(n=119) 68.07%	p=0.000
Percentage of women within each age group who reported having a mammography screening within the last 2 years.			
50-61 years	(n=11) 100.00%	(n=74) 72.97%	p=0.049
62-69 years	(n=11) 100.00%	(n=25) 60.00%	p=0.014
70 years or more	(n=8) 100.00%	(n=20) 60.00%	p=0.034
Percentage of people who smoke.			
Yes	(n=56) 44.64%	(n=260) 29.62%	p=0.029
Percentage of people within each age group who smoke.			
18-61 years	(n=30) 50.00%	(n=175) 33.14%	p=0.075
62-69 years	(n=16) 43.75%	(n=48) 27.08%	p=0.213
70 years or more	(n=8) 25.00%	(n=33) 12.12%	p=0.355

Percentage of people who reported engaging in weekly physical activity.				
Rarely/never	(n=57)	(n=263)		p=0.849
1-2 times	10.53%	11.41%		p=0.506
3-4 times	33.33%	28.90%		p=0.273
5 or more times	24.56%	31.94%		p=0.562
Percentage of people who reported encountering barriers to obtain healthy foods, by barrier.				
None	(n=58)	(n=268)		p=0.013
Can't walk far	10.34%	25.37%		p=0.000
Cost	46.55%	16.04%		p=0.752
Time	63.79%	61.57%		p=0.819
Transportation	5.17%	4.48%		p=0.016
Percentage of people who reported using certain strategies to access healthy foods, by strategy				
Bus	(n=58)	(n=268)		p=0.563
Chore worker	34.48%	30.60%		p=0.000
Food Stamps	24.14%	5.22%		p=0.488
Drive	68.97%	64.18%		p=0.958
Ride/carpool	6.90%	7.09%		p=0.664
Borrow from family/friends	5.17%	6.72%		p=0.262
Meals with friends	13.79%	8.96%		p=0.499
Shrinking portion sizes	17.24%	13.81%		p=0.613
Skippping meals	17.24%	20.15%		p=0.586
Other	29.31%	20.90%		p=0.408
Percentage of people who reported consuming fruits and vegetables daily, by daily intake.				
None	(n=57)	(n=262)		p=0.379
1-4 servings	5.26%	8.78%		p=0.892
5 or more servings	85.96%	86.64%		p=0.202
Percentage of women who reported consuming fruits and vegetables daily, by daily intake.				
None	(n=37)	(n=139)		p=0.264
1-4 servings	2.70%	7.91%		p=0.905
5 or more servings	89.19%	88.49%		p=0.242
Percentage of men who reported consuming fruits and vegetables daily, by daily intake.				
None	(n=20)	(n=115)		p=0.953
1-4 servings	10.00%	10.43%		p=0.627
5 or more servings	80.00%	84.35%		p=0.403
Percentage of people 18-61 years old who reported consuming fruits and vegetables, by age.				
None	(n=29)	(n=175)		p=0.214
1-4 servings	3.45%	10.86%		p=0.881
5 or more servings	86.21%	85.14%		p=0.143
Percentage of people 62-69 years old who reported consuming fruits and vegetables, by age.				
None	(n=17)	(n=50)		p=0.435
1-4 servings	11.76%	6.00%		p=0.249
5 or more servings	76.47%	88.00%		p=0.435
Percentage of people 70 years old or more who reported consuming fruits and vegetables, by age.				
None	(n=9)	(n=33)		
	0.00%	0.00%		

1-4 servings	100.00%	96.97%	p=0.597
5 or more servings	0.00%	3.03%	p=0.597
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Percentage of people who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.			
	(n=58)	(n=257)	
Rarely/never	44.83%	60.70%	p=0.027
1-2 times	32.76%	26.85%	p=0.365
3-4 times	12.07%	7.78%	p=0.292
5-7 times	10.34%	4.67%	p=0.093
 Percentage of people 18-61 years old who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.			
	(n=30)	(n=171)	
Rarely/never	56.67%	66.67%	p=0.289
1-2 times	30.00%	23.39%	p=0.437
3-4 times	3.33%	5.85%	p=0.576
5-7 times	10.00%	4.09%	p=0.170
 Percentage of people 62-69 years old who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.			
	(n=17)	(n=49)	
Rarely/never	35.29%	46.94%	p=0.405
1-2 times	35.29%	34.69%	p=0.964
3-4 times	17.65%	10.20%	p=0.418
5-7 times	11.76%	8.16%	p=0.656
 Percentage of people 70 years old or more who reported meeting other residents in their building in organized or unorganized social activities in a given week, by frequency of interaction.			
	(n=9)	(n=33)	
Rarely/never	22.22%	48.48%	p=0.158
1-2 times	33.33%	36.36%	p=0.866
3-4 times	33.33%	12.12%	p=0.130
5-7 times	11.11%	3.03%	p=0.313
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Social interaction time at each activity of people who Rarely/never meet other residents in their building in a given week.			
	(n=25)	(n=152)	
None; does not meet with others	64.00%	59.21%	p=0.651
Less than 30 minutes	20.00%	28.29%	p=0.388
30 minutes or more	16.00%	12.50%	p=0.630
 Social interaction time at each activity of people who meet other residents in their building 1-2 times in a given week.			
	(n=18)	(n=69)	
None; does not meet with others	11.11%	4.35%	p=0.272
Less than 30 minutes	55.56%	62.32%	p=0.600
30 minutes or more	33.33%	33.33%	p=1.000
 Social interaction time at each activity of people who meet other residents in their building 3-4 times in a given week.			
	(n=7)	(n=20)	
None; does not meet with others	0.00%	0.00%	
Less than 30 minutes	42.86%	55.00%	p=0.678
30 minutes or more	57.14%	45.00%	p=0.678
 Social interaction time at each activity of people who meet other residents in their building 5-7 times in a given week.			
	(n=6)	(n=12)	
None; does not meet with others	0.00%	0.00%	
Less than 30 minutes	0.00%	33.33%	p=0.245
30 minutes or more	100.00%	66.67%	p=0.245
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Percentage of people who reported having poor to excellent	(n=58)	(n=263)	

health, by respondent-assessed rating.			
Poor	17.24%	15.21%	p=0.699
Fair	50.00%	48.67%	p=0.854
Good	31.03%	31.18%	p=0.983
Excellent	1.72%	4.94%	p=0.277
Percentage of people 18-61 years old who reported having poor to excellent health, by respondent-assessed rating.			
	(n=30)	(n=176)	
Poor	16.67%	13.64%	p=0.659
Fair	50.00%	47.16%	p=0.773
Good	30.00%	34.66%	p=0.618
Excellent	3.33%	4.55%	p=0.764
Percentage of people 62-69 years old who reported having poor to excellent health, by respondent-assessed rating.			
	(n=17)	(n=51)	
Poor	17.65%	19.61%	p=0.859
Fair	47.06%	49.02%	p=0.889
Good	35.29%	21.57%	p=0.258
Excellent	0.00%	9.80%	p=0.180
Percentage of people 70 years old or more who reported having poor to excellent health, by respondent-assessed rating.			
	(n=9)	(n=32)	
Poor	11.11%	18.75%	p=0.591
Fair	55.56%	56.25%	p=0.970
Good	33.33%	25.00%	p=0.618
Excellent	0.00%	0.00%	
Percentage of people who reported having selected conditions, by condition.			
	(n=48)	(n=237)	
Arthritis	39.58%	31.65%	p=0.286
Asthma, chronic bronchitis, or emphysema	37.50%	25.74%	p=0.097
Cancer	6.25%	5.91%	p=0.927
Depression	52.08%	50.21%	p=0.813
Diabetes	16.67%	19.83%	p=0.612
Heart disease, hypertension, or stroke	45.83%	35.44%	p=0.174
No natural teeth	25.00%	22.78%	p=0.740
Trouble hearing	25.00%	18.57%	p=0.306
Trouble seeing	43.75%	34.60%	p=0.229
Percentage of people who reported having an untreated condition, by condition.			
	(n=48)	(n=237)	
Arthritis	2.08%	9.28%	p=0.095
Asthma, chronic bronchitis, or emphysema	0.00%	4.64%	p=0.128
Cancer	2.13%	1.69%	p=0.849
Depression	10.42%	6.33%	p=0.312
Diabetes	2.08%	1.69%	p=0.849
Heart disease, hypertension, or stroke	6.25%	3.80%	p=0.440
No natural teeth	8.33%	11.39%	p=0.535
Trouble hearing	12.50%	11.81%	p=0.894
Trouble seeing	8.33%	13.08%	p=0.361
Percentage of people who reported a number of untreated conditions, by number of conditions.			
	(n=48)	(n=237)	
1 or more	27.08%	32.49%	p=0.462
2 or more	14.58%	16.46%	p=0.748
3 or more	6.25%	8.44%	p=0.612
Percentage of people who reported having gone to the emergency room in the past year, by frequency of visits.			
	(n=53)	(n=262)	
None	37.74%	50.76%	p=0.084
Once	24.53%	27.48%	p=0.659
2-5 times	37.74%	20.99%	p=0.009

6 times or more	0.00%	0.76%	p=0.523
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Percentage of people who reported having spent one night or more in the hospital within the past year, by frequency of hospitalization.	(n=53)	(n=258)	
None	64.15%	74.81%	p=0.112
Once	26.42%	17.83%	p=0.149
2-5 times	7.55%	6.59%	p=0.800
6 times or more	1.89%	0.78%	p=0.451
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