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ORIGINAL ARTICLE

Housing Characteristics of Areas With More Falls by Older Adults Living in Single-Family Detached Dwellings: A Cohort Study Using Geospatial Analysis

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Abstract

Objective: To identify geographic locations with high numbers of medically attended falls (ie, hotspots) by older adults and to test the associations between fall hotspots and resident/housing characteristics.

Patients and Methods: In this cohort study, we retrospectively reviewed adults who were 65 years or older, lived in a single-family detached dwelling, and had a medically attended fall in Olmsted County, MN, between April 1, 2012, and December 31, 2014. We identified medically attended falls by using billing codes and confirmed by manual review of the electronic health records. We performed geospatial analysis to identify fall hotspots and evaluated the association between fall hotspots and resident or housing characteristics with logistic regression models, adjusting for age, sex, socioeconomic status, chronic health conditions, and/or a history of falls.

Results: Among 12,888 residents living in single-family detached dwellings in our community, 587 residents (4.6%) had documented accidental falls. Falls were more common in older residents and in women. Residents who had more chronic diseases, lower socioeconomic status, and a history of falls also had higher odds of a fall. Geospatial analysis identified 2061 (16.0%) residents who lived in a fall hotspot. Houses in hotspots were more likely to have more stories with fewer stairs (split level) (odds ratio [OR], 1.75; 95% CI, 1.57-1.94, for split level vs 1-story houses), smaller square feet (OR, 0.29; 95% CI, 0.24-0.35, for largest vs smallest houses), and in the highest quartile for age (OR, 1.46; 95% CI, 1.26-1.70, for oldest built vs newest built houses).

Conclusion: Falls were more common in locations in our community that had older, smaller homes and lower housing-based socioeconomic status. These findings can be used by clinicians to identify residents who are at higher risk for falls.

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Falls are a common challenge for older adults and may lead to functional decline after a fall.[1] The US Centers for Disease Control and Prevention recommends screening programs to identify patients who are at high risk for falls in the clinical setting; however, these screening programs can be labor-intensive.[2] Clinicians may prescribe physical therapy as a method to prevent falls, as outlined in the recent guidelines from the US Preventive Task Force.[3] Clinicians have a strong clinical impetus to identify patients who are at risk for falls. A principal factor for falling involves environmental risks.[4] Clinical teams often perform home environmental assessments to help prevent falls by removing tripping hazards and using handrails in the bathroom.[5] The efficacy of environmental assessments remains uncertain.[6] Although many programs assess modifiable tripping hazards, such as rugs, cords, and lighting,[7] patients may be exposed to other environmental

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risks, such as the age of the home or structures built in homes (ie, construction of stairways). Homeowners, perhaps through public health interventions, can modify their home to account for such built structures.[8] Clinicians and patients may not be aware of the risks of the built environment. However, many members of the health care team, including occupational therapy, routinely ask about the home environment. The use of nontraditional risk factors for falls can potentially refine clinical work in the future.

Housing type (ie, single-level or multilevel homes) and location may be associated with falls. In typical communities, up to one-third of residents 75 years or older may have a fall.[9] As falls become more frequent for residents, they can seek help in the home or move out of their community. Of residents who participated in the National Health and Aging Trends Study and had a phenotype of frailty, one-half had fallen in the previous year.[10] Approximately 15% of patients aged 65 years or older are considered frail and are at risk for falls.[10] Clinicians often identify the risk factors for falls, which include cognitive impairment, comorbid health conditions, weight loss, balance problems, and gait disturbance.[11] Within a neighborhood or city, some geographical areas may have a higher risk of falls, whereas other areas may have a lower risk of falls. The characteristics of urban areas may differ from those of rural areas. Specifically, housing density is lower in rural areas. These discrete areas may be viewed as clusters because housing characteristics are similar or community members may have similar age and socioeconomic status (SES). Housing characteristics may be used as a potential risk modifier for adverse health outcomes, such as falls.

Whether residents who live in an area with a high fall density (hotspot) live in a house with different characteristics than those who do not live in a hotspot is unclear. This is a novel area of investigation that, to our knowledge, has not been reported or studied. We do not fully understand the risks associated with living in a fall hotspot, and the contribution of housing characteristics to the risk of falls is uncertain. Therefore, the aims of this study were to first identify fall hotspots for patients aged 65 years or older who live in single-family detached (SFD) dwellings in a mixed urban-rural county and then to assess whether living in a hotspot was associated with specific resident or housing characteristics.

METHODS

Study Design, Setting, and Population

This study was approved by institutional review boards at both Mayo Clinic and Olmsted Medical Center. We conducted the study in accordance with the principles of the Declaration of Helsinki.[12] In this population-based retrospective cohort study, we retrospectively searched electronic health records curated by the Rochester Epidemiology Project (REP)[13] for older adults (≥65 years) who were residents of Olmsted County, MN, on April 1, 2012 (index date). Specifically, patients who were 65 years or older at the index date or who turned 65 years old before December 31, 2014, were included in the study.

Patients who had a medically documented accidental fall during the study period (from April 1, 2012, through December 31, 2014) were included in our analysis. We defined an accidental fall as a fall that resulted in medical attention through an outpatient clinic or emergency department visit. We identified these visits by using *International Classification of Diseases, Ninth* and *Tenth Revisions, Clinical Modification* (ICD-9-CM and ICD-10-CM, respectively) billing codes (E880-888 and V15.88 for ICD-9-CM; W00-19 and Z91.81 for ICD-10-CM) from electronic health record data. These outcomes were confirmed by manual review of the electronic health records.

Patients who declined research authorization of their health records were excluded from analysis, in accordance with Minnesota state law.[14] We also excluded residents from the study if (1) their falls occurred outside of the home or their fall location was not clearly documented, (2) the reason for outpatient clinic or emergency department visit was not specifically for a fall, or (3) they were not residents of Olmsted County, MN, or their residential location was unclear. We manually reviewed the locations of the falls. This study was conducted in accordance with Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines

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(Supplemental Table, available online at https://www.mcpdigitalhealth.org/).[15]

Classification of Residential Settings

We abstracted address information of Olmsted County residents on April 1, 2012, from the REP. For residents who had medically documented falls during the study period, we assembled their address information at the time of the falls. We used publically available real property data linked to the address information to classify SFD dwellings.[16] We further excluded residents who lived in attached single-family dwellings (ie, townhouses and twin homes), group homes, and all types of multifamily housing (duplexes to large apartment complexes). We also cataloged the architecture types of SFD dwellings according to number of stories, with the assumption that houses with more stairs are associated with more falls: no story (eg, mobile home), 1 story (eg, ranch-style home), 2 or more stories with more stairs (eg, 2-story home), 2 or more stories with fewer stairs (eg, split-level home with 2 short sets of stairs), and unknown. We determined the age of the homes (in years) at the index date (or at the time of falls) on a continuous scale and in quartiles (in our study cohort). Moreover, we recorded the size of the homes (in square feet) on a continuous scale and in quartiles. Although falls can occur in various locations (eg, at home, skilled nursing facilities, long-term care facilities, or nonresidential locations), we focused on cases that occurred in SFD dwellings in which the residents lived.

Identification of Hotspots for Falls

We identified areas with high concentrations of documented accidental falls among older residents who lived in SFD dwellings by using geospatial analysis.[17] The kernel density estimation[18] implemented in ArcMap software, v10.4.1 (Esri), was used by following the geospatial approach used in our previously published study of pertussis outbreaks,[17] with some modification. To identify hotspots, we used a bandwidth of 0.5 miles and a cell size of 330 feet. For rural areas, we used a larger bandwidth and cell size. We calculated the kernel density of observed (O) and expected (E) cases, which reflected both the average incidence of falls among the study population and the expected incidence of falls by using the average rates of falls for different ages), sex (men and women), and SES (housing-based socioeconomic status [HOUSES] Index[16] score quartile) (E_{axs}). The final hotspot analysis relied on the relative difference computed as RD $= (O - E_{\text{axs}})/E_{\text{axs}}$, in which $E_{axs} \geq 3$. To protect resident privacy, we used a minimum E value of 4 to prevent mapping of hotspots with a small number of dwellings. Expected kernel density in a given cell was determined by summing individual chances of falling (values reflecting combinations of age group, sex, and HOUSES index score quartile) in a moving window of the half-mile bandwidth, summarized for each 330- $\times$ 330-foot cell. Areas where the observed value had less than a 5% probability of occurring, given the expected value, were considered hotspots if $O > E_{\text{axs}}$. We have performed geospatial analyses for several other health outcomes of interest, which include pertussis outbreaks,[17] childhood accidents,[19] and SARS-CoV-2 infections.[20]

Resident Characteristics

We analyzed the common resident characteristics known to be most associated with falls including age, chronic health conditions, SES, and a history of falls, which is the strongest predictor. We also included age, sex, and a history of falls in our adjusted model. We abstracted age data from electronic health records because of a known association between age and falls in multiple different settings.[21,22] We assessed numbers of chronic health conditions by counting the number of conditions with at least 1 ICD-9-CM billing code from 20 chronic conditions defined by the US Department of Health and Human Services[23] and classified them into 3 groups (0-1, 2-3, and 4 or more conditions). These conditions included cardiac arrhythmias, asthma, arthritis, autism spectrum disorder, cancer, coronary artery disease, chronic obstructive pulmonary disease, chronic kidney disease, congestive heart failure, dementia, depression, diabetes, hepatitis, hypertension, hyperlipidemia, osteoporosis, substance use disorders, stroke, HIV infection, and schizophrenia. To measure SES, we divided HOUSES index scores into quartiles, with the highest quartile representing the highest SES status. We also

TABLE 1. Characteristics of Older Adults Living in Single-Family Detached Dwellings With or Without a Fall (N=12,888)[a]

Characteristic	With fall (n=587)	Without fall (n=12,301)	Odds ratio (95% CI)	*P*	Overall *P*
Resident age (y)	80.2 ± 8.6	72.0 ± 7.1	1.13 (1.12-1.14)[b]	<.001	<.001
Sex				<.001	<.001
Women	351 (59.8)	6359 (51.7)	1.39 (1.17-1.65)		
Men	236 (40.2)	5942 (48.3)	Reference		
HOUSES Index score quartile	(n=582)	(n=12,231)			<.001
Q1 (lowest SES)	86 (14.8)	1070 (8.7)	1.86 (1.40-2.47)	<.001	
Q2	207 (35.6)	4345 (35.5)	1.10 (0.88-1.38)	.28	
Q3	162 (27.8)	3879 (31.7)	0.97 (0.76-1.22)	.005	
Q4 (highest SES)	127 (21.8)	2937 (24.0)	Reference		
Chronic health conditions					<.001
0-1	34 (5.8)	1,801 (14.6)	Reference		
2-3	76 (12.9)	3,356 (27.3)	1.20 (0.80-1.80)	.002	
≥4	477 (81.3)	7,144 (58.1)	3.53 (2.49-5.02)	<.001	
History of previous fall					<.001
Yes	364 (62.0)	2,655 (21.6)	5.93 (4.99-7.04)	<.001	
No	223 (38.0)	9,646 (78.4)	Reference		

[a]Age data summarized as mean ± SD, and all other data summarized as n (%) of residents.
[b]Per 1 y.
HOUSES, housing-based socioeconomic status; SES, socioeconomic status.

used previous medically attended falls as a predictor of future falls. To this end, we performed a 10-year evaluation of falls before 2012, which were determined from ICD-9-CM billing codes.

Statistical Analysis

We first summarized the overall study cohort with descriptive statistics: mean (SD) for continuous variables and count (%) for categorical variables, stratified by falls status. Because the main focus of this study was to characterize fall hotspots (ie, living in geographic areas with higher rate of falls, rather than individual-level fall status), we used univariate logistic regression models for characterizing individual-level fall status.

To test associations between housing characteristics (house architecture type, age, and size) and whether a resident lived in a fall hotspot, we used both univariate and multivariable logistic regression modeling, adjusting for pertinent variables (age, sex, a history of falls, number of chronic health conditions, and HOUSES index score). We reported the odds ratio (OR) and 95% CI for each variable included in each model. All *P* values <.05 were considered statistically significant. Statistical analyses were performed with SAS software, v9.4 (SAS Institute).

RESULTS

Characteristics of Residents with and without Falls

Of 20,917 adults who were 65 years (61.6%) or older and residing in Olmsted County, MN, during the study period, 12,888 who lived in SFD dwellings met our inclusion criteria. Of these residents in the total cohort, 587 (4.6%) had a documented accidental fall, and 12,301 (95.4%) did not have a documented fall (Table 1). The mean (SD) age at the index date was higher for residents with falls (80.2 [8.59] years) than for those without falls (72.0 [7.05] years). The percentage of residents who were women was significantly higher for those with any falls (59.8%) than for those without falls (51.7%) (OR, 1.39; 95% CI, 1.17-1.65;

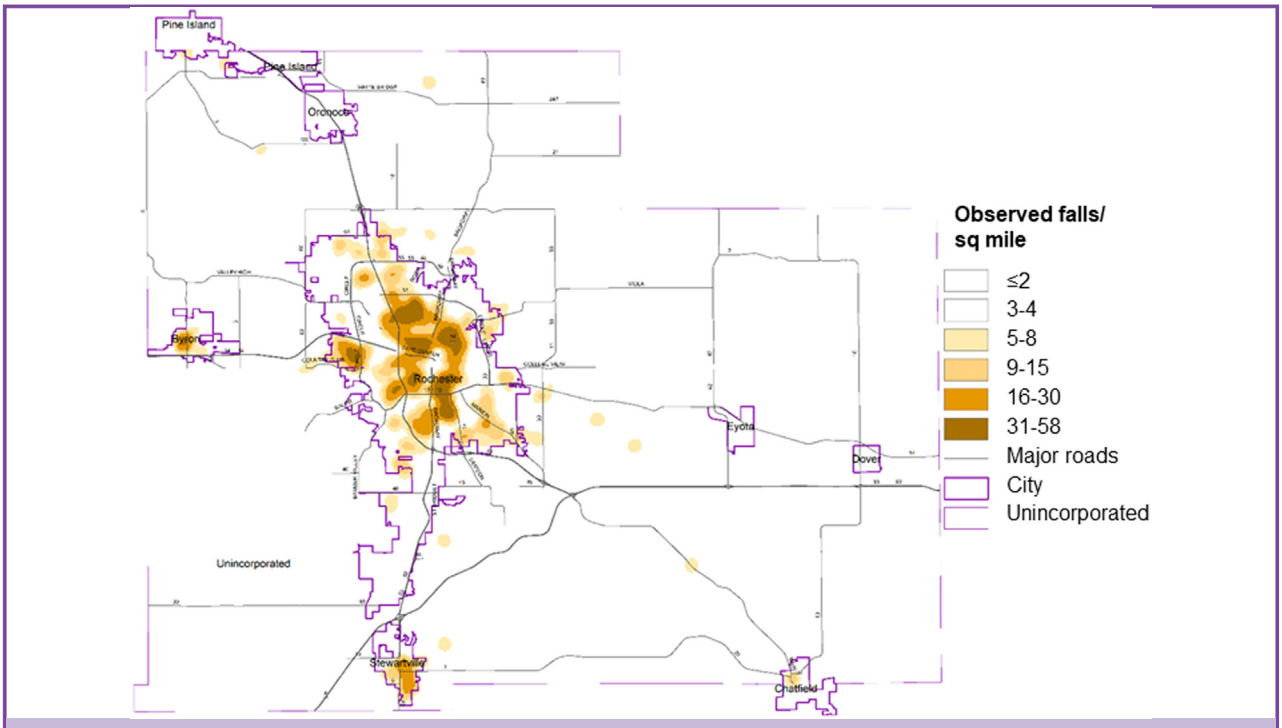

FIGURE 1. Kernel density map of observed falls among older adults living in single-family detached dwellings in Olmsted County, Minnesota. (© Esri, used under license terms.) The observed case density of falls among older adult residents living in single-family dwellings per square mile are indicated by color intensity.

$P<.001$). Significantly more residents who had a fall during the study period had a history of falls (62.0%) than did those without a fall during the study period (21.6%) (OR, 5.93; 95% CI, 4.99-7.04; $P<.001$). Residents with falls were significantly more likely to be in the lowest HOUSES index score quartile (OR, 1.86; 95% CI, 1.40-2.47; $P<.001$). More residents with falls had 4 or more chronic health conditions (81.3%) than did those without falls (58.1%) (OR, 3.53; 95% CI, 2.49-5.02; $P<.001$).

Fall Hotspot Analysis

We first identified regions with more falls among older adults who live in SFD dwellings in our community by generating a kernel density map of observed falls (Figure 1). To account for the effect of certain resident characteristics associated with falls, we compared observed kernel densities with expected kernel densities according to age, sex, and HOUSES index score distribution (Figure 2). A revised map of fall hotspots adjusted for age, sex, and HOUSES index score distribution for older residents in Olmsted County, MN, is shown in Figure 3.

Of 12,888 residents, 2061 (16.0%) lived in a fall hotspot (Table 2). The mean (SD) age of residents living in hotspots (71.9 [7.1] years) was lower than those who did not live in a hotspot (72.4 [7.4] years) (OR, 0.99 per 1 year; 95% CI, 0.98-1.00; $P<.001$). In the univariate analysis, residents in hotspots were more likely to be younger, women, and have a history of falls (all $P\leq.005$). Residents in hotspots were more likely to be in the lowest HOUSES index score quartile (10.8%) than those who did not live in a hotspot (8.7%) (OR, 2.19; 95% CI, 1.81-2.64.

After adjusting for all pertinent variables, fall hotspots were more likely to have homes with more stories (Table 3). Houses with 2 or more stories and fewer stairs (ie, split level) were more common in fall hotspots than outside of hotspots (975 [47.8%] vs 3685 [34.0%], adjusted). Fewer residents living in

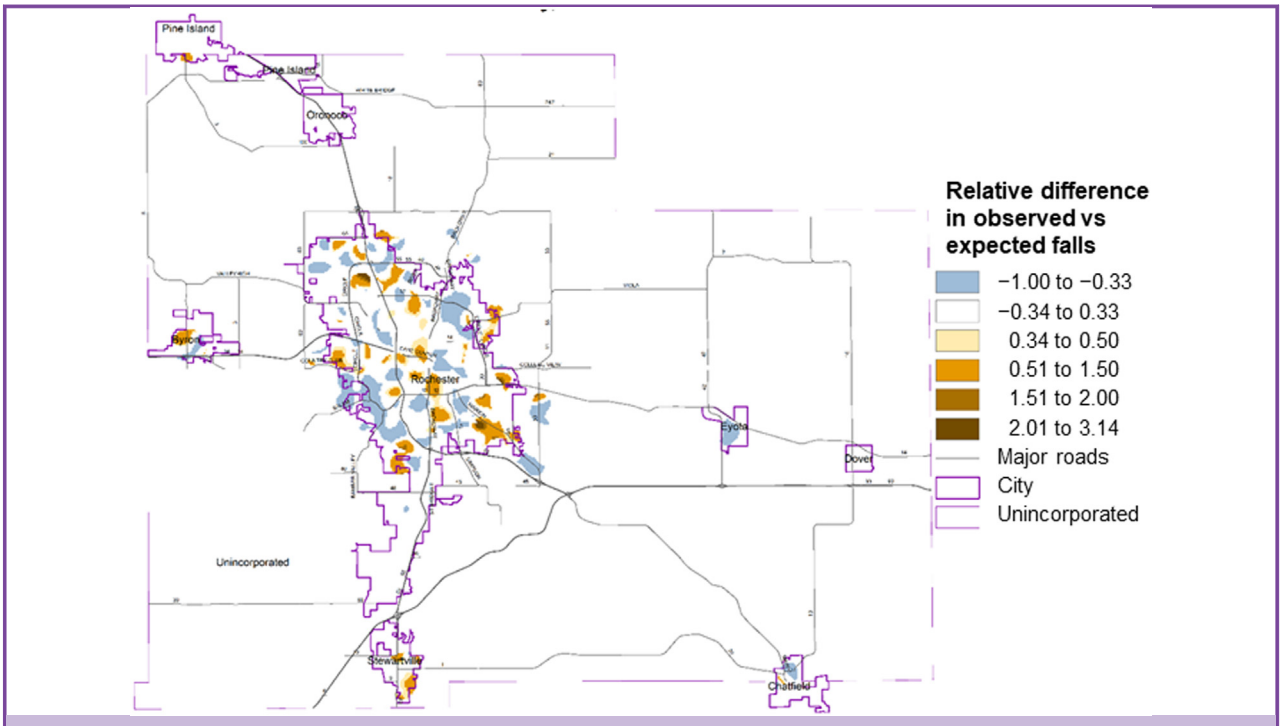

FIGURE 2. Relative difference in observed and expected falls adjusted for age, sex, and housing-based socioeconomic status. (© Esri, used under license terms.) The relative difference was calculated as (observed falls − expected falls)/expected falls.

hotspots 238 (11.5%) lived in large residences (highest quartile) than did those who did not live in a hotspot (2971 [27.4%]; adjusted OR, 0.29; 95% CI, 0.24-0.35). More residents living in hotspots 643 (32.1%) lived in older homes (highest quartile) than did residents not living in a hotspot (2480 [22.9%]; adjusted OR, 1.46; 95% CI, 1.26-1.70).

DISCUSSION

In this study of 12,888 older adults living in SFD dwellings in our community, we identified several hotspots with high fall densities. The traditional risk factors for falls we identified were concordant with those reported in previous studies.[19,24-26] Having a history of falls was associated with a 6-fold higher odds of subsequent falls, which has been reported by others.[24] Among the hotspots, the areas with higher fall density were generally closer to the Rochester city center, which is an older area of the city with older homes. We observed an association between falls and more stairs in a home (ie, 2-story homes). Previous reviews have indicated that stairs are a notable fall risk.[25] Indeed, questionnaires about falls commonly inquire about climbing flights of stairs.[26] The findings of our work will be important for public health interventions and health care teams in various specialties, including occupational therapy and social work.

After adjusting for age, sex, chronic health conditions, and a history of falls or HOUSES index score, the housing characteristics of residents who fell in a hotspot differed from those of residents who lived outside hotspots. Specifically, residents who lived outside hotspots were more likely to live in larger homes than those who lived in hotspots. In addition, the odds of falling were 2-fold higher for residents in hotspots who lived in older homes than those who lived in newer homes. Residents who lived in a 2-story home with fewer stairs (ie, split-level home) had a 75% higher odds of falls in hotspots than those who lived

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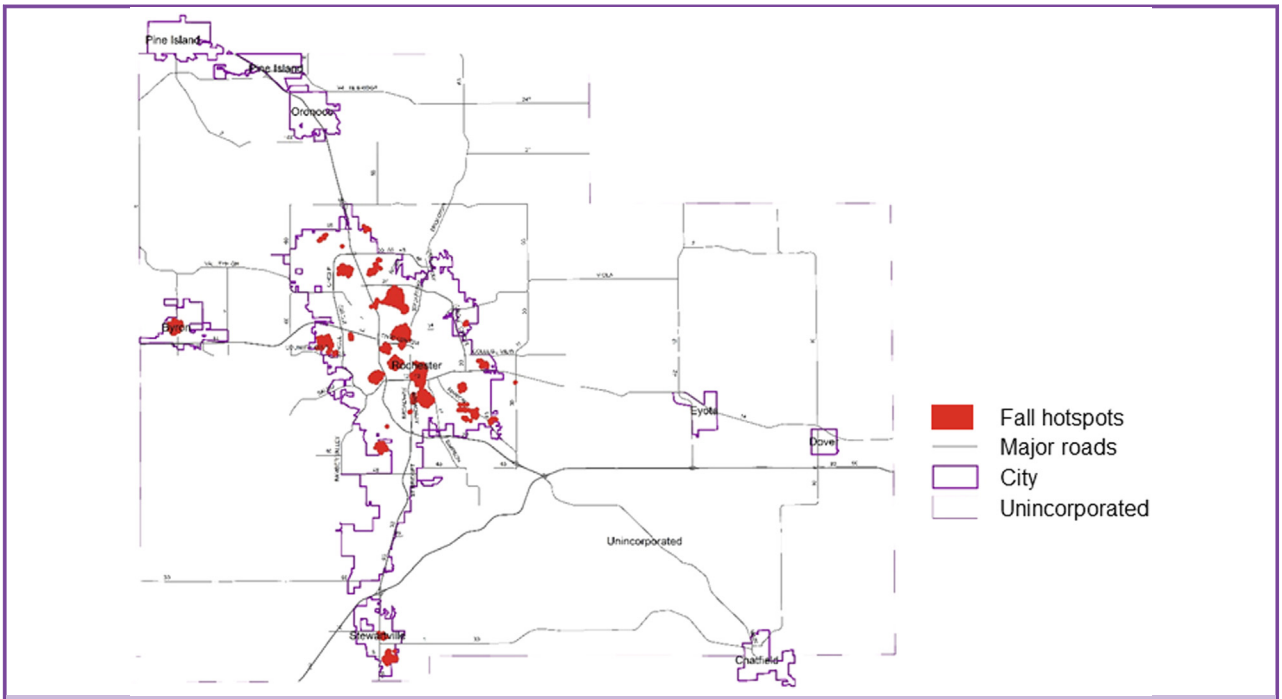

FIGURE 3. Revised fall hotspot map after adjusting for age, sex, and housing-based socioeconomic status. (© Esri, used under license terms.)

outside of hotspots. Residents living in 2-story homes with more stairs had a 49% increased risk of falls. These findings are important factors for clinicians to consider, in addition to such traditional risk factors as age, sex, and a history of falls.

Our findings have practical and clinical applications for residents as they age in their homes. Residents with a functional disability or physical impairment may be at higher risk for falls,[27] yet residents are encouraged to age in their homes rather than transitioning to senior housing or other living arrangements.[28] A previous study of fall rates in neighborhoods reported that increased social cohesion (assimilation and hospitality) and decreased physical environmental factors (blight and crime) are also important for reducing fall risk.[29] Other external environmental issues, such as uneven sidewalks, are also reportedly important risk factors.[30] However, few studies have reported on the importance of the home itself. In a systematic review of structural hazards in the home, the authors advocated for home safety checklists that evaluate structural safety issues with bathrooms or stairs.[8] Our findings suggest that homes in hotspots have characteristics that affect the likelihood of falls. Using digital and electronic methods of retrieving these characteristics from public data could help clinicians as they determine the risk of falls for their patients. SES was a particularly important risk factor because residents with lower economic means generally stay longer in older homes.[31,32] If residents in older homes have lower economic means, they may also be less likely to be able to make home modifications to reduce the risk of falls.[33] Public health policies, including retrofitting older homes, may be required to help modify some of these homes.

Limitations

Our findings provide important new insights into falls among older adults; however, this cohort study is limited by its retrospective nature. Because the falls we investigated were medically documented, falls by residents who did not seek medical attention were not

TABLE 2. Characteristic of Older Adults Living in Single-Family Detached Dwellings in or Outside a Fall Hotspot (N=12,888)[a]

Characteristic	In hotspot (n = 2061)	Outside hotspot (n=10,827)	Univariate odds ratio (95% CI)	Overall *P*[b]
Resident age (y), mean ± SD	71.9 ± 7.1	72.4 ± 7.4	0.99 (0.98-1.00)[c]	.001
Sex				.005
Women	1131 (54.9)	5579 (51.5)	1.14 (1.04-1.26)	
Men	930 (45.1)	5248 (48.5)	Reference	
History of fall				.001
No	539 (26.2)	2480 (22.9)	Reference	
Yes	1522 (73.8)	8347 (77.1)	1.19 (1.07-1.33)	
HOUSES Index score quartile	(n=2060)	(n=10,753)		<.001
Q1 (lowest SES)	223 (10.8)	933 (8.7)	2.19 (1.81-2.64)	
Q2	872 (42.3)	3680 (34.2)	2.17 (1.88-2.49)	
Q3	663 (32.2)	3378 (31.4)	1.80 (1.55-2.08)	
Q4 (highest SES)	302 (14.7)	2762 (25.7)	Reference	
Chronic health conditions				.18
0-1	299 (14.5)	1536 (14.2)	Reference	
2-3	515 (25.0)	2917 (26.9)	0.91 (0.78-1.06)	
≥4	1247 (60.5)	6374 (58.9)	1.01 (0.88-1.15)	
Architecture type				<.001
No story	4 (0.2)	112 (1.0)	0.24 (0.09-0.66)	
1 story	750 (36.4)	513 (47.2)	Reference	
≥2 stories with more stairs	259 (12.6)	1642 (15.2)	1.08 (0.92-1.25)	
≥2 stories with fewer stairs	978 (47.5)	3685 (34.0)	1.81 (1.63-2.01)	
Other types	39 (1.9)	124 (1.1)	2.14 (1.48-3.10)	
Unknown/missing	31 (1.5)	151 (1.4)	1.40 (0.94-2.08)	
House size (sq ft)	(n=2061)	(n=10,826)		
Mean ± SD	1140.3 ± 344.2	1317.5 ± 465.6	0.88 (0.87-0.90)[d]	<.001
House size quartile	(n=2061)	(n=10,826)		<.001
Q1 (smallest size)	736 (35.7)	2486 (23.0)	Reference	
Q2	587 (28.5)	2661 (24.6)	0.75 (0.66-0.84)	
Q3	500 (24.3)	2708 (25.0)	0.62 (0.55-0.71)	
Q4 (largest size)	238 (11.5)	2971 (27.4)	0.27 (0.23-0.32)	
House age (y)	(n=2061)	(n=10826)		
Mean ± SD	48.5 ± 25.1	44.2 ± 25.7	1.01 (1.01-1.01)[e]	<.001
House age quartile	(n=2061)	(n=10,826)		<.001
Q1 (newest built)	385 (18.7)	2868 (26.5)	Reference	
Q2	648 (31.4)	2603 (24.0)	1.85 (1.62-2.13)	
Q3	385 (18.7)	2875 (26.6)	1.00 (0.86-1.16)	
Q4 (oldest built)	643 (32.1)	2480 (22.9)	1.93 (1.68-2.22)	

[a]Resident/house age and house size data summarized as mean ± SD, and all other data summarized as n (%) of residents.
[b]Type 3 *P* values.
[c]Per 1 y.
[d]Per 100 sq ft.
[e]Per 1 y.
HOUSES, housing-based socioeconomic status; SES, socioeconomic status.

accounted for. Some falls may have also been miscoded or missed, which may have limited the sample size in our study. Because of privacy concerns, a minimum of 4 falls was used to calculate hotspots; thus, hotspots in rural areas may be underreported. Nevertheless, systematic bias for missing information about falls in hotspots vs those outside of hotspots is unlikely. The data were collected from 2012 through 2014, and the population and

TABLE 3. Association of a Fall Hotspot Status and Each of Housing Characteristics Among Older Adults Living in Single-Family Detached Dwellings (N=12,888)

Characteristic	Adjusted odds ratio (95% CI)[a]
Architecture type	
No story	0.16 (0.05-0.52)
1 story	Reference
≥2 stories with more stairs	1.49 (1.27-1.76)
≥2 stories with fewer stairs	1.75 (1.57-1.94)
Other types	2.13 (1.47-3.09)
Unknown/missing	1.91 (1.28-2.86)
Size of house	
Q1 (smallest size)	Reference
Q2	0.74 (0.65-0.84)
Q3	0.63 (0.55-0.73)
Q4 (largest size)	0.29 (0.24-0.35)
Age of house	
Q1 (newest built)	Reference
Q2	1.60 (1.39-1.84)
Q3	0.75 (0.64-0.88)
Q4 (oldest built)	1.46 (1.26-1.70)

[a]Logistic regression model was used to assess association between each housing characteristic (architecture type, size, and age) and fall hotspot status, adjusted for age, sex, history of falls within the past 10 years, number of chronic health conditions, and HOUSES index score.

housing characteristics may have changed since then; however, the overall concept of housing as a risk factor for falls may still apply. The possible effects of confounding factors on our findings are always possible in cohort studies; therefore, we accounted for age, sex, HOUSES index score, and a history of falls. The generalizability of our findings to different resident populations in other geographic locations may also be challenging because more than 90% of our study cohort identified as non-Hispanic White. Racial and ethnic differences between populations living in the US Midwest and other regions in the United States and the world are certainly important considerations.[34] Architectural differences among homes located in the US Midwest and other areas of the country or world may also affect generalizability of our findings. We did not analyze housing type according to the presence or absence of basements. We also did not stratify housing styles on the basis of the age of the home because of size concerns. Our resident cohort was assembled in the past, and changes in building codes may have occurred since our study period.

CONCLUSION

Older adults who live in fall hotspots often live in older homes and are at a higher risk of falls if they live in a home with 2 levels and fewer stairs (ie, split-level homes). Residents with lower SES also have a higher risk of falls. These findings reinforce the importance of SES on the risk of falls, in addition to the built structure of the home. Clinicians should be aware of the importance of housing type when assessing the risk of falls for their patients.

POTENTIAL COMPETING INTERESTS

None

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SUPPLEMENTAL ONLINE MATERIAL

Supplemental material can be found online at https://www.mcpdigitalhealth.org/. Supplemental material attached to journal articles has not been edited, and the authors take responsibility for the accuracy of all data.

Abbreviations and Acronyms: **HOUSES,** housing-based socioeconomic status; **ICD-9-CM,** International Classification of Diseases, Ninth Revision, Clinical Modification; **OR,** odds ratio; **SES,** socioeconomic status; **SFD,** single-family detached; **REP,** Rochester Epidemiology Project

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