The proportion of older population in Nagasaki, Japan, is higher in areas with poor walkability and accessibility

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A substantial part of the population of Nagasaki, Japan, resides in houses built on slopes. Considering their reduced physical capacity, older people may suffer disproportionately from the disadvantage of living in such neighborhoods. This study examined two hypotheses: (1) buildings on a slope are less likely to have immediate access to a roadway, and (2) the percentages of older people/households are higher in such disadvantaged areas. Using a geospatial information system, the distance to the nearest roadway was calculated for individual buildings in the study area. Buildings that were located 10 m or more from a roadway were classified as buildings that do not have immediate access (“off-road”). For each 250 × 250-m spatial cell, the average slope angle of the land and indicators of aging were obtained. Pearson’s chi-square test was used to test hypothesis (1) and two-way ANOVA was used to test hypothesis (2). The chi-square test indicated that the percentage of off-road buildings was significantly higher in cells with a higher average slope angle (\(p < 0.001\)). The two-way ANOVA showed that the indicators of aging were significantly associated with the average-cell-angle category and percentage of off-road buildings in cells, indicating that the percentages of older people/households in such disadvantaged areas are higher. The results indicate that older population suffers disproportionately from residing in environmentally disadvantaged neighborhoods in Nagasaki, implying an urgent need to redesign residential areas such that they are fairer to older population.

**Key words**: Older people, urban planning, population aging, accessibility, walkability

**Introduction**

Communities and governments must consider the requirements of vulnerable citizens, especially older people in the context of an aging society. Since conditions that do not matter to the younger generation may matter to older people, there is a need to be more careful about their living conditions.\(^1, 2\) For example, without an elevator, a station would be almost inaccessible and therefore useless for older residents with limited physical capacity. Such an absence of consideration for their needs could result in a disproportionate burden for older people.

In Japan, a country with the most advanced aging society, such problems are becoming more obvious and serious, especially in remote areas. Together with depopulation, population density has been declining, while the percentage of older residents is increasing. According to the national census, the total population in Japan decreased from 128,057,352 in 2005 to 127,094,745 in 2015, a decrease of 7.5%, while the percentage of those aged

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65 years or older has increased from 23.0% to 26.6% during the same period.\textsuperscript{3, 4} In rural communities, many shops and services have become economically unviable and have closed down. Consequently, daily life in these neighborhoods has become difficult, especially for older residents, who now comprise the majority of the communities. Consulting a doctor and purchasing food are essential activities, but can be virtually impossible for some older residents, especially those who do not live with their families. In such areas, older people constitute a vulnerable population.

The situation is even worse when the area has topographical constraints. Nagasaki, Japan provides a typical example of this. The city has experienced a trend of depopulation and population aging in step with the country as a whole. According to the national census, the total population of the city decreased from 455,206 in 2005 to 429,508 in 2015, a decrease of 5.6%, while the percentage of those aged 65 years or older has increased from 22.6% to 28.6% during the same period.\textsuperscript{3, 4} Originally, the city developed on a small plain surrounded by mountains but, over time, the built-up area expanded. Because the level land could not accommodate the growing population during the period of economic growth in the 1970s, the slopes of the surrounding mountains were cleared for housing (Figure 1). The slopes are so steep and the houses so close together that it was impossible to build roadways inside the residential zones (Figure 2). Few of the houses have immediate roadway access; therefore, the majority of households do not own a car. As the residents have aged, their children have married and moved out to their own new houses, leaving their older parents alone without anyone to support them in their daily activities. Many of the older residents who remain have reduced mobility and the environment of their neighborhood has restricted their ability to leave their houses.\textsuperscript{5}

Although this is widely shared as empirical knowledge among local people, it has not been shown quantitatively. However, considering that characteristics of streets such as street connectivity are associated with older adults’ disability to go outside the home as well as physical disability,\textsuperscript{6} it is highly likely. Therefore, this study collected quantitative data to examine whether older people are concentrated in slope zones, without immediate access to roadways. First, we tested the hypothesis that buildings in slope zones are less likely to have immediate access to a roadway. Then, we tested the main hypothesis that the percentages of older resi-
dents and households containing older persons are higher in such slope zones, which are characterized by many buildings that do not have immediate access to roadways.

**Methods**

This study focused on a heavily built-up area in Nagasaki City in Nagasaki Prefecture, Japan. The area investigated was the “chuo chiiki” (which literally means central zone), as defined by the city government. The analytical unit was a spatial cell of 250 × 250 m, which was the highest resolution for which census data were available.

**Building access to a roadway**

For individual buildings, the accessibility of roadways was evaluated according to the distance to the closest roadway. Using the polygon data of the Zmap-TOWN II (Zenrin, Kitakyushu, Japan) dataset for buildings, and the polyline data of the extended digital database of Street Map (Sumitomo Electric System Solutions, Tokyo, Japan) for the centerlines of roadways, the distance from buildings to roadways was estimated in ArcMap 10.3 (ESRI, Redlands, CA, USA). Since our main interest was in accessibility for vehicles, only roadways via which vehicles could travel easily were considered; those with a width < 3 m were excluded. The shortest distance between the outline of each building and the centerline of the closest roadway was calculated. Buildings that were located 10 m or more from a roadway were classified as “off-road” buildings. Since most buildings in urban residential zones, such as chuo chiiki, cover a large part of the land, and where few have a large front garden, a lot was considered to not be alongside the roadway if the associated building was 10 m or more from the roadway.

To validate this criterion for buildings that did not have immediate access to a roadway, we compared the percentage of such buildings in the study area to that for all of Nagasaki (including chuo chiiki) using the same procedure, based on statistics published by the local government.

**Spatial cells**

Spatial cells were categorized into two types based on the percentage of off-road buildings in the cell, i.e., less than 50% and 50% or higher, considering the distribution where the frequency showed two peaks around 20–25% and 55–60%.

The average slope angles (degrees) of the land in the cells were obtained from the National Land Numerical Information provided by the National Land Information Division of the National Spatial Planning and Regional Policy Bureau (Ministry of Land, Infrastructure and Transport, Japan) (downloaded on July 29, 2020). In accordance with a previous study, we divided the cells into three categories based on the average slope angle of the land in the cells: < 5, 5–14.9, and ≥ 15 degrees. This classification takes into account the empirical basis that the land with the slope angle from seven to eight degrees is suitable for residence rather than a flat land, and that building a residence on the land with the slope angle greater than 15 degrees is economically unviable.

As indicators of aging, data from the 2015 national census were used. In each 250 × 250 m cell the following figures were converted into percentages of the total population or number of households: population aged 65 years or older; number of households with at least one member aged 65 years or older; and number of households with a single person aged 65 years or older, or households with a husband and wife living alone who were both aged 65 years or older.

Cells were excluded from the analysis if the total number of households in the cell was two or less, or the total population in the cell was six or less, since the figures of older people/households were not available due to data confidentiality issues; or the total number of the buildings in the cell was
three or less, since the disadvantagedness of the buildings were not thought to be representative of the condition of the whole cell.

**Analysis**

To examine the hypothesis that the buildings on a slope were less likely to have immediate access to a roadway, the association between the average-cell-angle category and the percentage of off-road buildings was tested using Pearson’s chi-square test.

To assess the second hypothesis that the percentage of older residents/households is higher in areas with steeper slopes and more buildings without immediate access to roadways, two-way ANOVA was performed with the indicators of aging as dependent variables and the average-cell-angle category and percentage of off-road buildings as independent variables.

All statistical analyses were conducted in Stata 12 (Stata, College Station, TX, USA), with the statistical significance level set at $p = 0.05$.

**Results**

Within the defined *chuo chiiki* zone, 735 cells and 65,413 buildings were identified, and 175,206 residents were registered. After excluding cells with few households or buildings and those affected by confidentiality issues, 440 cells and 61,110 buildings were included in the analysis.

Of the 61,110 buildings, 26,165 were classified as off-road buildings. When the same procedure was applied to all of Nagasaki, 77,989 of the total of 178,790 buildings (43.6%) were classified as off-road buildings. This percentage was close to that reported by the government (44.8%).

Table 1 shows the number and percentage of off-road buildings by the average-cell-angle category. The overall percentage of off-road buildings was 42.8%, but it was significantly lower (36.5%) in cells with an average angle of less than 5 degrees, and higher in cells with an average angle of 15 degrees or greater ($p < 0.001$, chi-square test).

Table 2 summarizes the cell characteristics. Since the distributions of the total number of residents and residents aged 65 years or older were right-skewed, the median values with 25 and 75 percentiles are given. The median number of buildings in a cell was 141.5, and the median percentage of off-road buildings was 46.7%, although there was substantial variation by cell. The median percentage of residents aged 65 years or older was 31.8%; thus, the percentage of older residents was higher than 30% in more than half of the cells. Similarly, in more than half of the cells, more than one quarter of the households consisted of an older person or an older couple living alone.

Table 3 shows the mean values of the indicators of aging by average-cell-angle category and the percentage of off-road buildings. In general, the indicators were higher with greater average cell angles and a higher percentage of off-road buildings. Table 4 shows the results of the two-way

| Average cell angle | 10 m or more to roadway |  |  |  |  |  |
|-------------------|-------------------------|---|---|---|---|---|
|                   | Yes                     | No| Total |  |  |  |
| Less than 5 degrees | 4,578 (36.52)           | 7,958 (63.48) | 12,536 (100.0) |  |  |  |
| 5 to 14.9 degrees | 13,725 (42.49)           | 18,574 (57.51) | 32,299 (100.0) |  |  |  |
| 15 degrees or greater | 7,862 (48.31)           | 8,413 (51.69) | 16,275 (100.0) |  |  |  |
| Total | 26,165 (42.81)           | 34,945 (57.18) | 61,110 (100.0) |  |  |  |

Data are numbers with percentages in parentheses
Chi-square = 404.842, $p < 0.001$
Table 2 Characteristics of the cells (N = 440)

| Buildings          | Total number | Median | 25–75 percentile |
|--------------------|--------------|--------|------------------|
| Off-road (%)       | 141.5        | 60–203.5 |
| Residents          |              |        |                  |
| Total number       | 331          | 119–549|
| Individuals aged 65 years or older (%) | 31.8 | 24.7–38.3 |
| Households         |              |        |                  |
| Total number       | 149          | 52–266 |
| With individual(s) aged 65 years or older (%) | 47.2 | 34.1–57.0 |
| With one person or couple living alone aged 65 years or older (%) | 27.8 | 21.3–33.7 |

Table 3 Data for the indicators of aging by the percentage of off-road buildings and average-cell-angle category (N = 440)

| Average cell-angle category | Percentage of off-road buildings in the cell |
|-----------------------------|---------------------------------------------|
|                             | Less than 50% | 50% or higher |
| Less than 5 degrees         | (n=58)        | (n=28)         |
|                             | 20.91         | 24.71          |
|                             | 26.99         | 34.14          |
|                             | 17.69         | 21.92          |
| 5 to 14.9 degrees           | (n=112)       | (n=95)         |
|                             | 32.03         | 32.86          |
|                             | 47.29         | 47.97          |
|                             | 28.75         | 28.92          |
| 15 degrees or greater       | (n=65)        | (n=82)         |
|                             | 32.46         | 37.21          |
|                             | 47.58         | 53.83          |
|                             | 26.71         | 30.19          |

Top row, percentage of residents aged 65 years or older; middle row, percentage of households with individual(s) aged 65 years or older; bottom row, percentage of households with one person or a couple living alone both aged 65 years or older. Data are mean percentages.

Table 4 Results of the two-way ANOVA (N = 440)

| Percentage of residents aged 65 years or older (R^2 = 0.168) | F    | p   |
|-------------------------------------------------------------|------|-----|
| Average cell-angle category                                 | 36.3 | <0.001 |
| Percentage of off-road buildings category                   | 6.5  | 0.011 |
| Percentage of households with individual(s) aged 65 years or older (R^2 = 0.232) | F    | p   |
|-------------------------------------------------------------|------|-----|
| Average cell-angle category                                 | 56.7 | <0.001 |
| Percentage of off-road buildings category                   | 6.6  | 0.011 |
| Percentage of households with a person or couple both aged 65 years or older living alone (R^2 = 0.147) | F    | p   |
|-------------------------------------------------------------|------|-----|
| Average cell-angle category                                 | 32.2 | <0.001 |
| Percentage of off-road buildings category                   | 4.7  | 0.031 |
ANOVA. Interaction effects are not presented because none were significant. Both the average cell angle and percentage of off-road buildings in a cell were significantly positively associated with all three indicators of aging, indicating that in cells where the land sloped more steeply or more than half of the buildings were off-road, the percentages of older residents and households were higher.

Discussion

Focusing on a heavily built-up area in Nagasaki, we examined whether buildings on a slope were less likely to have immediate access to a roadway, and whether the percentages of older residents or of households with older persons were higher in areas with steeper slopes and a higher percentage of off-road buildings. It was found that, in areas with steeper slopes, buildings were more frequently located 10 m or more from a roadway. In addition, areas with steeper slopes and a higher percentage of off-road buildings tended to have a higher percentage of older residents or households with older members.

In Japan, it is illegal to build a new residence in a lot that does not abut onto a roadway, i.e., the lot must have a width of more than 2 m facing a roadway, which must be at least 4 m wide. Although this law has been in effect for more than 50 years, many buildings lack such immediate access to a roadway because of the relative flexibility of the law, including buildings built in a lot that is set back from a roadway (as well as buildings built before the law was passed). In Nagasaki, 77,989 residential buildings (44.8%) lack immediate access to a roadway, according to a government publication.

To estimate the number and spatial distribution of such buildings in the chuo chiiki zone, we applied the criterion that a building is 10 m or more from the closest roadway to digital geospatial datasets for Nagasaki. Using this procedure, 43.6% of all buildings were classified as off-road, which is close to the value reported by the government of 44.8%. Therefore, this procedure can be regarded as valid.

Applying the same procedure to the chuo chiiki dataset, we found that 42.8% of the buildings were off-road. The percentage was higher in cells with slopes greater than 5 degrees, and higher still in cells with slopes greater than 15 degrees. This supports the hypothesis that buildings in steep areas are less likely to have immediate access to a roadway.

Regarding the second hypothesis that the percentages of older residents and households with older person(s) in steeply sloping areas with many off-road buildings are higher, we used ANOVA to evaluate the associations of the three indicators of aging with the average cell angle and percentage of off-road buildings. The analysis showed that the percentages of older residents/households were significantly higher in cells with steeper slopes, and in cells where 50% or more of the buildings were off-road, thus supporting our second hypothesis.

It is not sustainable for older people to live in houses on a steep slope and without roadway access because it is difficult for them to walk up and down steep stairways, and it is also impossible for a car to collect them in front of their homes. As the residents age and become weaker, it becomes more difficult for them to leave home without assistance. Many of their neighbors are also old and face the same difficulties. Although commercial pick-up and delivery services are available, the costs are high due to the poor accessibility and it is difficult for companies to remain profitable. Ambulances and fire engines face the same difficulties accessing houses when an emergency occurs.

The negative effects of living in such a neighborhood, with poor walkability and limited accessibility, could impact the health status of the residents through at least two pathways. The first is reduced
physical activity. It has been reported that residents in neighborhoods with poor walkability (e.g., slope, lack of pedestrian infrastructure, or safety) or poor accessibility (e.g., scarce public transportation and poor street connectivity) undertake lower levels of physical activity, especially walking. This can result in reducing physical capacity to an even lower level among older people. Another study showed that, even among the same age cohort of older people in the same city, trip-making behavior, which inevitably involves physical activity, was spatially diverse and related to vehicle access. The other pathway is a lower quality of diet, because a lack of accessibility to food outlets can affect eating habits. For example, Sharkey et al. showed that better accessibility to food stores was both objectively and subjectively positively associated with vegetable and fruit intake among older people. Similarly, Fitzpatrick et al. showed that, among older people, transportation burdens were more strongly associated with food insufficiency than whether they resided in a so-called “food desert”, which was defined as a census tract characterized by low incomes and a scarcity of supermarkets.

The results indicate that the percentages of older people and households are higher in environments that have potentially negative effects on health. In other words, older people suffer disproportionately due to residing in disadvantaged neighborhoods with poor walkability and accessibility. This represents an issue of inequality that should be addressed. Unfortunately, the disadvantageous nature of the living environment may become apparent only after the residents reach old age, since young and physically fit people can easily overcome many of the factors that prove to be obstacles for older people. Since population aging is a global trend, this case in Nagasaki, Japan, provides a warning to other countries and cities that have inconvenient residential zones. Urban planners should be aware of the possibility of problems caused by clustering of older residents. A mixture of age groups and land-use types, and improvement of street connectivity at an earlier stage of urban development, would help to avoid this situation.

One of the major limitations of this study was the use of spatial cells as the analytic unit. Although we used a minimum cell size of 250 × 250 m, it may have been too large to capture neighborhood characteristics. It would have been better if the demographic information of all residents could have been assigned to individual buildings. Another limitation was the possible misclassification of “off-road” buildings. Because they were classified based on the shortest distance between the outline of a building to the centerline of the closest roadway, buildings may have been misclassified if the closest roadway was very wide, or if there was a garden in front of the building. For another way, even if the shortest distance is less than 10 m, it could be a long way to get to the roadway from the entrance if the entrance is not faced to the roadway, or if the building is walled and direct access to the roadway is blocked. However, this is not likely in residential zones in chuo chiiki in Nagasaki City and, therefore, should not have had a substantial influence on the results.

Although the percentages of older people/households were used as the dependent variables of ANOVA, other indicators were also possible. To examine if the results are different, we conducted post hoc analysis with the absolute numbers of older people/households as the dependent variables, and found that the associations with the average cell angle were significant (p < 0.001) while the associations with the percentage of off-road buildings were not (p = 0.061~0.105). Nevertheless, even though the p values for the associations with the percentage of off-road buildings exceeded the sig-
nificance level, they still could be regarded as low. Therefore, even if other indicators of aging were used in ANOVA, it would be likely that the associations with the average cell angle and the percentage of off-road buildings are suggested.

Considering the distributions and interpretability, we categorized the cells by the average slope angle and by the percentage of off-road buildings; however, the average slope angle and the percentage of off-road buildings could be treated as continuous variables. We confirmed that the significant associations were observed in similar ways even when they are treated as continuous variables. Specifically, the average slope angle was significantly associated with the percentage of off-road buildings (Spearman’s rho = 0.23, p < 0.001); and the average slope angle and the percentage of off-road buildings were significantly associated with the percentage of older person (p < 0.001 for the average angle and p = 0.01 for the percentage of off-road buildings), percentage of households with older person (p < 0.001 and p = 0.01), and percentage of households with an older person or older couple (p < 0.001 and p = 0.02), in multiple linear regression models.

In conclusion, this study showed that, in Nagasaki City, buildings on steep slopes are less likely to have immediate access to roadways, and the percentage of older residents/households is higher in such areas. This indicates that older residents suffer disproportionately from environmentally disadvantaged neighborhoods, which can be characterized as an inequality. Since the disadvantageous features of a residential area might be recognizable only when residents reach old age, urban planning should consider possible future inequities at an early stage.

Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

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Reference

1) Kerr J, Rosenberg D, Frank L. The Role of the Built Environment in Healthy Aging: Community Design, Physical Activity, and Health among Older Adults. J Plan Lit, 2012; 27(1): 43–60.
2) World Health Organization. Global age-friendly cities: A guide. 2007.
3) Statistics Bureau, Ministry of Internal Affairs and Communications, Japan. 2005 Population Census. 2006.
4) Statistics Bureau, Ministry of Internal Affairs and Communications, Japan. 2015 Population Census. 2016.
5) Nakao R, Sugiyama K, Kawasaki R, et al. Factors related to the self-rated health of elderly residents in sloped residential areas. Jpn J Health Hum Ecol, 2018; 84(3): 130–140.
6) Beard JR, Blaney S, Cerda M, et al., Neighborhood Characteristics and Disability in Older adults. J Gerontol B Psychol Sci Soc Sci, 2009; 64(2): 252–257.
7) Kataoka H. [Understanding the distribution of slopes and categorization of residential zones on slopes in Kitakyushu city]. Chiki Kadai Kenkyu. 2009; 131–145. Japanese.
8) Nagasaki city. [Results of 2018 Housing and Land Survey]. Japanese. https://www.city.nagasaki.lg.jp/syokai/750000/753000/p023258_d/fi1/H30jyutaku.pdf (cited August 11, 2020).
9) Borst HC, de Vries SJ, Graham JMA, et al. Influence of environmental street characteristics on walking route choice of elderly people. J Environ Psychol, 2009; 29(4): 477–484.
10) Durand CP, Andalib M, Dunton GF, et al. A systematic review of built environment factors related to physical activity and obesity risk: implications for smart growth urban planning. Obes Rev, 2011; 12(501): e173–e182.
11) Van Holle V, Deforce B, Van Cauwenberg J, et al. Relationship between the physical environment and...
different domains of physical activity in European adults: a systematic review. BMC Public Health, 2012; 12(1): 807.

12) McCormack GR, Shiell A. In search of causality: a systematic review of the relationship between the built environment and physical activity among adults. Int J Behav Nutr Phy, 2011; 8(1): 125

13) Sallis JF, Floyd MF, Rodriguez DA, Saelens BE. Role of Built Environments in Physical Activity, Obesity, and Cardiovascular Disease. Circulation, 2012; 125(5): 729–737.

14) Paez A, Scott D, Potogiou D, Kanaroglou P, Newbold KB. Elderly mobility: Demographic and spatial analysis of trip making in the Hamilton CMA, Canada. Urban Stud, 2007; 44(1): 123–146.

15) Caspi CE, Sorensen G, Subramanian SV, Kawachi I. The local food environment and diet: A systematic review. Health Place, 2012; 18(5): 1172–1187.

16) Hamamatsu Y, Goto C, Nishitani M, Shimadate R, Ueno J, Kusakari Y, Umezaki M. Associations between neighborhood food environments and deficient protein intake among elderly people in a metropolitan suburb: A case study in Kisarazu city, Japan. Am J Hum Biol, 2017; 29(6): e23043

17) Sharkey JR, Johnson C, Dean WR. Food Access and Perceptions of the Community and Household Food Environment as Correlates of Fruit and Vegetable Intake among Rural Seniors. BMC Geriatr, 2010; 10(1): 32

18) Fitzpatrick K, Greenhalgh-Stanley N, Ploeg MV. The Impact of Food Deserts on Food Insufficiency and SNAP Participation among the Elderly. Am J Agr Econ, 2016; 98(1): 19–40.

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和文抄録

【背景】長崎市では多くの人びとが斜面地に建てられた住宅に住んでおり、とくに急斜面である場合も少なくない。しかし、高齢者は身体機能が低下していることが多いため、こうした斜面地での生活には困難が伴う。すなわち、居住環境に起因する不利益をより大きく被りやすい。【目的】長崎市中央地域を対象として、1）斜面地では車道に接していない建物の割合が高いこと、2）勾配の急で、車道に接していない建物の割合が高い地域では、高齢者・高齢世帯の割合が高いこと、の2点を定量的に示すこと。【方法】地理情報システムを用いて幅員3メートル以上の道路から10メートル以上離れている建物を抽出した。さらに、その割合と土地の勾配によって250メートル四方のメッシュを分類した。1）はカイ二乗検定、2）は二元配置分散分析を用いて検討した。【結果】土地の勾配が5度以上15度未満のメッシュでは42.5％、15度以上のメッシュでは48.3％の建築物が車道に接していないと推定され、勾配によってその割合が有意に異なった。高齢者・高齢世帯の割合は、勾配が急なメッシュで高く、また、車道から離れた建物の割合が50％以上のメッシュで高かった。土地の勾配、車道から離れた建物の割合によるメッシュの分類は、高齢者・高齢世帯の割合と有意に相関した。【考察】上記1）および2）の仮説がともに定量的に支持された。自宅の周囲が急な斜面地であること、自宅から車両で移動できないことは高齢者の居住環境として不都合であり、外出行動の減少、ひいては身体活動の減少の要因となりうる。潜在的な社会的弱者が生活困難な地域に高い割合で居住している状態は改善されるべきである。また、都市計画においては、現状の人口構成では大きな問題となるない環境であっても、将来的に地域人口が高齢化すると住民に不都合なものとして顕在化しうることを認識すべきである。