Determining Appropriate Locations for Potential Nursing Homes in Maine

Introduction

Each year, the population of the state of Maine grows older as the baby boomer generation reaches retirement age. Based on U.S. Census Bureau figures, “Maine is the oldest state based on median age (43.5 years) and the second-oldest based on the proportion of people aged 65 and older (17 percent)” (Graham 2015). It is projected that 25 percent of Mainers will be over the age of 65 by 2030. This rise in the age of the population will require serious efforts to accommodate more seniors in nursing homes across the state. This project presents one model that considers three factors to help determine the most appropriate locations for new nursing homes across the state: 1) proximity to established nursing homes; 2) proximity to hospitals; and 3) proximity to seniors who live alone. A second model includes an additional factor: proximity to areas with higher rates of poverty among seniors. Population density in the surrounding area will be calculated first to determine the areas under consideration (the areas with the lowest population densities will not be considered).

To determine potential nursing home locations, this project utilizes the following data:

- Locations of current nursing homes (2013)
- Locations of hospitals (2016)
- Proximity of hospitals to allow hospitals more efficient discharge of patients who need long term care.
- Populations of people 65 years and older who live alone by block group (2014) (secondary model) to place greater weight on areas where more of elderly people live under the poverty line, as they are often more likely to be denied access to nursing home care due to an inability to pay or a reliance on Maine Care.
- A series of models transformed each of these datasets into raster layers in ArcMap. Each of these layers were then combined to give recommendations for the placement of future nursing homes. The portions of the state where the population density is greater than .001 residents per hectare were selected and used to create a new layer. The “Polygon to Raster” tool was used to transform this layer into a raster, and the “Reclassify” tool was used to give this area full weight in the final models. The “Euclidean Distance” tool was used to create raster layers around the preexisting nursing homes and the hospitals. These layers were then reclassified into two classes to give greater weight to locations near hospitals and to locations further from nursing homes. The “Polygon to Raster” tool transformed block group data with concern for the senior population that lives alone and the data concerning the senior population living under the poverty line into raster layers. The “Reclassify” tool gave higher weights to the block groups that contained more seniors in each of these categories. Finally, the “Raster Calculator” tool combined the previous layers into the final two models, which consider the weights of each location within the study area based on the four factors (or three for Model 1).

Data and Methodology

Population density of Maine by block (2010) to rule out areas in the state with extremely low population density as potential locations for new nursing homes.

Locations of current nursing homes (2013) to place greater weight on locations that currently do not have easy access to nursing homes.

Locations of hospitals (2016) to place greater weight on locations in the proximity of hospitals to allow hospitals more efficient discharge of patients who need long-term care.

Populations of people 65 years and older who live alone by block group (2014) to place greater weight on areas where more elderly people live alone, as they are more likely to need nursing home care than those who live with family members.

Populations of people 65 years and older who live under the poverty line by block group (2014) (secondary model) to place greater weight on areas where more of elderly people live under the poverty line, as they are often more likely to be denied access to nursing home care due to an inability to pay or a reliance on Maine Care.

A series of models transformed each of these datasets into raster layers in ArcMap. Each of these layers were then combined to give recommendations for the placement of future nursing homes. The portions of the state where the population density is greater than .001 residents per hectare were selected and used to create a new layer. The “Polygon to Raster” tool was used to transform this layer into a raster, and the “Reclassify” tool was used to give this area full weight in the final models. The “Euclidean Distance” tool was used to create raster layers around the preexisting nursing homes and the hospitals. These layers were then reclassified into two classes to give greater weight to locations near hospitals and to locations further from nursing homes. The “Polygon to Raster” tool transformed block group data with concern for the senior population that lives alone and the data concerning the senior population living under the poverty line into raster layers. The “Reclassify” tool gave higher weights to the block groups that contained more seniors in each of these categories. Finally, the “Raster Calculator” tool combined the previous layers into the final two models, which consider the weights of each location within the study area based on the four factors (or three for Model 1).

Results, Analysis, Limitations

Model 1, which includes data concerning locations of preexisting nursing homes, hospitals, and the 65 and older population who lives alone in the study area, suggests two locations for a new nursing home, with many others that could be appropriate. The following chart provides context for two of the locations with the most potential:

<table>
<thead>
<tr>
<th>Location</th>
<th>Nearest Preexisting Nursing Home</th>
<th>Population (including 3 nearest towns) (US 2010 Census)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calais</td>
<td>44.3 km (Eastport Memorial Nursing Home)</td>
<td>4,186 (Calais, Robinson, Grand-ky)</td>
</tr>
<tr>
<td>Fort Fairfield</td>
<td>30.9 km (Anoosook Health Center)</td>
<td>23,691 (Fort Fairfield, Presque isle, Caribou, Limestone)</td>
</tr>
</tbody>
</table>

Model 2, which includes the same data as Model 1 with the addition of data concerning the 65 and older population that lives under the poverty level, suggests a number of locations that could be appropriate for a new nursing home. The following chart provides context for two of the locations with the most potential:

<table>
<thead>
<tr>
<th>Location</th>
<th>Nearest Preexisting Nursing Home</th>
<th>Population (including 3 nearest towns) (US 2010 Census)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elba</td>
<td>33.3 km (Bangor Nursing and Rehabilitation Center)</td>
<td>8,695 (Elba, Newport, Carmil, Plymouth)</td>
</tr>
<tr>
<td>Warren</td>
<td>15.61 km (Knox Center for Long Term Care)</td>
<td>14,741 (Warren, Waldoboro, Thomaston, Cushing)</td>
</tr>
</tbody>
</table>

Future Use

These two models provide a starting point for selecting locations for future nursing homes in Maine. The variables that are included are important factors for determining where a new nursing home would be in high demand, but there are several other considerations to be made. Some of these include the following: the availability of real estate to house a nursing home, the potential funding from private or government sources, the desirability of locations for senior populations, the availability of staff or potential for recruitment to the area, etc.

Sources


Projections: Maine 2030 State Plan for Population.