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Mapping Melanoma Risk and Locating High-Need Regions for Dermoscopy and Skin Biopsy Training

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BACKGROUND

Melanoma is on the rise nationwide. In 2019, it was the 6th most common type of cancer, and it results in approximately 10,000 deaths each year.^{1,2} Maine consistently has melanoma rates higher than the national average, and also has one of lowest densities of dermatologists.^{2,3} Primary care providers (PCPs) play a critical role in detecting melanoma – in up to 25% of primary care visits, patients bring up a skin lesion of concern.⁴

When detected early, melanoma is highly treatable with a localized five-year survival rate of 99%. However, this decreases to 70.6% after regional spread and drops to only 33.4% following distant metastasis.² The pathologic tumor stage, or T-stage, is based on the depth of the melanoma, which is an indicator of prognosis. In-situ and T1a tumors are typically localized and at a low risk for metastasis. T1b is the threshold for a sentinel lymph node biopsy (SLNB), which examines for regional metastasis; thus, melanomas stage T1b and above are at a greater risk for regional metastasis.

Dermoscopy and skin biopsy trainings have been shown to help improve PCPs' knowledge of and confidence in detecting skin cancer. The goal of this project was to determine where to focus training efforts in order to maximize our impact and reach regions that face the highest burden of melanoma in the state.

METHODS

- Melanoma dataset received from the Maine Center for Disease Control Cancer Registry
 - Included 5,191 known stage melanomas
- Risk categories based on average 5-year survival rates:
 - **Low-risk** = in-situ + T1a
 - **Intermediate-risk** = T1b (SLNB) + T2
 - **High-risk** = T3 + T4
- County populations were retrieved from ACS
- Rates and numbers were calculated using these risk categories
- Maps were created in R studio

GIS MAPPING RESULTS

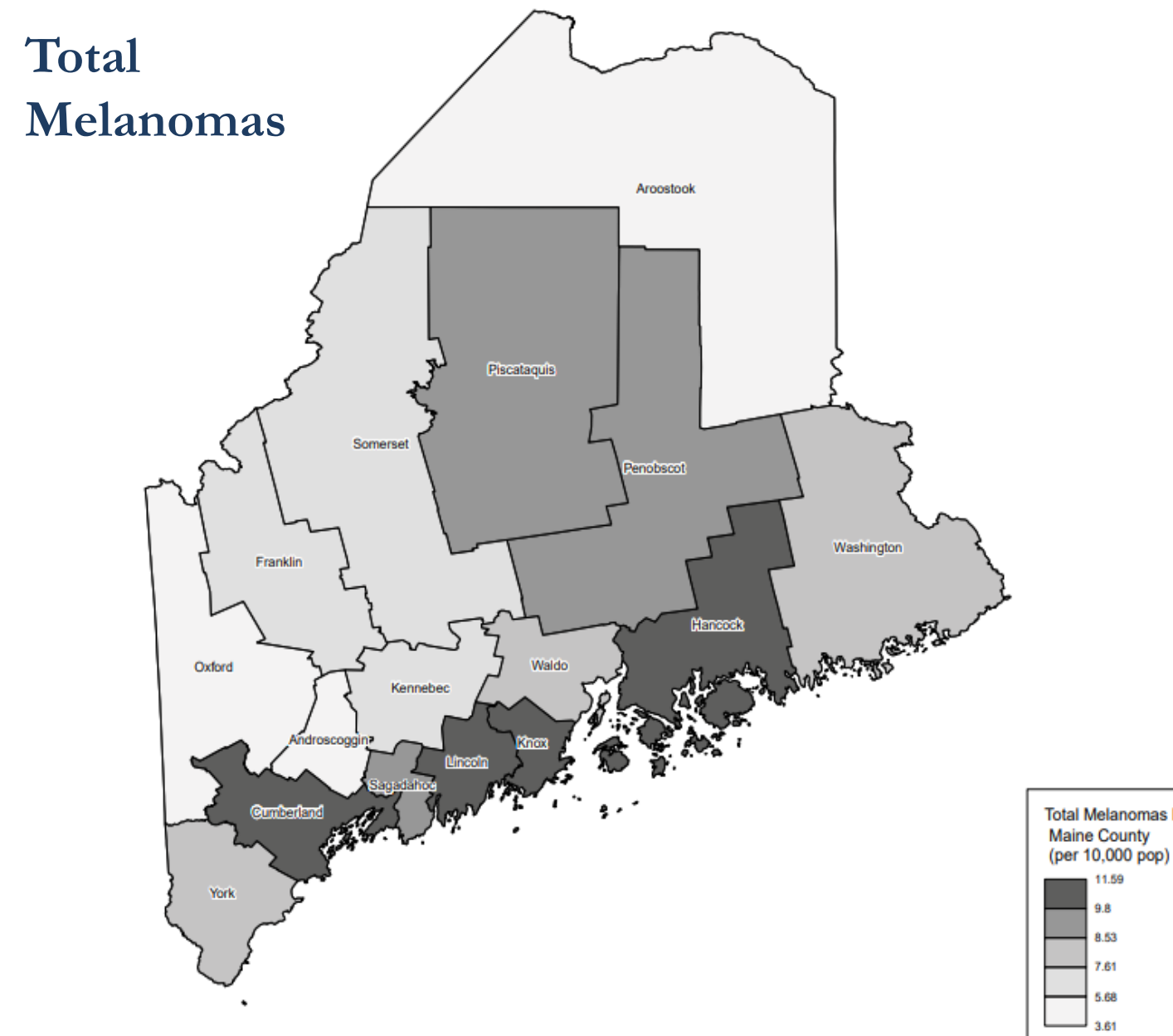


Figure 1: Total melanoma incidence rate per county (# of melanomas per county adjusted for population). Darker grey counties = higher melanoma incidence rates. Counties with the highest rates of melanoma (in order) include Hancock, Cumberland, Knox, Lincoln, and Sagadahoc.

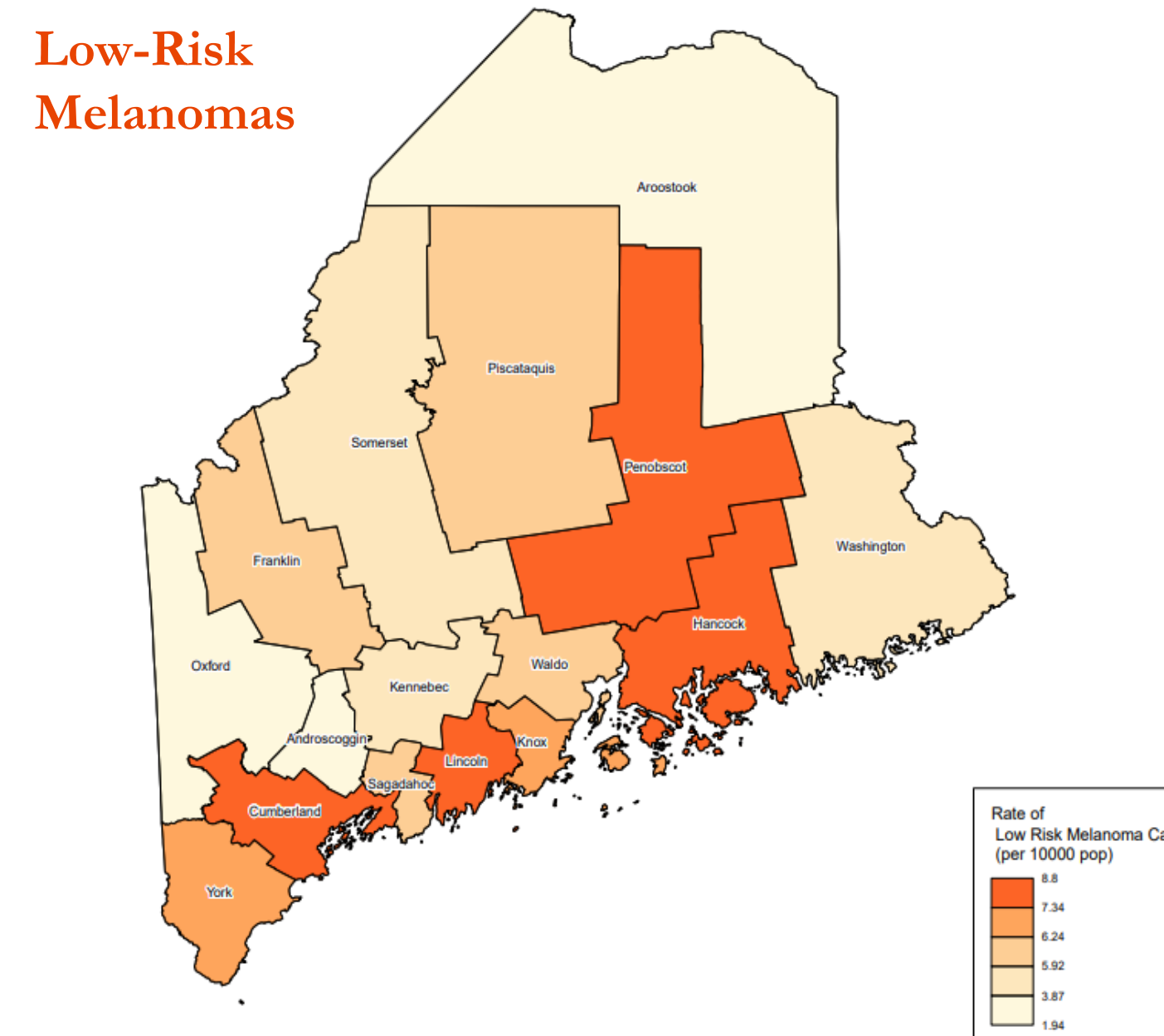


Figure 2: Rate of low-risk melanomas per county (# of in-situ and T1a melanomas per county adjusted for population). Darker orange counties = higher low-risk melanoma rates. Counties with the highest rates of low-risk melanoma (in order) include Hancock, Cumberland, Penobscot, Lincoln, and Knox.

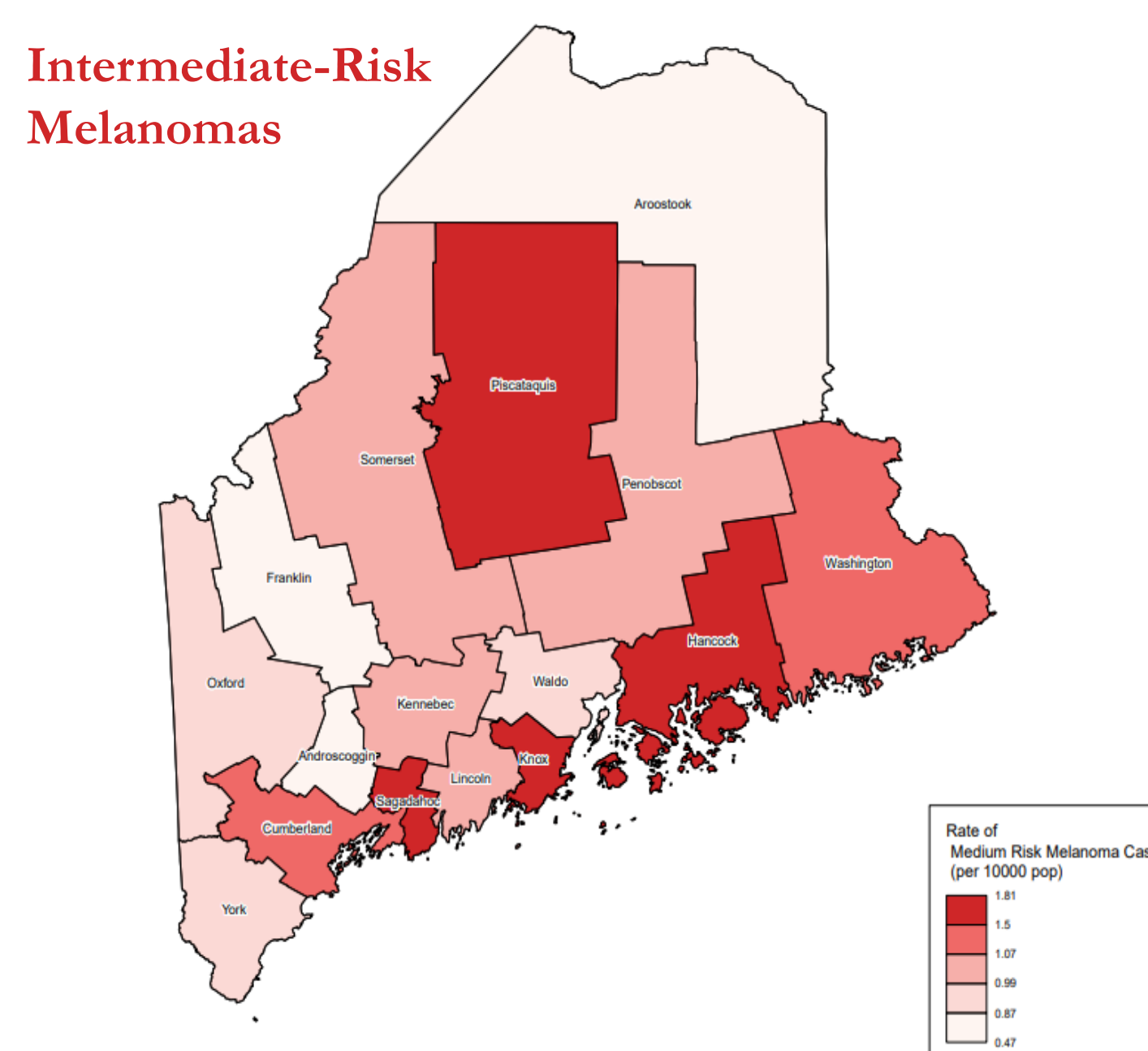


Figure 3: Rate of intermediate-risk melanomas per county (# of T1b and T2 melanomas per county adjusted for population). Darker red counties = higher intermediate-risk melanoma rates. Counties with the highest rates of intermediate-risk melanoma (in order) include Knox, Piscataquis, Sagadahoc, Hancock, and Cumberland.

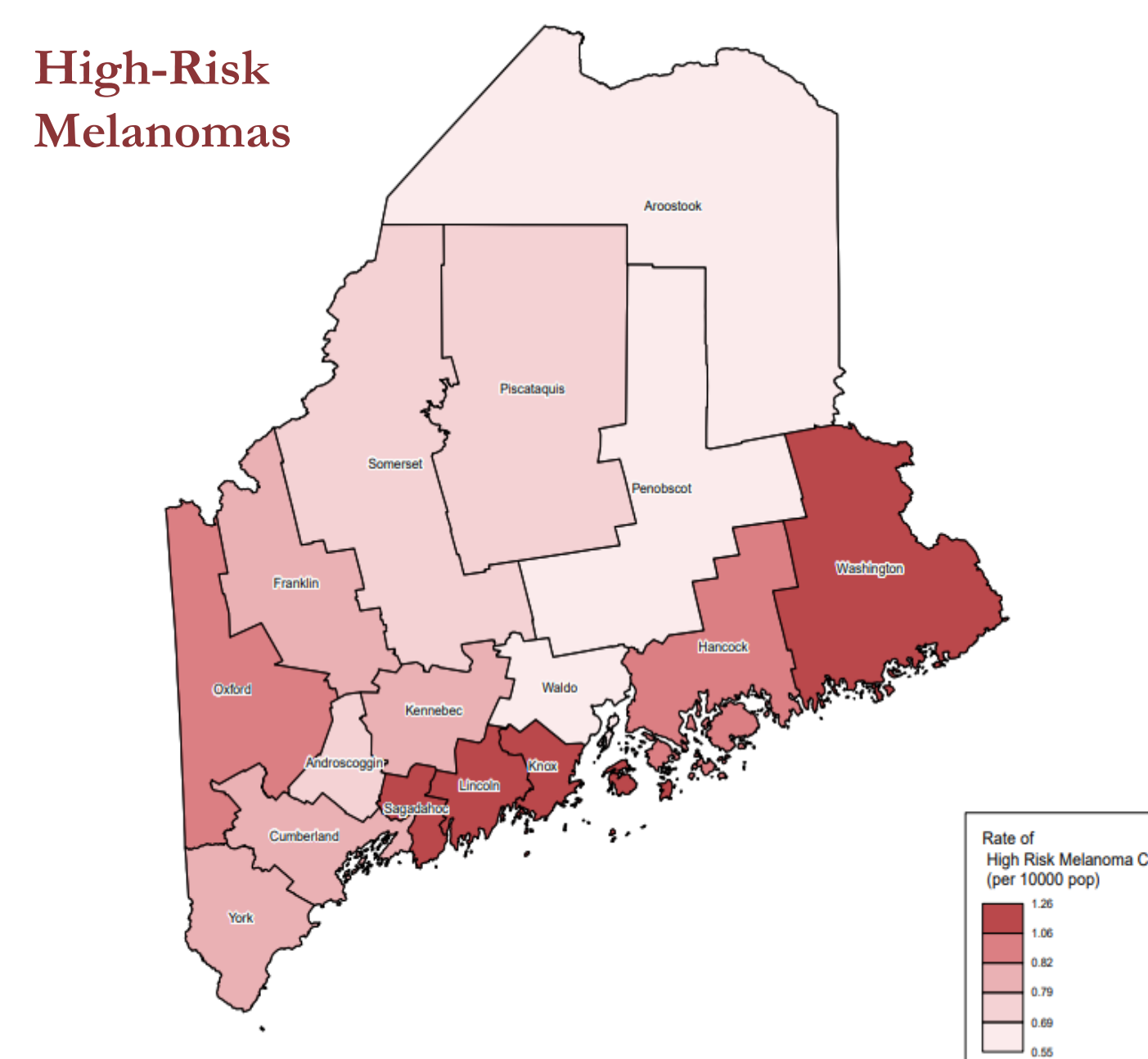


Figure 4: Rate of high-risk melanomas per county (# of T3 and T4 melanomas per county adjusted for population). Darker maroon counties = higher high-risk melanoma rates. Counties with the highest rates of high-risk melanoma (in order) include Washington, Knox, Sagadahoc, Lincoln, and Hancock.

CONCLUSIONS

Based on our data analysis and the maps created, we determined that **Hancock, Knox, Sagadahoc, and Washington** counties face the greatest burden of melanoma in Maine, and dermoscopy and skin biopsy training efforts should initially be focused in this region.

There are also some general geographical trends observed in the maps. It seems that coastal counties tend to have higher rates of melanoma, especially later-stage melanoma. In addition, counties with higher rates of PCPs and dermatologists tend to have higher rates of early stage melanomas, but lower rates of later stage melanomas than other counties with fewer PCPs and dermatologists (relative to their population).

FUTURE DIRECTION

- Obtain grant funding to train PCPs in these four counties over two years
- Determine whether training:
 - a) increases provider confidence and knowledge
 - b) results in practice change (more skin checks, dermatoscope use & skin biopsies)
- Continue to monitor melanoma rates in Maine for changes in geographical trends over time

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