This report explains the methods used to calculate the annual Oregon Office of Rural Health Areas of Unmet Health Care Need.

I. BACKGROUND

The Office of Rural Health (ORH) has been required by the Oregon Legislature to develop and utilize medical underservice criteria for rural areas. The Areas of Unmet Health Care Need (AUHCN) are used for the following applications:

- To grant exceptions to the state's rural hospital classification system as it applies to medical staff eligibility for the state's personal income tax credit program: In order for larger rural hospitals' medical staffs to receive this benefit, the Office must determine that the area is "medically underserved";

- To devise a risk assessment formula for rural hospitals that includes a factor reflecting medical underservice, and identify which ones receive cost-based Medicaid reimbursement (SB 607, passed in 1991; HB 3650, passed in 2011);

- As one factor to determine eligible "medically underserved" geographic areas for the Oregon Governor's Health Care Shortage Area Designation;

- To inform the distribution of state funds, grant dollars and other resources for the benefit of rural communities and health care services.

The Office of Rural Health developed the Areas of Unmet Health Care Need in response to these requirements. It is a single set of criteria that can be used in each of the required applications while helping our constituents evaluate their overall health delivery systems, view their status compared to other rural areas, and see their potential for assistance. It takes into account infrastructure: hospital buildings and road quality, beginning and end of life: low birth weight and mortality, quality of primary care: preventable hospitalizations, and health care resources: availability of primary care providers.

II. THE OFFICE OF RURAL HEALTH

The mission of the Oregon Office of Rural Health is to improve the quality and availability of health care for rural Oregonians.

The Oregon Office of Rural Health is one of 50 in the nation and was established by the state legislature in 1979. It is advised by the Oregon Rural Health Coordinating Council.

In order to secure maximum benefit of statewide health resources for rural Oregon, the Office partnered with Oregon Health & Science University in 1989.
ORH coordinates efforts to improve rural health systems, provides technical assistance to rural hospitals, clinics and communities, recruits health care providers, and serves as a clearinghouse for information on rural health issues.

Further information about ORH can be found at: www.ohsu.edu/oregonruralhealth.
III. DETERMINING PRIMARY CARE SERVICE AREAS

In most of the United States, county geographies are relatively small and homogenous, so county-level data is widely used to analyze information. In Oregon, however, the 36 counties vary greatly in size, geography, and population, so it was determined that sub-county units would more accurately represent community use of primary health care services. Among the established small geographic boundaries, postal ZIP Code areas are the only ones that follow logical transportation and market patterns. ZIP Codes are also currently linked to a large amount of demographic, socioeconomic and health status information—including hospital utilization and market share data—that are continuously updated. In addition, most people know and recognize their ZIP Codes, and the ZIP Code areas in their community. Thus, they were the best choice to be the building blocks of our sub-county service areas. The Office of Rural Health, with the help of other state and local agencies, grouped all of Oregon's ZIP Codes into Oregon "Primary Care Service Areas" using the following criteria:

1. Health resources are generally located within 30 to 40 minutes travel time.

2. Defined areas are not smaller than a single ZIP code and ZIP codes used are geographically contiguous.

3. Defined areas contain a population of generally 800 to 1,000 or more people.

4. Areas constitute a "rational" medical trade or market area considering topography, social and political boundaries, and travel patterns. Additional considerations for service areas are boundaries that:

   a. Are congruent with any existing special taxing districts (e.g., health or hospital districts);

   and

   b. Include a population, which has a local perception that it constitutes a "community of need" for primary health care services, or demonstrates demographic, socioeconomic or ethnic homogeneity. The population should be large enough (800-1000 or more) to be financially capable of supporting at least a single midlevel health care provider.

There are 130 Oregon Primary Care Service Areas in all, 104 of which are rural, using the Office of Rural Health's definition—a geographic area 10 or more miles from the centroid of a city of 40,000 or more. These areas are updated annually, when necessary, according to changes in population and health utilization.

Six-page profiles for each of these rural service areas, and dozens of their demographic, socioeconomic, and healthcare variables are compiled in ORH's Primary Care Service Area Database, and are used in updating the 2016 edition of "Areas of Unmet Health Care Need in Rural Oregon." (www.ohsu.edu/xd/outreach/oregon-rural-health/data/health-care-shortage.cfm)

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1 Van Eck, Ethan; Bennett, Marge et. al. Strategic Plan for Primary Health Care in Rural Oregon, 1985-1990. September 30, 1985. (Available through the Office of Rural Health)
IV. METHODOLOGY

The Office of Rural Health has selected five different variables to represent crucial aspects of access to health services in rural areas:

1. Percentage of Primary Care Visits Met
2. Ambulatory Care Sensitive Conditions (ACSC) Ratio
3. Travel Time to Nearest Hospital
4. Comparative Mortality Ratio
5. Low Birth Weight Rate

Data specific to each service area are updated each year from the Oregon Center for Health Statistics, the Oregon Medical Board, the Oregon Rural Practitioner Tax Credit Database, Nielsen, INFOH Hospital Discharge Database, and Google Maps. Each variable is converted from a raw score, (e.g., percentage, rate or number) to a uniform score of 0 (worst) to 20 (best), using a method that measures incremental deviations from the mean (set at 10).

\[
\text{Deviations from mean to lowest score} = \frac{(\text{Mean} - \text{Lowest Score})}{10}
\]
\[
\text{Deviations from mean to highest score} = \frac{(\text{Highest Score} - \text{Mean})}{10}
\]

Each of the five variables (V) is equally weighted in calculating each service area's total Unmet Need Score, as follows:

\[V_1 + V_2 + V_3 + V_4 + V_5 = \text{Total Unmet Need Score}\]

The best possible Unmet Need Score is 100. The highest and lowest total scores are discarded and the mean is calculated. Service areas with totals below the mean Unmet Need Score are the most medically underserved. An explanation of each of the variables follows:

\[V_1 = \text{PERCENTAGE OF PRIMARY CARE VISITS MET:}\]

Most organizations that attempt to track practitioner availability simply use a straightforward physician to population ratio. However, this simple number does not take into account the different office visit rates of the various primary care specialties and the unique needs of a rural, and especially elderly population. The Percentage of Primary Care Visits Met takes both into account by comparing the estimate of the visits the local primary care practitioners are able to provide with the office visits needed by the specific service area population—a visits-provided-to-visits-needed ratio. In addition to primary care physicians (FP/GPs, internists, pediatricians, and OB/GYNs), nurse practitioners and physician assistants are also included in this equation as many of Oregon’s most rural areas are served exclusively by these midlevel providers.

a) For physicians, the number of visits provided (the estimated number of office visits a full-time practitioner typically sees each year) is the mean amount for each primary care specialty reported in the CDC survey: Characteristics of Office-Based Physicians and Their Practices, 2005 - 2006, minus the western adjustment. (Physicians in the west see 10.6% fewer office visits than the national
In 2010, the Oregon Medical Board started collecting direct patient care FTE data on their licensure forms, and ORH was able to utilize this annual survey to make the physician counts in this equation more accurate.

For both NPs and PAs, the visits provided is the average of the figures derived by CMS (Centers for Medicare and Medicaid Services) and a study done by the Idaho Rural Health Education Center—2550. Since 2008, only NPs and PAs who are currently receiving the Oregon Rural Provider Tax Credit are being counted. This ensures that only those midlevels that are actively working in rural locations are calculated in this variable. In the past, state licensing data was used, but only mailing addresses were recorded in the nursing licensure database, leading to skewed counts of people who received mail in one area but actually worked in another. It is believed that the Oregon Rural Provider Tax Credit database is the most accurate count of midlevels working in rural areas in the state of Oregon.

Visits provided by each specialty is multiplied by the number of these practitioners available in the service area, then these 5 specialty numbers are summed to derive the total visits provided.

<table>
<thead>
<tr>
<th>SPECIALTY</th>
<th>VISITS PROVIDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP/FP</td>
<td>2753</td>
</tr>
<tr>
<td>PEDS</td>
<td>2991</td>
</tr>
<tr>
<td>OB/GYN</td>
<td>2702</td>
</tr>
<tr>
<td>INT</td>
<td>2421</td>
</tr>
<tr>
<td>NP/PA</td>
<td>2550</td>
</tr>
</tbody>
</table>

Total Visits Provided = p_1(2753) + p_2(2991) + p_3(2702) + p_4(2421) + p_5(2550)

where:
- p_1 = FTE of FP/GPs
- p_2 = FTE of pediatricians
- p_3 = FTE of OB/GYNs
- p_4 = FTE of internists
- p_5 = # of NP/PAs

b) Primary Care Visits Needed by the population is a measure calculated using annually adjusted rates from the National Center for Health Statistics according to each gender and age breakdown:

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Total # of Primary Care Visits Needed = 0.8 x 
\(([(\text{Female Population 0-14}) \times 2.3] + \\
[(\text{Female Population 15-24}) \times 2.1] + \\
[(\text{Female Population 25-44}) \times 3.1] + \\
[(\text{Female Population 45-64}) \times 3.8] + \\
[(\text{Female Population 65-74}) \times 5.6] + \\
[(\text{Female Population 75+}) \times 6.6] + \\
[(\text{Male Population 0-14}) \times 2.5] + \\
[(\text{Male Population 15-24}) \times 1.2] + \\
[(\text{Male Population 25-44}) \times 1.5] + \\
[(\text{Male Population 45-64}) \times 2.9] + \\
[(\text{Male Population 65-74}) \times 5.1] + \\
[(\text{Male Population 75+}) \times 6.9])\)

c) Total visits provided is divided by the total number of primary care visits needed. The final variable is a percentage of need being met, using the following formula:

\[
V_1 = \frac{\text{Total Visits Provided}}{\text{Total # of Primary Care Visits Needed}}
\]

The mean (average) percentage of Primary Care Visits Met for all rural service areas in 2015 is 77.2% (compared to last year’s 75.6%). A V1 score of 0 means that there are no primary care providers in the service area. There are fifteen service areas where this applies (three more than last year—*indicates areas that are new):

1. Alsea
2. Applegate/Williams*
3. Blodgett-Eddyville
4. Cascade Locks
5. Clatskanie
6. Detroit
7. East Klamath
8. Glendale
9. Glide
10. Harrisburg*
11. Jordan Valley
12. Powers
13. Scio*
14. Swisshome/Triangle Lake
15. Yachats

The rural service areas that have the highest percentage of Primary Care Visits Met are:

95. Seaside 161.7%
96. Warm Springs 161.9%
97. Klamath Falls 164.2%
<table>
<thead>
<tr>
<th>Rank</th>
<th>City</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>98.</td>
<td>The Dalles</td>
<td>169.5%</td>
</tr>
<tr>
<td>99.</td>
<td>Roseburg</td>
<td>219.8%</td>
</tr>
<tr>
<td>100.</td>
<td>La Grande</td>
<td>227.1%</td>
</tr>
<tr>
<td>101.</td>
<td>Hood River</td>
<td>227.2%</td>
</tr>
<tr>
<td>102.</td>
<td>Gold Beach</td>
<td>232.7%</td>
</tr>
<tr>
<td>103.</td>
<td>Newport</td>
<td>242.1%</td>
</tr>
<tr>
<td>104.</td>
<td>Ontario</td>
<td>255.3%</td>
</tr>
</tbody>
</table>
2015 Oregon Rural Areas Below Rural Mean Primary Care Visits Met (77.2%)
V2 = AMBULATORY CARE SENSITIVE CONDITIONS (ACSC) RATIO:

Ambulatory care sensitive conditions (also known as preventable hospitalizations) are a set of inpatient diagnoses that may have been preventable or unnecessary had they been treated with timely and effective primary care. These include common conditions such as asthma, diabetes, hypertension, and pneumonia. Many studies have shown that high rates of admissions for these conditions can be indicative of serious access or primary care performance problems. Other studies have also shown that areas with high numbers of elderly and low-income residents, minorities, and the uninsured tend to have higher rates of preventable hospitalizations.

For this calculation, ORH utilized the widely-used list of (ICD-9-CM) ACSC diagnoses pioneered by John Billings. Three years’ worth (2012-2014) of Oregon inpatient discharges by ZIP Code were retrieved from INFOH and averaged for a per year number. This average per year number is divided by the current population of the service area and then multiplied by 1000 to give a rate per 1000 population. Comparing the ACSC admissions to the population as a whole highlights areas that also have unusually high inpatient admissions, and gives a wider and more meaningful range in rates. Each service area rate is then divided by the ACSC rate of Oregon to produce a ratio.

\[
\text{ACSC Rate} = \frac{\text{One Year Average ACSC Admissions}}{\text{Current Total Population}} \times 1000
\]

\[
V_2 = \frac{\text{ACSC Rate for Service Area}}{\text{ACSC Rate of Oregon}}
\]

An ACSC ratio less than “1.00” indicates that the area has a lower preventable hospitalization rate than the state as a whole; a value equal to "1.00" equals the state's rate; and a value greater than “1.00” indicates above average hospitalization for preventable conditions.

The mean Ambulatory Care Sensitive Conditions Ratio for rural service areas is 1.25, compared to 1.29 last year. The service areas with the largest ratios compared to the state are:

1. Warm Springs 3.32
2. Elgin 2.33
3. Reedsport 2.05
4. Powers 1.99
5. Coos Bay 1.96
6. Lakeview 1.91
7. Wallowa/Enterprise 1.89
8. Bandon 1.84


Billings, John; Zeitel, Lisa; et. al. Impact of Socioeconomic Status on Hospital Use In New York City. *Health Affairs* (Spring 1993): 162-173

9. Coquille/Myrtle Point 1.82
10. Seaside 1.80

The service areas with the lowest Ambulatory Care Sensitive Conditions ratios are:

95. Ashland 0.72
96. Hood River 0.69
97. Sisters 0.69
98. Irrigon 0.67
99. Nyssa 0.66
100. Brookings* 0.56
101. Hermiston 0.50
102. Boardman 0.20
103. Milton-Freewater 0.03
104. Jordan Valley** 0.00

*About 45% of Brookings inpatients go to Sutter Coast in Crescent City, California. Unfortunately, since we only have information for Oregon and Washington hospitals, these California hospitalizations are not included in the Brookings ACSC rate.

** Similarly, because of its proximity to Nampa, a number of hospitalizations from Jordan Valley occur in Idaho. Unfortunately, Idaho does not collect statewide hospital data, and these hospitalizations are not included Jordan Valley’s ACSC rate.
Ambulatory Care Sensitive Conditions (ACSC) Ratio to State (1.25)

2012 - 2014 Oregon Rural Areas Above Rural Mean

Darker color signifies worse conditions.

Sources:
--INFOH 2012-2014
--2016 Nielsen Population

Areas below Mean or Urban

Unmet Need Areas

NOT Unmet Need

ACSC Ratio to State

2.90...3.32
2.49...2.90
2.07...2.49
1.66...2.07
1.25...1.66

6/30/2016
V₃ = TRAVEL TIME TO NEAREST HOSPITAL:

This third variable is used to account for a service area’s remoteness or proximity from a comprehensive source of hospital care. A service area may appear to be underserved because of a low Primary Care Visits Met percentage, when, in fact, it is near a larger city or town that is able to meet some of its needs.

Estimated travel time is calculated from the largest town/city in each rural service area to the nearest town/city with a hospital, unless the city already has a hospital, in which case the driving time is defaulted to 10 minutes. Driving time and distance are calculated annually by using the online driving directions at Google Maps. To avoid fluctuations in traffic depending on when the site is accessed, the time without traffic is used.

The mean Travel Time to the Nearest Hospital for rural service areas is 23 minutes, which is a minute less than the 24 minute average of the previous 9 years. Many of the travel times in eastern and central Oregon dropped due to the increased highway speed limits that took effect on March 1, 2016. The following service areas had the longest drive times (in minutes):

1. North Lake 105
2. Fossil 79
3. Halfway 71
4. Jordan Valley 70
5. Condon 58
6. McKenzie/Blue River 56
7. Arlington 52
8. Oakridge 46
9. Maupin 42
10. Powers 41

Thirty-seven rural towns had a 10 minute travel time to the nearest hospital.
2016 Oregon Rural Areas Above Rural Mean Travel Time to Nearest Hospital (23 min)

Darker color signifies worse conditions.

Source: --Google Maps (Mar 2016)
**V₄ = COMPARATIVE MORTALITY RATIO:**

This variable compares the service area’s crude death rate (not adjusted for age or other factors) to the death rate for the entire state. This non-age-adjusted rate is a valuable measure because it reflects a number of unique qualities that may affect rural areas, e.g., a higher proportion of elderly, a greater number of laborers in dangerous occupations, lack of emergency medical transport systems, and disadvantaged ethnic populations. Three years’ worth of mortality data are used (2012-2014), and then averaged for one year in order to control for fluctuations that may occur annually with small numbers in some service areas.

\[
\text{Crude Death Rate} = \frac{\text{One Year Average Resident Deaths}}{\text{Current Population}} \times 1000
\]

\[V₄ = \frac{\text{Crude Death Rate for Service Area}}{\text{Crude Death Rate for State}}\]

A comparative mortality ratio less than “1.00” indicates that the area has a lower death rate than the state as a whole; a value equal to "1.00" equals the state's death rate; and a value greater than “1.00” indicates above average mortality.

The mean Comparative Mortality Ratio for rural service areas is 1.28, compared to 1.27 last year. The places with the highest 3-year average mortality ratios are:

1. Reedsport 2.15
2. Brookings 2.13
3. Florence 2.07
4. Yachats 2.06
5. Powers 1.91
6. Bandon 1.89
7. East Klamath 1.87
8. Nehalem 1.74
9. Canyonville 1.74
10. Rogue River 1.73

The places with the lowest mortality ratios are:

95. Vernonia 0.89
96. Sisters 0.88
97. Brownsville 0.88
98. Arlington 0.87
99. Woodburn 0.86
100. Wemme 0.83
101. Harrisburg 0.83
102. Hermiston 0.82
103. Detroit 0.77
104. Boardman 0.44
2012 - 2014 Oregon Rural Areas Above Rural Mean Comparative Mortality Ratio to State (1.28)

Mortality Ratio to State
- 1.97...2.15
- 1.80...1.97
- 1.62...1.80
- 1.45...1.62
- 1.28...1.45

Darker color signifies worse conditions.

Source:
-- OR Center for Health Statistics, OHA
-- 2016 Nielsen Population

www.ohsu.edu/xd/outreach/oregon-rural-health/data/health-care-shortage.cfm
\( V_5 = \text{LOW BIRTH WEIGHT RATE:} \)

In calculating the final variable, several different options were considered to reflect access to care for the most vulnerable populations. While infant mortality is a common choice in this category, problems arise when using this measure in a rural context because in many small communities, infant mortality is a very rare event, and a single instance could drastically skew a service area’s rate. Because this index relies on relativity for its validity, a more common event—low birth weight (<2500 grams or 5.5 pounds)—was chosen instead, and data is averaged from the last five years (2010-2014) to account further for small populations.

Low birth weight rates target a failure in the health care system and are highest for mothers who receive inadequate prenatal care. Low birth weight values can also be used to predict future demands on the health care (and social) systems of a community. Low birth weight infants:

- Account for nearly half of all infant deaths in the first year of life and 70% of all deaths in the first four weeks of life.
- Are significantly more likely to suffer from long term handicapping conditions such as mental retardation, cerebral palsy, visual and hearing defects and lung disease.
- Are more likely to have some form of learning disability.

\[
V_5 \text{ (Five-Year Average Low Birth Weight Rate) = } \left( \frac{\text{[1st Year Total Low Birth Weight Amount]}}{\text{[1st Year Total Births]}} + \frac{\text{[2nd Year Total Low Birth Weight Amount]}}{\text{[2nd Year Total Births]}} + \frac{\text{[3rd Year Total Low Birth Weight Amount]}}{\text{[3rd Year Total Births]}} + \frac{\text{[4th Year Total Low Birth Weight Amount]}}{\text{[4th Year Total Births]}} + \frac{\text{[5th Year Total Low Birth Weight Amount]}}{\text{[5th Year Total Births]}} \right) \times 1000
\]

The mean Low Birth Weight Rate for rural service areas is 63.8 per 1000 births, compared to last year’s average of 63.9. The places with the highest 5 year average rates are:

1. Fossil 127.3
2. Alsea 120.0
3. Chiloquin 111.1
4. Port Orford 104.7
5. Moro/Grass Valley 102.6
6. Warm Springs 97.5
7. East Klamath 97.0
8. Lakeview 93.1
9. Condon 93.0
10. Glide 92.6

The places with the lowest 5 year average Low Birth Weight Rates are:

95. Ashland 44.4

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96. Gold Beach  42.7
97. Canyonville  40.0
98. Brownsville  38.9
99. Mill City/Gates  35.1
100. Halfway  25.3
101. Sisters  17.0
102. Detroit  0.0
103. Cascade Locks  0.0
104. Jordan Valley  0.0
2010 - 2014 Oregon Rural Areas Above Rural Mean
Low Birthweight Rate
(63.8 per 1000 births)

Darker color signifies worse conditions.

Source:
---OR Center for Health Statistics, OHA
V. FINDINGS AND CONCLUSIONS

Oregon's rural service areas display a range of total Unmet Need Scores from 24 to 81 (out of 100), with a mean (average) of 52, after the highest and lowest scores are discarded. A score of 52 and less is considered to have unmet health care needs. Last year's numbers ranged from 26 to 81, and had a mean of 54.

Using this method, 53 of the 104 rural service areas have unmet healthcare needs. East Klamath (24), Port Orford (27), Powers (27), Drain/Yoncalla (30), Glendale (32), Yachats (32), and Alsea (33), all scored 33 and below. In contrast, perpetual high scorer Hood River had an 81, with Ashland (76), Hermiston (75), and Newberg (73), following closely behind. Vernonia, St Helens, and Detroit rose above the mean from their scores last year, while Bandon, Wemme, and Harrisburg fell below the mean and became Unmet Need areas.

Even the presence of a local hospital in places such as Reedsport, Coquille/Myrtle Point, Florence, and Bandon, does not keep the area from having unmet healthcare needs. Likewise, a place like Warm Springs always scores below the mean even though it has an abundance of primary care visits provided. These places still suffer from the negative health outcomes of high preventable hospitalizations, high mortality rates, and/or above average low birth weight rates.

Although many of these regions have also been designated by the federal government as either medically underserved (MUA/MUPs) or Health Professions Shortage Areas (HPSAs), the intent of this analysis is not to replace or challenge the federal designations, but rather to complement them using more in-depth measures that are uniquely sensitive to Oregon's rural health environment.

The Office of Rural Health, state agencies, legislators, and other advocates of rural healthcare will find this instrument a useful means to evaluate health care services in rural Oregon. Its greatest strengths lie in its sensitivity to small variations among rural service areas, and the ability to be updated annually, as new data become available. Further, the Primary Care Service Area database is linked to an in-house GIS system, which provides mapping capability for all of the various results, from the statewide to ZIP code levels. This makes it easier for the reader to visually comprehend and compare this complex data, furthering the cause of rural health in Oregon.
2016 Oregon Rural Unmet Healthcare Need
by Service Area

Only Scores of 52 and Below (in RED) are Unmet Need

75...81
70...74
64...69
58...63
53...57
47...52
41...46
35...40
30...34
24...29

Urban or Forest

3/27/2016
www.ohsu.edu/xd/outreach/oregon-rural-health/data/health-care-shortage.cfm
VI. NOTES

1. Physician licensure data: Oregon Medical Board, December 2015
2. Nurse practitioner and physician assistant data: Oregon Rural Physician Tax Credit Database, February 2016
3. Death data: Oregon Center for Health Statistics, 2012-2014
4. Low birth weight data: Oregon Center for Health Statistics, 2010-2014
5. 2016 ZIP Code population estimates: Nielsen
6. 2012-2014 Ambulatory Care Sensitive Conditions (ACSC) Hospitalizations: INFOH

Additional information, maps, scores, and full results of all the service areas are available at: http://www.ohsu.edu/xd/outreach/oregon-rural-health/data/health-care-shortage.cfm

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