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Travel burden and dentist bypass among dentally insured children.

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TRAVEL BURDEN AND DENTIST BYPASS AMONG DENTALLY INSURED CHILDREN

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ABSTRACT

Objectives: Using administrative data from Iowa Medicaid and a large private dental insurer, we compared distance to the nearest primary care dentist for children ages 6-15 in 2012. Additionally, we examined rates of provider bypass in both populations as an indicator of spatial accessibility to dental care.

Methods: We calculated measures of travel burden, including distance to the nearest primary care dentist and distance to current primary care dentist. Distance outcomes and rates of bypass, traveling beyond the nearest dentist for care, were compared by insurance type.

Results: We found that Medicaid-enrolled children lived farther from the nearest dentist and farther from their current dentist than privately insured children. However, rates of bypass were higher among the privately insured population. These results were consistent among urban and rural residents; additionally, both rural populations demonstrated greater travel distances than urban dwellers.

Conclusions: Travel burden was greater among Medicaid-enrolled children. Lower rates of bypass, in conjunction with lower rates of dental utilization in this population, may indicate a distance threshold beyond which dental care becomes unattainable.

Key Words: Access to dental care; Medicaid; Dental utilization; Travel distance; Bypass
INTRODUCTION

The proportion of U.S. children with dental benefits has shown steady improvement in recent years. In 2012, 13% of children ages 2-18 lacked dental benefits, improved from 22% in 2000 (1). These gains are primarily the result of more children from low income families receiving public dental benefits. Approximately 37% of U.S. children received their dental benefits through Medicaid or the Children’s Health Insurance Program (CHIP) in 2012 and another 50% had private dental benefits (1). Despite increased rates of coverage, publicly insured children are consistently less likely to utilize dental services than their privately insured counterparts. In 2009, 51% of privately insured children had a dental visit, compared to 36% of publicly insured children (2).

One of the main barriers to dental care for publicly insured children is limited dentist availability. A recent survey of state Medicaid programs found that difficulty finding a dental provider who accepted Medicaid insurance was the most frequently reported barrier for children seeking dental care (3). Another well-documented barrier for Medicaid-enrolled children is transportation to and from the dentist (3). Transportation difficulties are exacerbated by limited provider availability, often resulting in excessive travel distances to dentists’ offices (4). While transportation is a frequently reported barrier to dental care for Medicaid enrollees, very little research has evaluated the extent of travel burden in this population and its effect on dental utilization.

These barriers to dental care – dentist availability and geographic accessibility – represent two dimensions of spatial accessibility (5). Availability encompasses the local provider options from which potential patients can choose, while accessibility is measured in terms of travel cost – either distance or time (5). Previous studies of spatial accessibility of dental care have largely focused on the dimension of provider availability, incorporating various measures of local dentist
supply such as dentist-to-population ratios or dental Health Professional Shortage Area
designations (6,7). The purpose of this study is to evaluate aspects of geographic accessibility of
dental care.

Distance to the nearest provider has been recommended as one measure of geographic
accessibility (5) and is increasingly used in oral health services research (8,9). One advantage of
this measure is that it can be applied to an entire study population, including individuals with and
without a dental visit. However, distance to the nearest dentist may not accurately reflect
accessibility in a population with provider-related barriers to care.

One indicator of how well distance to the nearest provider describes geographic
accessibility for a given population is the prevalence of provider bypass, or how frequently
patients travel beyond the nearest provider to a more distant source of care. The goal of this
study is to examine geographic accessibility to dental care by comparing travel burden of
publicly and privately insured children. Measures of travel burden include distance to the nearest
primary care dentist and distance to the current primary care dentist, which are used to calculate
rates of dentist bypass. Given the reported transportation barriers among Medicaid-enrolled
children (3,4), we hypothesized that travel burden among this population would be greater than
among privately insured children and that low Medicaid participation among dentists (3) would
result in higher rates of provider bypass.

METHODS

Data & Study Population

We analyzed enrollment and dental claims data from Delta Dental of Iowa (DDIA), the
state’s largest private dental insurer, and Iowa Medicaid for calendar year 2012. The study
population included children ages 6 through 15 years old insured by DDIA and Iowa Medicaid
during 2012. DDIA and Medicaid dental services are reimbursed fee-for-service. Children were required to have been enrolled in either program for at least 11 months during the year, which is consistent with quality measurement requirements from the Centers for Medicare and Medicaid for continuous enrollment (10). The study population was limited to children under age 16 in order to exclude those individuals with a driver’s license, thereby limiting our analyses to children who rely on a parent or guardian for transportation to the dentist. We also excluded children under age 6. Previous research has demonstrated that a substantial proportion of dentists restrict their acceptance of young children (11); we wanted to reduce the possibility that age represented the major barrier to receiving dental care.

**Study Questions**

This study addressed the following research questions:

1. Among all children in the study population, how does mean distance to the nearest primary care dentist differ by insurance type? We hypothesized that mean distance would be significantly greater for Medicaid-enrolled children.

2. Among children with a primary care dental visit, how does mean difference in distance between the current and nearest primary care dentist differ by insurance type and by urbanicity? We hypothesized that mean distance difference would be significantly greater for Medicaid-enrolled children and rural residents.

3. Among children with a primary care dental visit, how do rates of dentist bypass differ by insurance type and by urbanicity? We hypothesized that the rate of bypass would be significantly greater for Medicaid-enrolled children and for urban residents.
Outcomes & Covariates

Distance Measures

Two main distance measures were calculated: distance to the nearest primary care dentist for each child in the study population and distance to the current primary care dentist for each child with a qualifying dental visit. Our initial outcome of interest was distance to the nearest primary care dentist, including general and pediatric dentists in private practice. Information about dental providers was extracted from DDIA and Medicaid claims submitted during the study period; unique providers were identified by license number. Federally Qualified Health Center (FQHC) dental clinics (n=17) in Iowa and other safety-net dental clinics (e.g., non-FQHC Community Health Centers and the University of Iowa College of Dentistry) (n=4) were excluded from this evaluation. However, only 7% of Medicaid-enrolled children in the study population (n=7,430) and less than 1% of DDIA enrollees (n=213) received dental care from an Iowa FQHC dental clinic during 2012.

For children enrolled in DDIA, the population of potential primary care dentists included dentists who submitted at least 1 claim to DDIA on behalf of children ages 6 through 15 during 2012. For Medicaid enrollees, the population of potential primary care dentists included dentists who submitted at least 1 claim to Iowa Medicaid on behalf of children ages 6 through 15 during 2012.

As a second outcome of interest, we estimated distance to the current dentist among children with a visit to a primary care dentist during 2012. For children with multiple providers, we selected the dentist with whom they had the most visits; in cases with ties among multiple providers, the nearest of these providers was selected.
Geocoding and Distance Calculations

Address data were cleaned prior to geocoding by removing incomplete and post office box addresses. Children with post office box addresses were excluded from this analysis since prior research has found significant discrepancies between actual street address and post office box location (12). Geocoding was carried out in multiple steps; locations were initially geocoded using an address locator created in ArcMap (v10.3, ESRI, Redlands, CA, USA) using the “North American Detailed Streets” dataset maintained by ESRI. Addresses incorrectly located or not located after this process were determined using a combination of ESRI geocoding Application Programming Interface (API) and Google Maps geocoding API. Addresses that could not be geocoded to the street address were assigned to residential street segments (as a proxy for city block) where possible. Any remaining locations with errors in geocoding were omitted from the dataset. Approximately 91% of Medicaid member addresses and 96% of DDIA member addresses were successfully geocoded; 100% of dentists’ addresses were successfully geocoded.

Straight-line (i.e., Euclidean) distance was calculated from each child to primary care dentist using corresponding latitude and longitude coordinates. Straight-line distance was used rather than road network travel times due to computational processing limitations. However, straight-line distance has been shown to be highly correlated with travel times (13).

Dentist Bypass

We defined bypass as occurring when a child traveled more than 0.25 miles beyond nearest provider to receive primary dental care (i.e. difference between distances to the current provider and the nearest provider > 0.25 miles). This distance threshold was used to account for spatial variability in the geocoding process. Since 97% of residential street segments in the dataset were less than 0.25 miles in length, incorporating a distance threshold minimizes the risk
of misclassification bias. The distance threshold also allows for patient selection among multiple providers located within a small area, where differences in travel distance are negligible and may not be readily discernible by travelers. This situation is expected to occur more commonly in urban areas than rural areas, where multiple providers are often located within close proximity to residents (5). In addition to the 0.25 miles distance threshold, we conducted a sensitivity analysis to assess how changes in this variable would affect estimates of dentist bypass, using additional thresholds of 0.50, 0.75, and 1.00 mile.

In rural areas where provider options are limited, bypass results in greater travel costs to patients who must travel farther beyond the nearest provider. To assess geographic variation in dentist bypass, we compared distance outcomes and rates of bypass among dental utilizers living in urban and rural areas of the state. Urbanicity was categorized using zip code-based 2010 Rural Urban Commuting Area (RUCA) codes (14). RUCA codes were categorized as urban or rural using Categorization C from the University of Washington Rural Health Research Center (15).

Other Covariates

Demographic variables included age (member age in years, as of 12/31/2012) and sex. Race information was not available for children insured by DDIA and therefore excluded from analysis.

Statistical Analysis

Bivariate analyses (Chi-square test and t-tests) compared relationships between demographic characteristics, distance outcomes, and rates of bypass between DDIA and Medicaid enrolled children. A significance level of 0.05 was initially set for all hypothesis testing, but results showed that all bivariate comparisons were statistically significant at $P < 0.0001$. Due to the large sample size (N=171,734), we were concerned about identifying
statistically significant but inconsequential relationships due to deflated $P$-values (16).

Recommendations for the analysis of large datasets suggest including confidence intervals for mean values, which become more precise as sample size increases (16). In reporting our results, we have therefore included 95% confidence intervals for distance outcomes and emphasized direction and magnitude of the differences between our comparison groups. Analyses were conducted using SPSS Statistics (v22, IBM, Armonk, NY, USA). This study was approved by the University of Iowa Institutional Review Board.

RESULTS

Our study population included 171,734 children with dental benefits through DDIA and Medicaid (Table 1). Medicaid-enrolled children were slightly younger and more likely to live in rural areas of the state than DDIA enrollees. Over twice as many primary care dentists in private practice provided services to DDIA children than provided services to Medicaid children (1,206 vs. 591, respectively); however, dentist workforces for these two populations included similar proportions of general and pediatric dentists. We were not able to accurately examine overlap between Medicaid and DDIA dentists due to differences in claims structure. Primary care dental utilization was substantially higher in the DDIA population; 81.8% of DDIA-enrolled children received care from a primary care dentist in private practice in 2012, compared to 34.4% of Medicaid-enrolled children.

Distance Measures

Children enrolled in Medicaid lived slightly farther away from the nearest primary care provider than children enrolled in DDIA (2.68 miles vs. 2.20 miles, respectively) (Table 1). Among Medicaid enrollees, distance to the nearest provider ranged up to 32.10 miles; among DDIA enrollees, maximum distance to the nearest provider was 19.26 miles. Among Medicaid enrollees, mean distance to the nearest provider was slightly lower for children with a primary
care dental visit (mean = 2.54 miles; 95% CI = 2.49, 2.58) than children without a visit (mean = 2.75 miles; 95% CI = 2.82, 2.78). DDIA enrollees showed a similar pattern, with dental utilizers (mean = 2.18; 95% CI = 2.16, 2.20) slightly closer to the nearest dentist than non-utilizers (mean = 2.31; 95% CI = 2.25, 2.36).

Among children with a dental visit (Table 2), mean distances to the current primary care dentist and the nearest primary care dentist were greater for Medicaid-enrolled children than for DDIA children. Similarly, mean difference in distance between the current and nearest dentist was greater for Medicaid-enrolled children. On average, children enrolled in Medicaid with a dental visit travelled 8.62 miles farther than the nearest dentist to receive dental care, compared with a mean distance difference of 5.93 miles for DDIA enrollees.

**Dentist Bypass**

The rate of dentist bypass was slightly higher in the DDIA-enrolled population than the Medicaid population; 78.1% of DDIA enrollees bypassed the nearest primary care provider, compared to 74.5% of Medicaid enrollees (Table 2). This relationship remained consistent for all distance thresholds used in the sensitivity analysis.

Distance outcomes showed similar trends when we compared children with a dental visit by residential urbanicity. Medicaid-enrolled children living in urban and rural areas had greater mean distances to current and nearest providers and greater mean distance differences than their DDIA-enrolled counterparts (Table 3). Among DDIA enrollees, children living in urban areas of the state were more likely to have had a dental visit than those in rural areas (83.5% vs. 78.6%, respectively) (Table 3). Medicaid-enrolled children showed the opposite association: Medicaid-enrolled children living in rural areas were more likely to have had a dental visit than those living in urban areas. Dentist bypass was less prevalent in rural areas than in urban areas for both
the DDIA and Medicaid populations. However, DDIA-enrolled children showed higher rates of bypass in both urban and rural areas compared to Medicaid enrollees.

DISCUSSION

This study makes several substantial contributions to our understanding of geographic barriers to dental care. To our knowledge, it is the first to evaluate travel burden in a large population, and compare distance outcomes between Medicaid-enrolled children and a privately insured population. One previous study examining dentist bypass among Medicaid-enrolled children was limited by small sample size (n=48) and lack of a comparison group (9).

Additionally, this study provides the first estimates of dentist bypass rates in the U.S. Empirical studies of hospital bypass in the U.S. have found rates of approximately 30% (17,18), with higher rates for specialty services such as surgical care (19) and inpatient mental health services (20). Overall, the rate of dentist bypass among our entire study population was 76.8%. The relatively high rate of dentist bypass, compared with rates of hospital bypass, likely reflects the greater number of local dentist choices compared to hospital choices.

Higher rates of dentist bypass may also be related to different factors than for other health care services. Previous research has found that relatively few patients seriously consider an alternative hospital for surgical procedures; individuals either go to the nearest hospital or defer to their physician’s preferences (21). Hospital choice is also driven by need, with severely ill patients often willing to drive further for care (17). Limited research has examined factors affecting how patients choose a dentist. There is some evidence that convenient office locations are prioritized but are less important than personal characteristics of the dentist (e.g., interpersonal skills) (22,23).
Privately insured children were included in the current study to provide a baseline comparison with publicly insured children. While the rate of dental utilization among this Medicaid population is similar to national rates for publicly insured children in 2009 (34.4% vs. 36.1%, respectively), dental utilization among the DDIA population was much higher than national estimates for privately insured children (81.8% vs. 51.4%, respectively) (2).

Previous research has found higher rates of provider bypass and greater travel burdens among health disparity populations (24). These are hypothesized to be related to racial and economic segregation and provider-sided barriers. Parents of Medicaid-enrolled children in Iowa have reported difficulties finding a dentist who accepts Medicaid and reported travel distances of 60 miles or more, with appointment wait times of 5 to 6 months (4).

Given these well-documented provider-sided barriers, we hypothesized that rates of dentist bypass would be higher among the Medicaid population, based on the assumption that bypass would increase if local dentists limited the number of new Medicaid patients they accept or if appointment wait times were excessive. In 2013, 72% of dentists in Iowa who accepted Medicaid restricted the number of new Medicaid enrollees that they accept as patients (25).

Among dentists who did not accept new Medicaid patients, low reimbursement rates were reported to be the most important problem with Medicaid, followed by broken appointments and denial of payment by Medicaid (25). Nationally, low reimbursement rates, outreach and case management, and administrative processing are major barriers to dentist participation in state Medicaid programs (3).

Overall, our findings demonstrate that Medicaid-enrolled children live farther from the nearest dentist and drive farther to reach their current dentist, compared to privately insured children. We were unable to examine how many non-participating providers these children also
bypassed in order to reach their treating dentist. Given the small number of Medicaid providers relative to DDIA providers, increased travel distance is to be expected. Counter to our original hypothesis, we found that rates of dentist bypass were lower among the Medicaid population. However, these lower rates of bypass are best considered together with the lower rate of dental utilization in the Medicaid population relative to the DDIA population (34.4% vs. 81.8%, respectively). If local dentists limit acceptance of new Medicaid patients, parents and guardians of Medicaid-enrolled children may decide not to seek care rather than accept the additional travel costs incurred by bypass. In this context, higher rates of bypass in the privately insured population may be the product of families who have the resources required to travel further distances in order to see the dentist of their choice. One recent review found that the ability and tendency to choose from among multiple health care providers is positively associated with family income, overall health, and ability to travel (21).

The lower rates of bypass seen in both the Medicaid and DDIA rural populations, compared with their urban counterparts, also support the concept of a travel burden threshold. In rural areas with limited dentist availability, the next nearest provider may be so distant that bypass becomes impracticable. When we examined the distribution of Medicaid providers relative to each other, urban dentists were approximately 0.5 miles from each other, on average. However, rural providers were approximately 8 miles from each other, with maximum distances over 20 miles.

**Strengths and Limitations**

One strength of this study is that it considered travel distances without regard for geopolitical boundaries within the state (e.g., counties). We did limit our analyses to providers within Iowa and therefore could not examine the extent of travel across state borders. This may
also lead to underestimated dental utilization rates for populations in border regions. Additionally, children were excluded from the study population if they had a post office box address. However, previous research has found significant discrepancies between actual street addresses and post office box locations, with differences often exceeding 100 miles; removing these individuals from the analysis limited the potential for information bias (12).

All of the reported bivariate comparisons demonstrated statistical significance with \( p < .0001 \). While this is partially a function of the large sample size, the magnitude and consistent direction of outcomes indicate meaningful differences between the Medicaid and DDIA populations. Despite the potential for deflated \( p \)-values, the data used in this analysis are free from many of potential sources of bias associated with “big data”, including minimized potential for misclassification of bypass (26, 27).

In 2010, there were approximately 402,000 children aged 5 through 15 in Iowa (28). Our study population included 43% of children in this age group; including children with less than 11 months of insurance coverage during 2012, approximately 59% of Iowans in this age group had dental benefits through either Iowa Medicaid or Delta Dental of Iowa. Our findings are representative of the majority of children in Iowa, and potentially generalizable to insured children in other states.

For this study, we examined only general and pediatric dentists in private practice as potential sources of care for the study population. FQHCs and non-FQHC dental clinics were excluded due to the high volume of preventive outreach services that these organizations provide to low income children in Iowa. Outreach services almost exclusively include examinations and topical fluoride application and Iowa Medicaid data do not include information about which FQHC services were provided on-site and which were provided via outreach activities. We
excluded this source of limited dental care since it does not represent access to comprehensive dental care and could have resulted in overestimates of dental utilization in certain locations. The University of Iowa College of Dentistry and Dental Clinics (UI COD) were excluded from the evaluation due to its wide geographic service area; previous research has found that children who received dental care at academic institutions had frequently bypassed closer providers (9). Children from across the state receive care at the UI COD and a large proportion of them are likely to have bypassed their own local dental service areas in order to be seen at the University.

In order to assess the potential for bias due to excluding FQHCs and other safety-net clinics as potential nearest providers, we compared safety-net clinic locations with private practice locations by zip code. Medicaid and DDIA private practitioners were each found in 17 of the 21 zip codes where safety-net dental clinics were located. This overlap between safety-net and private practice locations limits potential bias in measuring distance to the nearest provider for both populations. However, by limiting this analysis to private practice dentists, the utilization rate reported for the study population – especially Medicaid-enrolled children – is slightly underestimated.

Finally, we do not have information about how families get to their dental appointments. A larger proportion of Medicaid members’ families may lack their own means of transportation and be dependent on public transportation. If so, then distance to the dentist may be compounded by this additional transportation burden. Additional research should examine modes of transportation in the Medicaid population and how this affects dental utilization.

Conclusions

Previous research has included distance to the nearest dentist as a measure of workforce accessibility (8,9). However, our finding that nearly 77% of children with a dental visit bypassed
the nearest provider indicates that this measure may not adequately describe local potential access to dental care. Evaluating geographic accessibility to dental care should include additional measures of local workforce supply.

While bypass was lower in Medicaid-enrolled children compared to privately insured children, so was the overall rate of dental utilization. Provider bypass may be the result of separate decision-making processes for Medicaid and privately insured children. Future research evaluating travel patterns at an individual level could help identify distance thresholds, beyond which the probability of utilization decreases for publicly insured children. Additionally, evaluation of travel patterns in other states with different levels of Medicaid participation by dentists could be compared with our findings to see whether this affects rates of provider bypass.

ACKNOWLEDGMENTS

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REFERENCES


16. Lin M, Lucas HC, Shmueli G. Too big to fail: Large samples and the \( p \)-value problem. 


Table 1. Demographic characteristics and distance to the nearest primary care dentist among the study population (N=171,734) †

<table>
<thead>
<tr>
<th></th>
<th>DDIA</th>
<th>Medicaid</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>73,734 (42.9)</td>
<td>98,000 (57.1)</td>
</tr>
<tr>
<td>Female (%)</td>
<td>48.3</td>
<td>48.5</td>
</tr>
<tr>
<td>Age (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-8 years</td>
<td>27.4</td>
<td>35.3</td>
</tr>
<tr>
<td>9-11</td>
<td>29.8</td>
<td>30.1</td>
</tr>
<tr>
<td>12-15</td>
<td>42.8</td>
<td>34.6</td>
</tr>
<tr>
<td>Rural residency (%)</td>
<td>34.8</td>
<td>43.8</td>
</tr>
<tr>
<td>Primary care dentists (N)</td>
<td>1,206</td>
<td>591</td>
</tr>
<tr>
<td>General dentists (%)</td>
<td>96.3</td>
<td>96.1</td>
</tr>
<tr>
<td>Pediatric dentists (%)</td>
<td>3.7</td>
<td>3.9</td>
</tr>
<tr>
<td>Dental office locations (N)</td>
<td>820</td>
<td>541</td>
</tr>
<tr>
<td>Primary care dental utilization (%)</td>
<td>81.8</td>
<td>34.4</td>
</tr>
<tr>
<td>Distance Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance to nearest PCD (miles)</td>
<td>2.20 (2.18, 2.22)</td>
<td>2.68 (2.65, 2.70)</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval; DDIA = Delta Dental of Iowa; PCD = Primary Care Dentist.

†All bivariate comparisons between DDIA and Medicaid in Table 1 were significantly different at p<.0001.
Table 2. Demographic characteristics, distance measures, and bypass rates among children with a primary care dental visit (N=94,068)

<table>
<thead>
<tr>
<th></th>
<th>DDIA</th>
<th>Medicaid</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>60,329 (64.1)</td>
<td>33,739 (35.9)</td>
</tr>
<tr>
<td>Female (%)</td>
<td>48.4</td>
<td>49.6</td>
</tr>
<tr>
<td>Age (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-8 years</td>
<td>28.1</td>
<td>37.2</td>
</tr>
<tr>
<td>9-11</td>
<td>30.1</td>
<td>30.3</td>
</tr>
<tr>
<td>12-15</td>
<td>41.8</td>
<td>32.5</td>
</tr>
<tr>
<td>Rural residency (%)</td>
<td>33.5</td>
<td>47.2</td>
</tr>
<tr>
<td><strong>Distance Measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance to current PCD (miles)</td>
<td>8.11 (8.00, 8.22)</td>
<td>11.15 (10.94, 11.36)</td>
</tr>
<tr>
<td>Distance to nearest PCD (miles)</td>
<td>2.18 (2.16, 2.18)</td>
<td>2.54 (2.50, 2.58)</td>
</tr>
<tr>
<td>Distance difference (Current – Nearest)</td>
<td>5.93 (5.83, 6.03)</td>
<td>8.62 (8.22, 9.02)</td>
</tr>
<tr>
<td><strong>Bypass Rate (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travelled &gt; .25 mile beyond nearest PCD</td>
<td>78.1</td>
<td>74.5</td>
</tr>
<tr>
<td>Travelled &gt; .50 mile</td>
<td>72.8</td>
<td>69.0</td>
</tr>
<tr>
<td>Travelled &gt; .75 mile</td>
<td>68.1</td>
<td>64.9</td>
</tr>
<tr>
<td>Travelled &gt; 1.00 mile</td>
<td>64.1</td>
<td>61.9</td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval; DDIA = Delta Dental of Iowa; PCD = Primary Care Dentist.  
†All bivariate comparisons between DDIA and Medicaid in Table 1 were significantly different at p<.0001.
Table 3. Comparison of distance outcomes and rates of bypass among urban and rural children with a primary care dental visit (N=94,068)

<table>
<thead>
<tr>
<th></th>
<th>DDIA</th>
<th>Medicaid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td><strong>Total (n)</strong></td>
<td>40,113</td>
<td>20,203</td>
</tr>
<tr>
<td>Primary care dental utilization (%)</td>
<td>83.5</td>
<td>78.6</td>
</tr>
<tr>
<td><strong>Distance Measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance to current PCD (miles)</td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
</tr>
<tr>
<td></td>
<td>6.51 (6.40, 6.62)</td>
<td>11.29 (11.06, 11.52)</td>
</tr>
<tr>
<td>Distance to nearest PCD (miles)</td>
<td>1.62 (1.60, 1.58)</td>
<td>3.28 (3.17, 3.39)</td>
</tr>
<tr>
<td>Distance difference (Current – Nearest)</td>
<td>4.89 (4.78, 5.00)</td>
<td>8.01 (7.79, 8.23)</td>
</tr>
<tr>
<td><strong>Bypass Rate (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travelled &gt; .25 miles beyond nearest PCD</td>
<td>85.2</td>
<td>64.1</td>
</tr>
</tbody>
</table>

*Note.* CI = confidence interval; DDIA = Delta Dental of Iowa; PCD = Primary Care Dentist.