Health Service Use in the Winnipeg Regional Health Authority: *Variations Across Areas in Relation to Health and Socioeconomic Status*

by Norman Frohlich, Randy Fransoo and Noralou Roos

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Abstract

The use of healthcare services in Winnipeg is examined to determine whether groups who appear to have a higher need for medical care actually get more care. Despite universal coverage, considerable variation in service use rates exists. Most of the basic healthcare services are provided in accordance with need as measured by premature mortality rates. Nevertheless, visits to specialist physicians, a variety of high profile procedures, and screening and preventative services appear not to be provided in accordance with need.

Résumé

Le recours aux services de santé à Winnipeg (Canada) a été analysé pour dégager si les groupes qui semblent avoir un besoin plus prononcé de soins médicaux bénéficient en réalité de plus de soins. En dépit du régime d'accès universel aux soins de santé gratuits, on a relevé des variations importantes au niveau des taux d'utilisation des services. La plupart des soins de santé élémentaire sont fournis en fonction des besoins, selon les taux de mortalité prématurée. En revanche, les visites aux spécialistes, certaines interventions très médiatisées et les services prophylactiques ne semblent pas être dispensées selon cette mesure du besoin.

Introduction

Canadian provinces, which fund health services centrally, have been moving toward the establishment of regional health authorities[1,2,3] which serve populations of diverse backgrounds. Implementation of regionalization has been proceeding for a number of years, and there is an emerging issue of the extent to which regional authorities are serving different segments of their populations equitably. A recent study in Ontario argues that healthcare services are being delivered according to need, as represented by self-reported health status in the National Population Health Survey.[4] However, the data are restricted to individuals aged 40 to 79, and the individuals are not identified with geographic areas.

Recently, we authored a study of health service use in the city of Winnipeg,[5] which is provided with healthcare services by the Winnipeg Regional Health Authority (WRHA). Because the city is socioeconomically diverse, it offers a microcosm that can be used to study how socioeconomic factors can affect the provision of different healthcare services, even when access is guaranteed by a central authority. By combining administrative, census, and mortality data, our analysis revealed a complex picture of health service utilization. This paper highlights some of our main findings and underlines the importance of providing not only sociodemographic, but also geographically-based analyses as a means of understanding how well the delivery system is working, and where fine tuning may be necessary.

One of the underlying principles of healthcare in Canada is that it be delivered according to patients' needs. Birch et al.[1] argue that the allocation of healthcare resources based on relative need for care involves two different elements: equity and efficiency. It is a question of equity that those suffering poorer health receive more treatment. But there is also a question of efficiency involved when one talks about allocating care on the basis of need. A very sick person may be able to benefit less from a given treatment than someone in slightly better health. So, efficiency and equity can conflict. In general, we know little about the effectiveness of specific healthcare interventions on different groups in a population. To know this we would require information about each group's capacity to benefit, and about the relative efficiency of various treatment alternatives (particularly if non-healthcare alternatives are considered).

Given these considerations, defining "need" is at best problematic. However, following Birch et al.[1], the concept of relative distribution is central; we can ask the question: "Do those groups in poorer health receive more care than those

groups in better health?" While such standards for need do not directly address the question of effectiveness, the evidence is strong that those in poor health have more conditions for which healthcare can offer prevention, relief from pain, a supportive environment, and palliation of symptoms.

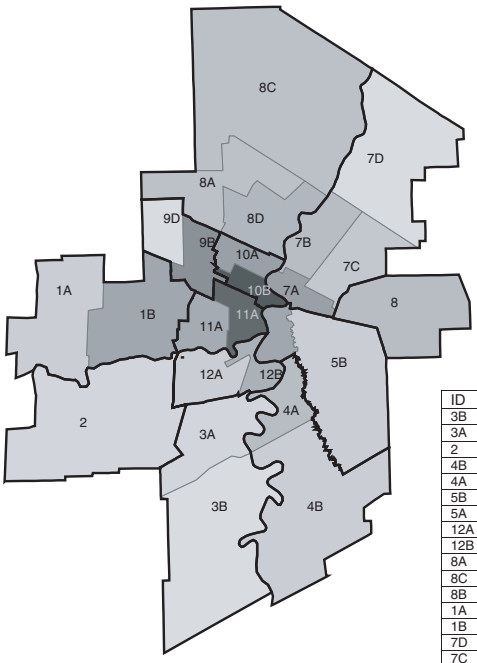
The problem is, there is no universally accepted way to measure the need for healthcare. However, there is one measure that has emerged from population health research which has gained general acceptance as a useful indicator of need: the Premature Mortality Rate.[2,6,7] We use the premature mortality rate as our surrogate measure of health status, and hence, as an indirect measure of need for healthcare services. This measure is easily calculated from administrative data, providing accurate information for the entire population, without need for additional data sources not available comprehensively (eg. that needed to calculate quality adjusted life expectancy). Premature mortality rates were calculated using all deaths recorded in the province's Vital Statistics files, with denominators created from MCHP's population registry files.

Figure 1 shows the geographical division of Winnipeg into the 12 Community Areas (CA's) and the 25 Neighbourhood Clusters (NC's) used by the WRHA. The darkness of the shading represents the level of the Premature Mortality Rate (PMR) for each neighbourhood. Though strictly a mortality measure, the premature mortality rate is highly correlated with morbidity indicators (measures of 'sickness' rather than death).[1,2] So areas where populations have higher premature mortality rates tend to report poorer general health status, more chronic diseases, and more sickness.

In addition to using PMR as a measure of health status, the Manitoba Centre for Health Policy has developed a composite measure of socioeconomic risk: the Socio-Economic Factor Index (SEFI)†. The index is derived by the use of factor analysis to combine data from the Canadian Census, including education levels, unemployment rates, and family characteristics. High values correspond to areas that have higher levels of unemployment, lower levels of education, higher levels of single parent families, and low female workforce participation. Low (and negative) values indicate better socioeconomic status. A consistently strong, positive relationship between socioeconomic status and health status has been demonstrated around the world, including in Canada: those with poorer socioeconomic status generally have poorer health.[8,9,10,11] In Winnipeg,

† For a full description please see:
http://www.umanitoba.ca/academic/centres/mchp/concept/dict/sefi.html.

Figure 1: Winnipeg's 12 Community Areas (lines) and 25 Neighbourhoods (shaded)



ID	Neighbourhood	PMR	SE
3B	Fort Garry S	2.15	0.12
3A	Fort Garry N	2.43	0.14
2	Assiniboine S	2.41	0.12
4B	St. Vital South	2.60	0.15
4A	St Vital North	3.14	0.15
5B	St. Boniface E	2.59	0.13
5A	St. Boniface W	3.65	0.22
12A	River Heights W	2.70	0.12
12B	River Heights E	3.50	0.19
8A	Seven Oaks W	2.97	0.20
8C	Seven Oaks N	3.03	0.48
8B	Seven Oaks E	3.31	0.14
1A	St. J– Assin W	2.56	0.12
1B	St. J - Assin E	3.91	0.16
7D	River East N	2.33	0.30
7C	River East E	2.84	0.16
7B	River East W	3.09	0.12
7A	River East S	4.20	0.23
6	Transcona	3.26	0.15
9A	Inkster West	2.23	0.21
9B	Inkster East	4.76	0.27
11A	Downtown W	3.73	0.15
11B	Downtown E	6.11	0.20
10A	Pt Douglas N	4.11	0.18
10B	Pt Douglas S	6.85	0.33

areas such as the inner core with high premature mortality tended to have poor socioeconomic status, while the suburbs, which have low premature mortality (good health), tended to score well on the socioeconomic indicators. So when we refer to neighbourhoods' premature mortality rates, there is a strong indication that those rates also indicate the relative socioeconomic status of residents, on average.

Using the premature mortality rate as a measure, it is clear that the WRHA provides healthcare services to areas in which the health status of the residents are very different. The premature mortality rates for residents of the 12 communities varies by more than a factor of two, from the healthiest (Fort Garry) to the least healthy (Point Douglas). But even within some of the communities there are major differences in premature mortality rates. Sub-dividing the 12 communities into the 25 neighbourhoods allows one to identify distinct areas with very different rates of premature mortality, and different utilization rates of various healthcare services. The most dramatic example of the insight gained by the sub-division of communities is in Inkster. That community, having the third highest premature mortality rate among the 12, is divided into two

neighbourhoods: Inkster East and West. Inkster East has the third *highest* premature mortality rate among the 25 neighbourhoods (4.76), while Inkster West has the second *lowest* rate (2.23). They are obviously populated by individuals with very different characteristics. These differences emphasize the importance of finding geographical areas of appropriate homogeneity if one wishes to understand whether services are being delivered according to the health needs of area residents. Moreover, the neighbourhood levels seem be relatively homogeneous regarding the standard errors of our PMR measure. The average standard error is .19 which is only 5.6 % of the mean neighbourhood PMR. The neighbourhood with the highest standard error is Seven Oaks North (.48) which is roughly 16% of the neighbourhood's mean rate. The standard errors of only two other neighbourhoods [(River East N (.3) and Inkster West (.21)] are more than 7% of their respective mean PMR rates. Accordingly, we use the 25 Neighbourhood Clusters (NCs) as the units of analysis.

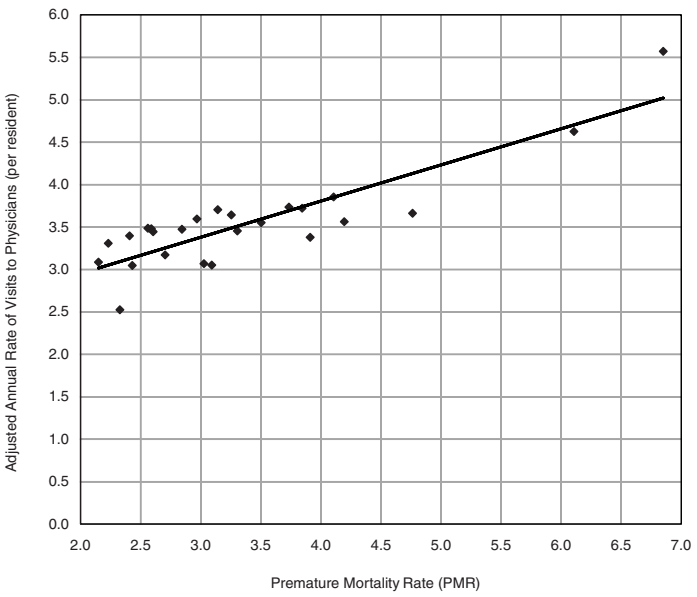
If premature mortality is a reasonable measure of health status and a proxy for the need for healthcare services, one would hope and expect that more healthcare would be delivered to areas with the least healthy residents, and that residents of healthier areas would use fewer health services. Below, we examine the relationship between PMR and the rates of use of various services. In all of our analyses we use Spearman's rank order correlation coefficients to assess how strongly rates of use are related to premature mortality rates. We chose this non-parametric test primarily because premature mortality rates are not normally distributed. All service use rates are age and sex adjusted so that comparisons across different neighbourhoods are not influenced by the age and sex structure of the local population.

Physician Services

A visit to a physician often represents the entry point to the healthcare system. It frequently leads to follow-up visits, diagnostic tests, consultations with specialists or surgeons, or hospitalization. Figure 2 shows the relationships between premature mortality rates and visits to physicians. These visit rates include virtually all contacts with physicians, except services provided to patients while in hospital.† As with all of our population-based indicators, we focus on the use of services according to where the patients live, not where the services are provided.

Figure 2 clearly shows that visits to GP/FPs are strongly correlated to premature mortality rates. The visit rates also vary considerably: from 2.53 visits per year among

Figure 2: Visits to GP/FPs vs Premature Mortality



residents of River East North, to 5.57 for residents of Point Douglas South – more than double the lowest rate. Thus residents from areas with less healthy populations, on average, tend to make more visits to primary care physicians. The Spearman's correlation coefficient for the relationship is 0.74 which is significant at the 0.0001 level and indicates a strong relationship between this measure of need and visits to GP/FPs. While the two least healthy neighbourhoods appear to make significantly more visits than the trend from the other neighbourhoods would seem to imply, these high visit rates are consistent with residents' markedly poorer health status (the correlation is still significant if these two neighbourhoods are excluded).

The picture is quite different, however, when one looks at visits to specialist physicians.‡ Figure 3 shows that there is considerable variation in visit rates to specialists, but no consistent relationship with premature mortality rates. River Heights West, one of the healthier neighbourhoods, has the highest rate of visits (1.79), while Point Douglas South, the least healthy, has the second lowest (1.24). The correlation is low (Spearman's r =0.20, p=0.338). One would have expected an increasing gradient in utilization which parallels the poorer health status shown in PMR or SEFI values. Since no such relationship is found, this means that specialist

† Our calculations include visits to physician offices, home hospital outpatient clinics, and emergency room visits. The Manitoba Health physician claims data contain Emergency Room claims for the two large teaching hospitals only, which together provide approximately 50% of all Winnipeg ER visits. The missing ER visits (from the community hospitals) comprise approximately 4% of all physician visits, thus would not significantly affect the patterns seen.

‡ Specialists include all physicians reimbursed by Manitoba Health as practising in a field other than General or Family Practice. Therefore, all Paediatricians, Internists and Surgeons are included as 'Specialists.'

Figure 3: Visits to Specialists vs Premature Mortality

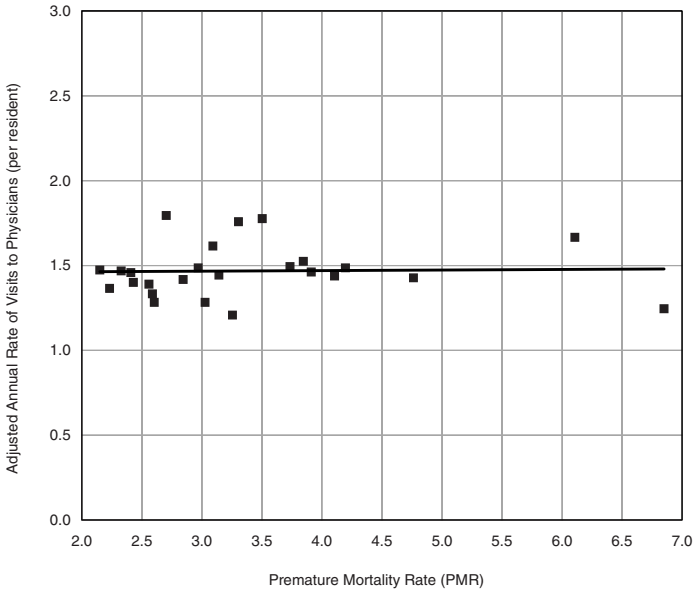
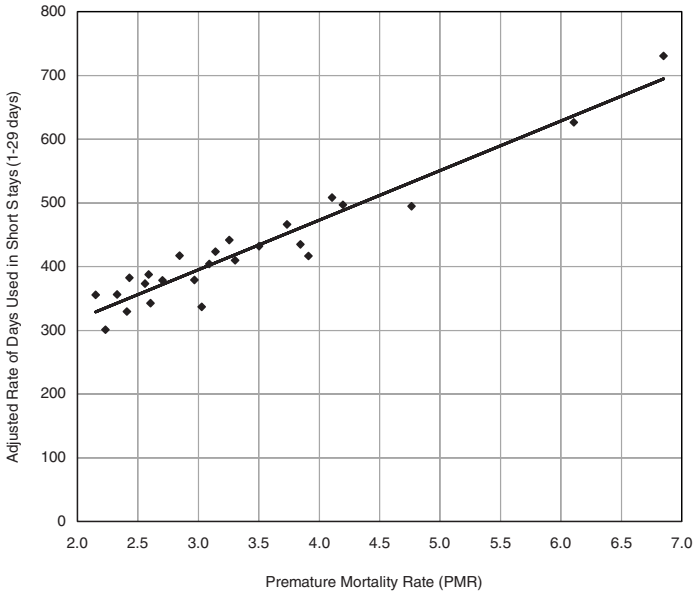


Figure 4: Hospital Days for Short Stay vs Premature Mortality



visits, unlike visits to general and family practitioners, are not well targeted to residents of areas where health status is poorer. This result is consistent with findings of Dunlop et al.[12]

Hospital Services

Hospital services constitute another core component of healthcare. There are a number of common indicators of hospital service use: separations (including both inpatient use and outpatient surgery), days used, and breakdowns of days and separations into either short or long stays.

Short stays are typically associated with episodes of acute illness, while long stays often involve chronic conditions or patients waiting to be placed in alternative care facilities. The former offers a picture of the healthcare system's response to acute episodes of ill health, and as such, provides insight into immediate responsiveness. Figure 4 shows the days of care used in short stays (less than 30 days) versus premature mortality. There is a wide range in the rates of days used, from the lowest (Inkster West, 301 days per 1000 residents) to the highest (Point Douglas South, 730 days per 1000). This variation of roughly 140% forms a relatively smooth gradient, reflecting the strong relationship between this measure of need and the use of hospital resources (r = 0.89).

An analysis of the other indicators reveal similar strong positive relationships between the use of hospital resources and premature mortality rates. The correlations, all significant (p<.001), are: total separations: 0.83, short stay separations: 0.84, long stay separations: 0.65, total days: 0.78, short stay days: 0.89, and long stay days: 0.64.

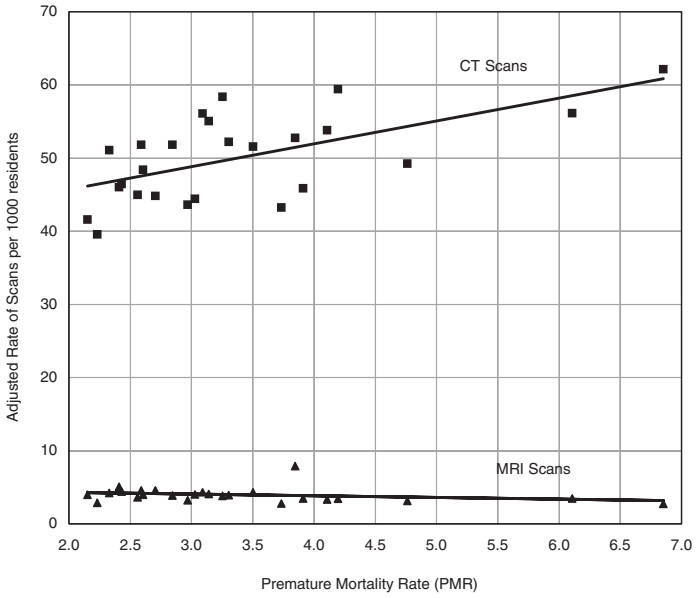
Diagnostic Imaging

Diagnostic imaging is an important component of healthcare services, providing information on a variety of conditions and thereby the route to subsequent treatments. Magnetic Resonance Imaging (MRI) is one of the few types of health service which operates according to an appropriateness protocol. This kind of protocol has been shown to result in more appropriate use of the MRI facility than use that is not protocol-based.[12] The protocol requires a referral by a specialist physician (only neurological, neurosurgical or orthopaedic specialists can refer). In contrast, any physician can order a Computerized Tomography (CT) Scan, and there are no explicit indications regarding appropriateness of use. There is also an important difference in supply; CT scanners are much more common than MRI facilities.

Figure 5 shows the rates for CT scans by neighbourhood. Rates vary from 39.5 per 1000 residents in Inkster West to 62.5 in Point Douglas South. There is a significant positive relationship between the rate of CT scans and the premature mortality rate (r = 0.61, p =.001), so service is being provided, to some degree, in accordance with this indicator of need.

Figure 5 also contains data on the use of Magnetic Resonance Imaging (MRI) scans. (There was only one MRI facility in the province until October 1998, so results cover the five-year period ending on March 31,

Figure 5: CT and MRI Scans vs Premature Mortality



1998.) The lowest MRI scan rate occurs among residents of Point Douglas South, the least healthy neighbourhood. Overall, there is a negative relationship with premature mortality: the areas with lower premature mortality rates have higher MRI scan rates (r = -0.45, p= .024). This is contrary to the results from the CT scans, and is counter to what would be expected if premature mortality connotes need. So the use of the two procedures follow opposite patterns in relation to PMR.

One possible explanation for this was alluded to earlier. Residents of less healthy areas do not have the higher visit rates to specialists one might expect. MRI scans cannot be ordered or performed by GP/FPs; only specialists can order them. Perhaps, therefore, it is not surprising that the relationship between MRI scan rates and premature mortality rates is not positive. However, that would not explain why the relationship is strong in the opposite direction, with the residents from healthier areas having higher use of MRIs.

These data suggest that while the appropriateness protocols may be a very effective method of targeting available capacity† to the indications most likely to benefit from a given procedure, the results of such screening need to be understood and evaluated at the population level. That is, appropriateness protocols can only be applied to those patients who "walk in the door." If residents of certain areas, for whatever reason, are less likely to be referred to or to contact specialists, their intervention rates will be lower. If these areas contain some of the least healthy residents, then health authorities need to think seriously about changing the pattern of specialist care delivery in these high need areas.

The obvious outlier in Figure 5 is St. Boniface West, which contains St. Boniface General Hospital (where the MRI facility was located). It has an MRI scan rate that is roughly double the Winnipeg average. It is impossible to know exactly why this anomaly exists, but potential explanations include geographical proximity, which increases the chances of nearby residents being called to use a cancelled appointment, as well as local physician practice patterns.

High Profile Procedures, Screening and Preventative Services

At the other end of the spectrum from basic health services lie a number of high profile procedures which have attracted significant public attention in Canada due to their perceived high level of impact on well being and their apparently limited availability. Table 1 sets out the relationships between premature mortality rates at the neighbourhood level and rates of various high profile procedures. These include 5-year rates of cardiac catheterization, angioplasty, coronary artery bypass surgery, hip replacement, knee replacement and cataract surgery (1998/99 only). Again, one would expect to see a positive relationship between these rates and PMR. Contrary to that expectation, no significant relationship appears between rates of any of these procedures and PMR.

Table 1: Correlations with Premature Mortality Rates

Spearman's correlation coefficients (r) and their statistical significance levels (p)		
	r	**p**
SEFI (Socio-Economic Factor Index)	0.90	0.000
Cardiac Catheterizations (5 yr average)	-0.15	0.472
Angioplasty (5 yr)	-0.26	0.205
Bypass Surgery (5 yr)	-0.07	0.734
Cataract Surgery (1 yr)	0.24	0.244
Hip Replacement (5 yr)	0.05	0.804
Knee Replacement (5 yr)	-0.13	0.524
Immunizations for 2 year olds (3 yr)	-0.60	0.002
Cervical Cancer Screen (3 yr)	-0.55	0.005
Breast Cancer Screen (2 yr)	-0.65	0.000

Even more problematic, we find rates of some screening and preventive services to be inversely related to premature mortality. There is a strong negative relationship between PMR and immunization rates for 2-year olds, as well as screening rates for cervical and

† Canada generally has a much lower rate of MRI use than the United States. Manitoba is no exception: in 1991 the MRI rates were approximately one fifth that of the state of Michigan.[13,14] In the years reported here Manitoba was still operating with one MRI machine. More recently, a second machine has been added.

breast cancer. Generally, the less healthy the neighbourhood, the less likely their residents are to take advantage of these services (our data do not indicate whether they were offered these services or not; only whether they used them).

Conclusions

It appears that the basic health services including general practitioner visits and hospitalization are being provided in accordance with need as measured by our best indicator of population health status: premature mortality rate. But visits to specialist physicians show no such pattern. In addition, a variety of high profile and screening and preventative services appear not to be provided in accordance with need as indicated by premature mortality rates. Despite the universal availability of the full range of services in the Manitoba single-payer system (without co-payment of any kind) there may still remain some significant impediments to appropriate usage. Healthcare providers, both in Winnipeg and other socioeconomically diverse jurisdictions, should consider mechanisms for identifying and targeting segments of the population that may have been marginalized either due to poor health status or low socioeconomic status.

We have noted above that premature mortality is highly correlated with our measure of socioeconomic risk (SEFI). It may be that some attributes of lower socioeconomic status, in addition to engendering poor health, act to impede access to those areas of the healthcare system which are more complex to access. Perhaps those at the lower end of the socioeconomic scale have less information about available services, different attitudes towards medical care, lower expectations of the success of procedures, are less assertive in demanding them, have difficulty communicating with their primary care physician, or experience different patterns of referral from them. These and other factors may contribute to their getting fewer referrals from primary physicians to specialists, who are, in turn, the gatekeepers to the higher-end procedures and services. Or it may be that higher mobility among the poor creates discontinuity of service, which reduces their access to physicians who understand the complexities of their medical conditions. The low level of use of screening and preventative services is somewhat more puzzling. We have shown previously that some women appear not to be offered cervical screening, even though they made regular office visits,[15] and that others were over-tested. Providing feedback to physicians on the screening and preventive service needs of their patients may be useful.

It appears that some impediments exist even in a system which removes virtually all direct monetary costs of treatment. This geographic/socioeconomic analysis reveals the existence of *some* underlying problems, although it cannot identify what they are. Future analyses might use multi-level models to try to distinguish between individual and area-level effects to inform policy makers. They may wish to examine the underlying causes of anomalies such as these with an eye to how they might bring the full range of services closer in alignment with the healthcare needs of all segments of the population.

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