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Community Well-being: A Comparable Communities Analysis

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Introduction

The purpose of this chapter is to develop a better understanding of the gaps in well-being between First Nation and non-Aboriginal communities throughout Canada. The primary concern of the research is to determine the degree to which the size and location of a community affects its inhabitants' levels of well-being. Well-being is assessed through the Community Well-being Index (CWB), developed by researchers at Indian and Northern Affairs Canada (INAC) to measure the social and economic well-being in Canadian First Nations communities (see Chapter 7). Given that the CWB is a composite indicator, it combines several facets of community well-being into a single index. The analysis uses this CWB and its constituent components (income, education, housing, and labour force activity) as outcome or dependent variables to assess First Nations and non-Aboriginal communities.

The comparison of well-being is accomplished utilizing the Matching Communities 2001 analysis (Maxim and White, 2005) created by of The University of Western Ontario. The analysis provides a pairwise comparison between each First Nation and a matched non-Aboriginal community. This approach provides controls for differences in the type of community (INAC classification), locality, and population size.

For the past several years, INAC's Strategic Research and Analysis Directorate has been researching well-being in First Nations communities. Among other things, the directorate has produced the Community Well-being Index (CWB), which was discussed extensively in Chapter 6. The index uses Census data to assign a well-being score to all Canadian communities,[1] allowing the comparison of reserves[2] to other Canadian communities across time. Initial analyses of the CWB revealed that reserves had lower well-being than other Canadian communities in 2001 (McHardy and O'Sullivan, 2004), but that the gap had narrowed since 1991 (O'Sullivan and McHardy, 2004).

These findings, at first glance, suggest that there is something *about* reserves that inhibits well-being. This is not necessarily the case, however. The relationship between well-being and reserve status may be a spurious one. Reserves tend to have much smaller populations than non-reserves. The average reserve has approximately 500 persons. Larger communities are few and very rarely reach

more than 5,000 persons. Reserves are also located disproportionately in remote or Northern areas where access to commodity, labour, and consumer markets is limited. It may be these factors, and not characteristics intrinsic to reserves, behind the lower levels of well-being observed in reserve communities.

To assess this possibility, we paired a selection of reserves with non-reserve communities that are "comparable" on the basis of location and population size, effectively "controlling" for these factors. We then compared the disparity in well-being (CWB) between reserves and all non-reserve communities to the disparity between reserves and their "comparable" non-reserve matches. A significantly smaller disparity between the matched communities would indicate that the lower levels of well-being observed in reserve communities were at least somewhat attributable to their location and population size. No disparity between the matched communities would indicate that being a reserve had absolutely no bearing on a community's well-being.

The Community Well-being Index (CWB)

As discussed in Chapter 6, the CWB is a composite index which includes four facets of well-being including education, labor force activity, income, and housing. Education is measured by the proportion of the population who have grade 9 or higher and the proportion of the population who have achieved at least a high school education. Labour force activity is measured by labour force participation and the employed proportion of the total labour force. Housing is measured by the proportion of the population living in dwellings with no more than one person per room and the proportion of the population reporting that their dwellings did not need major repairs. Finally, income is measured as income per capita.

Cooke (2005) developed a conceptual critique of the CWB index. After assessing the key dimensions of well-being that are included in the CWB, the sources of data and their availability and comparability over time, the sensitivity of the indicators to change, and the weights and scaling assigned to the components in the index calculations, he concluded that the CWB compares favourably to other indices and that "the CWB promises to be a useful indicator of the well-being in Aboriginal communities, and as other composite indices have done, it promises to make a positive contribution to Canadian policy research" (see Chapter 2 in this volume for more discussion).

Creating the Matching Communities

Given that reserves have special circumstances or conditions, any comparison of their characteristics with those of other Canadian communities has reduced validity. The primary aim of this study is to examine the degree to which the lower than average levels of well-being in reserve communities are a function of the size and location of those communities. To do this, we selected a matched sample of non-reserve communities based on proximity and population size.

The list of matching communities was generated in a four-stage process. First, we measured the direct line distance between each reserve[3] community and every non-reserve community in Canada. This distance was then standardized.[4] Second, we recorded and standardized each community's population size. Third, we used a mathematical algorithm to match each reserve with proximate non-reserves of similar population size.[5] We chose the following algorithm, which is based on the mean absolute euclidean distance across the variables for the two communities in question:

$$D = \frac{\sum w_j |\tilde{z}_j - z_j|}{J}$$

Here, D is the distance coefficient between two communities; z~ is the standard score or z-value for the jth variable of a First Nations CSD; z is the standard score or z-value for the jth variable of a non First Nations CSD; w is a weight attached to the jth variable; and, J is the number of variables under consideration. The FN refers to First Nation so this is a short form for the CSDs (as defined in note 3) that make up the reserve or first nation communities. We created the files for the FN communities by manually looking at each CSD that could have potentially made up the community. We then created the communities using the CSD data (or CSDs) .

Finally, from the eight closest matches, we selected the best match based on direct examination. Using this method, we were able to create 495 reserve/non-reserve pairs.[6]

Analysing Disparities Between Reserves and Comparable Communities

First, we measured the disparity in CWB (and its four components) means between reserves[7] and all other Canadian communities. Second, we compared those disparities to those measured between reserves and the 495 similar non-reserves with which they were paired. We also compared the differences in CWB means between reserves and their non-reserve pairs within four gross geographical categories: Urban, Rural, Remote, and Special Access. Details on each of these geographic zones, which are defined and assigned by INAC (2001),[8] are as follows:

- Zone 1 (Urban): A geographic zone where the First Nation is located within 50 km of the nearest service centre with year-round road access.
- Zone 2 (Rural): A geographic zone where the First Nation is located between 50 and 350 km from the nearest service centre with year-round road access.
- Zone 3 (Remote): A geographic zone where the First Nation is located over 350 km from the nearest service centre with year-round road access.
- Zone 4 (Special Access): A geographic zone where the First Nation has

Table 8.1: Comparison of Non-reserve and Reserve Communities

Variable	Non-reserve	Reserve	Difference	S.E. Difference
CWB Score	0.806	0.650	0.156	0.005
Income	0.727	0.499	0.228	0.006
Education	0.760	0.692	0.068	0.006
Housing	0.927	0.712	0.215	0.007
Labour Force Activity	0.808	0.696	0.112	0.005

Note: N=495 for reserve communities; N=4181 for non-reserve communities. All differences are statistically significant at p<.01

Table 8.2: Comparison of Matched Reserve and Non-reserve Communities

Variable	Non-reserve	Reserve	Difference	S.E. Difference
CWB Score	0.805	0.650	0.155	0.005
Income	0.721	0.499	0.222	0.007
Education	0.788	0.692	0.096	0.007
Housing	0.893	0.712	0.181	0.007
Labour Force Activity	0.820	0.696	0.124	0.006

Note: N=495 matches. All differences are statistically significant at p<.01

no year-round road access to a service centre and, as a result, experiences a higher cost of transportation.

Results

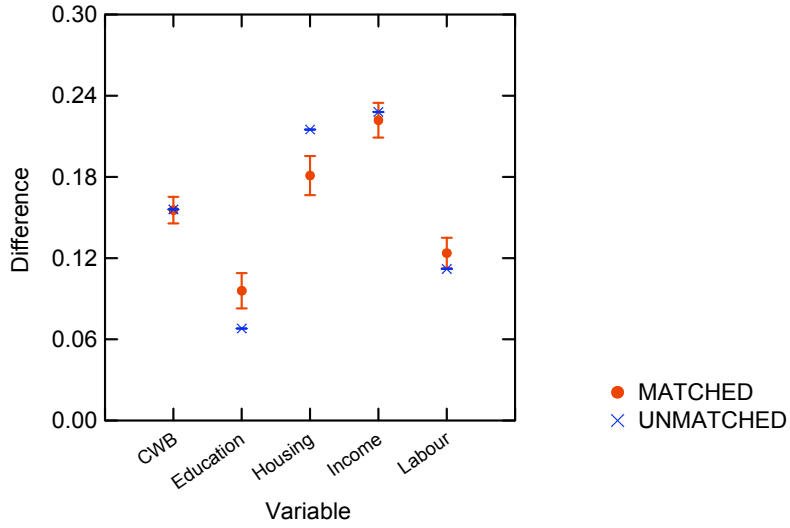
Reserve vs. Non-reserve Communities

In the unmatched analyses, where all reserves were compared with all other Canadian communities, reserves scored lower on the CWB index and its components. Based on the data presented in **Table 8.1**, the average CWB score for the 495 reserves included in this study was about 19% lower than the average score for other communities (.650 versus .806). For income, education, housing, and labour force activity, the differences were approximately 31%, 9%, 23%, and 14% respectively, all in favour of the non-reserve communities. These values provide a baseline against which the subsequent analyses can be compared.

Matched Communities

Table 8.2 presents the results of the matched pairs analysis of the CWB index and its components. Overall, the disparities between reserves and their matched non-reserve communities differ little from those derived from the comparison of all reserves to all non-reserve communities. The results are presented graphically in **Figure 8.1**.

Figure 8.1: Matched vs. Unmatched Community Comparisons



In **Figure 8.1**, the vertical lines represent the results of the matched analyses of the CWB and each of its four components (**Table 8.2** data). Specifically, the lines define the 95% confidence intervals around the difference between the average scores for reserves and the average scores for their non-reserve matches. Each of the lines shares its vertical plane with an H. These Hs represent the results of the unmatched analysis drawn from **Table 8.1**. Where the H falls above the vertical line, we may say that the gap between reserves and non-reserves decreased significantly when we controlled for community location and population size. Where the H falls below the vertical line, we may say that the gap increased significantly when we controlled for community location and population size.

Only the unmatched values for housing and education fell outside the confidence boundaries generated by their respective matched analyses. The unmatched disparity in housing conditions fell about two points (on the 100-point scale) above the upper boundary of the matched confidence interval. This suggests that on the housing sub-index, there is a small tendency toward convergence in the quality of housing when communities are matched on the basis of location and size. Undoubtedly, part of this convergence is due to the greater homogeneity of housing stock in remote areas.

The unmatched disparity in education, on the other hand, fell about two points below the lower boundary of the matched confidence interval. Again, this is not too surprising since more remote Aboriginal communities often suffer a "talent drain" while smaller and more remote non-Aboriginal communities are often "talent magnets." This latter situation is particularly the case for resource-based communities where the demand for highly trained engineers and technicians is great.

Table 8.3: Comparison of Matched Non-reserve and Reserve Communities by Zone

Variable	Non-reserve	Reserve	Difference	Standard Error Difference
Community Well-being				
Zone 1 (Urban)	0.832	0.706	0.126	0.009
Zone 2 (Rural)	0.800	0.640	0.160	0.007
Zone 3 (Remote)	0.745	0.639	0.106	0.022
Zone 4 (Special Access)	0.782	0.583	0.199	0.015
Income				
Zone 1 (Urban)	0.742	0.550	0.192	0.012
Zone 2 (Rural)	0.716	0.468	0.248	0.009
Zone 3 (Remote)	0.660	0.549	0.111	0.034
Zone 4 (Special Access)	0.707	0.480	0.227	0.016
Education				
Zone 1 (Urban)	0.827	0.769	0.058	0.010
Zone 2 (Rural)	0.768	0.702	0.066	0.010
Zone 3 (Remote)	0.735	0.576	0.159	0.043
Zone 4 (Special Access)	0.770	0.537	0.233	0.018
Housing				
Zone 1 (Urban)	0.933	0.782	0.151	0.012
Zone 2 (Rural)	0.900	0.704	0.196	0.011
Zone 3 (Remote)	0.843	0.713	0.130	0.026
Zone 4 (Special Access)	0.821	0.626	0.195	0.027
Labour Force				
Zone 1 (Urban)	0.825	0.721	0.104	0.011
Zone 2 (Rural)	0.817	0.686	0.131	0.009
Zone 3 (Remote)	0.741	0.716	0.025	0.042
Zone 4 (Special Access)	0.832	0.687	0.145	0.015

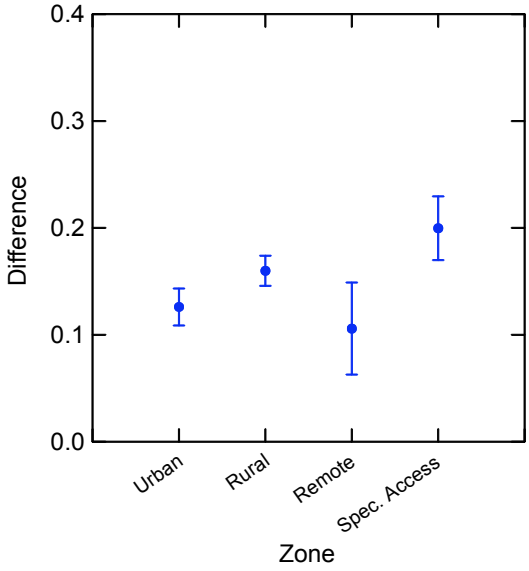
No statistically significant difference was observed between the matched and unmatched analyses of either the income or labour force activity sub indices, or for the overall CWB index.[9]

Stratifying by Geography

The previous analysis suggests that, even when population size and proximity are controlled, there is no systematic convergence in measured well-being between reserves and non-reserve communities.

Another question that might be asked, however, is whether there are variations in discrepancy between reserves and matched non-reserve communities when gross geography is considered. One might hypothesize, for example, that matched pairs in remote areas are more similar than those in less remote areas.

Figure 8.2: CWB Differences by Zone



We addressed this question by using the broad, four-category zonal differentiation described earlier. Our results for the CWB and each of its components, broken down by geographic zone, are presented in **Table 8.3**.

The first block in **Table 8.3** presents the results for the CWB. As previously demonstrated in McHardy and O'Sullivan (2004), reserves in and near urban areas had the highest scores, while reserves in the Special Access zone had the lowest scores. The scores calculated for reserves in Zones 2 and 3 fell between these two extremes. Our matched community analysis demonstrates that the relative well-being of reserves and their non-reserve matches were distributed in the same way: the disparity between reserves and their non-reserve matches increased with isolation.

The fact that reserves in Zone 3 had higher scores than reserves in the less remote Zone 2 is somewhat counterintuitive. This anomaly notwithstanding,[10] however, these results indicate that isolation adversely impacts both reserves and non-reserves, but that the effect on reserves is more pronounced. **Figure 8.2** provides 95% confidence intervals for the differences between the two types of communities provided in **Table 8.3**. It demonstrates that the likely disparity in CWB scores between reserves and their non-reserve matches in Zone 1, for example, fell between about 0.11 and 0.14.

The remaining blocks in **Table 8.3** display the distribution of income, education, housing, and labour force participation respectively by geographical zone. Confidence intervals for those results are presented in **Figures 8.3** through **8.6** (pages 180–181. As might be expected with a large number of comparisons, some

Figure 8.3: Income Differences by Zone

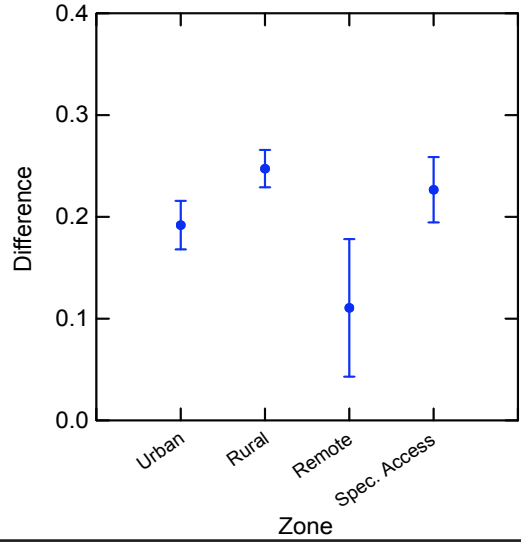
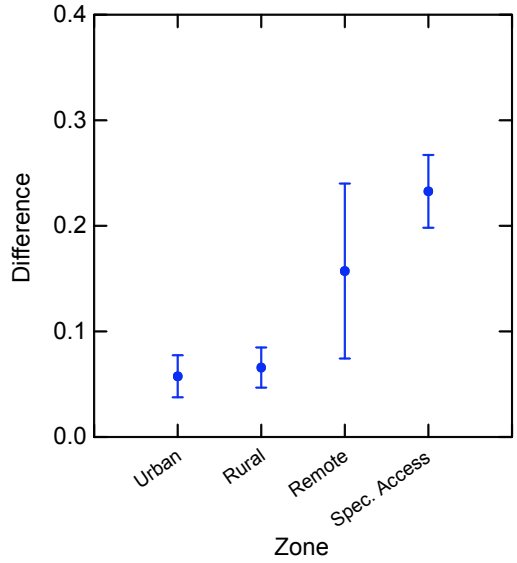


Figure 8.4: Education Differences by Zone



deviations from an overall pattern exist. Generally speaking, though, the results were similar to those calculated for the CWB index. Reserves in Zone 4 tended to have the lowest scores while reserves proximal to urban areas had the highest scores. Scores for reserves in Zones 2 and 3 generally fell between those calculated for reserves in Zones 1 and 4. In most cases, the average score for the 11 reserves in Zone 3 were higher than that of the 200 reserves in Zone 2. The disparity between reserves and non-reserves tends

Figure 8.5: Housing Differences by Zone

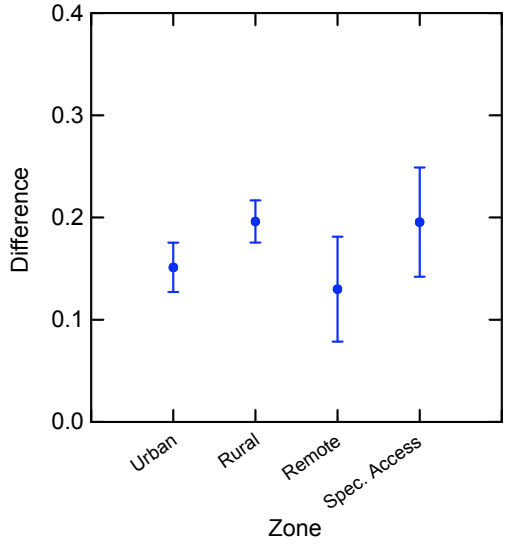
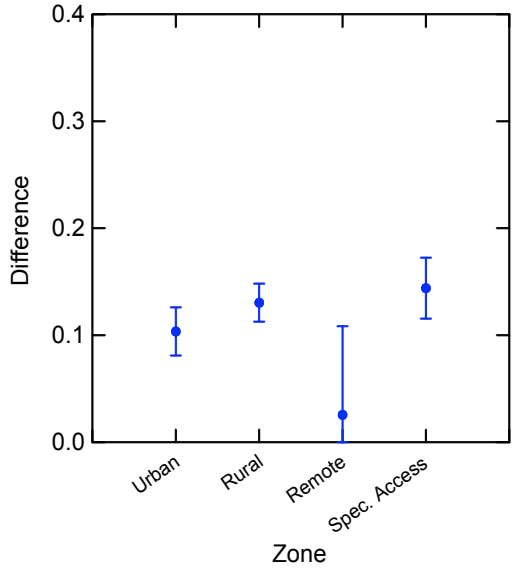


Figure 8.6: Labour Differences by Zone



to follow the same pattern. The Zones, ranked from smallest to largest in terms of the reserve/non-reserve disparities therein, are as follows: Zone 1 (Urban), Zone 3 (Remote), Zone 2 (Rural), and Zone 4 (Special Access). Again, the preponderance of reserves in Zone 3 over those in Zone 2 notwithstanding, isolation appears to have a negative effect on well-being in both types of communities, but impacts on reserves more strongly.

Conclusion

The impetus behind this analysis was to ascertain whether the negative relationship between reserve status and community well-being reported by McHardy and O'Sullivan (2004) was spurious. That is, were the lower levels of well-being found on-reserve attributable to the fact that more reserves are remotely situated and sparsely populated, rather than to the fact that they are reserves per se? Overall, our matched analyses, which controlled for differences in location and population size between reserves and non-reserves, produced similar results to analyses that did not control for these factors. Evidently, there is something about reserves, apart from their isolation and small size, that has inhibited their ability to achieve levels of well-being akin to those observed in other Canadian communities. The list of possible factors is virtually endless. Perhaps community well-being on reserves was adversely affected by the legal limitations on reserve land transfer. Perhaps the cultural and social impacts of colonial rule were significant.

We did, however, identify an interaction effect between gross geography and reserve status. Specifically, it seems that the well-being of reserves, both in absolute terms and relative to non-reserves, decreases as isolation increases. Based on the overall CWB scale, as well as on its components, it is evident that reserves near urban areas are more similar to non-reserve communities than those in difficult to access parts of the country. There are some inconsistencies in our findings, however, indicating a need for further research in this area. Of particular interest in this regard are those reserve communities in the Remote (Zone 3) band that often show far more similarity with their matched counterparts than do reserves in other parts of the country.

Endnotes

1 Excluded from analyses were communities with fewer than 65 inhabitants, communities with data quality issues, and communities which did not participate in the Census.

2 INAC's list of reserves, which the designers of the CWB termed "First Nations communities," differed slightly from ours. They categorized both legal and non-legal reserves as First Nations communities, as this definition corresponds to that used by INAC and Statistics Canada to retrieve "on-reserve" figures from the Census of Canada. For reasons that will be expounded later, we chose to categorize non-legal reserves as "other Canadian communities" or non-reserves.

3 As indicated earlier, the original CWB analysis conducted by McHardy and O'Sullivan categorized a selection of non-legal reserves as First Nations, or reserve, communities. These communities are uniformly northern and can be of any type. INAC, interested in tracking the progress of communities with informal affiliations with First Nations bands or large Registered Indian populations, classifies non-legal reserves as such on a case-by-case basis. As McHardy and O'Sullivan were interested in how well-being in First Nations compares to that in other communities, their inclusive approach was appropriate. We, however, were interested in whether the causes for the disparity are inherent to First Nations or incidental. As such, it was necessary for us to adopt the stricter definition of reserve. With a few exceptions, legal reserves share the distinction of being governed by the *Indian Act* (a piece of legislation with unique provisions and correspondingly unique effects) or specific self-government agreements. We should also note that the terminology used to refer to reserve communities varies in the literature, and that particular attention should always be paid to how reserves/First Nations/Aboriginal communities, etc. are defined in a given study.

4 All measures were converted to z-scores in order to provide for a common metric across all variables. One cannot reasonably compare measures based on kilometres or miles with size of population.

5 We should note that this method allows a non-reserve community to be selected as a match for more than one reserve community. Statistically, this is known as sampling with replacement and generally provides better parameter estimates (Maxim, 1999). In addition, we weighted the two variables, giving population more influence than geography.

6 It is important to emphasize again that our reserve/non-reserve typology is based on location and not exclusively population characteristics. Not all of the people living on a reserve are necessarily Aboriginal. Many non-Aboriginal spouses and children of band members or status Indians reside in reserve communities. Also, non-Aboriginal people are often employed on-reserve. Some First Nations also rent or lease reserve land to non-Aboriginal persons. Consequently, it is possible that a reserve and its non-reserve match may have the same proportion of Aboriginal inhabitants. Indeed, the non-reserve match may have more. This geographically-based classification is appropriate given our interest in the effects on well-being of the special circumstances that exist on legal Indian reserves. Additional research that defines Aboriginal communities in terms of the size of their Aboriginal populations is warranted, but would address different issues than the ones under consideration here.

7 This comparison group was comprised of only the 495 reserves for which we were able to generate matches. Including the 46 additional reserves for which CWB data were available would have confounded our interpretation of the matched pairs: we would not have been able to eliminate the possibility that the absence of the unmatched reserves from the matched pairs analysis was the cause of any differences detected in well-being observed between the complete and paired samples.

8 Where a First Nation band includes more than one reserve, that band is assigned to a remoteness category based on its most populous site. Consequently, remoteness classifications are not available for reserves not designated as a band's more populous site. In total, remoteness classifications were available for 387 of the 495 (78%) reserves under consideration in this study. It must also be noted that remoteness classifications are not available for non-reserves. Since reserves are matched with non-reserves based, in part, on location, it is likely that most reserve/non-reserve pairs lie within the same remoteness zone. It is possible, however, that a non-reserve may occupy a different zone from the reserve with which it was matched.

9 McHardy and O'Sullivan (2004) found that, although the overall disparity between reserves and

non-reserves was significant in 2001, well-being varied greatly among reserves. As an aside, we examined the differences in CWB scores between individual reserve/non-reserve pairs. In keeping with McHardy and O'Sullivan's findings, we found a great deal of variation among pairs. The disparities between reserves and their non-reserve pairs (measured as non-reserve CWB score minus reserve CWB score) were normally distributed between about -.23 and .44. Still, the predominance of the non-reserve communities was clear: the reserve had a higher score than its non-reserve match in about 7% of the cases only.

10 We chose not to attach too much significance to this anomaly given that the distinction between Zones 2 and 3 is arbitrary, and that only 11 reserves were categorized as Zone 3 reserves. Further research is certainly indicated, however, as there are a number of interesting reasons why remote reserves might achieve higher levels of well-being than rural reserves. A popular explanation is that a road into a remote community indicates the nearby exploitation of natural resources. Such exploitation could, of course, spur economic development.

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