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Composite health indices: Useful tools or more work than they're worth?

MANITOBA CENTRE FOR HEALTH POLICY

Summary of report:
*Composite Measures/
Indices of Health and Health
System Performance*

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Consider the dashboard in your car. It houses a variety of gauges and lights designed to tell you how things are going under the hood. These instruments serve as an early warning system that signals potential mechanical problems requiring attention.

What if there was a similar “dashboard” for healthcare that showed, at a glance, how healthy people are and how well the system is performing? Such a tool would be very useful for policy makers if it combined large amounts of detailed information from individual measures into one easy-to-understand number. It could, for example, help identify those aspects of our healthcare system that require particular attention.

Just as a car's temperature gauge pulls together information on a vehicle's coolant level, the outside air temperature, and the condition of hoses and the radiator cap, a composite index rolls several related measures (indicators) into a single score that provides a summary of how the health system is performing in certain areas. An index of preventive care for women, for example, would combine rates of Pap tests and mammograms to produce one summary score. While there are plenty of individual indicators, there is a dearth of high-quality summary or composite indicators on key aspects of health care. Manitoba Health and Healthy Living (MHHL) commissioned the Manitoba Centre for Health Policy (MCHP) to develop a set of composite indices for this province's health system. Such a dashboard would, in theory, make it easier to compare differences in healthcare delivery and health outcomes across Manitoba's Regional Health Authorities (RHAs) and Winnipeg Community Areas (CAs), and allow planners to track them over time.

How we built our composite indices

We knew from the outset that this project would be challenging. We started by looking at existing research on developing and using composite health indices. We also consulted with experts in the area and drew upon our previous experience using individual indicators. Based on this background we attempted to construct a series of composite indices using administrative data housed at MCHP. This includes data from the province's Health Ministry and self-reported data on Manitobans' health behaviors gathered through the Canadian Community Health Survey.

We were able to create composite indices in four areas: illness prevention and screening; healthy living; surgical wait times; and overall health status. We could not, however, develop indices for quality of primary care, quality of drug prescribing, or a summary of the extent of chronic disease in the population.

Composite indices were deemed to “work” when we found strong correlations between their various indicators. For example, if rates of mammography and Pap tests rose or fell together in a similar pattern across RHAs, this would suggest an underlying related factor between these two indicators. Where this was the case, a single score could be used to describe an RHA's performance across these indicators.

For most of the composite indices, we looked at two three-year time periods: April 1, 2000 to March 31, 2003, and April 1, 2003 to March 31, 2006.

- In general, there is little value in creating a composite index when most of its indicators can compare the health status of Manitobans across regions.

- Composite indices may facilitate comparisons between RHAs but they do not describe how these scores are achieved.

- Risky behaviours had a greater impact than healthy actions on overall health status.

- The Surgical Wait Times Index may be somewhat helpful for comparisons to national benchmarks.



The composite indices

We created a **Prevention and Screening Index**, to show how well health regions are doing in screening for cancer and preventing infectious diseases. It pulls together rates of mammography and Pap tests in women, flu shots for older adults, and vaccinations among 2-year-old children.

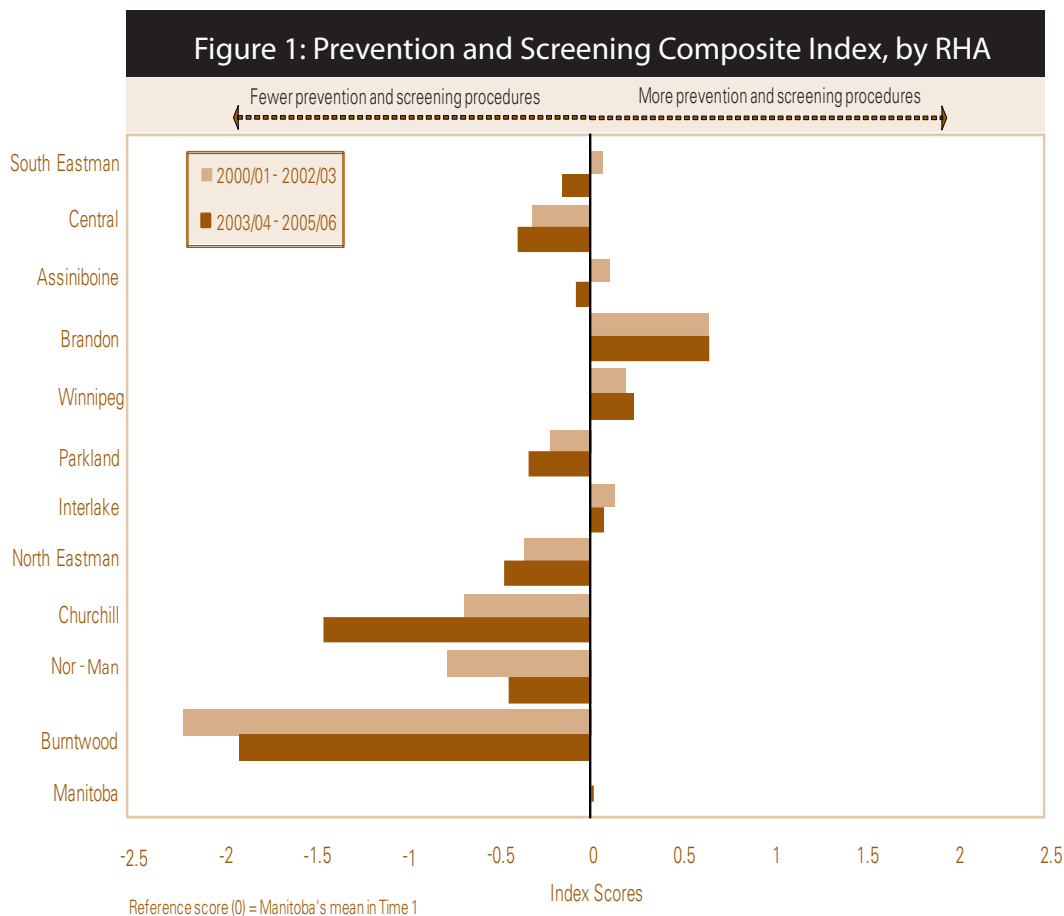
At first glance, (see Figure 1) the resulting composite index appears to show that prevention and screening improved slightly over the two time periods. In particular, rates increased somewhat in northern RHAs (Nor-Man and Burntwood) and in some of the least healthy areas of Winnipeg (Downtown and Point Douglas). If you were to look more closely at the indicators upon which the composite is based however, you would see that the overall increase was in fact the result of an increase in only one indicator – the percentage of older adults receiving a flu shot. Rates of mammography and Pap tests stayed the same, and childhood immunizations rates actually fell significantly.

We created two indices of healthy living to determine the prevalence of behaviours thought to lead to premature death from preventable

diseases such as cardiovascular, respiratory, cancer, and diabetes. The **Health-Promoting Behaviours Composite Index** includes self-reported data on healthy eating, changes to improve health, and physical activity; the **Health-Risk Behaviours Composite Index** is a summary of self-reported rates of smoking and binge drinking.

While you would assume that areas with high rates of healthy eating and fitness would have low rates of tobacco and alcohol use, this pattern was in fact true only in Winnipeg's healthiest CAs. Risky behaviours had a far greater impact than healthful actions on overall health status. Because this index consists of only two indicators – smoking and binge drinking – it would be easier to simply measure those rates than to build an entire composite index using these and other indicators. Another potential limitation to these indices is that they are based on survey data from Statistics Canada where the same questions may not be included in future surveys.

We created a **Surgical Wait Times Composite Index** to get a sense of how long residents in one RHA or Winnipeg CA wait for surgery compared to residents in other regions.



This index pooled wait times for six common elective procedures:

- surgical removal of the gallbladder
- hernia repair
- removal of breast lesions
- stripping/ligation of varicose veins
- carpal tunnel release
- tonsillectomy

The Index scores increased over time for all RHAs, indicating that Manitoba residents were waiting longer for these procedures at the end of the study period. As well, wait times appear to have been shortest in areas with the highest rates of premature mortality (a surrogate for overall healthiness of a region’s population), which suggests those people most in need of surgery waited the least amount of time to be operated on.

We developed a **Health Status Composite Index** to gauge the extent to which factors proven to influence the health of all citizens could be summarized (e.g., healthy eating, regular exercise and sleep, accessible medical care, and safe physical and social environments – including income and education). The Index combined eight indicators of health, among them life expectancy, potential years of life lost, self-

rated health, and census-based measures of socioeconomic status.

However, the Index scores closely mirrored the rates for the individual indicators behind them. We concluded that there is little value in creating a composite index when most of its indicators do as good a job at comparing the health status of Manitobans across regions and are easier to understand on their own by policy-makers and the general public. For example, it is likely easier to interpret the individual indicator “life expectancy” than an index of health status indicators.

We tried, without success, to construct two quality of care composite indices that would describe how efficiently and effectively we’re using evidence-based practices to help patients. Indicators of quality of primary care and prescription practices included the use of a long-term anti-inflammatory agent in people with asthma, potentially inappropriate prescribing of benzodiazepines in older adults, follow-up on prescribing of antidepressants for people with depression, eye exams for persons with diabetes (to help prevent blindness), use of multiple prescription medications (polypharmacy), and

Table 1: Summary of Pros and Cons of Using Composite Indices

Pros	Cons
Summarize complex issues for busy decision-makers	Could lead to wrong policy decisions if poorly constructed or misinterpreted
Easier to interpret one number than find trends across multiple indicators	Could suggest simplistic policy solutions if composite index is viewed in isolation from indicators upon which it is based
Facilitate ranking of RHAs on complex issues	Could lead to inappropriate use if their development is not transparent and based on unclear indicator definitions
Facilitate assessing RHAs’ performance over time	Choice and weighting of indicators could be challenged by critics
Reduce total number of indicators	Could make it harder to identify best corrective action(s), if problems with individual indicators are masked
Highlight RHAs’ performance and progress on improvement	Could lead to wrong policies if difficult-to-measure aspects of performance are not considered

beta-blocker use after heart attacks (to reduce stress on the heart and lower blood pressure). We concluded that composite indices cannot accurately reflect the fact that some doctors may meet quality goals in one area but not another. For example, a doctor may do a great job applying “best practices” in diabetes care, but may not do as well in caring for patients with depression. Likewise, some doctors may do a better job of prescribing drugs for some conditions than others.

We also tried to develop a composite index of the prevalence of chronic disease to show how well our system is preventing people from developing chronic conditions such as arthritis, asthma, diabetes, hypertension (high blood pressure), and ischemic heart disease. This single score did not seem like a plausible measure of differences in the prevalence of chronic disease across RHAs or over time, since it just didn’t “make sense.” When a region has a higher rate of asthma, but a lower rate of diabetes, it’s not clear what – if any – conclusions you can draw from an Index that combines the two scores. Looking at the incidence and prevalence rates of individual chronic conditions over time is probably a better way to describe the burden of each disease and to determine the effectiveness of specific prevention programs.

Implications

Although we succeeded in building a handful of valid, reliable composite indices, we came away from the project questioning the value or utility of such tools for health planners and decision-makers (see table 1). While the notion of rolling up large amounts of detailed information about health status and system performance into single markers or measures is appealing, such index scores lack real world application and sufficient “actionability” to improve the health of Manitobans.

To determine why an index is rising or falling – and more importantly, what to do in response – you need to go back to the indicators upon which

it is based. While composite indices may facilitate ranking or comparing Manitoba RHAs, they do not, on their own, describe what health regions are or are not doing to achieve their scores.

As we found with the Prevention and Screening Index, a change in a composite score could be the product of movement on only one indicator. A closer look at that index’s component indicators suggests that Manitoba needs to identify and address reasons why more children aren’t getting vaccinated. As well, a change in policy to address some but not all of an index’s indicators could potentially jeopardize its validity. MCHP’s 2008 report, *What Works? A First Look at Evaluating Manitoba’s Regional Health Programs and Policies at the Population Level*¹ provides a more useful approach for planners, as it starts to connect the dots between the health of residents and the programs and policies that may be contributing to good health outcomes.

One composite index that may warrant further use is the Surgical Wait Times Index. It should tell us whether RHAs’ efforts to meet national benchmarks for selected, high-profile procedures (e.g., those set by the Canadian Institute for Health Information (CIHI)) have affected the length of time Manitobans are waiting for other surgeries. If this index stays the same or falls over time, it would suggest that our system has made the changes necessary to absorb the increased demand created by CIHI’s wait time standards.

Composite indices, by their very nature, can provide us with only a high-level indication of our health system’s performance or the health of our population. In the same way that the “service engine” light on your vehicle’s dashboard requires a detailed diagnosis by a mechanic to determine specifically where the problem lies, composite indices require planners to go “under the hood” to figure out what is or is not working. Our findings suggest that the effort required to develop, validate, and update composite indices is disproportionate to the value of the information they yield.

¹ Martens P, Fransoo R, *The Need to Know Team*, et al. (March 2008) *What Works? A First Look at Evaluating Manitoba’s Regional Health Programs and Policies at the Population Level*. Winnipeg MB, Manitoba Centre for Health Policy

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