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CONSTRUCTING A HEALTH AND SOCIAL INDICATOR FRAMEWORK FOR INDIGENOUS COMMUNITY HEALTH RESEARCH

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ABSTRACT. Health and social indicators that capture the distinct historical, social, and cultural contexts of Indigenous communities can play an important role in informing the planning and delivery of community interventions. There is currently considerable interest in cataloguing and vetting meaningful community-level health and social indicators that could be applied to research and health promotion activities in Indigenous communities in Australia, Canada, and New Zealand, inclusive of conventional indicators as well as measures developed specifically for use in or with Indigenous communities. To avoid haphazard selection of indicators, and to assure the comprehensiveness and relevance of any given set of indicators, a framework that can accommodate and conceptually classify indicators representing a full range of domains is required. We report here on the development of a conceptual framework, by which Indigenous community indicators, and more general community-level social indicators, can be sorted, catalogued, and systematically classified within four hierarchical levels. The indicator framework was developed across Canada, Australia and New Zealand in consultation with academic researchers and Indigenous community stakeholders, building from established health and social indicator systems. The Indigenous indicator framework permits Indigenous communities, public health researchers, and funding agencies to compare and select the most appropriate indicators for application in specific contexts from the multitude of existing indicators.

KEY WORDS: Australia, Canada, community-level indicators, indicator framework, Indigenous peoples, New Zealand, population health

1. INTRODUCTION

Social and health indicators have become integral to community-based health promotion programming and evaluation (Hancock et al., 1999; Salvaris, 2000; Frankish et al., 2002; von Schirnding, 2002). They provide information about the structural and contextual characteristics of social and physical environments essential to resource allocation, policy development,

intervention planning, and outcome assessment in public health. Community-level indicators can be based on environmental data for which communities are the unit of observation. They can also be based on individual-aggregate data for which individuals were originally observed with grouped results pooled or averaged to represent the community.

The increasing burden from Type 2 diabetes and other chronic diseases such as cardiovascular disease, obesity, and metabolic syndrome, are critical concerns for Aboriginal people living in Canada and Australia and New Zealand Maori, and are the focus of much recent health research, program, and policy efforts (Canadian Institutes of Health Research, 2002; Canadian Institutes of Health Research et al., 2002). Political, social, and economic subjugation and the limited ability of the western health care system to address community needs in culturally relevant and meaningful ways have been noted as risk conditions for diabetes and chronic diseases in Indigenous communities that must be taken into account in planning health promotion and disease prevention strategies (Royal Commission on Aboriginal Peoples, 1996; Daniel et al., 1999; Maar, 2004;Willows, 2005). Health and social indicators that capture these distinct historical, social, and cultural contexts can play important roles in informing health interventions and their evaluation. However, the distinct historical, social, and cultural contexts of Indigenous communities also generate unique challenges to the application of existing indicators (Wilson and Rosenberg, 2002; Durie, 1994; Steering Committee for the Review of Government Service Provision, 2003; Donna Cona, 2004). For example, researchers and community stakeholders have noted that health indicators that are framed from a non-Indigenous perspective, do not adequately reflect Indigenous health concerns from the holistic approach espoused in communities (Royal Commission on Aboriginal Peoples, 1996; Donna Cona, 2004). Australian researchers have noted the inadequacy of housing indicators such as size of dwelling because they do not take into account the issues of family structure and cultural and local specificity that affect how these indicators may be interpreted (Walker et al., 2002).

There is currently considerable interest in cataloguing and vetting meaningful community-level social indicators that could be applied to research and health promotion activities in Indigenous communities in Australia, Canada, and New Zealand, inclusive of conventional health and social indicators as well as measures developed specifically for use in Indigenous communities. The majority of ''indicator'' initiatives rely on ''expert committees'' for proposing the use of currently available indicators, or the development of altogether new measures. Such experts have

traditionally been scientists, but are increasingly community members affected by the issue being studied. Irrespective of the background of indicator "experts", a great many indicators proposed for use or development are generally not the product of a systematic appraisal that attempts to meet user needs through a logically defensible classification system by which desired measures are vetted against indicator domains. Furthermore, limited attention to understanding relations amongst domains and their sub-classifications in a comprehensive conceptual framework specified a priori can lead to an overlooking of existing or desirable indicators representing particularly key classes of influences on Indigenous health. Explicit linkages between domains and indicators are vital for understanding and investigating further the complex influences on Indigenous health.

As part of a broader project mapping biopsychosocial pathways of chronic disease in Indigenous populations in Canada, Australia, and New Zealand, we undertook to review indicators that measured structural and contextual aspects of physical and social environments. These we conceived as "exposures" from a social epidemiological perspective aimed at identifying pathways influencing Indigenous health. We aimed to: (i) assess the state of social and environmental indicators being used in Indigenous community research, program planning and evaluation, and policy decisions; (ii) identify remaining gaps in coverage of relevant aspects of physical and social environments; and (iii) organise the indicators so they could be easily scanned for selection for use in future programs.

The goal of this project was to create a classification framework that could sort and catalogue existing indicators. While many projects have developed indicator frameworks to guide their work (e.g. Statistics New Zealand, 1995; Stein, 1996; Berger-Schmitt and Noll, 2000; Noll, 2002; Statistics Canada, 2003b; Statistics New Zealand, 2002c; and see International Institute for Sustainable Development, for a database of over 600 indicator initiatives), these frameworks generally categorise the indicators according to the specific objectives of the project and often include only the areas pertinent to their activities. In such, the frameworks are often limited in scope and cannot integrate indicators outside of the original domains of inquiry, presenting major challenges to their utility for classifying indicators relevant to Indigenous communities. Frameworks designed for small collections of indicators often have narrowly defined categories that are not readily amendable to accommodate related indicators, and they usually are lacking ample hierarchical levels to effectively order constructs and categorise large numbers of indicators. Furthermore, few frameworks

systematically delineate the connections between indicators included in the framework and the domains that they measure and represent.

To avoid haphazard selection of indicators and to assure the comprehensiveness and relevance of any given set of indicators, a framework that can accommodate and conceptually classify indicators representing a full range of domains is required. In our assessment, after thorough searching and review of the literature, no indicator framework exists that can adequately encompass and classify a broad range of indicators, including those that address issues of concern to Indigenous communities. We report here on the development of a conceptual framework, by which Indigenous community indicators, and more general community-level social indicators, can be systematically classified. This paper details the framework development process, including consultation with community stakeholders and public health researchers in Canada, Australia, and New Zealand. It also provides recommendations for future development of indicator initiatives in Indigenous health, and promotes the development of novel indicators in conceptually relevant domains.

2. METHODS

The general procedures implemented in the indicator framework development process are described below in sections corresponding to sequential steps taken: (i) Consultation activities; (ii) Selection of a foundational framework; (iii) Supplementation; (iv) Adaptation; (v) Expansion; and (vi) Amendment and approval. Specific results corresponding to, or following from, these procedures are given in the Results section.

2.1. *Consultation Activities*

Academic researchers from the three countries were convened in three teleconferences in which they discussed indicator framework resources and searching and vetting procedures. A Canadian Working Group, comprised of nine members of Indigenous descent, was established after outreach and recruitment activities were conducted via email and at several Indigenous health conferences throughout Canada. Working Group members received background materials about the study and approved and signed a Memorandum of Understanding for the project. In a series of three teleconferences and additional email exchanges between February and September 2004, Working Group members reviewed project progress and discussed areas of concern for Indigenous communities that members perceived were not being

adequately represented by existing indicators and existing domains in indicator systems. Consultation activities were also conducted during this time with Indigenous community members and stakeholders in the following forms and locations: two face-to-face meetings in Darwin, Australia and three discussion groups in Galiwin'ku, Australia with leaders of community organisations and health promotion programme officers; two meetings in Melbourne and Shepparton (in rural Victoria), Australia; and one formal convention of a New Zealand Working Group in Hamilton, New Zealand.

2.2. *Selection of a Foundational Framework*

A literature search for existing indicator frameworks was conducted with two primary objectives: (i) to select a suitably broad and also comprehensive framework that could serve as a foundation for development of the Indigenous indicator framework targeted by this project; and (ii) to catalogue categories (classification groups) of community-level indicators (for non-Indigenous and Indigenous populations) to supplement and adapt the Indigenous indicator foundational framework.

Starting with the national statistical and health agencies of the three countries within the study, a review of systems of social indicators was conducted. In addition, searches for a variety of keywords (including "indicator", "social indicator", "indicator framework", "conceptual framework", "indicator system", "indicator development") were conducted utilising the Google internet search engine and MEDLINE. Links and references from these sources to other sources were also pursued. Criteria for inclusion/consideration were the existence of a transparent organisational framework that was comprehensive, contained multiple clearly specified levels that could support isomorphism, and was publicly accessible (available over the internet or in indexed journals).

A foundational framework was selected from the results of the literature search to provide the nomenclature for mutually exclusive hierarchical levels of our Indigenous indicator framework and the first draft of categories by which to sort indicators. This foundational framework was then adapted in several steps, according to the following procedures.

2.3. *Supplementation*

The foundational framework was amended with categories of indicators found in other systems of social and health indicators identified in the literature search. Additions were made to all hierarchical levels of the

framework. In completing this supplementation, the scopes of these categories were delineated and recorded in a compendium of decision rules to ensure consistent classification of indicators. For this step, only indicator frameworks not specified for application in Indigenous communities were included.

2.4. *Adaptation*

Since the elements within frameworks designed to categorise indicators characterising Indigenous communities largely fell outside the purview of the foundational framework and those frameworks used to supplement the foundational framework, adaptation required several steps. First, we distilled a condensed list of categories for indicators we found represented in the systems of indicators consulted that addressed concerns of Indigenous communities. Next, we placed these categories into the supplemented framework, similar to the process completed in the supplementation step described above. Some categories were absorbed or amended into existing hierarchical levels of the supplemented framework, but many required the addition of new sections to the framework. Sections added at the highest level of categorisation were subsequently sub-classified to correspond to hierarchical classification levels of the framework. All additions to and delineations of the scopes of the hierarchical levels of the indicator framework in the adaptation step were recorded in the compendium of decision rules described above.

2.5. *Expansion*

After supplementation and adaptation of the framework was complete, a broader classification level was created to be the highest level in the framework to simplify sorting of indicators.

2.6. *Amendment and Approval*

A written account of the framework development process was produced and distributed, along with a list of the indicator framework sources consulted, to academic researchers and Indigenous community representatives from the three countries involved in the study. A follow-up presentation was made to these collaborators during a 2-day international meeting in Montréal in November 2004, with 16 Indigenous researchers, health scientists, and public health practitioners. These stakeholders approved the

framework development process and recommended revisions to the indicator framework which were then incorporated and are reflected in the final framework.

3. RESULTS

The indicator frameworks that were consulted included those developed and used by major international (e.g. the Organisation for Economic Co-operation and Development) and national organisations (e.g. Statistics New Zealand) and agencies for general population (e.g. Health Canada) and Indigenous population statistics (e.g. Office for Aboriginal and Torres Strait Islander Health), as well as locally oriented community-based indicator projects (e.g. Oregon (U.S.) Benchmarks) that developed frameworks to organise indicators. In total, 33 frameworks were studied. Comparing these existing indicator organisational schemes, the ''German System of Social Indicators'' (German Social Science Infrastructure Services Social Indicators Department, 2004) was determined to be the most thorough and systematic and was selected for use as the foundation from which to develop the indicator framework. The nomenclature used for hierarchical levels of the framework in the ''German System of Social Indicators'' was adopted in a slightly modified form, such that these three levels of organisation to categorise indicators in the Indigenous indicator framework are, from broadest to most specific, Domain, Goal Dimension, and Indicator Group. It should be noted that Indicator Groups do not exist for all Goal Dimensions; Goal Dimensions which provide sufficiently narrow parameters for classifying indicators do not necessitate division into multiple Indicator Groups, but the framework allows for Indicator Groups to be defined in such cases if an increase in numbers or diversity of indicators requires it.

Supplementation of the framework was completed with the addition and insertion of Domains, Goal Dimensions, and Indicator Groups from 14 other indicator frameworks (Organisation for Economic Co-operation and Development, 1982; Statistics New Zealand, 1995; Stein, 1996; United Nations Economic and Social Council and Working Group on International Statistical Programmes and Coordination Social Statistics, 1996; Berger-Schmitt and Noll, 2000; Lickerman and Flynn, 2000; Treasury Board of Canada Secretariat, 2000; Canadian Policy Research Network, 2001; Environment Canada et al., 2001; Statistics Canada, 2003b; United Nations Development Programme, 2003; United Nations Economic Commission for Europe, 2003; Bricknell et al., 2004; United Nations Statistics Division, 2004). Ten indicator systems designed for use with Indigenous

communities were utilised in the adaptation process (Indian and Northern Affairs Canada, 2000; Office for Aboriginal and Torres Strait Islander Health Division, 2000; Australia Bureau of Statistics, 2002; McDonald, 2002; Statistics New Zealand, 2002a, b, c; Health Canada First Nations and Inuit Health Branch, 2003; Indian and Northern Affairs Canada, 2003; Statistics Canada, 2003a; Australia Bureau of Statistics, 2004). The Goal Dimension level of classification corresponds to likely targets of public health policies and programs for which indicators are being applied, sought, or need to be developed, and thus constitutes the primary level in the framework for users to consult in an indicator selection, assessment, or development process. Examples of the nested categories within three Domains are shown in Table I.

As the highest level in the framework, a "Subject Grouping" level was adopted to correspond with the social epidemiological framework that forms the conceptual basis of the study. Seven subject groupings were approved in the three-nation Indigenous consultation process: Built and Natural Environment; Culture; Psychosocial; Social Organisations; Socio-demographic; Socio-economic; Socio-political. The three other classification levels for indicators in the framework (Domain, Goal Dimension, Indicator Group) are not strictly nested in Subject Groupings. Each Indicator Group or Goal Dimension (when an Indicator Group does not exist) is assigned to one of the seven Subject Groupings (see Figure 1). Therefore, Subject Groupings do not exclusively correspond to Domain divisions; Domains fall into multiple Subject Groupings. Examples of the assignment of Subject Groupings to Goal Dimensions and Indicator Groups within three specific Domains are found in Table I.

The final supplemented and adapted framework includes 22 Domains (see Table II), 101 Goal Dimensions, and 112 Indicator Groups. Domains have between two and eight Goal Dimensions assigned to them. Indicator Groups are found in 31 Goal Dimensions (up to eight Indicator Groups per Goal Dimension), spanning across 12 Domains (see Table III).

A relational database derived from the Indigenous indicator framework was developed. Further work to collect, enter, and classify health and social indicators in the database will facilitate analyses of indicator coverage, assist in tracking the progress of indicator development efforts, and provide for pinpointed retrieval of relevant indicators. An indicator rating tool balancing Indigenous and western scientific perspectives and intended to assist communities in the selection of relevant and meaningful indicators was developed and is currently being pilot tested in Indigenous communities and with public health researchers in Canada, Australia, and New Zealand. In

TABLE I

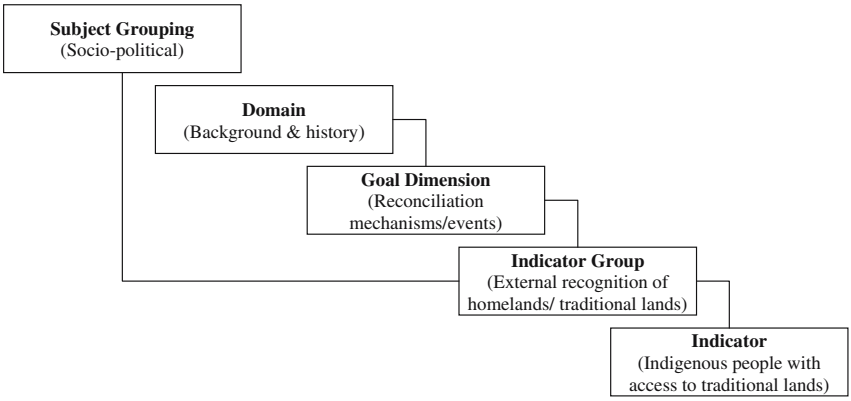
Examples of three domains with nested goal dimensions, indicator groups, and subject grouping assignments

Domain	Goal dimension	Indicator group	Subject grouping
Education	Educational participation and enrolment	–	Socio-demographic
	Educational attainment	–	Socio-demographic
	Structure and type of schooling	–	Social Organisations
	Qualifications	Language abilities/ literacy skills	Socio-demographic
		Computer skills	Socio-demographic
		Vocational training	Socio-demographic
	Effective output of education	Access to the labour market	Socio-economic
	Expenditures for education	Costs of the educational system	Social Organisations
		Public/private financing of study	Social Organisations
	Subjective measures of educational participation and attainment	–	Psycho-social[a]
Housing	Residential space available	–	Built and Natural Environment
	Quality of housing unit amenities	–	Built and Natural Environment
	Quality of the residential environment	–	Psycho-social
	Costs of housing accommodations	–	Socio-economic
	Housing ownership	–	Socio-economic
	Inequality of housing ownership	–	Psycho-social[a]
	Subjective evaluation of housing conditions	–	Psycho-social[a]
	Housing programs and services	–	Social Organisations

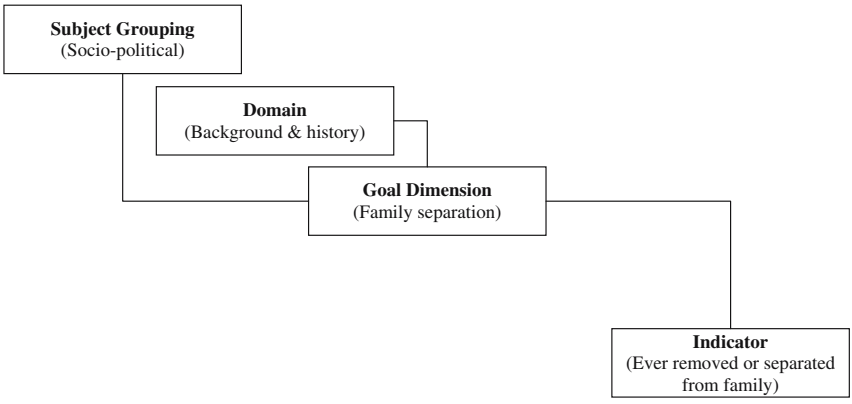
TABLE I
Continued

Domain	Goal dimension	Indicator group	Subject grouping
Background & History	Family ancestry, affiliation and identification	–	Culture
	Family separation	–	Socio-political
	Subjective measures of background and history	–	Psycho-social[a]
	Historical events	–	Socio-political
	Reconciliation mechanisms or events	External recognition of homelands or traditional lands	Socio-political
		Return or recognition of removed artefacts	Socio-political
		Recognition of other losses	Socio-political
	Assimilation policies	–	Socio-political

[a]Psycho-social Goal Dimensions and Indicator Groups denote classes of indicators that are subjective measures of experience or perceptions, as well as objective measures of psycho-social domains.



a. Indicator placed within three nested classification levels; Subject Grouping for Indicator corresponds to Indicator Group level



b. Indicator placed within two nested classification levels (no Indicator Groups exist for the Goal Dimension); Subject Grouping for Indicator corresponds to Goal Dimension level

Fig. 1. The two configurations for placement of an indictor in the framework (with an example for each).

consort with the rating tool, the indicator framework and database can be used to review indicators and select from a wide range of conceptually relevant constructs for application to specific research and health programme activities.

4. DISCUSSION

The Indigenous indicator framework provides a four-level structure by which indicators from diverse sources can be systematically classified and

TABLE II
Domains in the indigenous indicator framework

Background and History
Community Economic Resources
Community Well-Being
Consumption and Supply
Education
The Environment
Health
Housing
Income and Income Distribution
Indigenous Language
Indigenous Self-Government and Autonomy
Indigenous Visibility and Representation
Individual Well-Being
The Labour Market and Working Conditions
Leisure and Media Consumption
Participation
Population
Public Safety and Crime
Social Welfare
Socioeconomic Status and Subjective Class Identification
Traditional Activities and Cultural Responsibilities
Transportation

situated according to the domains or issues they are intended to measure. The framework provides categories to accommodate conventional health and social indicators. The indicator framework also includes sections in which indicators on Indigenous culture and language, identity and affiliation, historic events and policies, and community economic, social, and political development can be sorted. A comprehensive structured framework that incorporates these domains of key importance to Indigenous communities and also contains ample categories for more conventional health and social indicators does not only exist elsewhere. At least one other project, however, "The Survey of Living Conditions in the Arctic" has been carried out and in partnership with Indigenous peoples to develop a model for conducting research on living conditions in the Arctic (Andersen and Poppel, 2002).

The Indigenous indicator framework development process aimed to incorporate multiple perspectives and involved extensive literature reviews and consultation with academic and community partners from Canada, Australia, and New Zealand. A number of limitations follow, given the

TABLE III
Description of the indicator framework classification levels

Classification Level	Number of Items	Relationship to Other Levels in the Framework
Subject Grouping	7	broadest classification level; other categories are not nested in this level; one Subject Grouping assigned to each discrete Indicator Group or, in the instances where no Indicator Group exists, one Subject Grouping assigned to each discrete Goal Dimension
Domain	22	broadest of the nested hierarchical categories
Goal Dimension	101	nested in Domain; 2–8 assigned to each Domain (mean = 4.6, median = 4.5)
Indicator Group	112	nested in Goal Dimension; 0–8 assigned to each Goal Dimension (mean = 1.0, median = 0)
Indicator	unlimited	nested in Indicator Group or Goal Dimension, where no Indicator Group exists

breadth of the task attempted. The indicator framework does not espouse a particular agenda and was not formulated from the perspective of a specific program or mission. Rather, it was constructed using a European national social indicator reporting system as a foundation, to which other domains were added. Thus, while the process aimed to create a universally applicable framework, this product is inherently value-laden in its development from a western academic perspective. In addition, while the domains in the framework were designed to encompass an extensive variety of existing and presently undeveloped indicators in a broad range of areas, classification of indicators that address unforeseen emerging issues may require further adaptation of the framework. We acknowledge that any attempt to classify the wide variety of indicators in use for disparate projects is a gross oversimplification. We maintain, nonetheless, that a singular framework that can systematically catalogue indicators has utility and an important role to play in the advancement of indicator projects.

As community indicator projects and government proclivity towards benchmark and indicator programs has grown in the past two decades, so

too have the numbers of indicators and the types of agencies and researchers who are developing and applying indicators (Hancock et al., 1999; Salvaris, 2000; Frankish et al., 2002; von Schirnding, 2002). Systemic attempts to locate and select candidate indicators for a particular project from the wide range of existing indicators can be challenging and time consuming. Furthermore, many researchers and community stakeholders have pointed to the value-based decisions inherent in defining measures of community health, quality of life, policy objectives, and program outcomes (Olsen et al., 1985; Hancock et al., 1999; Young, 2001) and the problems associated with applying measures for use in cultures or social settings for which they were not created (Pearce, 1996; Sommerfeld et al., 1999). To ensure the significance and relevance of indicators at a local level, community involvement in both development and selection of measures has been recommended (Waddell, 1995; Raphael et al., 1999; St. Leger, 2000). The Indigenous indicator framework permits Indigenous communities, public health researchers, and funding agencies to compare and select the most appropriate indicators for application in specific contexts from the scores of existing indicators.

Researchers have noted the inadequacy of existing indicators for characterising and addressing health issues in Indigenous communities, highlighting frequent perceptions of irrelevance to community concerns and community goals (Institute of the Environment/University of Ottawa et al., 2001; Young, 2001; Steering Committee for the Review of Government Service Provision, 2003; Walker et al., 2002;) and their lack of incorporation of traditional knowledge or attention to historical context (Durie, 1994; Winds and Voices Environmental Services, 2000; Institute of the Environment/University of Ottawa et al., 2002; Karjala et al., 2004). Pointing to the narrow definitions of health and well-being guiding established indicator systems, much research has called for the need to rectify gaps in knowledge from the use of existing indicators. Specifically, a large number of critiques have espoused the development and application of new indicators reflecting more culturally appropriate, holistic views of health and well-being for Indigenous populations (Durie, 1994; Thompson and Gifford, 2000; Auer and Andersson, 2001; Wilson and Rosenberg, 2002; Coe et al., 2004; Donna Cona, 2004). Indeed, several projects in Canada, Australia, and New Zealand have already engaged in processes to create and validate new community-level measures for specific use in health and social programmes and research in Indigenous communities (Institute of the Environment/University of Ottawa et al., 2002; Steering Committee for the Review of Government Service Provision, 2003; Walker, et al., 2003; Giles and

Findlay, 2004; Karjala et al., 2004). However, little research has developed a means to methodically assess the coverage and range of existing indicators or surveyed what types of measurements have not yet been developed or applied. The Indigenous indicator framework described here provides a system to classify the diverse and numerous indicators that have been created for and utilised in public health research and intervention activities, according to the domains which the indicators are intended to measure. Thus, in utilising the framework to catalogue existing indicators, gaps in coverage can be illuminated and progress of indicator development efforts can be tracked. Future work to collect and enter indicators into the associated database will enable systematic analyses of the state of indicators relevant to Indigenous communities, provide guidance to indicator development efforts, and facilitate indicator selection processes. We propose that such a framework, while having obvious utility in application to marginalised or disadvantaged communities, is relevant to general population studies as well.

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