The Sources and Predictors of Information Use by Nurses in Rural and Remote Canada

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Abstract

Health care professionals, particularly registered nurses, are encouraged to engage in evidence-based practice. The tide of evidence-based literature has brought with it numerous assumptions regarding hierarchies of evidence, the objectivity of scientific knowledge, as well as the proper roles of researchers as *producers* and health care practitioners as *users* of that knowledge. Given the current push to encourage nurses to use research evidence in everyday practice, the question becomes: from which sources are rural and remote nurses most likely to obtain the information to update their nursing practice? In addition, what are the significant socio-demographic, professional, organizational, and personal attitude correlates of specific types of information use by rural and remote nurses?

This study is based on data from the 2001-2002 Nursing in Rural and Remote Canada: A National Survey, which is one component of a larger three-year project titled The Nature of Nursing Practice in Rural and Remote Canada. We mailed these questionnaires to two groups: approximately 5,700 nurses (proportionately sampled on a provincial basis) listed on the registries of the provincial and territorial nursing associations as working in rural areas, and all nurses working in remote areas and the territories. Nurses working in communities outside the commuting zone of urban centres with populations greater than 10,000 were considered 'rural', while nurses working in communities across northern Canada were included as 'remote. The final response rate was 68%, translating into 3,933 returned questionnaires.

Analysis of survey results indicates that to obtain new information on nursing practice, more rural and remote nurses use central sources of information produced within their environments (colleagues, inservice, and newsletters) than peripheral sources produced outside of their environments (internet, library, journal subscriptions, and continuing education). In addition, organizational and professional factors outweigh nurses' socio-demographics and personal attitudes as significant correlates of peripheral information use. These findings indicate that direct and instrumental research use is not widespread among all nurses in rural and remote settings, but rather concentrated among nurses in particular professional roles and work settings. However, it is possible that indirect research use is occurring via central sources, such that information is exchanged between the two groups that do and do not appear to regularly use peripheral information to inform their nursing practice.

Introduction

Figure 1: *Empirical* Information Usage in Nursing Practice, according to Evidence-based Nursing

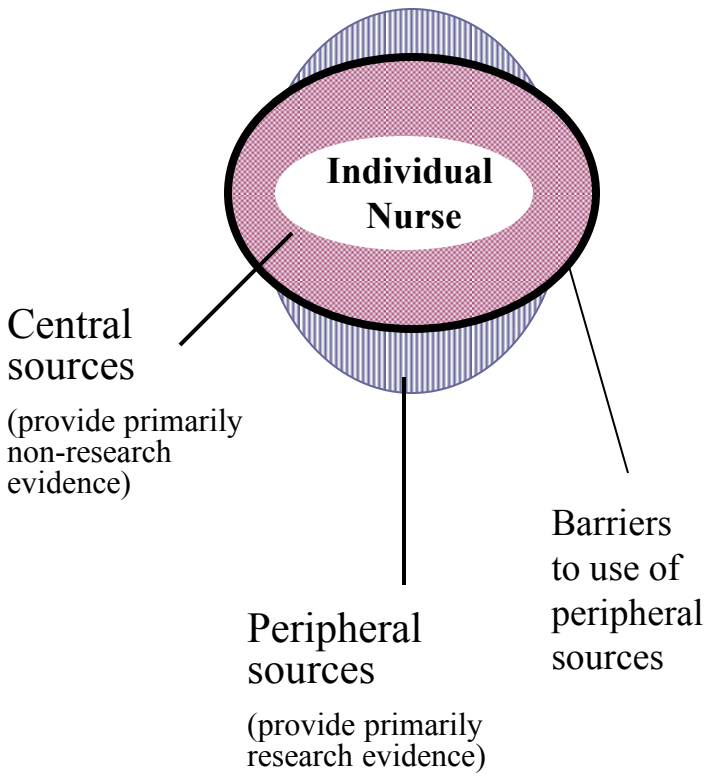


Figure 1 illustrates the practicing nurse as both knowledge user *and* producer (Larsen, et al., 2002). However, the knowledge that nurses predominantly produce and use is non-research.

Figure 1 emphasizes the empirical findings by evidence-based nursing (EBN) proponents that nurses in their everyday practice use central sources of information to a far greater extent than peripheral sources. In this presentation, we conceptualize central sources of information as those that other studies have concluded are used because they are most convenient, easily accessible, applicable, reliable (Dawes & Sampson, 2003), interpersonal, contextually relevant (Estabrooks et al., 2003), inexpensive and tacit. These sources primarily contribute to nurses' practical and subjective knowledge that rests on the foundations of clinical judgement, manual skill, body knowledge, aesthetics, intuition, and pattern recognition (Johnson & Ratner, 1997). Central sources include verbal and written observations, experiences, and opinions provided by the nurse her/himself, patients, other nurses, and workplace colleagues, all of which provide information that is collectively considered 'non-research evidence' (Estabrooks, 1998), or evidence ranking toward the bottom of the evidence hierarchy.

As conceptualized here, peripheral sources are those that studies have found to typically fall outside nurses' normal purview. Variously referred to as "published research knowledge" (Larsen et al., 2002) and "research literature" (Tsai, 2000), these are sources such as reports, journals, textbooks, continuing education forums, and clinical guidelines containing scientific research findings generated by objective methods, and written up or presented in a scientific fashion. EBN proponents repeatedly conclude that nurses tend to overlook peripheral sources of information in favor of central sources, due chiefly to the barriers faced by nurses to employ peripheral sources, and secondly to the alternative ease of central source use.

Figure 2: *Normative* Information Usage in Nursing Practice, according to Evidence-based Nursing

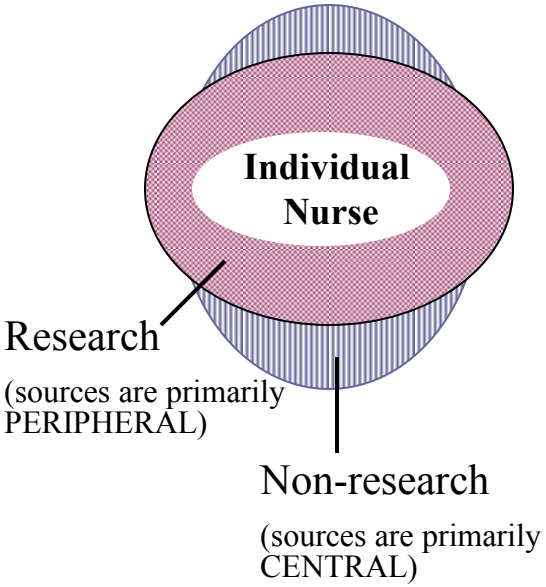


Figure 2 underscores the clear separation between the researcher as knowledge producer and the practicing nurse as knowledge user. In EBN proponents' normative vision of nursing practice, research from peripheral sources should be used to a much greater extent than information from central sources. Ideally, the nursing profession is rooted in evidence-based practice, with scientific research at the top of the evidence hierarchy and non-research evidence at the bottom. To reach this ideal, EBN proponents advise to shrink the barriers between the individual nurse and the research evidence, thereby diminishing nurses' reliance upon their practical and subjective knowledge base.

EBN proponents consider the barriers between nurses and research evidence to be primarily individual, and secondarily organizational or endemic to the source of the research evidence. Individual barriers include nurses' beliefs, perceptions, values (Edwards et al., 2002), information-seeking behavior, education, socio-demographics (Estabrooks et al., 2003), authority, time, and training (Sitzia, 2001). Examples of organizational barriers are unco-operative colleagues (Closs et al., 2000), lack of infrastructure, incentive, technical support, access, funds (Sitzia, 2001) and research culture. Barriers endemic to the sources that might also hinder use include distance from and expense to the user (CRaNHR, 2002), relevance (Parahoo, 1998), appropriateness (Tsai, 2000), complexity and an explicit rather than tacit nature.

Study Aims

- To determine whether more rural and remote nurses use central or peripheral sources to obtain new information on nursing practice.
- To determine the specific socio-demographic, professional, organizational, and personal attitude factors associated with the use of each of the four peripheral sources under consideration (internet, library, journal subscription, continuing education outside the workplace).
- To determine the factors associated with the use of any two (at minimum) of the four peripheral sources under consideration.

Data Sources

Sample Selection

The sampling strategy was three-fold: first, for logistical reasons we sampled nurses in rural areas of the country. For this survey, 'rural' nurses worked in rural areas and small towns, operationalized " as the population living outside the commuting zones of larger urban centres; i.e., non-CMA and non-CA (>10,000) population" (Mendelson and Bollman (1998: 2). Second, we included all nurses registered as working in nursing stations and outpost settings; third, all nurses licensed to practice in the Northwest Territories, the Yukon and Nunavut were included in the sample frame. The names and addresses of rural and remote nurses were selected by each provincial and territorial nursing association using criteria and sample sizes supplied by the survey research term. An initial target sample of 7065 was selected.

Data Collection Method and Procedures

The choice of data collection method for this study was largely determined by rules and procedures of provincial and territorial nursing associations concerning the release of names and addresses of registered nurses for research purposes. Due to concerns regarding anonymity and confidentiality, some of the nursing associations would not release names and addresses of nurses for contact for research purposes. Therefore, these associations distributed the questionnaires. We used a modified version of Dillman's Tailored Design Method for the mail survey (Dillman, 2000). However, full personalization was not possible for some provinces and we did not use a pre-survey letter to encourage response, nor did we use registered mail or telephone follow-up to encourage response.

Survey Response Rate

We received a total number of 3,933 usable questionnaires. This response rate has been calculated as follows:

Mailed out	7,065
Explicit refusal to participate	153
Wrong address, duplicate registration, moved no forwarding address, deceased, etc.,	1,114
'Not heard from'	1,696
Completed but ineligible (lived rural worked urban, retired, long term disability	169
Completed eligible	3,933

Based on the above figures, we determined the number of nurses truly eligible for inclusion in the survey to be 5,782 [7,065-(1,114+169)]. Both explicit refusals (153) and those 'not heard from' (1,696) were counted as non-response. The response rate for the survey is 68% (3,933/5,782).

Analytical Techniques

According to conventional predictor selection in multivariate analysis regression techniques, we chose the predictors for initial analysis on the basis of their relationship with each of the four peripheral sources as theorized or reported in the literature. Cross-tabulations were performed to obtain the prevalence of each type of peripheral information source use for the sample by the four categories of correlates (listed in the following "Measures" section). The prevalence rates and odds ratios for each variable exclude missing data; only the data from study participants who provided valid responses for all relevant variables within each model were included in this analysis.

We then performed multinomial logistic regression analysis using forward selection with likelihood ratio selection using the SPSS statistical package. Using this iterative-model building strategy, our purpose was to determine the best-fitting model of the variables that affected the odds of using each peripheral information source. This technique allows for the assessment of relationships between the predictors and the outcome occurring simultaneously. For example, the relationship between age and the odds of using the internet takes into account the statistical effects of each of the professional, organizational, and personal attitude factors listed in that particular model (see Table 1, page 15).

The fit of each model may be assessed with the statistics listed at the bottom of each table (see Tables 1 through 4, pages 15-18). For example, Nagelkerke R^2 =.11 (Table 2) can be interpreted as: approximately 11% of the variation in the outcome is explained by this model. Furthermore, the c statistic=.66 (Table 2) can be interpreted as: in approximately 66% of all possible pairs of cases in which one case uses the information source and the other does not, this particular model results in a higher probability for the cases with the outcome than for the cases without the outcome.

Measures

OUTCOMES

Yes/No responses to the following: "How do you get *new* information on nursing practice?

Central Sources

- Nursing Colleagues
- Inservice
- Newsletter
- Non-nursing colleagues

Peripheral Sources

- Internet
- Library
- Journal Subscription
- Continuing Education (outside the workplace)

CORRELATES

Socio-demographics

- Age
- Gross nursing income
- Marital status
- Dependent child/relatives

Professional Characteristics

- Highest attained nursing education
- Number of years since receiving highest attained nursing education
- Number of years licensed to practice as RN
- Currently hold more than one nursing position
- Hours worked in nursing in last year
- Current practice that takes most time
- Current nursing position
- Number of years held current primary position
- Years employed by primary agency/institution
- Work with student physicians, nurses, physiotherapists, or others
- Colleague availability
- Colleague support network to provide consultation and/or support
- Hours most often work
- Perform advanced decision or practice
- Read a journal article in last 12 months
- Performed a computer-based literature search in last 12 months
- Read a professional textbook in last 12 months
- Subscribed to a journal in last 12 months
- Number of nursing procedures regularly performed
- Personal nursing knowledge is current

Measures (cont'd)

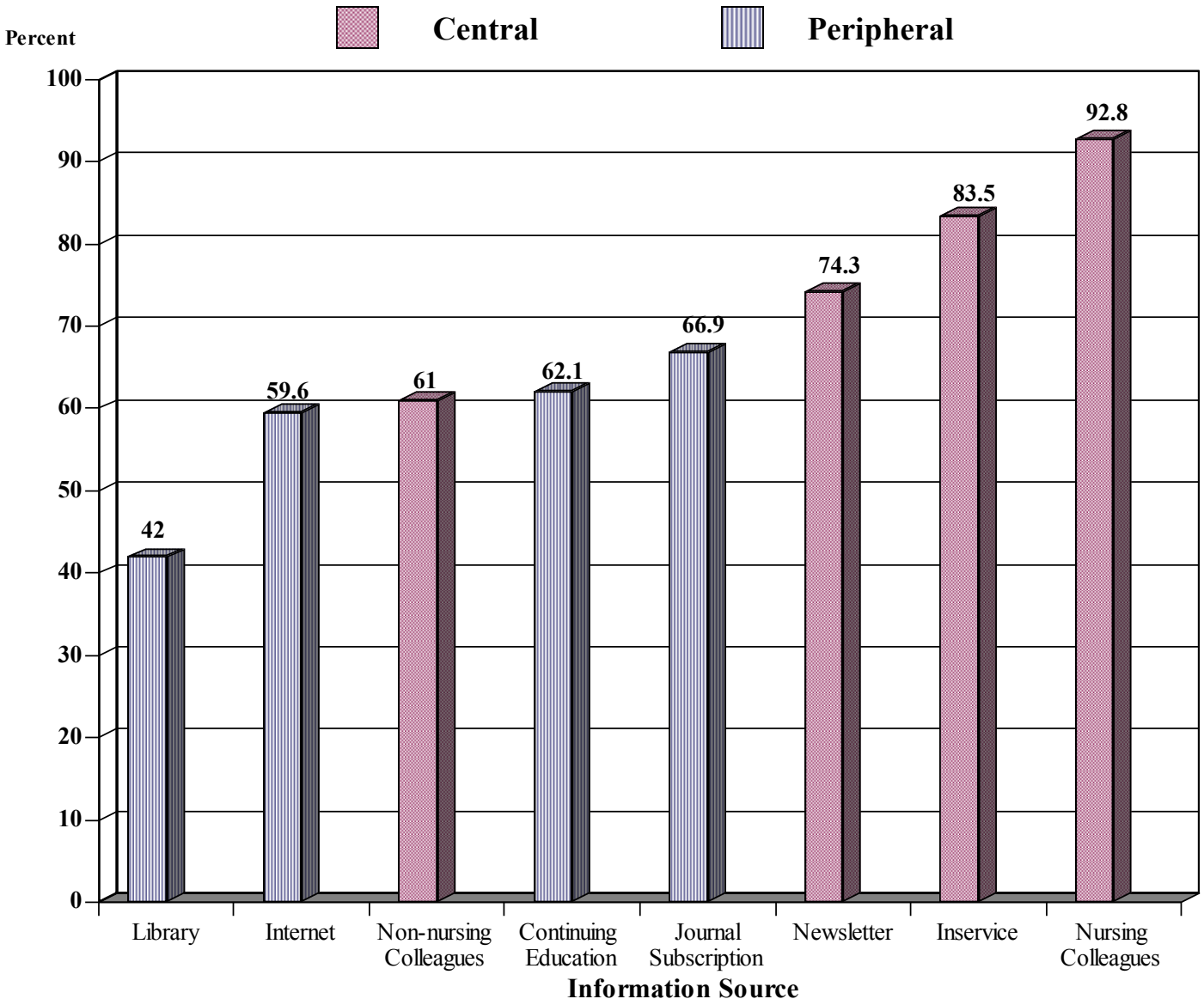
Organizational Characteristics

- Have access to current info that would help in job
- Opportunities to share knowledge from CE/staff development
- Internet access in workplace
- Telehealth in workplace
- Number of workplace RN positions including self
- Distance from closest basic referral centre
- Distance to closest advanced referral centre
- Work situation allows flexibility to respond to family obligations
- Receive extended health or dental insurance
- Receive tuition, CE, and travel and sustenance support
- Receive professional registration fee
- Current work setting
- Facility ownership
- Orientation provided by current organization adequate
- Adequate RN staffing in primary workplace
- Adequate support staff in primary workplace
- Equipment needed for care is available
- Workplace remote
- Workplace rural
- Community supportive of health agency
- Community accessible only by plane
- Population of work community

Personal Attitudes

- Satisfaction with work schedule
- Satisfaction with home community
- Think of role as advanced nursing practice
- Satisfaction with nursing pay
- Satisfaction with nursing autonomy
- Satisfaction with nursing organizational policies
- Satisfaction with organization professional status
- Satisfaction with nurse-to-nurse interactions
- Satisfaction with nurse-to-physician interactions
- Nursing satisfaction index
- Happy with work community
- Frequently asked for professional advice when not at work
- Health status
- Ever taken sick day due to job stressors
- Perceived stress
- Job strain

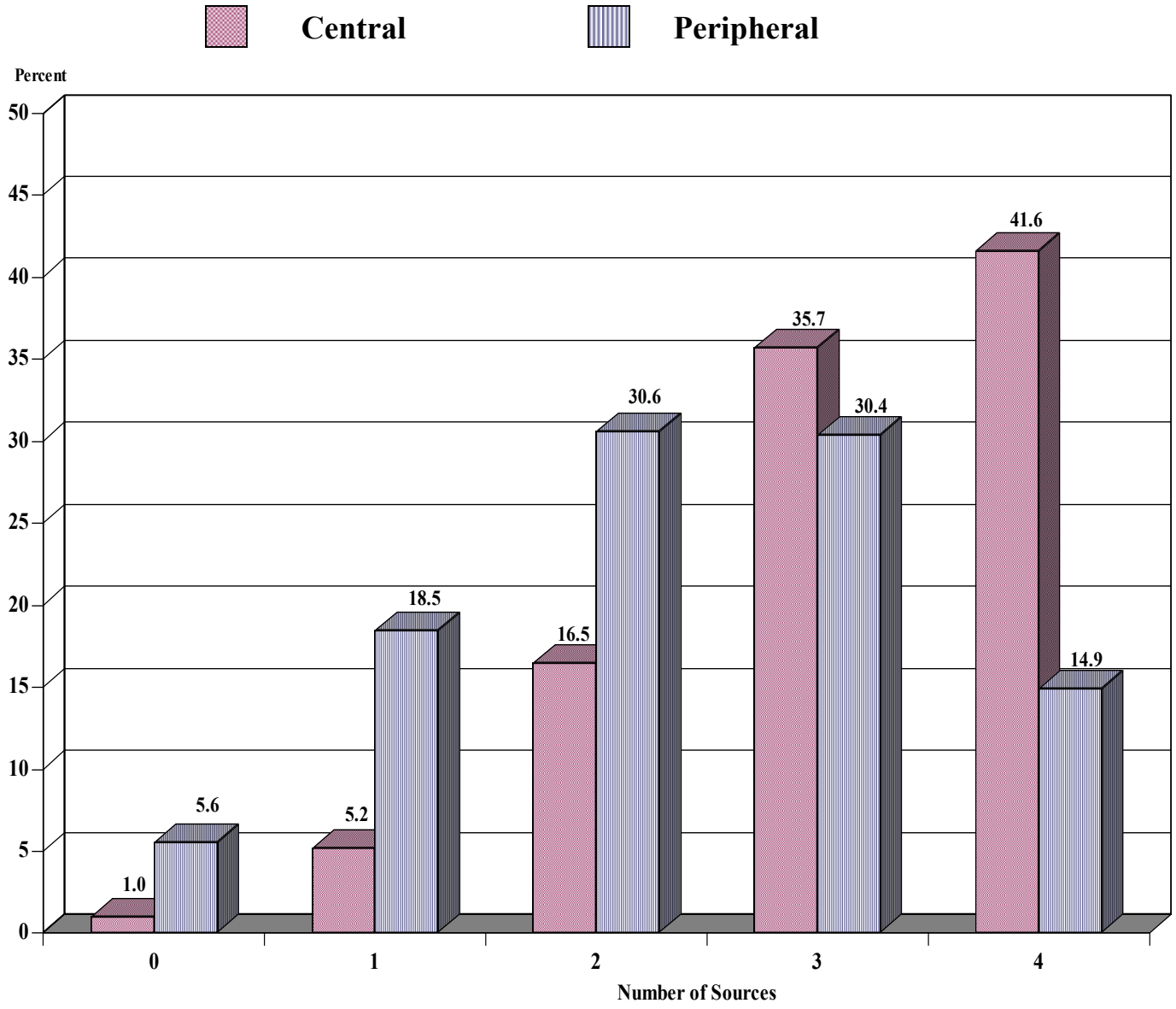
Figure 3: Sources of New Information on Nursing Practice Used by Rural and Remote Nurses



Source: 2001-2002 Nursing in Rural and Remote Canada Survey (N=3440)

- The three information sources used most frequently by rural and remote nurses (than any other suggested source) are nursing colleagues, inservice, and newsletters.
- Nurses are 32% more likely to use newsletters than the library to inform their practice, and 21% more likely to use inservice than continuing education to obtain new information on nursing practice.

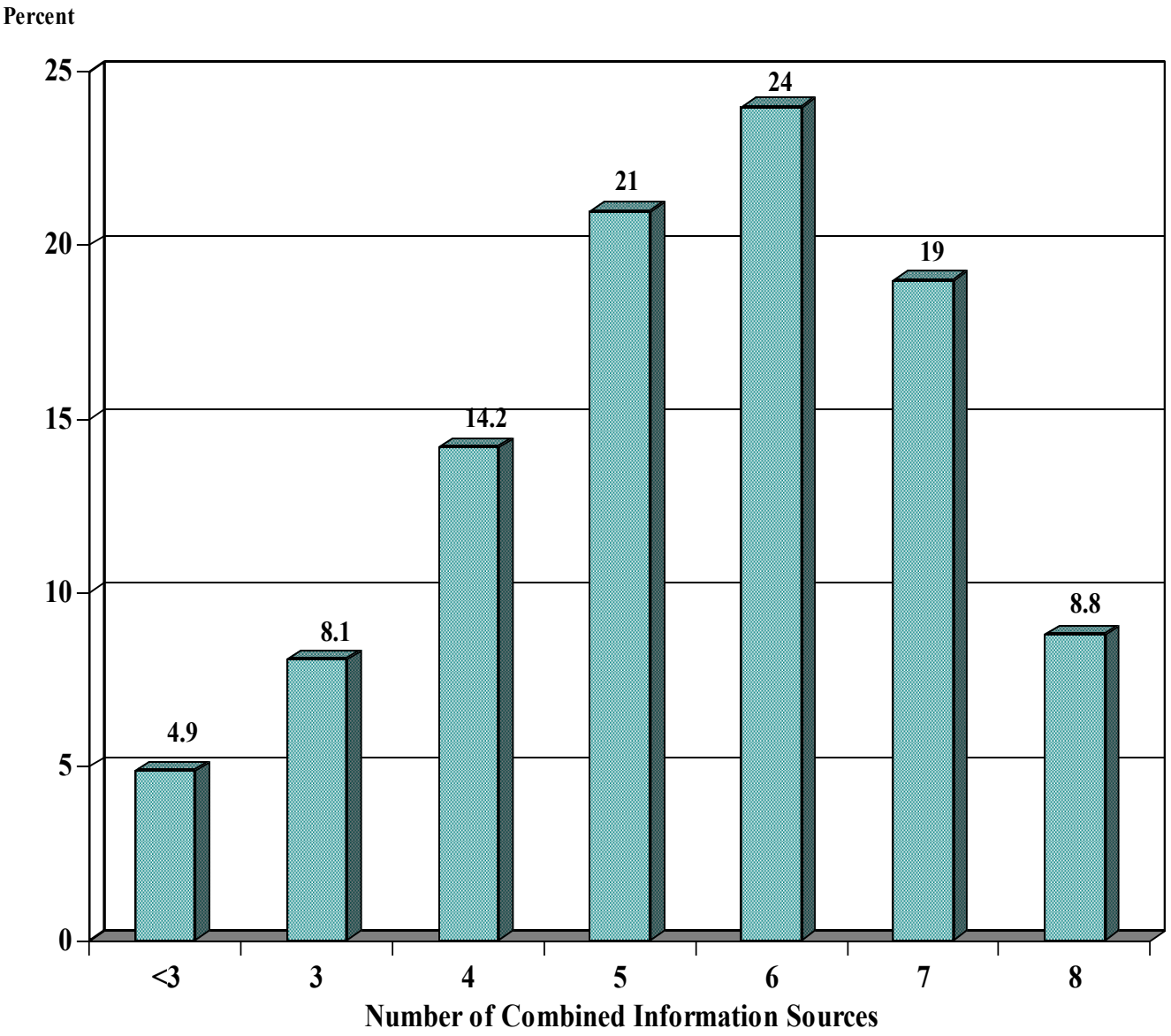
Figure 4: Number of Central versus Peripheral Information Sources Used by Rural and Remote Nurses



- Figure 4 indicates that nurses are 26% more likely to use four central sources than to use four peripheral sources.
- A paired-sample t test reveals that nurses use a significantly greater number of central sources (mean=3.12, SD=0.93) than peripheral sources (mean=2.31, SD=1.10).
- The number of central and peripheral sources used by nurses is significantly positively correlated (.26).

Source: 2001-2002 Nursing in Rural and Remote Canada Survey (N=3440)

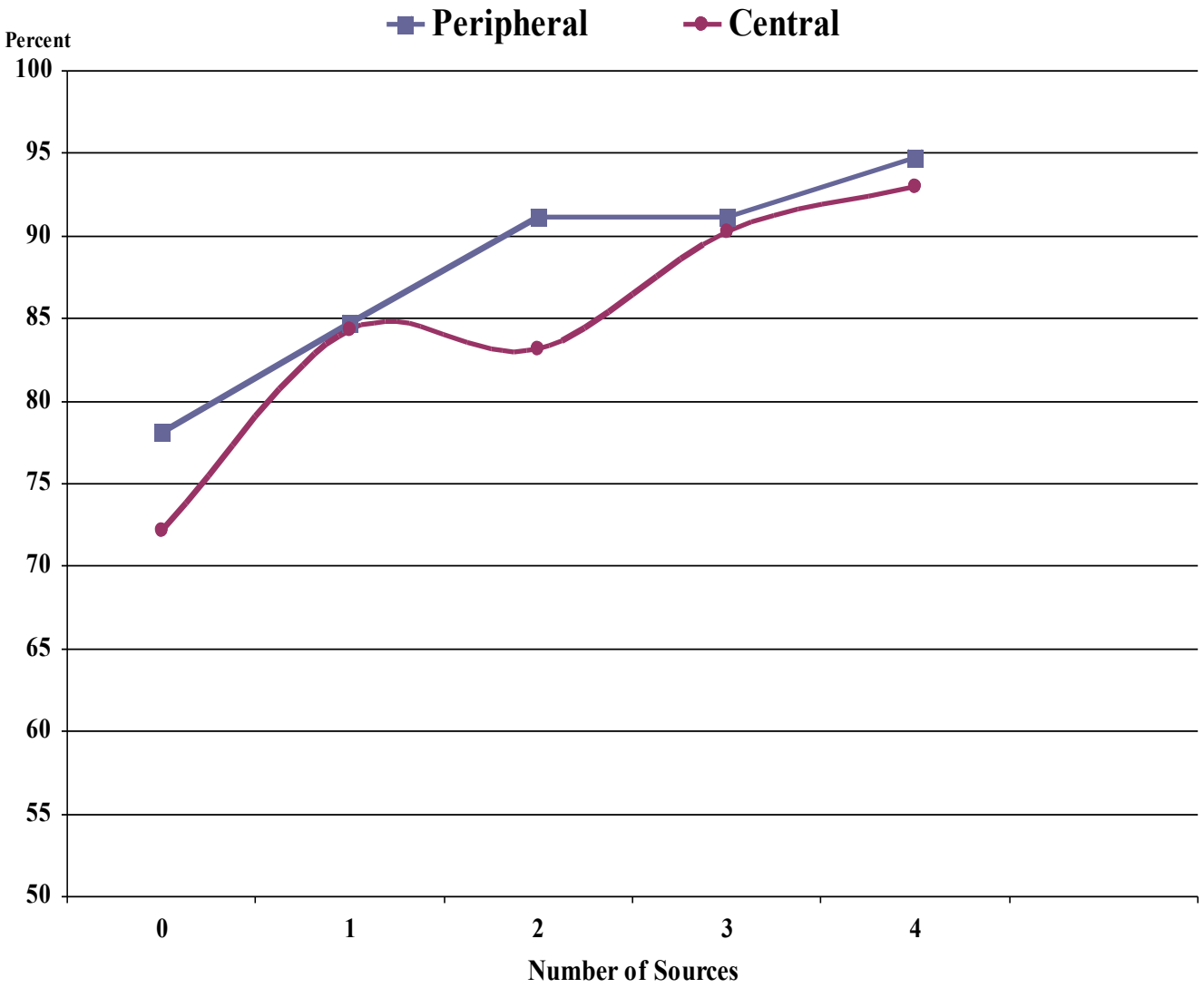
Figure 5: Number of Combined (Peripheral and Central) Information Sources Used by Rural and Remote Nurses



Source: 2001-2002 Nursing in Rural and Remote Canada Survey (N=3440)

- On average, rural and remote nurses use six sources of information to inform their nursing practice (mean=5.42, median=6, SD=1.62).
- Three times as many nurses use 6 sources of information (24%) than use only three sources (8.1%).
- Twenty-eight percent (28%) of nurses use seven or more peripheral and central information sources combined.

Figure 6: Rural and Remote Nurses' Belief that their Nursing Knowledge is Current, according to Number of Central versus Peripheral Information Sources

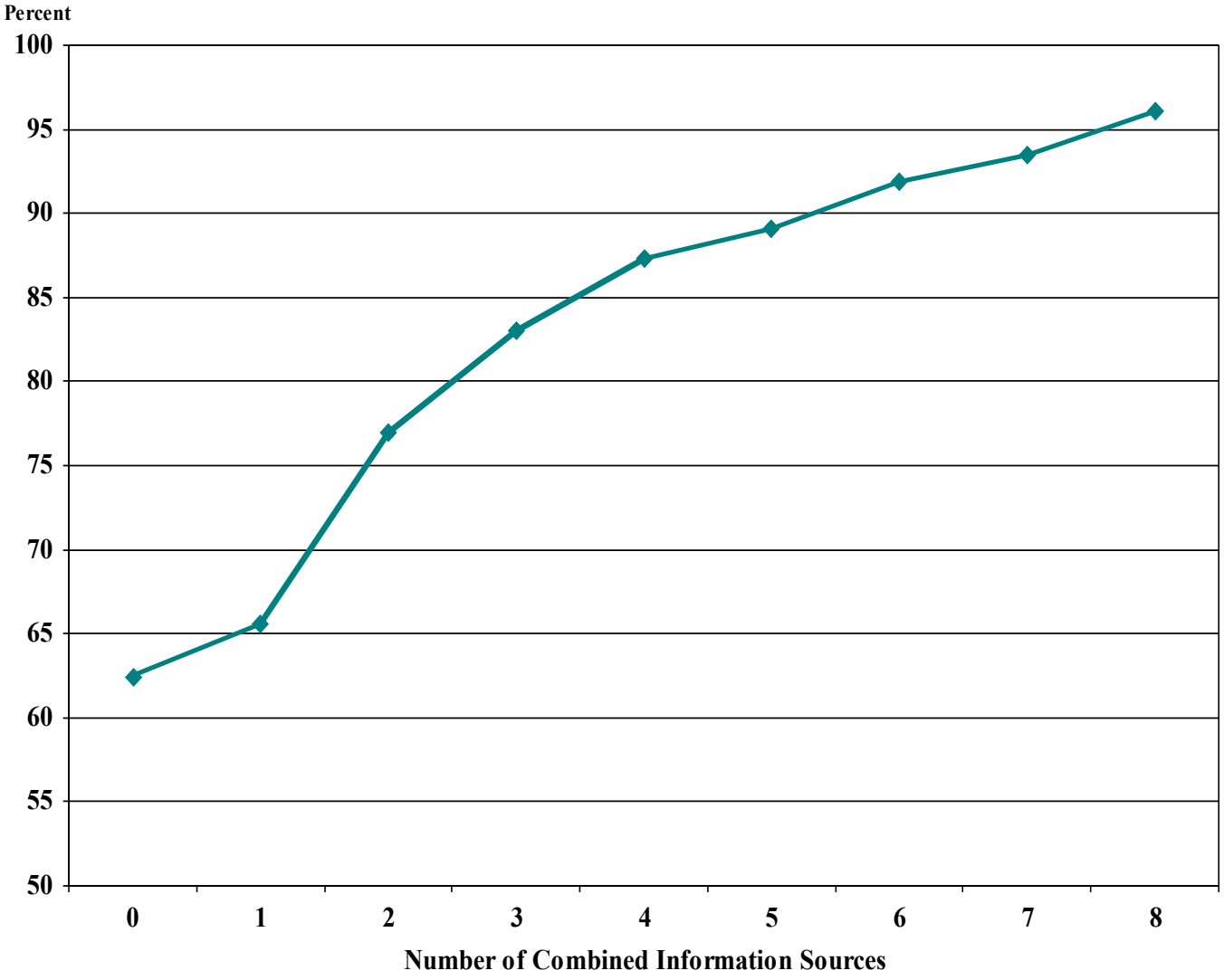


Source: 2001-2002 Nursing in Rural and Remote Canada Survey (N=3430)

Chi-square=63.36 p<.001 Chi-square=60.66 p<.001

- The number of peripheral and central sources that nurses use is significantly positively associated with their belief that their nursing knowledge is current.
- A paired-sample t test indicates that nurses who believe that their nursing knowledge is current use a significantly greater number of central (mean=3.15, SD=.91) than peripheral sources (mean=2.35, SD=1.09).

Figure 7: Rural and Remote Nurses' Belief that their Nursing Knowledge is Current, according to Number of Combined (Peripheral and Central) Information Sources



Source: 2001-2002 Nursing in Rural and Remote Canada Survey (N=3430)
Chi-square=93.12 p<.001

- The number of all sources used by nurses is significantly positively associated with their belief that their nursing knowledge is current.
- Specifically, 96.1% of nurses that use all eight sources of information believe that their knowledge is current, compared with 65.6% of nurses that use only one source.

Discussion

1. This study indicates that rural and remote nurses are more likely to use central than peripheral sources to obtain new information on nursing practice (Figure 3), and on average, also use a significantly greater number of central than peripheral sources (Figure 4). Nurses use an average of six combined sources to inform their practice (Figure 5), and as the number of combined sources increases, nurses' belief that their knowledge is current also increases (Figure 7).

2. Tables 1 through 4 highlight the significant relationships between each peripheral source use and several characteristics of nurses' professional roles and work organizations, *when controlling for all other factors* within each of the four models. Most notable are those correlates significantly associated with the use of more than one information source:

   - **Nurses who perform a computer-based literature search within the last 12 months** as part of their professional role have significantly greater odds of using every one of the four peripheral sources, than nurses who do not.
   - **Current position occupied by nurses** is significantly associated with greater odds of using three peripheral sources: the internet, journal subscription, or continuing education, particularly the positions of educator/ researcher/consultant; and chief nursing officer/assistant-associate director.
   - The odds of nurses using any two of four peripheral sources are greater for those with the following professional role characteristics: **higher attained nursing education**, **holding more than one nursing position**, and **working with student medical professionals**. Compared with their counterparts, nurses with fewer **years since receiving highest attained nursing education** have greater odds of internet use, but lower odds of library use.
   - The odds of nurses using any two of four peripheral sources are greater for those associated with work organizations with the following characteristics: **access to current information that would help in job**, and **opportunities to share knowledge from CE staff development events**. Compared with their counterparts, nurses who **receive their professional registration fee from their employer** have lower odds of library use and higher odds of using continuing education; nurses **working remote** have lower odds of using continuing education and greater odds of using a journal subscription.

3. Tables 1 through 4 also indicate the only socio-demographic to demonstrate a significant relationship with at least two peripheral sources, as well as the finding that not one of the personal attitudes tested demonstrates a significant relationship with the use of more than one peripheral source.

   - **Age** is significantly associated with two sources: younger nurses compared with older nurses have greater odds of internet use but lower odds of using journal subscriptions.

Limitations of the Study

The structure of the Rural and Remote Nursing Survey (2001-2002) imposed certain key limitations on the analyses of information use and the factors associated with such use.

1. The Rural and Remote Nursing Survey was a self-report mail questionnaire. For this reason, missing values and reporting bias are important issues that must be noted. It is possible that the respondents chose socially desirable answers. However, all of the nurses, not just certain groups, would be susceptible to this.

2. We do not intend to imply that any of the statistically significant relationships outlined in this presentation are indicative of causation, given the cross-sectional nature of this study and the complex interactions between nursing practice, information use, and the relevant correlates. These relationships are indicative of association.

3. This survey did not include explanations of terminology. For instance, nurses may have differing understandings of the terms 'use' or 'nursing practice'. Furthermore, incremental measures of use, employed in other studies, were not employed in this study. For these reasons, a single measure of information use as interpreted by the respondents may not be equivalent to more sophisticated measures.

4. The fact that this survey concerns rural and remote nurses may lead to results that are not generalizable to the urban nurse population.

5. While we provide explanations for our findings, the above points must be taken into account when evaluating our conclusions.

Conclusion

- This study examines the characteristics associated with information acquisition from sources produced central and perippheral to nurses' familiar terrain. As we fully expected to find, more rural and remote nurses use central sources, presumably produced within their organizations, than peripheral sources produced outside of their organizations. This finding is supported by other theoretical and empirical studies (Estabrooks et al., 2003; Larsen et al., 2002).

- Nurses' professional roles must be taken into account when evaluating their research use. Our finding that privileged education attainment and higher status in current nursing practice or position are associated with greater odds of peripheral source use, may provide support for the *bifurcation*[1] hypothesis (Wotherspoon, 2002). That is, not *all* nurses in their daily practice are able to directly consult sources produced peripherally to their environments. Rather, research use is engaged in mainly by nurses with higher education, and in positions with greater authority and hence access to advanced resources. Currently, such nurses may be better positioned than the majority of nursing professionals, to find, review, and integrate this research into their practice (White and Taylor, 2002). This situation may change as evidence-based practice training becomes commonplace. For now, it is possible that the average practicing nurse engages in indirect peripheral (research) use via central sources, such as newsletter, inservice, and colleague communication.

- It is also unsurprising to find that characteristics of nurses' work organizations figure more prominently than their socio-demographics and personal attitudes in peripheral information use. Certainly, leading researchers in this field have come to the realization that the rational actor notion of research use must evolve to account for the realities within which nurses practice their profession. These include the constraints inherent in organizations, such as existing lack of access to the internet, the library, or other information sources, a lack of opportunities to share this information with other nurses due to heavy workloads, and a lack of financial and time support to use these sources. These constraints are only compounded if nurses lack advanced professional status within their organization.

- Certainly, the increasing pressure upon the nursing profession to strengthen their members' evidence-based nursing methods and practice proves an additional challenge for nurses practicing in rural and remote areas. The parallel challenge for persons charged with the task of research dissemination is to evaluate the receptivity of their target audience, given the medium of their message. Our hope is that our study results might aid in such evaluations.

[1] Bifurcation refers to the notion that "…any benefits from a restructured organization of health care services will be distributed in a highly asymmetrical fashion….Resources….are more likely to be channelled toward the minority of nurses who can use credentials and authority positions to their advantage" (Wotherspoon, 2002: 96)