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# Monitoring local trends in Indigenous tobacco consumption

## Abstract

**Objective:** To compare two methods of monitoring tobacco consumption in remote Indigenous communities.

**Methods:** We examined the monthly difference between wholesale invoice and point-of-sale data for tobacco products from three stores from remote Aboriginal communities in the Northern Territory. We assessed three measures of wholesale data.

**Results:** The average monthly difference between the sale data and the average of wholesale invoices for the previous, same and following month was -33 cigarettes per day (95% CI -157, 92). This average of three months' wholesale invoices provided a more precise estimate than either wholesale invoices from the same or previous month.

**Conclusion:** Tobacco wholesale data provided a close estimate of sales data in these stores.

**Implications:** This wholesale data could be used to monitor local trends in remote Indigenous tobacco consumption, facilitating the evaluation of the impact of tobacco control activities and informing future work to reduce Indigenous smoking and its harms.

**Key words:** Aboriginal health, tobacco consumption, smoking, monitoring, measurement

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Prime Minister Kevin Rudd recently announced that the Australian Government would spend an extra \$14.5 million over four years to tackle high rates of Indigenous smoking.<sup>1</sup> He described this as an important step in his commitment to closing the life expectancy gap between Indigenous and other Australians. Tobacco smoking is estimated to be responsible for 17% of the health gap between Indigenous and non-Indigenous Australians.<sup>2</sup>

Effective monitoring is the first of six essential policies in the 'MPOWER' tobacco control policy package recommended by the World Health Organization.<sup>3</sup> Monitoring is essential for the other tobacco control policies to succeed, by providing information about the size of the problem and what is working. In Australia, tobacco consumption is monitored using national surveys and indirectly by the amount of tobacco cleared through excise and customs.<sup>4</sup> Smoking in Indigenous Australia is monitored by triennial national surveys of the Indigenous population.

In contrast to the continuing decline in the prevalence of smoking in the total Australian population, there has been no significant change in Indigenous smoking prevalence in the three published national surveys since 1994.<sup>5-7</sup> Fifty per cent of Indigenous adults smoke daily, twice the prevalence of non-Indigenous Australians.<sup>7</sup> While these surveys are large, the Australian Bureau of Statistics warns that they cannot provide accurate estimates of local or even regional smoking prevalence.

Smaller local surveys of Indigenous communities have generated a wide range

of smoking prevalences.<sup>8</sup> It would be prohibitively expensive and intrusive to keep repeating these local surveys to identify the different smoking trends in these locations. Nonetheless, such local trend information is valuable in assessing the impact of local tobacco activities and for generating local information to assist local health promotion.

In remote Indigenous communities, it is possible to monitor tobacco consumption indirectly using sales or wholesale invoices at the small number of stores and takeaways selling tobacco in each community. This unobtrusive method has been used to evaluate the impact of tobacco control projects in a small number of locations in the Northern Territory (NT).<sup>9</sup> We are now assessing whether this can be expanded to sustainably monitor local tobacco consumption in many remote communities.

An early question that has arisen is whether wholesale invoice data is an acceptable proxy for sales data. Expansion of electronic point-of-sale scanning means sale data is now available for many remote community stores, especially in the NT following the Australian Government's 'Emergency Response,' as quarantined funds from welfare payments can only be spent in stores with such electronic scanning equipment. Nevertheless, many smaller outlets in NT remote communities still do not use this equipment and only wholesale invoice data is available. Here we compare point-of-sale and wholesale invoice data from three stores in remote NT communities. The three communities are on islands off the NT coast, with 2006 Census populations of about 300, 400 and 800 respectively.

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## Methods

Electronic point-of-sale data for sales of tobacco products were collected either directly from the store or from the central office of an Aboriginal retail organisation running several remote community stores. Electronic wholesale invoice data were collected from the wholesaler supplying all three stores.

Sales or wholesale invoices were converted into cigarette (stick) equivalents, with 0.8 g of loose tobacco equivalent to one cigarette, consistent with national reports based on excise and customs clearances.<sup>4</sup> We calculated for each month the average number of cigarettes per day sold or ordered by each store. We used the statistical methods proposed by Bland and Altman based on the difference between the measurements rather than inappropriately using the correlation coefficient.<sup>10</sup> We compared the monthly sales results with (a) monthly wholesale results (b) monthly wholesale results from the previous month and (c) the average of the three monthly wholesale results for the previous, same and following month. Statistical analyses were performed using STATA (Version 8.0, Stata Corporation, Texas, US).

Ethical approval was given by the Human Research Ethics Committee of the NT Department of Health and Community Services and Menzies School of Health Research, including its Aboriginal subcommittee. Consent was given by each community council and either the store manager or the regional Aboriginal retail organisation.

## Results

Sale and wholesale data from July 2006 to April 2008 were collected from stores 1 and 2, but only 12 months of sale data from July 2006 were available from store 3. The average number of cigarettes sold per day for each month in the three stores was 1,677, 1,797 and 1,713 respectively.

For each month and store, the average number of cigarettes sold per day was subtracted from the three measures of the wholesale invoices. In each case, the distribution of the difference did not differ significantly from the normal distribution, and so t-tests were used to test statistical significance and generate confidence

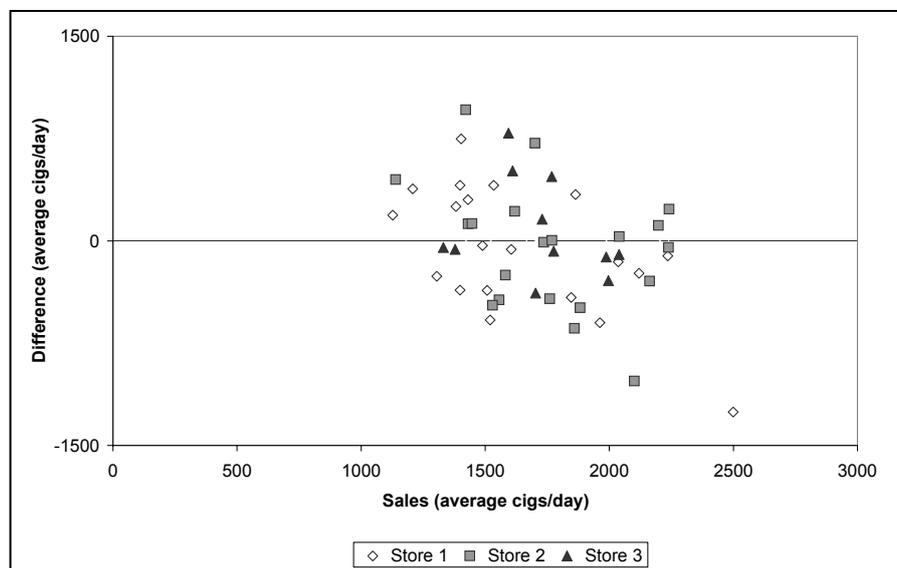
intervals (CI). The average monthly difference between wholesale and sale data was: a) -45 cigarettes per day (95% CI -237, 146) (monthly wholesale results), b) -31 cigarettes per day (95% CI -241, 180) (monthly wholesale results from the previous month) and c) -33 cigarettes per day (95% CI -157, 92) (average of the three monthly wholesale results for the previous, same and following month). In each case, the average monthly difference was small, negative (sales greater than wholesale invoices) and not statistically significantly different from zero. The three-monthly wholesale average led to a similarly small mean difference but with a much smaller standard error and confidence interval, suggesting it had the best agreement with sales data.

This showed when the difference was graphed against average cigarettes sold per day for each month and store. Figure 1 shows the graph using the three-monthly wholesale average; graphs for the other wholesale results are available from the first author. Figure 1 shows no systematic variation in the difference over the range of sales results or in the different stores. Similarly, there was no systematic variation in the difference by month (graph available from first author).

## Discussion

Wholesale invoice data provides a close estimate of sales of tobacco in these remote NT Aboriginal stores. Variations in the size and how often wholesale orders are placed arguably explain why a three-month average of wholesale invoices provides the best estimate.

Wholesale data has practical advantages over sales data in the monitoring of Indigenous tobacco consumption in these remote towns. Not all stores use electronic point-of-sale scanning, so not all can provide sales data. Only a small number of wholesale organisations serve these communities, so collecting and regularly collating wholesale data from wholesalers (after initial consent from stores) is simple. It requires contacting only the small number of wholesalers and then receiving data in one of only a few electronic formats, enabling simpler and more sustainable data management. It has the additional benefit of not requiring any work for busy store and takeaway managers, who have recently had to deal with enormous



**Figure 1: Monthly difference (three-monthly average wholesale minus sales data) versus monthly sales for the three stores.**

extra administrative burdens associated with welfare quarantining. However, it does require the co-operation and some extra work by the wholesalers, all of which are commercial businesses. The effect of this data collection on these businesses will need to be monitored.

However, some limitations have emerged with monitoring wholesale data. We have already found that one store ordered some tobacco (for its vending machine but not for other tobacco sales) directly from a tobacco company rather than its regular wholesaler. That arrangement recently ceased (and the vending machine is no longer used) and it has been explicitly noted in the feedback to the community that those sales have not been included. Our research team has chosen to not deal directly with a tobacco company, following the experience of other researchers with tobacco companies.<sup>11</sup> We are concerned that any reliance on the goodwill of a tobacco company to provide us with data (if they consented) might lead to perceptions that our research work is compromised. This Journal requires all authors to sign a declaration that their 'work was conducted without any financial or other support or assistance from any tobacco company or individual or entity acting on behalf of the tobacco industry'. We also worry that the tobacco company may misrepresent their involvement in our research.

Some smaller takeaways do not order tobacco from a wholesaler but buy it from a large supermarket in a nearby town. This is less easy to monitor sustainably; so far, we have chosen to contact the takeaway manager every six months and ask them to estimate how much tobacco they order in an average month. Such smaller outlets are also unlikely to have point-of-sale scanning.

There are other limitations. These methods are not suitable to monitor Indigenous tobacco consumption trends in places with large non-Indigenous populations and so are largely restricted to discrete remote Indigenous communities. We have been informed of illegal sales after-hours of cigarettes in some communities; these are not included but are likely to be a small proportion of total sales. Some Indigenous residents may purchase cigarettes in nearby regional towns, however, we expect this also to be a small proportion of total sales. Similarly, sales of duty-free tobacco and black-market tobacco are not included in the customs and excise monitoring of Australian tobacco consumption.<sup>4</sup>

We do not have a neat population denominator. We have population estimates from censuses, but these are not totally reliable and are only available every five years. We are aware that monthly community populations can vary due to events like festivals, ceremonies and funerals. Nevertheless, analogous to the long-established monitoring of communicable disease trends, the practical public health utility of this monitoring is likely to be achieved in spite of some uncertainty about changes in denominator. Large and sustained changes in tobacco consumption should still be apparent and worthy of further investigation. We investigated using total sales as a denominator, but information about price seemed quite sensitive and unlikely to be widely provided.

Finally, monitoring local sales and wholesale trends cannot identify the separate contributions of increasing quitting, reducing initiation and the average amount smoked. For this we must turn

to complementary national survey data; however, survey data can significantly underestimate total consumption<sup>12</sup> and in this setting has been shown to provide imprecise information.<sup>13</sup>

## Conclusion

Wholesale invoice data provide a close estimate of sales of tobacco in these remote NT Aboriginal stores. With some limitations, this wholesale data may be able to be used to unobtrusively and sustainably monitor local trends in Indigenous tobacco consumption and complement national survey results. However, the limitations of this monitoring with wholesale data may require it to be complemented with other local measurement methods of Indigenous smoking, with periodic assessment of its validity.

This monitoring of Indigenous tobacco consumption could be used in evaluations of the impact of future local Indigenous tobacco control projects and to identify remote communities that are succeeding in reducing consumption. The lessons learnt from successful communities and these evaluations could then inform future work to reduce high smoking rates among Aboriginal and Torres Strait Islander peoples.

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