

Canada Post community mailboxes: Implications for health research

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ABSTRACT

This article discusses the implications for health research of Canada Post's transition from door-to-door postal delivery to community mailboxes. We argue that using postal code data to geocode participants based on community mailboxes will result in positional and linkage errors. Positional errors involve misplacing people's residential location. Linkage errors result from incorrectly linking residential location from community mailboxes to census or health administrative data. The article discusses examples of how the transition to community mailboxes could have important implications for health research. We encourage research examining the extent of positional and linkage errors on the 11 pilot communities transitioning to community mailboxes in the fall of 2014.

KEY WORDS: Geography; data collection; health; epidemiology

La traduction du résumé se trouve à la fin de l'article.

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It is recognized that where you live plays a small but important role in determining health.¹ Six-digit postal codes are commonly used in health research to identify individuals' location in space, usually their residential location, and derive environmental exposure measures based on census data or other administrative data sources² which are then linked to health data. Over the next 5 years, Canada Post will transition 5 million Canadians from door-to-door postal delivery to community mailboxes.³ Eleven communities will pilot test the transition. These include neighbourhoods in Calgary, Fort McMurray, Winnipeg, Oakville, Ottawa, Rosemère, Lorraine, Bois-des-Fillion, Charlemagne, Repentigny, Halifax, Lower Sackville and Bedford, and represent a combined total of 86,950 addresses.

As Canada Post transitions to community mailboxes, 6-digit postal codes will be assigned to community mailbox areas instead of smaller postal code areas. Currently, 6-digit postal code areas correspond to approximately one city block in urban areas, while community mailbox areas are larger than postal code areas and can vary widely in size. It is plausible that over the course of the transition to community mailboxes, Canada Post may choose not to maintain 6-digit postal codes and transition to a unique community mailbox number instead. In both cases, the transition to community mailboxes may have important implications for health research. We highlight these below.

Individual's residential location will be misplaced

In comparison to assignment based on 6-digit postal codes, assigning people to a geographic location based on their community mailbox location will increase positional error. This error stems from the difference between an assigned location and one's true location in space.^{4,5} A recent Canadian study estimated that when using 6-digit postal codes, positional errors ranged from 109 metres to 1363 metres in urban and rural areas respectively.⁴ Reliance on community mailboxes will increase

positional errors. Using a single community mailbox to represent multiple 6-digit postal codes will reduce precision when health researchers assign individuals to a home location (Figure 1A).

Linking residential location to the census or national health survey

Health researchers often use postal code information to link health data with census data. Currently, Statistics Canada develops Postal Code Conversion Files (PCCF & PCCF+) to link 6-digit postal codes to census geographic areas (e.g., dissemination area [DA]). The transition to community mailboxes is of concern for Statistics Canada, as noted in the 2013 Postal Code Conversion File Reference Guide: "community mailboxes are a growing source for multiple records per postal code on the PCCF. In newer urban delivery areas, postal codes are assigned to a community mailbox that may cover partial dissemination blocks, both sides of a street, and different streets within 200 metres of the community mailbox. These situations often result in multiple links being established between a postal code and block-faces, unlike the more traditional urban postal codes, which correspond generally to a block-face."^{6, p.9} (Figure 1B) Linkage errors from postal codes to census geographies will make studies using these linkages biased in unknown ways.

Examples of the problem

Positional and linkage errors described above will result in greater misclassification of environmental exposures in health research.

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Figure 1A

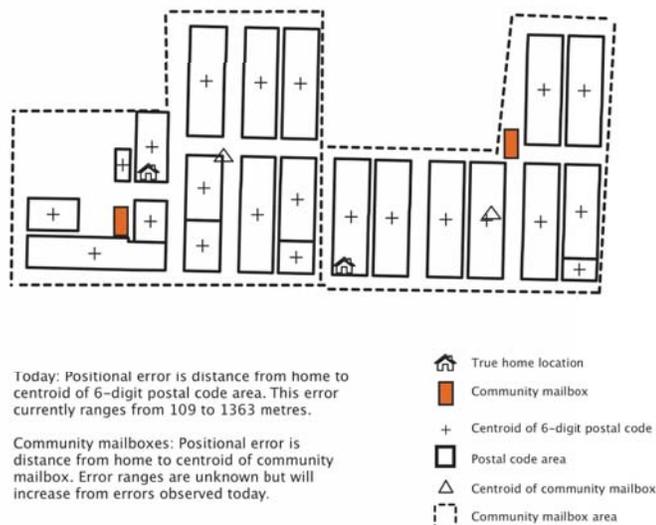


Figure 1B

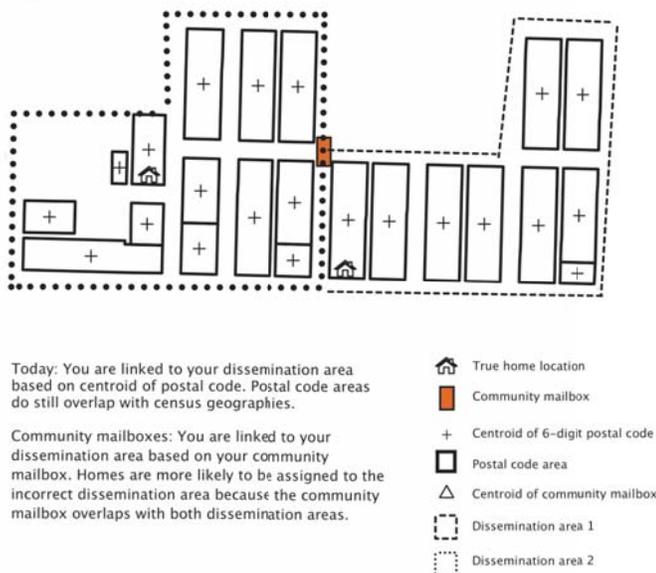


Figure 1. Examples of positional and linkage errors resulting from the change to community mailboxes

Researchers will not be able to use 6-digit postal codes to locate, as precisely as possible, individuals' homes, and derive exposure measures based on this location.

There are three major research implications resulting from the move to community mailboxes. First, using residential location as a proxy for socio-economic status (SES) in epidemiological research will be biased. There is evidence that residential SES is related to health¹ and that aggregate measures of SES at the postal code level are a reasonable proxy for individual-level SES in urban areas.⁷ It is not known how, for example, the results of a study by Roos et al.,⁸ who used individual health data linked to the Canadian census to estimate the odds of premature mortality by neighbourhood SES, would change given positional and linkage

errors. Second, studies examining access (or proximity) to health-enhancing (e.g., green space, grocery stores) and health-diminishing (e.g., fast food outlets) resources will have greater measurement error, which will bias results.^{9,10} Finally, researchers will struggle to define environmental exposures by linking postal code information to census geographies.¹¹ For example, a study by Hoek et al.¹² used residential location to define exposure to air pollution and showed that cardiopulmonary mortality was associated with living near a major road (relative risk 1.95, 95% CI 1.09-3.52). If residential location is not correct based on postal code, the results of this study could be biased and erroneous. We have presented here three illustrative examples of the problem but there are potentially many other examples, depending on the research area.

What will the future look like?

In many places in Canada, particularly small towns and rural areas, community mailboxes or post office boxes are already in place. Examining research comparing linkage and positional errors in urban and rural areas sheds light on the future of this type of research in Canada. For example, Pampalon et al.¹³ showed that survival inequalities in small towns and rural areas are lower than elsewhere when area-based measures of socio-economic status are used. It is plausible that the different results for urban and rural areas are due to positional and linkage errors in the data. Healy et al.⁴ show that in rural areas, the mean distance error for access to the closest hospital is 3285 metres compared to a mean of 414 metres in urban areas. In the context of health policy planning, an error of over 3 kilometres in the estimate of the distance between someone's home and a hospital's location is not acceptable.

Moving forward with health geographic research in Canada

The upcoming changes to Canada Post have the potential to bias studies using postal codes and census or national health survey data. We believe these changes have broad implications for the health of all Canadians and should be addressed by the research community, Statistics Canada, and Canada Post. Canadian researchers should study potential positional and linkage errors due to the implementation of community mailboxes. We believe that the 11 pilot communities can and should serve as an important case study to evaluate potential measurement error and biases in health research that could accompany the transition to community mailboxes.

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RÉSUMÉ

Notre article porte sur les conséquences, pour la recherche sur la santé, de la transition de Postes Canada de la livraison du courrier de porte en porte au service de boîtes postales communautaires. Nous faisons valoir que l'utilisation du code postal pour géocoder les participants selon leur boîte postale communautaire entraînera des erreurs de position et de liaison. Les erreurs de position consistent à mal classer les gens selon leur lieu de résidence. Les erreurs de liaison résultent de la liaison incorrecte du lieu de résidence selon la boîte postale communautaire aux données du Recensement ou aux données administratives sur la santé. Nous présentons des exemples qui montrent que le passage au service de boîtes postales communautaires pourrait avoir de lourdes conséquences pour la recherche sur la santé. Nous encourageons les chercheurs à examiner l'étendue des erreurs de position et de liaison pour les 11 communautés pilotes qui sont passées aux boîtes postales communautaires à l'automne 2014.

MOTS CLÉS : géographie; collecte de données; santé; épidémiologie