Prevalence of urinary incontinence in New Zealand women from the cross-sectional Sexual and Reproductive Health module of the New Zealand Health Survey 2014/2015

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ABSTRACT

AIMS: To describe urinary incontinence prevalence for New Zealand women.

METHODS: The New Zealand Health Survey Adult Sexual and Reproductive Health module 2014/2015 was used to estimate urinary incontinence prevalence. Associations between urinary incontinence and age, body mass index (BMI), parity and ethnicity were estimated by logistic regression adjusted for sampling weights.

RESULTS: There were 2,472/5,685 (43.5%) of women aged between and 16 and 74 who responded to the urinary incontinence question and reported at least some incontinence. The sample survey weight-adjusted prevalence (95% confidence interval) was 41.7% (40.0–43.4). An increased prevalence of incontinence was seen with older age, increased BMI and greater parity. The association between BMI and parity was complex, with the lower prevalence with lower BMI attenuated with increasing parity. After adjustment for these variables there was no association with incontinence prevalence for Māori versus non-Māori or European versus non-European.

CONCLUSIONS: Urinary incontinence is highly prevalent in New Zealand women. There was no association with ethnicity after adjusting for older age, increased BMI and parity. The prevalence identified in the New Zealand Health Survey is higher than that reported in older surveys based on the electoral roll.

Urinary incontinence is the complaint of involuntary urinary loss. It is a bothersome condition that is strongly associated with reduced quality of life.[1]

Most of the research in this area in New Zealand is relatively old and difficult to interpret in the context of the changing New Zealand population structure with respect to age and ethnicity. There has been a decline in parity of New Zealand women over the last 30 years, particularly for Pākehā, and this may influence prevalence estimates. Diabetes and obesity have increased in prevalence over recent decades, and this may also have substantially affected the prevalence of continence problems overall, and within different ethnic groups. Continence problems affect both men and women and there is little published information about the prevalence of urinary incontinence in men in New Zealand. The past research comprises regional surveys, all based on random samples of local electoral roll, from Gisborne,[2] Dunedin[3] and Wellington.[4] The Gisborne study (1985) was of people over the age of 65 years, with the definition of urinary incontinence as a positive response to the question "*Have you ever wet yourself?*" in a face-to-face interview. For this study 11.6% of respondents reported incontinence. The Dunedin study (1988) was a phoned interview of a sample of women from the electoral roll. The overall prevalence of urinary incontinence was 31%. Only 35% of this sample had sought help. The Wellington study (1994) was a postal questionnaire with phoned follow-up of a sample of women. The overall prevalence of urinary incontinence was 34%. There was higher prevalence in Māori (47%) and European (31%) compared to Pacific women (29%).

The authors recently gave advice to the Ministry of Health New Zealand Health Survey design team about specific questions for the planned 2024 New Zealand Health Survey and through these discussions learned that the urinary incontinence questions from the 2014/2015 survey have never been published.

The aim of this study is to estimate the prevalence of any urinary incontinence in women

in New Zealand and to explore associations with age, ethnicity, body size and parity based on the unpublished New Zealand Health Survey urinary incontinence data.

Methods

The full methodology of the New Zealand Health Survey and the Adult Sexual and Reproductive Health module are available on the Ministry of Health – Manatū Hauora website.[5,6]

In brief, this is a sample survey that is carried out annually, with the main survey collecting standardised information from a set of core questions, and is administered to adults aged 15 years and older face-to-face and by computer-assisted techniques. In addition, separate "modules" focussing on specific conditions are also administered, and for this report the data summaries and analyses are based on the urinary incontinence questions in the Sexual and Reproductive Health module. The continence questions comprised two questions: about frequency of incontinence in relation to month, week and day; and amount of incontinence, categorised as "a few drops", "enough to wet your underwear", "enough to wet your outer clothing" and "enough to wet the floor." These questions were based in turn on questions from the United States of America's Nurses Health Study 2003. These questions were only asked of female participants. The sample selection was a multi-stage, stratified, probability-proportional-to-size design of approximately 13,000 adults and 4,500 children, and a dual frame approach was used with an area-based sample using "meshblocks" and a list-based electoral roll sample. Exclusions from the survey population are specific types of non-private dwellings, which includes hospitals, dementia care units, hospital-level care in aged care facilities and very remote and sparsely populated areas. The final weighted response rate was 79% for adults.

Ethnicity group variables used the concept of "total response ethnicity", meaning that survey respondents can appear in and contribute to statistics for more than one ethnic group; and these were summarised by Māori, Pacific, Asian and European/Other, the latter including mainly Middle-Eastern, Latin-American and African ethnicities, and those who answered "New Zealander". For age, this was grouped in the survey into three bands: 16–29 years, 30–49 years and 50–74 years. For body size, this was grouped in categories in relation to body mass index (BMI) as <18.5, 18.5–25, 25–30 and >30kg/m^2. The variable used for parity was the numeric response to the question "*How many live children have you given birth to*" with parity of 3 or more treated as one category.

Access to the data used in this study was provided by Statistics New Zealand under conditions designed to keep individual information secure in accordance with requirements of the *Data and Statistics Act 2022*. The opinions presented are those of the authors and do not necessarily represent an official view of Statistics New Zealand.

The data tabulations include both the raw counts and proportions, and the proportions estimated after accounting for sampling weights. For analysis purposes we have opted to use "any incontinence" as the measurement of incontinence and we describe the associations between urinary incontinence, age band, BMI category, parity and ethnicity, with logistic regression, also accounting for sampling weights. We give a summary of the proportion of participants with incontinence in relation to how often participants reported they had incontinence. Interaction terms are used to explore if associations between urinary incontinence and age band depend on BMI or parity. If the interaction p-value is not significant then main effects are reported for comparison of age bands with the youngest band and for ethnicity, BMI or parity, each adjusted for age band. If the interaction p-value is significant then there is evidence that the association between incontinence and age band depends on BMI or parity. The associations with ethnicity are shown after adjustment for age band, BMI and parity, and their two-way interactions. This is shown for Māori versus non-Māori and European versus non-European.

SAS 9.4 was used for analyses, and in particular "Proc Samplefreq" for estimation of prevalence and "Proc Samplelogistic" for the sample weight-adjusted logistic regression analyses of associations between continence and age, body size, parity and ethnicity.

Results

The numbers of participants answering each general section varied: 5,685 had data on age, 5,377 on BMI and 4,214 on parity. The prevalence estimates for any urinary incontinence by age band and BMI category, age band and parity, and

parity and BMI category are shown in Tables 1–3. Prevalence by these variables is also shown in Figure 1. Among those with any incontinence, 1,022/2,472 (41%) had incontinence less than monthly, 1,076 (47%) at least once a week up to monthly and 374 (15%) daily. As shown in Table 4 there was no evidence of a two-way interaction between age band and BMI category (P=0.49) or age-band and parity (P=0.14) but there was evidence of an interaction between parity and BMI category (P<0.001), and for a main effect of age (P=0.04). For the main effect of age, both the older age bands had a greater probability of having incontinence compared to the youngest age category, with an odds ratio for association of about 1.5 for both older age bands. The relationship between parity and BMI category was more complex. In general, those in the lowest BMI category (<18.5) had a lower probability of incontinence compared to those in the 18.5–25 category, although the strength of this association weakened as parity increased. The prevalence in the lowest BMI category for those with a parity of 0 was not able to be estimated due to low cell counts. In general, those in the higher BMI categories had a higher probability of incontinence compared to those in the 18.5–25 category, although the strength of this association was not as strong when parity was in the categories of 1 or 2 for those in the BMI category of 25–30. In general, higher parity was associated with a greater probability of incontinence although this was most marked when moving from parity 0 to 1, and a smaller increase in probability from 1 to greater parity.

Because of the way ethnicity was categorised it was not possible to model ethnicity in mutually exclusive categories; however, because of the effect of age identified in the analysis above, Table 5 shows prevalence estimates for urinary incontinence by ethnicity and age band. Estimated prevalence by ethnicity and age is also shown in Figure 2. In a logistic regression model, there was no evidence of an interaction between Māori ethnicity versus non-Māori and any of age (P=0.22) or BMI category (P=0.78) and a weak association with parity (P=0.02). Table 6 shows associations of incontinence with ethnicity after adjustment for the other possible predictors of incontinence: age, BMI and parity. After adjustment for the other effects there was no evidence that Māori had a higher probability of incontinence. In a similar model, there was no evidence of an interaction between European ethnicity versus non-European and any of age (P=0.41), BMI category (P=0.18) or parity (P=0.36), and the main effects associations are also shown in Table 6. There was also no evidence of an association between European versus non-European ethnicity and urinary incontinence after adjustment for the other variables.

Discussion

The complaint of any urinary incontinence is highly prevalent in New Zealand women, with an overall prevalence of over 50% in women aged between 50 and 74 years, although the complaint was also prevalent in the younger age band—women aged between 16 and 29 years—at around 21%. Incontinence severity was more than monthly for about 60% of those with incontinence. There was evidence that incontinence prevalence increased with older age, greater BMI and greater parity, although the effect of parity also depended on BMI, with the lower prevalence of incontinence with BMI <18.5 being attenuated with greater parity. The presence of incontinence was not associated with ethnicity after adjustment for other possible predictors of incontinence: age, BMI and parity.

The strengths of this analysis are the high response rate, about 80%, and the representative sample with appropriate weighting in relation to the sampling process. There was good representation of different ethnicities. Weaknesses of the data are that it did not include those in very old age ranges or those living in residential care, that the question assessing continence was based on an older questionnaire and may not have the good measurement properties of contemporary questionnaires, and that BMI was by self-report.

For analysis purposes we opted to use “any incontinence” in terms of frequency of the symptom, although we noted about 60% of those with incontinence had this symptom monthly or more often and 15% had daily or more often incontinence. We felt the volume of incontinence question was, by contemporary standards, likely to be inaccurate as a gauge of incontinence severity.[7]

The prevalence identified in this survey is likely to be relatively unbiased because of the robust sampling process, the relatively high response rate and using questions about frequency of incontinence that were likely to elicit a response close to the target response of “any incontinence.” Prevalence of urinary incontinence identified in

Table 1: Urinary incontinence prevalence by age band and BMI category.

All	Raw proportion N/N (%)	Proportion (%) adjusted for sampling weights (95% confidence interval)
Age band (years)		
16–29	340/1,304 (26.1)	20.8 (18.1–23.6)
30–49	1,013/2,200 (46.1)	46.6 (43.7–49.4)
50–74	1,119/2,181 (51.3)	51.0 (48.3–53.8)
BMI categories		
<18.5	15/80 (18.8)	13.2 (5.8–20.6)
18.5–25	582/1,688 (34.5)	33.2 (31.3–36.2)
25–30	651/1,503 (43.3)	42.0 (38.7–45.3)
>30	1,088/2,106 (51.7)	51.6 (48.7–54.6)
BMI categories		
<18.5		
Age band (years)		
16–29	1/36 (2.8)	0.9 (0–2.8)
30–49	7/24 (29.2)	32.5 (10.0–55.0)
50–74	7/13 (35.0)	23.1 (4.1–42.1)
18.5–25		
Age band (years)		
16–29	102/470 (21.7)	17.1 (12.9–21.4)
30–49	254/665 (38.2)	39.5 (34.6–444)
50–74	226/533 (40.9)	42.3 (36.9–47.7)
25–30		
Age band (years)		
16–29	68/283 (24.0)	20.7 (14.8–26.6)
30–49	265/563 (47.1)	46.7 (41.2–52.2)
50–74	318/657 (48.4)	48.6 (43.5–53.6)
>30		
Age band (years)		
16–29	125/400 (31.3)	27.0 (21.7–32.4)
30–49	425/811 (52.4)	54.0 (49.2–58.88)
50–74	538/895 (60.1)	60.3 (56.0–64.6)

Table 2: Urinary incontinence prevalence by age band and parity.

All	Raw proportion N/N (%)	Proportion (%) adjusted for sampling weights (95% confidence interval)
Age band (years)		
16–29	340/1,304 (26.1)	20.8 (18.1–23.6)
30–49	1,013/2,200 (46.1)	46.6 (43.7–49.4)
50–74	1,119/2,181 (51.3)	51.0 (48.3–53.8)
Parity		
0	82/230 (35.7)	33.7 (26.2–41.3)
1	392/876 (44.8)	43.7 (39.2–48.2)
2	747/1,465 (51.3)	52.0 (48.6–55.4)
3+	876/1,643 (53.3)	55.2 (52.0–58.5)
Parity categories		
0		
Age band (years)		
16–29	29/91 (31.9)	34.2 (22.0–46.4)
30–49	29/91 (31.9)	25.8 (15.2–6.4)
50–74	24/48 (50)	52.1 (34.8–69.3)
1		
Age band (years)		
16–29	105/251 (41.8)	40.9 (33.0–48.8)
30–49	182/412 (44.2)	43.9 (37.3–50.6)
50–74	105/213 (49.3)	45.7 (36.5–54.9)
2		
Age band (years)		
16–29	61/135 (45.2)	41.3 (30.4–52.1)
30–49	329/643 (51.2)	52.9 (47.9–58.0)
50–74	357/678 (52.7)	52.4 (47.5–57.4)
3+		
Age band (years)		
16–29	41/117 (35.0)	38.1 (25.6–50.5)
30–49	348/634 (54.9)	56.3 (51.0–61.5)
50–74	487/892 (54.6)	55.8 (51.5–60.1)

Table 3: Urinary incontinence prevalence by parity and BMI category.

All	Raw proportion N/N (%)	Proportion (%) adjusted for sampling weights (95% confidence interval)
BMI category		
<18.5	15/80 (18.8)	13.2 (5.8–20.6)
18.5–25	582/1,688 (34.5)	33.2 (31.3–36.2)
25–30	651/1,503 (43.3)	42.0 (38.7–45.3)
>30	1,088/2,106 (51.7)	51.6 (48.7–54.6)
Parity		
0	82/230 (35.7)	33.7 (26.2–41.3)
1	392/876 (44.8)	43.7 (39.2–48.2)
2	747/1,465 (51.3)	52.0 (48.6–55.4)
3+	876/1,643 (53.3)	55.2 (52.0–58.5)
Parity categories		
0		
BMI category		
<18.5	0/2 (0)	NA
18.5–25	17/70 (24.3)	23.9 (11.1–36.6)
25–30	19/48 (36.6)	40.0 (22.6–57.3)
>30	31/73 (42.5)	36.3 (23.0–49.5)
1		
BMI category		
<18.5	2/8 (25)	18.2 (0–45.0)
18.5–25	111/292 (38.0)	38.7 (31.0–46.4)
25–30	104/225 (46.2)	46.3 (37.2–55.3)
>30	144/286 (50.4)	51.1 (43.3–58.8)
2		
BMI category		
<18.5	9/20 (45)	34.1 (10.2–58.0)
18.5–25	215/442 (48.6)	47.7 (41.8–53.5)
25–30	199/427 (46.6)	45.5 (39.4–51.5)

Table 3 (continued): Urinary incontinence prevalence by parity and BMI category.

>30	291/498 (58.4)	62.8 (57.1–68.4)
3+		
BMI category		
<18.5	2/10 (20)	38.0 (0–78.0)
18.5–25	143/36 (39.1)	44.9 (37.9–52.0)
25–30	244/461(52.9)	55.2 (49.2–61.1)
>30	450/737 (61.1)	60.7 (55.9–65.5)

Table 4: Association between urinary incontinence and age band, BMI category and parity.

Comparison	Odds ratio (95% confidence interval)	P-value
Age band–parity interaction	NA	0.14
Age band–BMI category interaction	NA	0.49
Age band (years) main effect		0.04
30–49 versus 16–29	1.5 (1.1–1.9)	
50–74 versus 16–29	1.5 (1.1–2.0)	
Parity–BMI category interaction		<0.001
Parity 0		
<18.5 versus 18.5–25	NA	
25–30 versus 18.5–25	2.2 (0.8–6.1)	
>30 versus 18.5–25	1.9 (0.8–4.8)	
Parity 1		
<18.5 versus 18.5–25	0.4 (0.06–2.3)	
25–30 versus 18.5–25	1.3 (0.8–2.2)	
>30 versus 18.5–25	1.7 (1.1–2.7)	
Parity 2		
<18.5 versus 18.5–25	0.6 (0.2–1.7)	
25–30 versus 18.5–25	0.9 (0.7–1.3)	
>30 versus 18.5–25	1.7 (1.1–2.7)	
Parity 3+		
<18.5 versus 18.5–25	0.8 (0.1–4.3)	
25–30 versus 18.5–25	1.5 (1.0–2.2)	
>30 versus 18.5–25	1.9 (1.3–2.7)	

Table 5: Urinary incontinence prevalence by age band and ethnicity.

All	**Raw proportion** **N/N (%)**	**Proportion (%) adjusted for sampling weights** **(95% confidence interval)**
Age band (years)		
16–29	340/1,304 (26.1)	20.8 (18.1–23.6)
30–49	1,013/2,200 (46.1)	46.6 (43.7–49.4)
50–74	1,119/2,181 (51.3)	51.0 (48.3–53.8)
Total	2,472/5,685 (43.5)	41.7 (40.0–43.4)
Ethnicity categories		
Non-Māori		
Age band (years)		
16–29	198/867 (22.8)	18.9 (15.8–22.0)
30–49	716/1,612 (44.4)	45.9 (42.7–49.0)
50–74	865/1,733 (49.9)	50.3 (47.3–53.4)
Total	1,779/4,212 (42.2)	41.2 (39.3–43.1)
Māori		
Age-band (years)		
16–29	142/497 (32.5)	29.2 (23.9–34.6)
30–49	297/588 (50.5)	51.1 (45.7–56.4)
50–74	254/448 (56.7)	57.5 (51.7–63.3)
Total	693/1,473 (47.1)	45.0 (41.7–48.3)
Non-Pacific		
Age band (years)		
16–29	299/1,153 (25.9)	20.8 (17.9–23.8)
30–49	951/2,051 (46.4)	46.8 (43.9–49.7)
50–74	1,097/2,125 (51.6)	51.7 (48.9–54.5)
Total	2,347/5,329 (44.0)	42.5 (40.7–44.3)
Pacific		
Age band (years)		
16–29	41/151 (27.2)	21.0 (13.4–28.6)
30–49	62/149 (41.6)	43.0 (33.0–53.1)

Table 5 (continued): Urinary incontinence prevalence by age band and ethnicity.

50–74	22/56 (39.3)	25.0 (13.1–36.9)
Total	125/356 (35.1)	29.6 (23.8–35.3)
Non-Asian		
Age band (years)		
16–29	327/1,145 (28.6)	24.7 (21.5–28.0)
30–49	952/2,000 (47.6)	48.6 (45.6–51.6)
50–74	1,096/2,106 (52.0)	51.8 (48.9–54.6)
Total	2,375/5,251 (45.2)	44.4 (42.5–46.2)
Asian		
Age band (years)		
16–29	13/159 (8.2)	5.3 (2.1–8.5)
30–49	61/200 (30.5)	34.1 (25.8–42.4)
50–74	23/75 (30.7)	36.9 (22.2–51.6)
Total	97/434 (22.4)	22.8 (17.6–27.4)
Non-European		
Age band (years)		
16–29	118/516 (22.9)	14.9 (11.4–18.5)
30–49	271/636 (42.6)	41.0 (35.6–46.3)
50–74	207/387 (53.5)	47.2 (39.9–54.5)
Total	596/1,539 (38.7)	31.9 (28.7–35.1)
European		
Age band (years)		
16–29	222/788 (28.2)	24.4 (20.6–28.2)
30–49	742/1,564 (47.4)	48.5 (45.2–51.9)
50–74	912/1,794 (50.8)	51.6 (48.6–54.6)
Total	1,876/4,146 (45.2)	44.8 (42.8–46.8)

Table 6: Association between urinary incontinence and ethnicity in adjusted models.

Comparison	Odds ratio (95% confidence interval)	P-value
Māori ethnicity		
Age band (years)		0.02
30–49 versus 16–29	1.5 (1.1–2.0)	
50–74 versus 16–29	1.5 (1.1–2.0)	
BMI category		<0.001
<18.5 versus 18.5–25	0.6 (0.3–1.3)	
25–30 versus 18.5–25	1.2 (1.0–1.5)	
30+ versus 18.5–24	1.8 (1.5–2.3)	
Parity		0.002
1 versus 0	1.6 (1.1–2.5)	
2 versus 0	2.0 (1.3–3.1)	
3+ versus 0	2.1 (1.4–3.2)	
Māori versus non-Māori	1.0 (0.8–1.2)	0.85
European ethnicity		
Age band (years)		0.03
30–49 versus 16–29	1.5 (1.1–1.9)	
50–74 versus 16–29	1.4 (1.1–2.9)	
BMI category		<0.001
<18.5 versus 18.5–25	0.6 (0.3–1.3)	
25–30 versus 18.5–25	1.2 (1.0–1.5)	
30+ versus 18.5–24	1.8 (1.5–2.3)	
Parity		0.001
1 versus 0	1.7 (1.1–2.6)	
2 versus 0	2.0 (1.3–3.1)	
3+ versus 0	2.2 (1.4–3.3)	
European versus non-European	1.2 (1.0–1.5)	0.09

Figure 1: Urinary incontinence prevalence by age, BMI and parity.

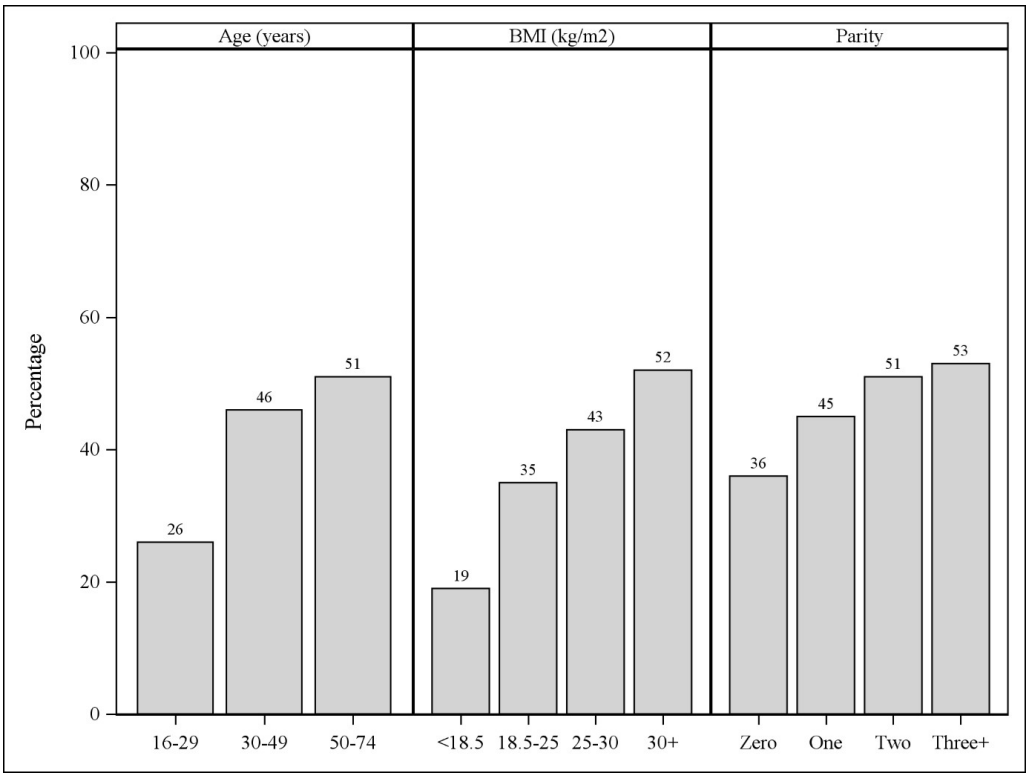
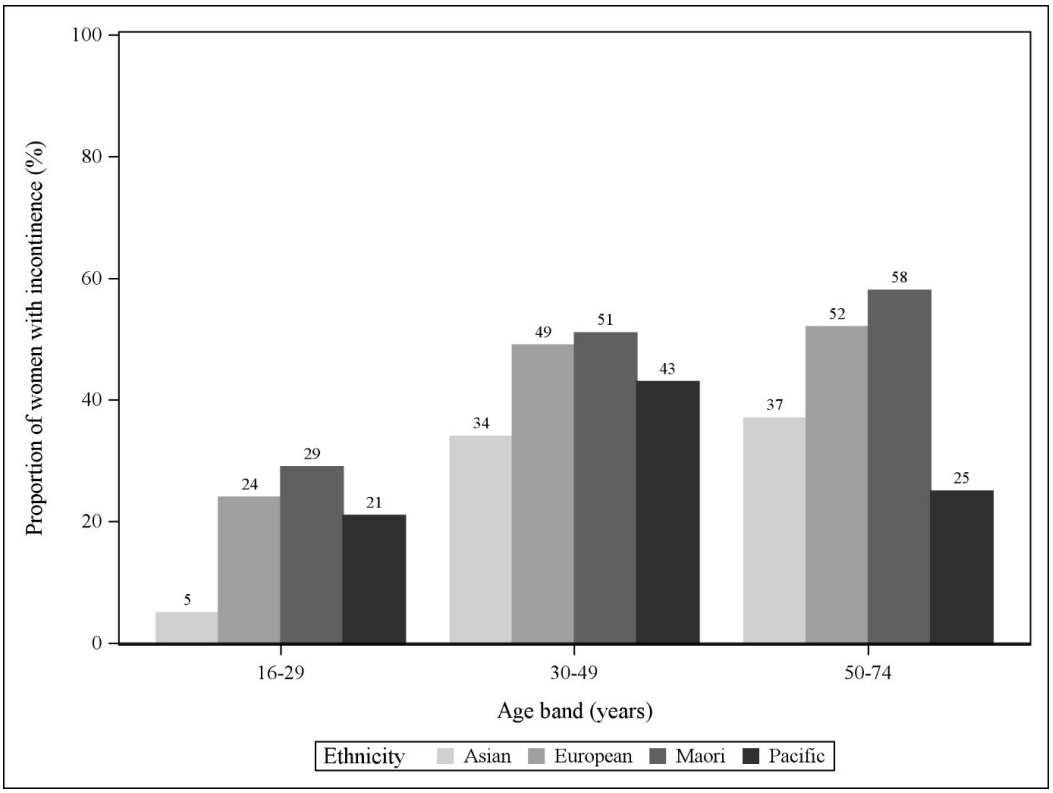


Figure 2: Urinary incontinence prevalence by ethnicity and age band.



the Health Survey is substantially higher than that in other New Zealand surveys. It is difficult to know how much response bias and sample frame inefficiencies (such as relying only on the electoral roll) may have caused this discrepancy, or whether this represents an increase in the prevalence of a likely causal risk factor—obesity—for the respondents in this survey compared to past surveys.

This Health Survey did not ask about help-seeking behaviour or about self-management strategies, but clearly there is likely to be substantial unmet need both for treatment and for provision of healthcare management to otherwise reduce the effect of incontinence on quality of life as well as an additional problem of inequitable distribution of services across New Zealand.[8] It would be useful for healthcare planners to consider addressing the unmet needs of women with incontinence, as it seems likely most women are not seeking help and are funding their own continence care, such as self-purchase of continence products. This has been the case in the United Kingdom,[9] although the New Zealand Women's Health Strategy only mentions incontinence twice, and one of these in relation to the issue of surgical mesh.[10] It would be useful to compare the New Zealand approach to the provision of "period" products with the difficulty of access to continence services and products.

For older adults with continence problems there is non-experimental evidence in New Zealand that continence, particularly in the setting of mobility problems, is associated with an increased risk of residential care.[11,12] If the very high prevalence of incontinence in this group, up to age 75, is carried through to older age, this may be challenging for healthcare resources allocated to the care of older adults.

We were unable to identify a difference in the prevalence of incontinence in relation to ethnicity after adjustment for age, parity and body size as measured by self-reported BMI. There may still be inequities in relation to continence, however, in relation to access to healthcare or continence products where these are needed. This was not captured in the Health Survey.

The associations with urinary incontinence identified in the Health Survey have been previously reported for all of age, obesity and parity.[13–19] Of these, likely the factor that may be most amenable to change may be obesity: both at an individual level for those with incontinence and a larger body size, but also at population level.

COMPETING INTERESTS
Nil.

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URL
https://nzmj.org.nz/journal/vol-137-no-1598/prevalence-of-urinary-incontinence-in-new-zealand-women-from-the-cross-sectional-sexual-and-reproductive-health-module-of-the-ne

ERRATUM
https://nzmj.org.nz/journal/vol-137-no-1599/erratum

REFERENCES
1. Pizzol D, Demurtas J, Celotto S, et al. Urinary incontinence and quality of life: a systematic review and meta-analysis. Aging Clin Exp Res. 2021;33(1):25-35. doi: 10.1007/s40520-020-01712-y.
2. Campbell AJ, Reinken J, McCosh L. Incontinence in the elderly: Prevalence and prognosis. Age Ageing. 1985;14(2):65-70. doi: 10.1093/ageing/14.2.65.
3. Holst K, Wilson PD. The prevalence of female urinary incontinence and reasons for not seeking treatment. N Z Med J. 1988;101(857):756-758.
4. Lara C, Nacey J. Ethnic differences between Maori, Pacific Island and European New Zealand women in prevalence and attitudes to urinary incontinence. N Z Med J. 1994;107(986 Pt 1):374-376.
5. Ministry of Health – Manatū Hauora. Methodology Report 2014/2015: New Zealand Health Survey [Internet]. Wellington: Ministry of Health; 2015 [cited 2024 Apr 10]. Available from: https://www.health.govt.nz/publication/methodology-report-2014-15-new-zealand-health-survey.
6. Ministry of Health – Manatū Hauora. Content Guide 2014/15: New Zealand Health Survey [Internet]. Wellington: Ministry of Health; 2015 [cited 2024 Apr 10]. Available from: https://www.health.govt.nz/system/files/documents/publications/new-zealand-health-survey-content-guide-2014-15-dec15.pdf.
7. Castro-Diaz D, Robinson D, Arlandis Guzman S, Bosch JLH, Costantini E, Cotterill N, et al. Patient-reported outcome assessment. In: Cardozo L, Rovner E, Wagg A, Wein A, Abrams P, editors(s). Incontinence 7th edition. Bristol, United Kingdom: International Continence Society; 2023. p. 437-485.
8. Esplin J, Smith J, Doust E, Poynton. Report on Good Practice of Continence Services in New Zealand [Internet]. Continence New Zealand; 2017 [cited 2024 Apr 10]. Available from: https://www.continence.org.nz/pages/Report-on-Good-Practice-of-Continence-Services-in-New-Zealand/199/.
9. United Kingdom Government. National pelvic health service to support women [Internet]. London: Department of Health and Social Care; 2023 [cited 2024 Apr 10. Available from: https://www.gov.uk/government/news/national-pelvic-health-service-to-support-women.
10. Ministry of Health – Manatū Hauora. Women's Health Strategy [Internet]. Wellington: Ministry of Health; 2023 [cited 2024 Apr 10]. Available from: https://www.health.govt.nz/publication/womens-health-strategy.
11. Weatherall M, Slow T, Wiltshire K. Risk factors for entry into residential care after a support needs assessment. N Z Med J. 2004;117(1202):U1075.
12. Schluter PJ, Ward C, Arnold EP, et al. Urinary incontinence, but not fecal incontinence, is a risk factor for admission to aged residential care of older persons in New Zealand. Neurourol Urodyn. 2017;36(6):1588-1595. doi: 10.1002/nau.23160.
13. Milsom I, Altman D, Cartwright R, Lapitan MC, Nelson R, Sjöström S, et al. Epidemiology of urinary incontinence (UI) and other lower urinary tract symptoms (LUTS), pelvic organ prolapse (POP) and anal incontinence (AI). In: Cardozo, L, Rovner, E, Wagg, A, Wein, A, Abrams, P, editors(s). Incontinence 7th edition. Bristol, United Kingdom: International Continence Society; 2023. p. 13-130.
14. Hannestad YS, Rortveit G, Sandvik H. A community-based epidemiological survey of female urinary incontinence: The Norwegian EPINCONT Study. J Clin Epidemiol. 2000;53(11):1150-7. doi: 10.1016/s0895-4356(00)00232-8.
15. Grodstein F, Fretts R, Lifford K, et al. Association of age, race, and obstetric history with urinary symptoms among women in the Nurses' Health Study. Am J Obstet Gynecol. 2003;189(2):428-434. doi: 10.1067/s0002-9378(03)00361-2.
16. Hunskaar S. A systematic review of overweight and obesity as risk factors and targets for clinical intervention for urinary incontinence in women. Neurourol Urodyn. 2008;27(8):749-757. doi: 10.1002/nau.20635.
17. Lamerton TJ, Torquati L, Brown WJ. Overweight and obesity as major, modifiable risk factors for

urinary incontinence in young to mid-aged women: a systematic review and meta-analysis. Obes Rev. 2018;19(12):1735-1745. doi: 10.1111/obr.12756.
18. Press JZ, Klein MC, Kaczorowski J, et al. Does cesarean section reduce postpartum urinary incontinence? A systematic review. Birth. 2007;34(3):228–237. doi: 10.1111/j.1523-536X.2007.00175.x.
19. Hage-Fransen MAH, Wiezer M, Otto A, et al. Pregnancy- and obstetric-related risk factors for urinary incontinence, fecal incontinence, or pelvic organ prolapse later in life: A systematic review and meta-analysis. Acta Obstet Gynecol Scand. 2021;100(3):373-382. doi: 10.1111/aogs.14027.