

# THE NEW ZEALAND SURVEY ON OCCUPATIONAL EXPOSURE AND HEALTH

(THE 'BURDEN' STUDY)



# OBJECTIVES



- To assess, through telephone interviews, current exposures and work practices in a random sample of the New Zealand workforce;
- What is the prevalence of exposure in the New Zealand work force?
- What groups within the work force carry a heavier burden of exposure?
- How are occupational exposures associated with health?

# QUESTIONNAIRE



- Demographic factors
- Work history
- More details about tasks and exposures of current or most recent job:
  - chemical exposures, dust
  - physical factors
  - organisational factors
  - PPE
- morbidity (e.g. respiratory symptoms, musculoskeletal problems, sleep disorders)

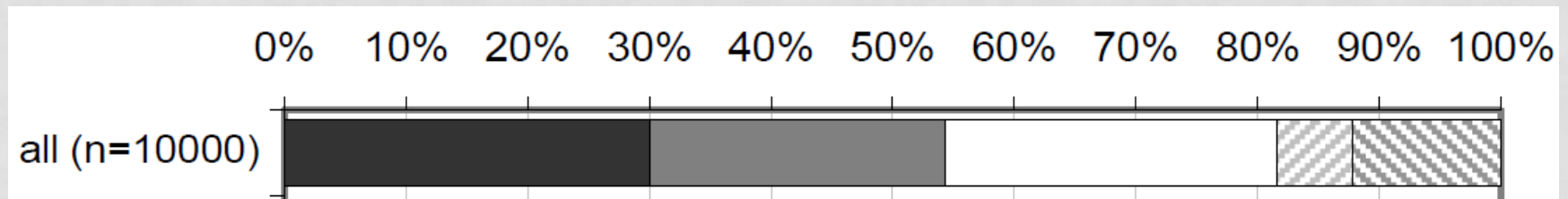
# RECRUITMENT



Figure 1: Recruitment flow chart of the survey.



# RESPONSE PROFILE

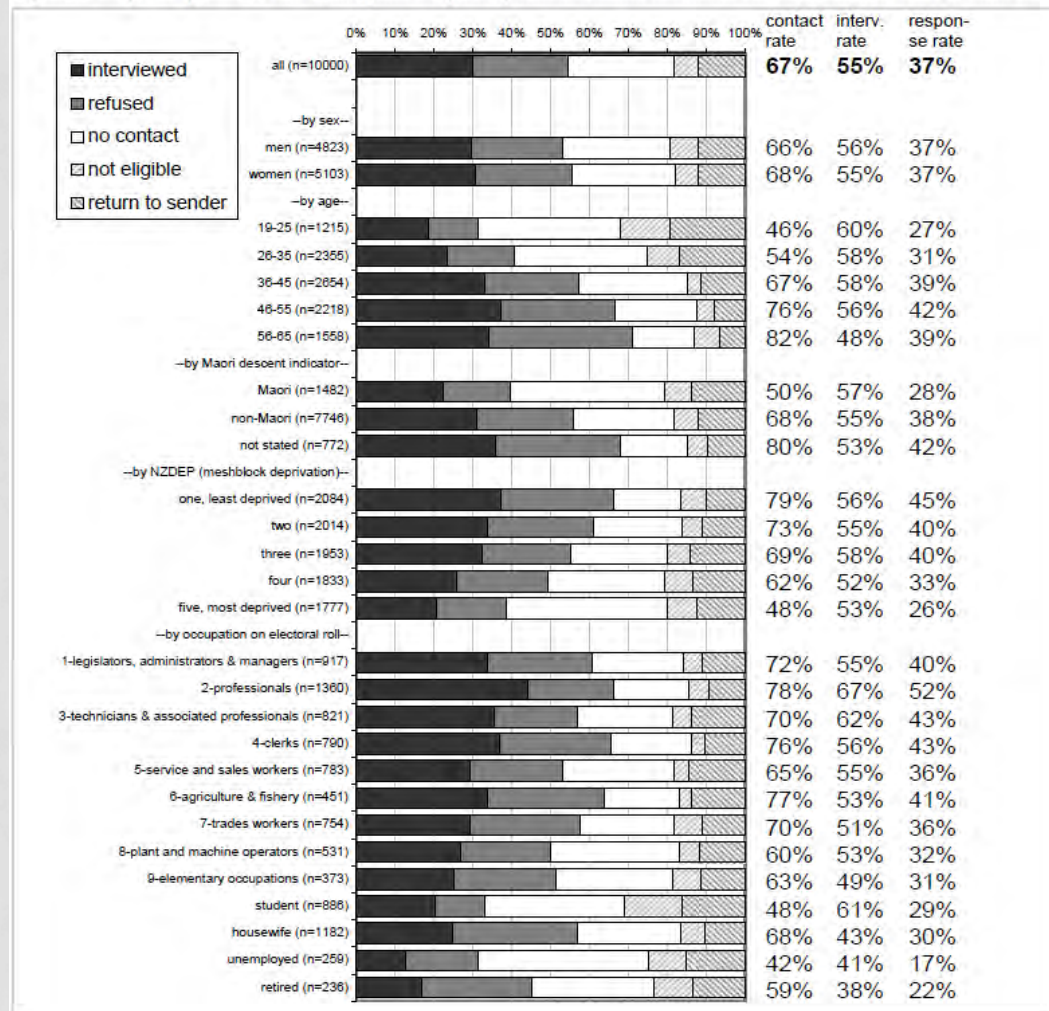


- interviewed
- refused
- no contact
- ▨ not eligible
- ▩ return to sender

# RESPONSE PROFILE IN DIFFERENT DEMOGRAPHIC GROUPS



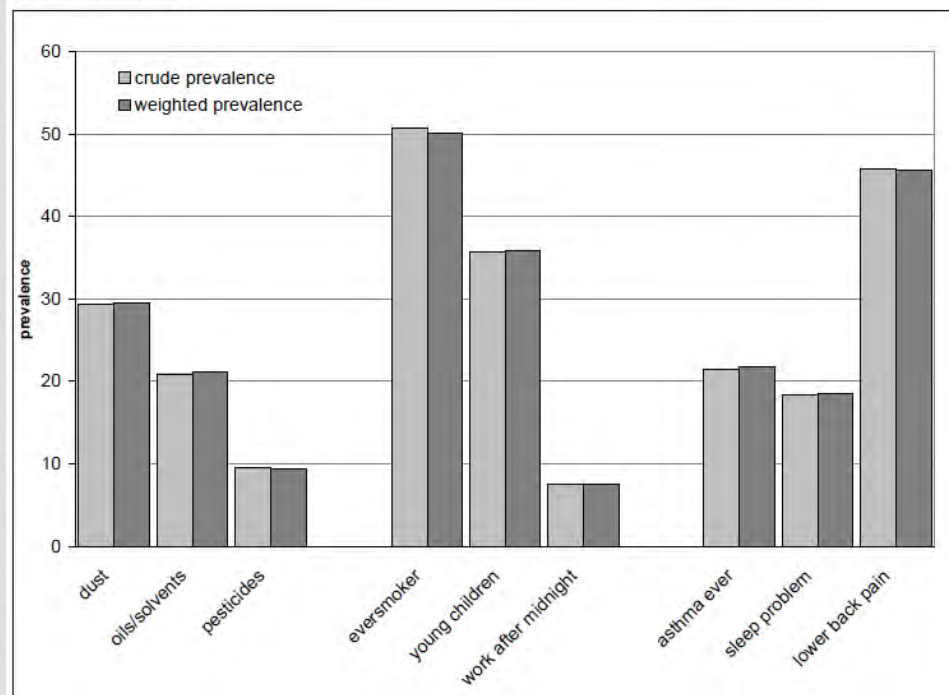
Figure 2: Response profile of the 10,000 potential participants in relation to the variables available on the Electoral Roll.



# EFFECT OF NON-RESPONSE ON PREVALENCE OF KEY VARIABLES



**Figure 3: Potential effect of non-response on survey prevalence data (3 exposures, 3 lifestyle factors, 3 health outcomes), by comparing the crude prevalence with prevalence weighted towards the sex, age, ethnicity, deprivation and occupational profile of the source population.**



# PREVALENCE OF EXPOSURE



Table 3. Self-reported exposure prevalence by current job (1-digit code)

	Total %	NZSCO 1 (legislators, administrators and managers, %)	NZSCO 2 (professionals, %)	NZSCO 3 (technicians and associate professionals, %)	NZSCO 4 (clerks, %)	NZSCO 5 (service and sales workers, %)	NZSCO 6 (agricultural and fishery workers, %)	NZSCO 7 (trades workers, %)	NZSCO 8 (plant and machine operators and assemblers, %)	NZSCO 9 (elementary workers, %)
Dust	29.4	25.2	17.3	19.3	18.3	20.1	55.8	75.4	55.3	37.2
Smoke/fume /gas	21.4	19.2	15.1	13.6	13.5	23.6	28.2	42.5	43.0	25.7
Oils and solvents	20.9	15.6	12.0	15.6	7.3	21.8	35.9	58.8	33.0	31.9
Acids or alkalis	9.4	6.7	6.9	7.0	2.5	8.3	25.4	21.7	11.7	14.2
Pesticides etc	9.6	5.0	3.7	5.9	2.8	2.9	63.0	16.7	10.6	16.8
Protective equipment	47.5	36.0	35.0	33.6	18.3	54.3	90.6	90.4	82.7	77.9
Night shift	6.9	7.0	7.6	5.2	2.3	8.7	5.7	4.8	17.5	9.1
Irregular hours	16.1	12.1	13.8	12.4	7.9	24.1	27.9	13.8	33.0	23.0
Lifting	39.3	27.4	25.5	31.1	24.2	53.6	70.0	68.8	56.4	64.6
Loud noise	29.9	21.8	19.7	18.1	15.8	24.4	48.9	71.6	67.6	52.2

# BY SEX



**Table 3** Differences in occupational exposure prevalence between males and females

Exposure	Exposure in males and females (whole sample)			
	Total n=3003 (%)	Male n=1431 (%)	Female n=1572 (%)	OR (95% CI)†
<b>Dust/chemical factors</b>				
Dust	29.3	40.3	19.3	2.83 (2.40 to 3.33)
Smoke/fume/gas	21.4	29.5	14.0	2.61 (2.17 to 3.13)
Oils and solvents	20.9	29.8	12.8	3.00 (2.48 to 3.62)
Acids or alkalis	9.4	13.4	5.8	2.57 (1.98 to 3.34)
Pesticides	9.6	14.5	5.0	3.14 (2.39 to 4.11)
Any of the above	45.4	57.0	34.7	2.52 (2.17 to 2.92)
<b>Physical factors</b>				
Lifting‡	39.2	43.1	35.8	1.40 (1.21 to 1.62)
Loud noise‡	29.9	40.1	20.5	2.70 (2.29 to 3.18)
Awkward or tiring positions‡	56.1	54.5	57.6	0.91 (0.78 to 1.05)
Awkward grip or hand movements‡	38.2	40.5	36.1	1.25 (1.08 to 1.45)
Standing‡	28.0	27.3	28.6	0.95 (0.81 to 1.11)
Tools that vibrate‡	11.4	17.6	5.7	3.80 (2.94 to 4.90)
<b>Organisational factors</b>				
Repetitive tasks‡	68.2	64.7	71.5	0.76 (0.65 to 0.89)
Working at very high speed‡	51.2	47.0	55.0	0.75 (0.65 to 0.87)
Working to tight deadlines‡	73.1	74.9	71.4	1.26 (1.07 to 1.49)
Night shift	7.1	10.2	4.3	2.57 (1.89 to 3.50)
Irregular hours	16.1	20.1	12.5	1.76 (1.44 to 2.15)
<b>Stress</b>				
Not at all—mildly	39.7	36.6	42.6	1.00 (ref)
Moderately	45.2	48.5	42.2	1.36 (1.16 to 1.59)
Very—extremely	15.1	15.0	15.3	1.14 (0.92 to 1.42)
<b>Household responsibility</b>	34.7	29.3	39.6	0.66 (0.57 to 0.78)

Prevalence ORs and 95% CIs use the unexposed as the reference group for each occupational factor.

\*Males and females matched on current occupation (New Zealand Standard Classification of Occupations five-digit code).

†Adjusted for age.

‡A quarter of the time or more.

# BY ETHNICITY - MEN



**TABLE III.** Differences in Occupational Exposure Prevalence Between Maori and Non-Maori Males

	Exposure in Maori and non-Maori (whole sample)		
	Non-Maori	Maori	OR (95% CI) <sup>a</sup>
	N = 1316 (%)	N = 109 (%)	
Dust/chemical factors			
Dust	39.8	45.9	1.24 (0.84–1.85)
Smoke/fume/gas	29.1	33.0	1.16 (0.76–1.77)
Oils and solvents	30.2	24.8	0.72 (0.46–1.14)
Acids or alkalis	13.8	9.2	0.61 (0.31–1.18)
Pesticides	14.4	15.6	1.16 (0.68–2.00)
Any of the above	56.8	57.8	1.01 (0.68–1.51)
Physical factors			
Lifting <sup>d</sup>	41.9	56.0	1.65 <sup>c</sup> (1.11–2.46)
Loud noise <sup>d</sup>	39.4	45.0	1.19 (0.80–1.76)
Awkward or tiring positions <sup>d</sup>	53.6	64.2	1.48 (0.98–2.22)
Awkward grip or hand movements <sup>d</sup>	39.4	53.2	1.64 <sup>c</sup> (1.10–2.44)
Standing <sup>d</sup>	26.3	37.6	1.65 <sup>c</sup> (1.09–2.48)
Tools that vibrate <sup>d</sup>	16.8	23.9	1.41 (0.88–2.26)
Organizational factors			
Repetitive tasks <sup>d</sup>	63.7	77.1	1.77 <sup>c</sup> (1.11–2.83)
Working at very high speed <sup>d</sup>	46.4	54.1	1.23 (0.82–1.83)
Working to tight deadlines <sup>d</sup>	74.6	78.5	1.12 (0.69–1.81)
Nightshift	10.0	14.0	1.44 (0.79–2.61)
Irregular hours	19.5	27.8	1.59 <sup>c</sup> (1.02–2.48)
Stress			
Not at all-mildly	36.2	39.3	1.00 (ref)
Moderately	48.5	49.5	0.93 (0.61–1.42)
Very-extremely	15.3	11.2	0.70 (0.36–1.36)

<sup>a</sup>Adjusted for age.

<sup>b</sup>Maori and NZ European matched on current occupation (New Zealand Standard Classification of Occupations 5-digit code) and gender.

<sup>c</sup>Statistically significant at  $P < 0.05$  level.

<sup>d</sup>1/4 of the time or more.

# BY ETHNICITY - WOMEN



**TABLE IV.** Differences in Occupational Exposure Prevalence Between Maori and non-Maori Females

	Exposure in Maori and non-Maori (whole sample)		
	Non-Maori	Maori	OR (95% CI) <sup>a</sup>
	N = 1,408 (%)	N = 164 (%)	
Dust/chemical factors			
Dust	19.1	21.3	1.16 (0.78–1.72)
Smoke/fume/gas	13.7	16.5	1.24 (0.80–1.92)
Oils and solvents	12.8	12.8	0.99 (0.61–1.61)
Acids or alkalis	6.3	1.8	0.28 <sup>c</sup> (0.09–0.89)
Pesticides	5.0	5.5	1.12 (0.55–2.28)
Any of the above	34.7	35.4	1.03 (0.73–1.45)
Physical factors			
Lifting <sup>d</sup>	34.4	47.2	1.70 <sup>c</sup> (1.22–2.35)
Loud noise <sup>d</sup>	19.3	31.1	1.87 <sup>c</sup> (1.31–2.68)
Awkward or tiring positions <sup>d</sup>	56.7	66.1	1.47 <sup>c</sup> (1.04–2.08)
Awkward grip or hand movements <sup>d</sup>	34.9	46.6	1.62 <sup>c</sup> (1.17–2.25)
Standing <sup>d</sup>	28.3	30.7	1.12 (0.79–1.59)
Tools that vibrate <sup>d</sup>	5.5	8.0	1.48 (0.80–2.73)
Organizational factors			
Repetitive tasks <sup>d</sup>	71.2	73.8	1.12 (0.77–1.62)
Working at very high speed <sup>d</sup>	54.7	57.7	1.12 (0.80–1.55)
Working to tight deadlines <sup>d</sup>	71.4	72.0	1.01 (0.70–1.45)
Night shift	4.1	5.6	1.40 (0.68–2.89)
Irregular hours	12.3	14.0	1.16 (0.73–1.85)
Stress			
Not at all-mildly	42.3	45.1	1.00 (ref)
Moderately	43.4	31.1	0.67 <sup>c</sup> (0.46–0.97)
Very-extremely	14.3	23.8	1.55 <sup>c</sup> (1.02–2.36)

<sup>a</sup>Adjusted for age.

<sup>b</sup>Maori and NZ European matched on current occupation (New Zealand Standard Classification of Occupations 5-digit code) and gender.

<sup>c</sup>Statistically significant at  $P < 0.05$  level.

<sup>d</sup>1/4 of the time or more.

# ASTHMA



Table 1. Characteristics of the study participants

	Total		Men		Women	
	<i>N</i> = 2903		<i>N</i> = 1381 (47.6%)		<i>N</i> = 1522 (52.4%)	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Smoking						
Never	1475	50.8	686	49.7	789	51.8
Current	532	18.3	251	18.2	281	18.5
Ex	896	30.9	444	32.2	452	29.7
Asthma prevalence						
Woken by SOB in past 12 months	281	9.7	139	10.1	142	9.3
Asthma attack in past 12 months	253	8.7	103	7.5	150	9.9
Currently taking asthma medication	275	9.5	105	7.6	170	11.2
Current asthma	496	17.1	220	15.9	276	18.1
Wheeze in past 12 months	688	23.7	308	22.3	380	25.0
Ever had asthma	620	21.4	243	17.6	377	24.8
Doctor-diagnosed asthma	571	19.7	219	15.9	352	23.1
Adult-onset asthma	269	9.3	84	6.1	185	12.2
Doctor-diagnosed adult-onset asthma	246	8.5	75	5.4	171	11.2

# OCCUPATIONS WITH ELEVATED ASTHMA RISK



occupation		OR	95% CI
market oriented animal producers (n=307)	<i>current asthma</i>	1.0	(0.7-1.4)
	<i>adult onset asthma</i>	1.7	(1.1-2.4)
sawmill labourers (n=13)	<i>current asthma</i>	3.3	(1.1-10.2)
	<i>adult onset asthma</i>	6.3	(1.9-21.0)
baker's assistants (n=16)	<i>current asthma</i>	2.5	(0.9-7.0)
	<i>adult onset asthma</i>	3.6	(1.1-11.4)
baked goods and cereals producing machine operators (n=18)	<i>current asthma</i>	2.7	(1.0-7.0)
	<i>adult onset asthma</i>	4.2	(1.4-12.1)
printers (n=35)	<i>current asthma</i>	2.3	(1.1-4.7)
	<i>adult onset asthma</i>	2.2	(0.9-5.5)
teachers (n=380)	<i>current asthma</i>	1.3	(1.0-1.8)
	<i>adult onset asthma</i>	1.2	(0.9-1.7)
stock clerks (n=80)	<i>current asthma</i>	1.8	(1.1-3.1)
	<i>adult onset asthma</i>	2.8	(1.5-5.3)

market farmers and crop growers  
(n=197)

**0.9** (0.6-1.4)

**0.7** (0.4-1.2)

# WORK STRESS AND ASTHMA



- **Current asthma:** 23.7% reports a very-extremely stressful job
- **No current asthma:** 13.4% reports a very-extremely stressful job

# WORK STRESS AND ASTHMA



TABLE 2.—Odds ratios (OR) and 95% confidence intervals (CI) for job stress and asthma symptoms.

Job stress	Not at all—mildly			Moderately			Very—extremely		
	Number of cases	%	OR (95% CI)	Number of cases	%	OR (95% CI)	Number of cases	%	OR (95% CI)
Current asthma									
Total	179	15.7	1.00 (reference)	197	15.1	0.98 (0.79–1.22)	117	26.7	1.98* (1.52–2.58)
By sex									
Male	84	16.7	1.00 (reference)	79	11.7	0.67* (0.48–0.93)	56	26.9	1.87* (1.27–2.76)
Female	95	14.8	1.00 (reference)	118	18.6	1.34 (1.00–1.80)	61	26.4	2.02* (1.40–2.91)
By smoking									
Never smoker	91	15.5	1.00 (reference)	100	14.7	0.94 (0.69–1.27)	62	31.2	2.47* (1.70–3.60)
Current smoker	47	21.8	1.00 (reference)	40	18.4	0.84 (0.52–1.35)	23	23.5	1.04 (0.58–1.85)
Ex-smoker	41	12.1	1.00 (reference)	57	13.9	1.28 (0.82–1.97)	32	22.5	2.21* (1.32–3.71)
By BMI									
Normal (18.5–24)	70	14.9	1.00 (reference)	67	12.9	0.85 (0.59–1.22)	35	22.3	1.65* (1.04–2.60)
Overweight	62	15.9	1.00 (reference)	79	15.3	0.96 (0.67–1.39)	45	28.9	2.15* (1.38–3.35)
Obese (30+)	40	18.2	1.00 (reference)	46	20.8	1.28 (0.79–2.06)	34	33.3	2.42* (1.40–4.20)
By age (years)									
20–34	43	17.5	1.00 (reference)	47	15.7	0.92 (0.58–1.45)	28	30.8	2.08* (1.18–3.65)
35–44	55	17.6	1.00 (reference)	55	15.5	0.89 (0.59–1.34)	32	25.4	1.61 (0.97–2.65)
45–54	48	14.8	1.00 (reference)	58	15.0	1.02 (0.67–1.55)	30	24.0	1.84* (1.10–3.08)
55+	33	12.6	1.00 (reference)	37	13.9	1.19 (0.72–1.98)	27	27.8	2.90* (1.61–5.21)

All models adjusted for age, sex, smoking status, and deprivation.

# WORK STRESS AND ASTHMA



- Very-extreme job stress is associated with doubling of risk for current asthma
- Not explained by sex, occupation, age, BMI or smoking

## **What can explain this association?**

- Reverse causality? (asthma causing job stress)
- Job stress alters perception of asthma symptoms?
- Personality type affects reporting of both job stress and asthma symptoms?
- Job stress exacerbates asthma symptoms?
- Job stress causes asthma?

# CONCLUSIONS



- 'traditional' chemical and physical exposures remain common in the New Zealand work force
- Other risk factors (i.e. organisational and psychosocial factors) also play a role in workers' health
- Substantial differences in occupational exposure between men and women
- Also differences in occupational exposure between Maori and non-Maori
- Risk factors for asthma remain present in the working population: opportunity for prevention
- The survey data: a valuable information source on occupational exposure and health in the current New Zealand work-force

# THE NEW ZEALAND SURVEY ON OCCUPATIONAL EXPOSURE AND HEALTH PUBLICATIONS



- Response rate:
- 't Mannetje A, Eng A, Douwes J, Ellison-Loschmann L, McLean D, Pearce N. **Determinants of nonresponse in an occupational exposure and health survey in New Zealand.** *The Australian & New Zealand Journal of Public Health*. Volume 35, Issue 3, pages 256–263, June 2011
- Exposure prevalence:
- Eng A, Mannetje A, Cheng S, Douwes J, Ellison-Loschmann L, McLean D, Gander P, Laird I, Legg S, Pearce N. 2010. **The New Zealand Workforce Survey I: Self-Reported Occupational Exposures.** *Ann Occup Hyg* 54:144-153.
- Ethnic differences:
- Eng A, 't Mannetje A, Ellison-Loschmann L, McLean D, Cheng S, Pearce N. 2011. **Ethnic differences in patterns of occupational exposure in New Zealand.** *Am J Ind Med*, 54(5):410-8
- Gender differences:
- Eng A, 't Mannetje A, McLean D, Ellison-Loschmann L, Cheng S, Pearce N. **Gender Differences in Occupational Exposure Patterns.** *OEM*, 2011 Dec;68(12):888-94.
- Occupation & asthma:
- Eng A, Mannetje A, Douwes J, Cheng S, McLean D, Ellison-Loschmann L, Pearce N. 2010. **The New Zealand Workforce Survey II: Occupational Risk Factors for Asthma.** *Ann Occup Hyg* 54:154-164.
- Job stress & asthma:
- Eng A, Mannetje A, Pearce N, Douwes J. **Work-related stress and asthma: results from a workforce survey in New Zealand.** *J Asthma*. 2011 Oct;48(8):783-9.

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