

Evaluation outcomes of a Western Australian campaign designed to reduce alcohol use in pregnancy

Simone Pettigrew,^{1*} Leon Booth,¹ Tahnee McCausland,² Kelly Kennington,² Danica Keric³

¹The George Institute for Global Health, University of New South Wales, Sydney, NSW, 2042, Australia

²Mental Health Commission, Western Australian Government, Perth, Western Australia, Australia

³Cancer Council Western Australia, Perth, Western Australia, Australia

Submitted: 22 June 2023; Revision requested: 28 August 2023; Accepted: 4 October 2023

Abstract

Objective: To assess (i) the effectiveness of a mass media campaign communicating the potential harms associated with consuming even small amounts of alcohol in pregnancy and (ii) changes in females' intentions to abstain during pregnancy after campaign exposure.

Methods: Independent samples of ~400 Western Australian adults (18-45 years) were recruited at two time points (before and after the 'One Drink' campaign) to complete online surveys. Attitudinal and behavioural intention outcomes were assessed at both time points. Descriptive analyses and generalised linear models were used to assess outcomes.

Results: Three-quarters (76%) of the post-campaign sample members reported awareness of the campaign. In the descriptive analyses there were significant improvements in three of the seven attitudinal items. The regression models yielded significant increases in agreement that pregnant women should not drink alcohol (assessed among females and males) and intentions to abstain during pregnancy (assessed among females only).

Conclusions: The results indicate favourable understanding and behavioural intention effects from exposure to a campaign promoting alcohol abstinence during pregnancy.

Implications for public health: This study demonstrates that investment in campaigns warning about alcohol use in pregnancy is likely to be a worthwhile approach to reduce the burden of alcohol-related harms to individuals and society.

Key words: alcohol, pregnancy, campaigns, behaviour change

Introduction

There is no known safe level of alcohol use while pregnant.¹ Alcohol consumed during pregnancy passes through the placenta to produce comparable blood alcohol concentration levels in the mother and foetus.² Outcomes can include impaired foetal development, foetal alcohol spectrum disorder (FASD), and stillbirth.³ Alcohol-caused impairments to the foetus are permanent and last throughout life.³

The strength of the evidence that alcohol harms unborn babies means the public has a right to this information to enable informed decisions.^{1,4,5} Impending parenthood is a key window when many people are willing to make lifestyle changes,^{3,6,7} highlighting the need to ensure people have access to relevant information at this critical

time. In addition to during pregnancy, relevant information provision is important for those planning pregnancy due to the potential for alcohol use pre-conception by the mother and father to have negative outcomes via epigenetic mechanisms.^{8,9} Further, it is important for the broader community to be aware of the harms associated with alcohol use during pregnancy to create supportive social environments for abstinence at this time.^{10,11} Sharing responsibility for alcohol-free pregnancies across the community can assist in addressing the wide range of sociocultural and psychological factors contributing to alcohol use in pregnancy.¹²⁻¹⁴

Mass media campaigns are an important element of a comprehensive approach to informing the community about the potential harms associated with alcohol use during pregnancy.¹⁵ The application of a broad-based approach to information dissemination is warranted by

*Correspondence to: Simone Pettigrew, The George Institute for Global Health, University of New South Wales, 1 King St Newtown, Sydney, NSW, 2042, Australia, Tel.: +0428 888 202;

e-mail: spettigrew@georgeinstitute.org.au.

© 2023 The Author(s). Published by Elsevier B.V. on behalf of Public Health Association of Australia. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Aust NZ J Public Health. 2023; Online; <https://doi.org/10.1016/j.anzjph.2023.100102>

the need to reach multiple target groups and to make meaningful inroads into social norms relating to the role of alcohol in society.¹⁶ However, little evidence is available to guide the development and implementation of effective campaigns addressing this issue.^{15,17} Identified common knowledge deficits relating to alcohol use in pregnancy include a lack of awareness of alcohol guidelines and the assumption that only large amounts of alcohol are harmful to the foetus.^{18,19} Campaigns designed to discourage alcohol use during pregnancy thus need to clearly convey the message that abstinence is the only certain way to avoid alcohol-related damage to the foetus because even small amounts can be harmful.^{10,19} Drinking during pregnancy has been found to be more common among older women,^{19,20} those of higher socioeconomic status,⁶ and those with higher levels of pre-pregnancy alcohol intake,¹⁹ making it important to ensure campaign evaluations account for potential differences in outcomes according to these attributes.

The present study

The context of this study is Australia, where the relevant National Health and Medical Research Council alcohol guideline states: “To prevent harm from alcohol to their unborn child, women who are pregnant or planning a pregnancy should not drink alcohol”.²¹ The recommendation to avoid alcohol during pregnancy has been included in the guidelines since 2009; however, data from the most recent government national survey suggest that just around 35% of Australian women consume alcohol at some stage during their pregnancies.²² This is high compared to the global average of 10%,²³ and has been partially attributed to suboptimal awareness of the guideline and confusion about risk thresholds.^{19,24,25}

In Western Australia, a mass media campaign, titled ‘One Drink’, was developed and implemented to communicate the message that no level of alcohol intake during pregnancy is safe. The video component of the campaign depicted a glass mould of a foetus being filled with red wine via a glass placenta (see [Figure 1](#); video advertisement available at <https://alcoholthinkagain.com.au/campaigns/alcohol-and-pregnancy-one-drink>). In the video, a female voice stated “To you, it’s just one drink. But because your placenta does not protect your baby from alcohol, any amount you drink, your baby drinks. Which can lead to lifelong physical, mental, and behavioural disabilities. Women who are pregnant or planning a pregnancy should not drink alcohol”. Other components of the campaign included radio ads using the video voiceover and out-of-home (e.g., roadside billboards) and online media (social media and Internet banner ads) featuring an image from the video ad. The campaign was funded by the Western Australian Mental Health Commission and developed in collaboration with Cancer Council Western Australia. Campaign advertising ran from January 2021 to May 2022.

A population-wide cross-sectional evaluation of the ‘One Drink’ campaign undertaken mid-rollout via an online survey found high levels of believability (rated believable by 89% of survey respondents), trustworthiness (87%), and memorability (82%).¹⁵ Most (85%) of the sample reported increased concern about the potential harms of drinking alcohol during pregnancy as a result of exposure to the campaign. Just over half (54%) felt the campaign taught them something new. At this rollout mid-point, there was 71% campaign awareness among those sampled. The aims of the present study were to extend this prior work by using a pre-post design to assess (i) the

effectiveness of the ‘One Drink’ campaign in increasing understanding among females and males of child-bearing age that there is no safe level of maternal alcohol intake during pregnancy and (ii) changes in females’ intentions to abstain during pregnancy.

Methods

Samples

A social research company (Lightspeed Research) was commissioned to recruit samples of approximately 400 Western Australian adults of child-bearing age (18–45 years) from their panel at two time points (before and after the campaign) and administer an online campaign evaluation survey. Quotas were applied at both baseline (August 2020) and follow-up (June 2022) to generate a sample of adults aged 18–44 years with the following characteristics: 75% females, at least 50% of whom were currently pregnant, recently pregnant (within the previous 12 months), planning a pregnancy, or already had children; 25% males, at least 50% of whom already had children or their partners were currently or recently pregnant; 75% residing in the metropolitan area and 25% in regional/remote areas; and one-third in each socioeconomic position tertile. The sex variable was as per individuals’ self-reported status as male or female. These quotas and the specified total sample size were designed to establish minimum cell sizes of $n = 30$ per sample subgroup (e.g., currently pregnant women located in regional Western Australia of mid-socioeconomic status). Given these requirements, no attempt was made to recruit a sample aligned with the population profile of Western Australia.

Panel members meeting demographic criteria were sent an invitation to participate in a survey on “general health, well-being and lifestyle”, with no specific mention of alcohol or pregnancy until they had clicked through to the survey. The baseline and follow-up samples were independent of each other and the mid-rollout evaluation sample. The study protocol received approval from a University Human Research Ethics Committee and all respondents provided informed consent before commencing the survey.

Measures

The survey instrument included items relating to the following demographic characteristics: age, sex, postcode (for derivation of socioeconomic position²⁶), education, and parental status. Usual alcohol consumption (i.e., pre-pregnancy) was assessed using items from the Australian Institute of Health and Welfare’s National Drug Strategy Household Survey.²² Respondents reported how often they drank alcohol (8 response options ranging from ‘Never’ to ‘6 or 7 days per week’). Those who reported consuming alcohol were shown a standard drinks information graphic and asked to state the number of standard drinks they consume on a typical drinking day.

Respondents were then asked a series of attitudinal and behavioural intention questions. The attitudinal items assessed agreement with the following phrases expressed on a 10-point scale (1 Strongly Disagree to 10 Strongly agree): “Women should not drink any alcohol while pregnant”, “Drinking alcohol during pregnancy can cause lifelong disabilities for the baby”, “The harm done by drinking alcohol during pregnancy is irreversible”, “It’s okay for pregnant women to drink while pregnant”, “Drinking small amounts of alcohol while pregnant is not harmful”, “It’s okay for pregnant women to drink one standard drink occasionally”, and “It’s okay for pregnant women to drink two standard

Figure 1: Image from the 'One Drink' campaign.



drinks occasionally". The behavioural intention question was only asked of females and was phrased as follows: "If you were to become pregnant in the future, how likely or unlikely is it that you would stop drinking alcohol completely during your pregnancy?" (10-point response scale: 1 Extremely unlikely to 10 Extremely likely).

Finally, exposure to the 'One Drink' campaign was assessed by showing respondents three examples of the campaign materials and asking if they had seen them previously (response options: Yes/No/Not sure). These materials were presented in randomised order and included the television advertisement, the radio advertisement, and

Table 1: Sample profiles.

Demographics	Baseline (n = 415)		Follow-up					
			Total (n = 454)		Unaware of campaign (n = 107, 24%)		Aware of campaign (n = 347, 76%)	
	n	%	n	%	n	%	n	%
Sex								
Female [^]	298	72	334	74	58	54	276	80
Male [^]	117	28	120	26	49	46	71	20
Age								
M (SD)* [^]		32.9 (6.8)		31.6 (6.7)		33.0 (7.0)		31.2 (6.5)
18-29*	135	33	178	39	38	36	140	40
30-39	200	48	198	44	38	36	160	46
40-45 [^]	80	19	78	17	31	29	47	14
Location								
Metropolitan*	341	82	346	76	86	80	260	75
Regional/rural*	74	18	108	24	21	20	87	25
Socioeconomic position								
Low 1-4	106	26	100	22	18	17	82	24
Mid 5-7*	124	30	170	37	45	42	125	36
High 8-10	185	45	184	41	44	41	140	40
Education								
Secondary school	93	22	118	26	28	26	90	26
Certificate/diploma [^]	143	36	164	36	30	28	134	39
University	174	42	169	37	47	44	122	35
Missing	5	1	3	1	2	2	1	1
Parental status								
Pregnant/Trying to conceive	115	28	143	32	31	29	122	32
Have children*	154	37	128	28	29	27	99	29
No children	146	35	183	40	47	44	136	39
Usual alcohol use: drinks per week (M (SD))		5.27 (12.1)		5.76 (13.1)		6.28 (12.2)		5.60 (13.4)

[^]Significant differences in proportions between Unaware and Aware follow-up groups at $p < .05$.

*Significant differences in proportions between Baseline and Total groups at $p < .05$.

Note: percentages may not sum to 100% due to rounding.

an image used on out-of-home and social media advertising. The television and radio advertisements were shown in their entirety.

Analyses

Chi-square (for proportions) and independent samples t-test analyses (for means) were used to identify demographic and campaign awareness differences between the baseline and follow-up samples. ANOVA analyses were then used to explore differences in attitudinal and behavioural intention outcomes between the baseline and follow-up samples and between the follow-up subsamples of those who were aware and unaware of the campaign.

Two ordinal logistic generalised linear models were generated to examine factors associated with agreement that women should not consume alcohol while they are pregnant (female and male respondents) and likelihood of stopping drinking completely during pregnancy (female respondents only). To assess the impact of the campaign, pre- versus post-campaign time condition (i.e., membership of baseline vs follow-up sample) was included as an independent variable. To control for differences between the samples, the following variables were included as independent variables: age, residential location (metropolitan vs. regional), socioeconomic status (decile), parental status (have children, pregnant/trying to conceive, no children), and usual alcohol consumption (drinks per week). Sex was also included as a control variable in the model examining factors

associated with agreement that women should not drink while they are pregnant.

Results

Table 1 shows the demographic and usual alcohol consumption profiles of the baseline and follow-up samples. These two samples were generally comparable, although those in the baseline sample were significantly more likely than those in the follow-up sample to be older (mean age 32.9 years vs 31.6 years for the follow-up sample), live in the metropolitan area (82% vs 76%), and have children (37% vs 28%). Those in the follow-up sample were more likely than those in the baseline sample to be classified as mid-socioeconomic status (37% vs 30%).

Among those in the follow-up sample, 76% reported awareness of the 'One Drink' campaign (i.e., selected 'Yes' for at least one of the three sets of campaign materials). There were some significant differences in awareness by demographic characteristics: females and those with a certificate/diploma were more likely to exhibit campaign recall, while those in the oldest age group (40-45 years) were less likely to report being aware of the campaign.

Table 2 shows the attitudinal and behavioural intention outcomes by sample group. There were no significant differences in outcomes between those in the baseline sample and those without campaign awareness at follow-up. By comparison, those in the follow-up sample who reported campaign awareness were significantly less

Table 2: Attitudinal and behavioural results by sample group.

Outcome	Baseline (n = 415)	Follow-up (n = 454)	
		Unaware of campaign (n = 107)	Aware of campaign (n = 347)
	M (SD)	M (SD)	M (SD)
Women should not drink any alcohol while pregnant ^a	8.1 (2.6)	8.1 (2.6)	8.5 (2.5)
Drinking alcohol during pregnancy can cause lifelong disabilities for the baby ^a	7.8 (2.4)	7.5 (2.6)	8.1 (2.4)
The harm done by drinking alcohol during pregnancy is irreversible ^a	7.6 (2.6)	7.5 (2.8)	8.0 (2.7)
It's okay for pregnant women to drink while pregnant ^a	2.7 (2.4) ^c	2.8 (2.6) ^{cd}	2.2 (2.2) ^d
Drinking small amounts of alcohol while pregnant is not harmful ^a	3.5 (2.7) ^c	3.5 (2.8) ^{cd}	3.0 (2.6) ^d
It's okay for pregnant women to drink one standard drink occasionally ^a	3.5 (2.8) ^c	3.6 (3.0) ^c	2.8 (2.5) ^d
It's okay for pregnant women to drink two standard drinks occasionally ^a	2.6 (2.3) ^{cd}	3.1 (2.7) ^c	2.3 (2.3) ^d
Likelihood of stopping drinking completely while pregnant (females only) ^b	8.7 (2.4)	8.6 (2.6)	9.3 (1.6)

Within rows, groups with different superscript letters (c and d) differed significantly from each other at $p < .05$.

^a10-point scale: 1 (Strongly disagree) to 10 (Strongly agree); 'I don't know' responses excluded.

^b10-point scale: 1 (Extremely unlikely) to 10 (Extremely likely).

likely than those in the baseline sample to agree with the following statements: "It's okay for pregnant women to drink while pregnant" (M (mean) = 2.2 vs 2.7 on 10-point agreement scale), "Drinking small amounts of alcohol while pregnant is not harmful" (M = 3.0 vs 3.5), and "It's okay for pregnant women to drink one standard drink occasionally" (M = 2.8 vs 3.5). The results for the other attitudinal outcomes and the behavioural intention variable were trending in favourable directions, but did not reach statistical significance.

The generalised linear model results for factors associated with agreeing that "Women should not drink any alcohol while they are pregnant" are presented in Table 3. Those in the post-campaign condition were significantly more likely than those in the pre-campaign condition to agree with this statement ($B = 0.32$ [.06, .58], $p = .015$). The only other significant outcome was that across the pre- and post-samples, females were more likely than males to agree that women should not consume any alcohol while pregnant ($B = .29$ [$<.01$, .58], $p = .048$). There were no significant differences by age, location, socioeconomic status, parental status, or usual alcohol

consumption. Similarly, female respondents in the post-campaign condition were more likely than those in the pre-campaign condition to report an intention to stop drinking completely during pregnancy ($B = .49$ [.14, .85], $p = .006$) (see Table 4). Of the other assessed variables, the only significant result was stronger intentions to completely abstain among those with lower usual levels of alcohol consumption ($B = -.02$ [-0.03, $<-.01$], $p = .034$).

Discussion

These results build on previous evaluation outcomes of the 'One Drink' campaign that showed that the advertising execution resulted in high levels of campaign believability, trustworthiness, and memorability, and that the ad was effective in increasing audience members' concern about the potential harms of drinking alcohol during pregnancy.¹⁵ The present results additionally demonstrate knowledge gains and enhanced behavioural intentions, providing support for the limited existing evidence that investment in such

Table 3: Generalised linear model results for factors associated with agreeing that "Women should not drink any alcohol while they are pregnant" (n = 849).

Variable	B [95% CI]	p-value
Age	<.01 [-0.02, .02]	.789
Sex		
Female	.29 [$<.01$, .58]	.048*
Male ^a	-	-
Parental status		
Have children	.15 [-.18, .48]	.375
Pregnant/Trying to conceive	.06 [-.25, .37]	.714
No children ^a	-	-
Location		
Regional	.32 [-.03, .67]	.075
Metropolitan ^a	-	-
Usual drinks per week	-.01 [-0.02, $<.01$]	.135
Socioeconomic status (decile)	-0.04 [-0.10, .02]	.236
Condition		
Post-campaign	0.32 [.06, .58]	.015*
Pre-campaign ^a	-	-

Note: 10-point scale: 1 (Strongly disagree) to 10 (Strongly agree).

* Significant at $p < .05$.

^aReference category.

^bExcludes those selecting 'Don't know' (n = 20).

Table 4: Generalised linear model results for factors associated with “Likelihood of stopping drinking completely during pregnancy” (females only, n = 632).

Variable	B [95% CI]	p-value
Age	.02 [-.01 .04]	.241
Parental status		
Have children	.24 [-.19, .68]	.275
Pregnant/Trying to conceive	.29 [-.14, .72]	.184
No children ^a	-	-
Location		
Regional	.39 [-.07, .85]	.096
Metropolitan ^a	-	-
Usual drinks per week	-.02 [-.03, <-.01]	.034*
Socioeconomic status (decile)	-.04 [-.12, .04]	.309
Condition		
Post-campaign	.49 [.14, .85]	.006**
Pre-campaign ^a	-	-

Note: 10-point scale: 1 (Extremely unlikely) to 10 (Extremely likely).

* Significant at $p < .05$ **; significant at $p < .01$.

^aReference category.

campaigns is likely to be a worthwhile approach to reducing alcohol-related harms to individuals and society.¹⁶

The ‘One Drink’ campaign achieved strong awareness across adults of child-bearing age in Western Australia, with 76% of those in the post-campaign sample reporting recognition of at least one campaign element. This was a small increase on the 71% identified across a broader sample at the campaign mid-point.¹⁵ While the recognition method used to determine campaign exposure is likely to have somewhat inflated reported awareness compared to measures of spontaneous recall, the high level of awareness may be at least partly attributable to the novel execution involving a glass foetus filling with red wine, simulating the transfer of alcohol across the placenta. In addition, the information communicated by the ad appears to have been new for many,¹⁵ and health messages conveying new information can be more effective than those delivering known information.²⁷

The descriptive analyses suggest the campaign may have produced significant improvements in understanding the potential harms of alcohol use in pregnancy across three of the seven assessed attitudinal statements. Changes in the other attitudinal items and the behavioural intention item trended in favourable directions but failed to reach statistical significance, possibly resulting from high baseline scores. However, the generalised linear model results provide additional insights into the potential effects of the campaign by simultaneously accounting for a range of demographic attributes, including those found in previous research to be associated with alcohol use in pregnancy (age, socioeconomic status, and pre-pregnancy alcohol intake levels^{6,19,20}). Compared to those in the pre-campaign sample, those in the post-campaign sample expressed stronger agreement that women should not drink while pregnant (females and males) and were more likely to intend to abstain from alcohol during pregnancy (females only). This suggests the ‘One Drink’ campaign was likely to have been successful in modifying these key attitudinal and behavioural intention outcomes.

Study limitations and future research directions

The primary limitation of the present study was the use of cross-sectional samples at two time points rather than a longitudinal design involving the same sample members over time. This approach was necessary due to the substantial priming effects associated with using the same sample pre- and post-campaign activity. However, the use of generalised linear models with campaign conditions included as an independent variable enabled assessment of potential effects of exposure, with the outcomes likely to be understated due to those who reported being unaware of the campaign being included in the post-campaign condition sample in the models. A second limitation of note was the use of a web panel provider for respondent recruitment. Sampling via a web panel provider limits participation to those with access to the Internet, and while quotas were used to generate samples with specific demographic profiles, it is possible that the resulting self-selected study population differed from the general population on unassessed attributes. Little is known about how web panel samples may systematically vary from samples generated via other means, although some research has found differences in terms of psychological variables such as voting preferences and religiosity.²⁸ Third, although the sample frame only included those of child-bearing age, it is possible that many were not anticipating a future pregnancy and therefore the behavioural intention question was merely hypothetical for these respondents.

Conclusion

The permanent harms associated with alcohol use in pregnancy make it critical for the public to be aware of the abstinence in pregnancy alcohol guideline to enable informed choices. The findings of this study indicate favourable understanding and behavioural intention effects that are likely to have resulted from exposure to the ‘One Drink’ campaign, adding to the very small body of evidence on outcomes associated with mass media campaigns designed to reduce alcohol use in pregnancy. Further work is required to scope the relative effectiveness of different types of message executions that could be used in such campaigns.

Ethics statement

The study protocol received approval from a University Human Research Ethics Committee and all respondents provided informed consent before commencing the survey.

Funding

This study was funded by the Western Australian Mental Health Commission.

Acknowledgements

Thanks are extended to the agencies involved in campaign development. Kantar Public conducted the formative research and 303 MullenLowe Perth was responsible for creative strategy and execution.

Conflicts of interest

The Mental Health Commission (authors TM and KK) funded Cancer Council WA (author DK) to deliver the campaign and The George Institute for Global Health (authors SP and LB) to conduct the evaluation. The authors have no other conflicts of interest to declare.

Author ORCIDs

Simone Pettigrew  <https://orcid.org/0000-0003-3921-1174>

Leon Booth  <https://orcid.org/0000-0002-6326-1908>

Tahnee McCausland  <https://orcid.org/0000-0003-2777-2839>

Kelly Kennington  <https://orcid.org/0000-0002-7473-2920>

Danica Keric  <https://orcid.org/0000-0002-0311-2062>

References

- World Health Organization. *Global alcohol action plan 2022-2030 to strengthen implementation of the global strategy to reduce the harmful use of alcohol*. Geneva: WHO; 2021.
- Burd L, Blair J, Dropps K. Prenatal alcohol exposure, blood alcohol concentrations and alcohol elimination rates for the mother, fetus and newborn. *J Perinatol* 2012;**32**(9):652–9.
- DeJong K, Olyaei A, Lo JO. Alcohol use in pregnancy. *Clin Obstet Gynecol* 2019; **62**(1):142–55.
- O'Brien P. *Warning labels about alcohol consumption and pregnancy: moving from industry self-regulation to law*. Rochester, NY: Social Science Research Network; 2021. Report No.: ID 3795151.
- Lyall V, Wolfson L, Reid N, Poole N, Moritz KM, Egert S, et al. "The problem is that we hear a bit of everything...": a qualitative systematic review of factors associated with alcohol use, reduction, and abstinence in pregnancy. *Int J Environ Res Publ Health* 2021;**18**(7):3445.
- Leggat G, Livingston M, Kuntsche S, Callinan S. Changes in alcohol consumption during pregnancy and over the transition towards parenthood. *Drug Alcohol Depend* 2021 Aug 1;**225**:108745.
- Pettigrew S, Jongenelis M, Cronin S, Dana LM, Sliva D, Prescott SL, et al. Health-related behaviours and weight status of expectant fathers. *Aust N Z J Publ Health* 2022;**46**(3):275–80.
- Shelton D, Reid N, Till H, Butel F, Moritz K. Responding to fetal alcohol spectrum disorder in Australia. *J Paediatr Child Health* 2018;**54**(10):1121–6.
- Maas VYF, Poels M, de Kievit MH, Hartog AP, Franx A, Koster MPH. Planning is not equivalent to preparing, how Dutch women perceive their pregnancy planning in relation to preconceptional lifestyle behaviour change - a cross-sectional study. *BMC Pregnancy Childbirth* 2022;**22**(1):577.
- Jonsson E, Salmon A, Warren KR. The international charter on prevention of fetal alcohol spectrum disorder. *Lancet Global Health* 2014;**2**(3):e135–7.
- Hammer R, Rapp E. Women's views and experiences of occasional alcohol consumption during pregnancy: a systematic review of qualitative studies and their recommendations. *Midwifery* 2022;**111**:103357.
- Chikritzhs T, Dangardt F, Pettigrew S. Pregnancy, partners and alcohol warning labels. *Addiction* 2021;**116**(8):1949–51.
- Merlino A, Clifford S, Smith JA. New frontiers in alcohol and gender: the role of health promotion policy and practice in Australia. *Drug Alcohol Rev* 2021; **40**(2):258–62.
- Wolfson L, Poole N. Supportive alcohol policy as a key element of fetal alcohol spectrum disorder prevention. *Women's Health* 2023;**19**:17455057231151838.
- Pettigrew S, Booth L, McCausland T, Kennington K, Miller M, Bowden J, et al. Evaluation outcomes of an alcohol and pregnancy campaign targeting multiple audiences. *Drug Alcohol Rev* 2023;**42**(1):36–45.
- Young B, Lewis S, Katikireddi SV, Bauld L, Stead M, Angus K, et al. Effectiveness of mass media campaigns to reduce alcohol consumption and harm: a systematic review. *Alcohol Alcohol* 2018;**53**(3):302–16.
- Crawford-Williams F, Fielder A, Mikocka-Walus A, Esterman A. A critical review of public health interventions aimed at reducing alcohol consumption and/or increasing knowledge among pregnant women. *Drug Alcohol Rev* 2015; **34**(2):154–61.
- Popova S, Dozet D, Akhand Laboni S, Brower K, Temple V. Why do women consume alcohol during pregnancy or while breastfeeding? *Drug Alcohol Rev* 2022;**41**(4):759–77.
- Tsang TW, Kingsland M, Doherty E, Anderson AE, Tully B, Crooks K, et al. Predictors of alcohol use during pregnancy in Australian women. *Drug Alcohol Rev* 2022;**41**(1):171–81.
- Pettigrew S, Jongenelis M, Chikritzhs T, Pratt IS, Slevin T, Glance D. A comparison of alcohol consumption intentions among pregnant drinkers and their nonpregnant peers of child-bearing age. *Subst Use Misuse* 2016; **51**(11):1421–7.
- National Health and Medical Research Council. *Australian guidelines to reduce health risks from drinking alcohol*. Canberra: NHMRC; 2020.
- Australian Institute of Health and Welfare. *National Drug Household survey 2019*. Canberra: AIHW; 2020 (Drug Statistics series no. 32. PHE 270).
- Popova S, Lange S, Probst C, Gmel G, Rehm J. Estimation of national, regional, and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis. *Lancet Global Health* 2017; **5**(3):e290–9.
- Foundation for Alcohol Research and Education. *2019 annual alcohol poll: attitudes and behaviours*. 2019.
- Holland K, McCallum K, Walton A. 'I'm not clear on what the risk is': women's reflexive negotiations of uncertainty about alcohol during pregnancy. *Health Risk Soc* 2016;**18**(1–2):38–58.
- Australian Bureau of Statistics. *Census of population and housing: socio-economic indexes for areas*. Australia: SEIFA; 2016. 2018.
- Brennan E, Durkin SJ, Wakefield MA, Kashima Y. Assessing the effectiveness of antismoking television advertisements: do audience ratings of perceived effectiveness predict changes in quitting intentions and smoking behaviours? *Tobac Control* 2014;**23**(5):412–8.
- Chandler J, Rosenzweig C, Moss AJ, Robinson J, Litman L. Online panels in social science research: expanding sampling methods beyond Mechanical Turk. *Behav Res Methods* 2019;**51**(5):2022–38.