

# High education and increased parity are associated with breast-feeding initiation and duration among Australian women

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## Abstract

**Objective:** Breast-feeding is associated with positive maternal and infant health and development outcomes. To assist identifying women less likely to meet infant nutritional guidelines, we investigated the role of socio-economic position and parity on initiation of and sustaining breast-feeding for at least 6 months.

**Design:** Prospective cohort study.

**Setting:** Australia.

**Subjects:** Parous women from the Australian Longitudinal Study on Women's Health (born 1973–78), with self-reported reproductive and breast-feeding history (*N* 4777).

**Results:** While 89% of women (83% of infants) had ever breast-fed, only 60% of infants were breast-fed for at least 6 months. Multiparous women were more likely to breast-feed their first child (~90% *v.* ~71% of primiparous women), and women who breast-fed their first child were more likely to breast-feed subsequent children. Women with a low education (adjusted OR (95% CI): 2.09 (1.67, 2.62)) or a very low-educated parent (1.47 (1.16, 1.88)) had increased odds of not initiating breast-feeding with their first or subsequent children. While fewer women initiated breast-feeding with their youngest child, this was most pronounced among high-educated women. While ~60% of women breast-fed their first, second and third child for at least 6 months, low-educated women (first child, adjusted OR (95% CI): 2.19 (1.79, 2.68)) and women with a very low (1.82 (1.49, 2.22)) or low-educated parent (1.69 (1.33, 2.14)) had increased odds of not breast-feeding for at least 6 months.

**Conclusions:** A greater understanding of barriers to initiating and sustaining breast-feeding, some of which are socio-economic-specific, may assist in reducing inequalities in infant breast-feeding.

## Keywords

Breast-feeding initiation  
Breast-feeding duration  
Social inequalities  
Socio-economic position  
Infant feeding guidelines

The Australian Dietary Guidelines recommend exclusive breast-feeding of infants up to at least 6 months, with further continued breast-feeding up to 12 months and beyond<sup>(1)</sup>. These recommendations are based on the numerous positive and protective short-/long-term effects of breast-feeding for both the infant and mother<sup>(2–7)</sup> and are in accordance with the WHO recommendation of exclusive breast-feeding up to 6 months, followed by an introduction of complementary foods and continued breast-feeding thereafter<sup>(2)</sup>.

In 2010, it was estimated that breast-feeding was initiated with 96% of Australian infants; however, only 15% of

infants were exclusively breast-fed up to the recommended 6 months (21% predominantly breast-fed)<sup>(6)</sup>. With 60% of infants breast-fed at all (be it exclusive, full/predominant or complementary) at 6 months, information about breast-feeding duration based on birth order is scarce.

Maternal attributes positively associated with breast-feeding initiation and duration include: higher maternal age<sup>(6,8–11)</sup>; higher maternal education<sup>(6,8–13)</sup>, although not in all studies<sup>(10)</sup>; higher family income<sup>(8)</sup>; being married<sup>(9,11)</sup>, although not in all studies<sup>(10)</sup>; living with a partner<sup>(13)</sup>; history of prior breast-feeding<sup>(13–15)</sup>; and having a healthy pre-pregnancy BMI<sup>(16–18)</sup>. Higher parity has also been positively associated with breast-feeding initiation<sup>(11)</sup> and more frequently with breast-feeding duration<sup>(10,19,20)</sup>; while difficulties with infant feeding in

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the first month postpartum are negatively associated with breast-feeding duration<sup>(10)</sup>. Further social and demographic characteristics positively associated with breast-feeding, such as father's preference for breast-feeding, can be found summarised in the 2013 Australian Dietary Guidelines (Table 4.2)<sup>(21)</sup>.

While lower education has been associated with reduced odds of breast-feeding in Australia<sup>(6,8,10)</sup> and other high-income countries<sup>(8,9,13,18,22)</sup>, one study found negligible social differences in ceasing exclusive breast-feeding at 3 months<sup>(23)</sup>. In 2004–05, an Australian study found a 26% increase in odds of breast-feeding at 6 months in neighbourhoods of increasing socio-economic position (SEP) advantage, as measured by quintiles of SEIFA (Socio-Economic Indexes for Area; a measure of the distribution of socio-economic conditions based on neighbourhood<sup>(24)</sup>); these social inequalities have increased since 1995 and are similar when investigating odds of breast-feeding at 3 and 12 months<sup>(25)</sup>.

Given the association of breast-feeding with positive maternal and infant health and development outcomes, it is important to understand how SEP and parity relate to breast-feeding initiation and duration in Australia today. Such information will assist in identifying groups of women less likely to meet the guidelines and thus encourage consideration of strategies to overcome SEP-specific barriers to breast-feeding. The present study uses childhood and adulthood measures of SEP to identify whether initiation of breast-feeding and breast-feeding for at least 6 months (i) varies by parity and (ii) is socially patterned.

## Methods

### *Study design and participants*

We used data from the Australian Longitudinal Study on Women's Health (ALSWH), a prospective cohort study comprising Australian citizens and permanent residents randomly selected from the national health and insurance database (Medicare), with an intentional oversampling of women in rural/remote areas. Women completed a self-reported questionnaire in 1996 (baseline) and at approximate 3–4 yearly intervals thereafter. The ALSWH has obtained informed consent from all study participants and is approved by the Human Research Ethics Committees of the Universities of Newcastle and Queensland. Further details about ALSWH recruitment and study design can be found elsewhere<sup>(26,27)</sup>.

Our sample is drawn from the ALSWH cohort born in 1973–78 (aged 18–23 years at baseline, *n* 14 247). Analysis of the relatively high attrition between baseline and Survey Two (*n* 9688; conducted in 2000; women aged 22–27 years) has concluded that possible biases due to loss to follow-up do not limit significant longitudinal analysis of these data<sup>(28)</sup>. Since Survey Two, attrition has remained fairly stable: at Survey Three, 64% (*n* 9081; 2003; aged 25–30 years);

Survey Four, 64% (*n* 9145; 2006; aged 28–33 years); at Survey Five, 58% (*n* 8200; 2009; aged 31–36 years); and at Survey Six, 56% (*n* 8010; 2012; aged 34–39 years).

In order to use the most recent child birth information, we restricted the sample to parous women who answered Surveys One and Six (*n* 5917). Our final sample included complete cases for all exposures (*n* 4777).

## **Measurements**

### *Exposure: indicators of socio-economic position*

Parental education (highest of mother's or father's), a marker of early-life SEP, was collected at Survey Two and categorised as: very low ( $\leq 10$  years); low ( $\leq 12$  years/equivalent); intermediate (trade/certificate/diploma); high (degree/higher); or did not know.

Own highest achieved education was collected at age 34–39 years and categorised as: low ( $\leq 12$  years); intermediate (trade/apprentice/certificate/diploma); or high (degree/higher).

Area of residence at baseline was categorised as: urban (major cities); rural (inner regional); or remote (outer regional/remote). Distribution of socio-economic conditions based on neighbourhood (SEIFA score for education and occupation) was collected at baseline and divided into quintiles, with lower scores indicating greater disadvantage<sup>(24)</sup>, and was included as a continuous variable in the models. Financial stress was measured by asking women about their ability to manage on their income. This was collected at age 34–39 years and categorised as: always difficult (impossible/always); sometimes difficult; or easily managed (not too bad/easy).

### *Outcome measures*

Duration of breast-feeding was taken from Survey Six (if missing, then Survey Five) from the question 'How many complete months have you breast-fed each of your children?' Given that 92.4% of women had three or fewer children, we analysed breast-feeding with the first, second or third child only, categorised as: not initiated; <6 months; or  $\geq 6$  months. For each child, two dichotomous outcomes were: initiation of breast-feeding; and, among those who had initiated breast-feeding, whether they were breast-fed (at all) for at least 6 months<sup>(1)</sup>.

### *Additional covariates*

Parity (total number of children) was categorised as: one; two; or three or more. Age at birth of the first child was calculated by subtracting the woman's date of birth from that of her first child. This score was categorised as: <20.0 years; 20.0–24.99 years; 25.0–29.99 years; 30.0–34.99 years; or  $\geq 35.0$  years. Fertility issues, measured at Survey Six, were dichotomised based on the question 'Have you and your partner (current or previous) ever had problems with infertility (that is, tried unsuccessfully to get pregnant for 12 months or more)?'

BMI at age 34–39 years was based on self-reported weight and height ( $\text{kg}/\text{m}^2$ ). Using the WHO's categories, weight status was defined as: underweight ( $<18.50 \text{ kg}/\text{m}^2$ ); healthy weight ( $18.50\text{--}24.99 \text{ kg}/\text{m}^2$ ); overweight ( $25.00\text{--}29.99 \text{ kg}/\text{m}^2$ ); or obese ( $\geq 30.00 \text{ kg}/\text{m}^2$ )<sup>(29)</sup>. Country of birth was categorised as 'Australia' or 'other', since few women were born outside Australia.

### **Statistical analysis**

Descriptive analyses, including *t* tests and Pearson's  $\chi^2$  tests, were used to describe the sample and explore the associations between maternal and own SEP characteristics with the breast-feeding patterns, with results considered statistically significant at  $P < 0.05$ . 'Lasagne plots'<sup>(30)</sup> were created to show breast-feeding patterns stratified by parity, and proportions were plotted to document breast-feeding patterns stratified by highest education and total parity.

Logistic regression was used to: (i) describe the patterns of breast-feeding by parity; and investigate the association between the SEP measures and (ii) initiating breast-feeding with each child and (iii) breast-feeding each child for at least 6 months (among women who had initiated breast-feeding with that child). All models were adjusted for age at baseline (centred at the cohort mean) and the child's year of birth (OR1). OR2 further adjusted for parental education.

We ran sensitivity analyses: (i) investigating the association between SEP and odds of breast-feeding each child for at least 6 months among all women with an index child, and not only those who had initiated breast-feeding; and (ii) for both outcomes using data imputed for all parous women ( $n = 5917$ ). We ran PROC MI, with twenty imputations using fully conditional specification, to impute all outcomes, exposures and covariates used in the multinomial logistic models. We also included auxiliary variables associated with missingness in the imputation model<sup>(31)</sup>.

All analyses were completed using the SAS statistical software package version 9.4.

## **Results**

At Survey Six and a mean age of 36.8 years (median 36.9 years, interquartile range 35.6–38.1 years), approximately 79% of the sample was multiparous, with almost half of women having two children. Almost three-quarters of the women were aged between 25 and 35 years at first birth (median 29.3 years), and half of the sample had a high education and lived in an urban area (Table 1). Approximately 60% of women had breast-fed the first, second and third child for at least 6 months (Table 1).

### **Patterns of breast-feeding by parity**

Overall, 89% of the ALSWH population had ever breast-fed (Table 1) and 83% of the children included in the

analyses were breast-fed; while 59% of infants were breast-fed for at least 6 months and 68% of women had breast-fed at least one child for at least 6 months. Breast-feeding of firstborn children was more common among women who continued to deliver more children; ~71% of primiparas initiated breast-feeding with their first child (44.9% breast-fed for at least 6 months, 26.5% breast-fed for less than 6 months; results not shown) compared with 90.5% of women with two children and 88.7% of women with three or more children (Fig. 1).

With the first child, a lower percentage of primiparous women breast-fed for at least 6 months (45%), compared with almost two-thirds of multiparous women (Fig. 1). Among women with three or more children, breast-feeding initiation and duration tended to be similar with the first and second child (Fig. 1). However, 20% of multiparous women did not initiate breast-feeding with their youngest child (Fig. 1).

### **Socio-economic position and breast-feeding initiation and duration**

A slightly higher percentage of high-educated women initiated breast-feeding with the first child compared with lower educated women (Fig. 2). Further analysis stratified by total parity showed this was apparent only among multiparous women (see online supplementary material, Supplemental Fig. 1). With regard to the second and third child, the percentage of women initiating breast-feeding was highest among women with an intermediate education (Fig. 2 and Supplemental Table 1). Overall, women were less likely to initiate breast-feeding with their youngest child (Fig. 2). Stratification by total parity showed that the largest absolute decrease in the percentage of women initiating breast-feeding with their youngest, compared with oldest child, was among high-educated women (Supplemental Fig. 1).

Stronger social patterning was found in breast-feeding for at least 6 months, where higher educated women were more likely to do so with each child (Fig. 2). However, while the percentage of low- and intermediate-educated women breast-feeding for at least 6 months increased slightly from the first to the third child, this was not the case with high-educated women (Fig. 2). These women were less likely to breast-feed their youngest child for at least 6 months.

Results from logistic regression models adjusted for woman's age and birth year of the index child (OR1), and further adjusted for parental education (OR2), confirmed that compared with high-educated women, low-educated women had 1.5–2 times increased odds of not having initiated breast-feeding with any of their children (Table 2). As well as intermediate-educated women, low-educated women also had increased odds of not breast-feeding their first, second and third child for at least 6 months (Table 3).

**Table 1** Reproductive and demographic characteristics among parous women (born 1973–78) from the Australian Longitudinal Study on Women's Health (*n* 4777)

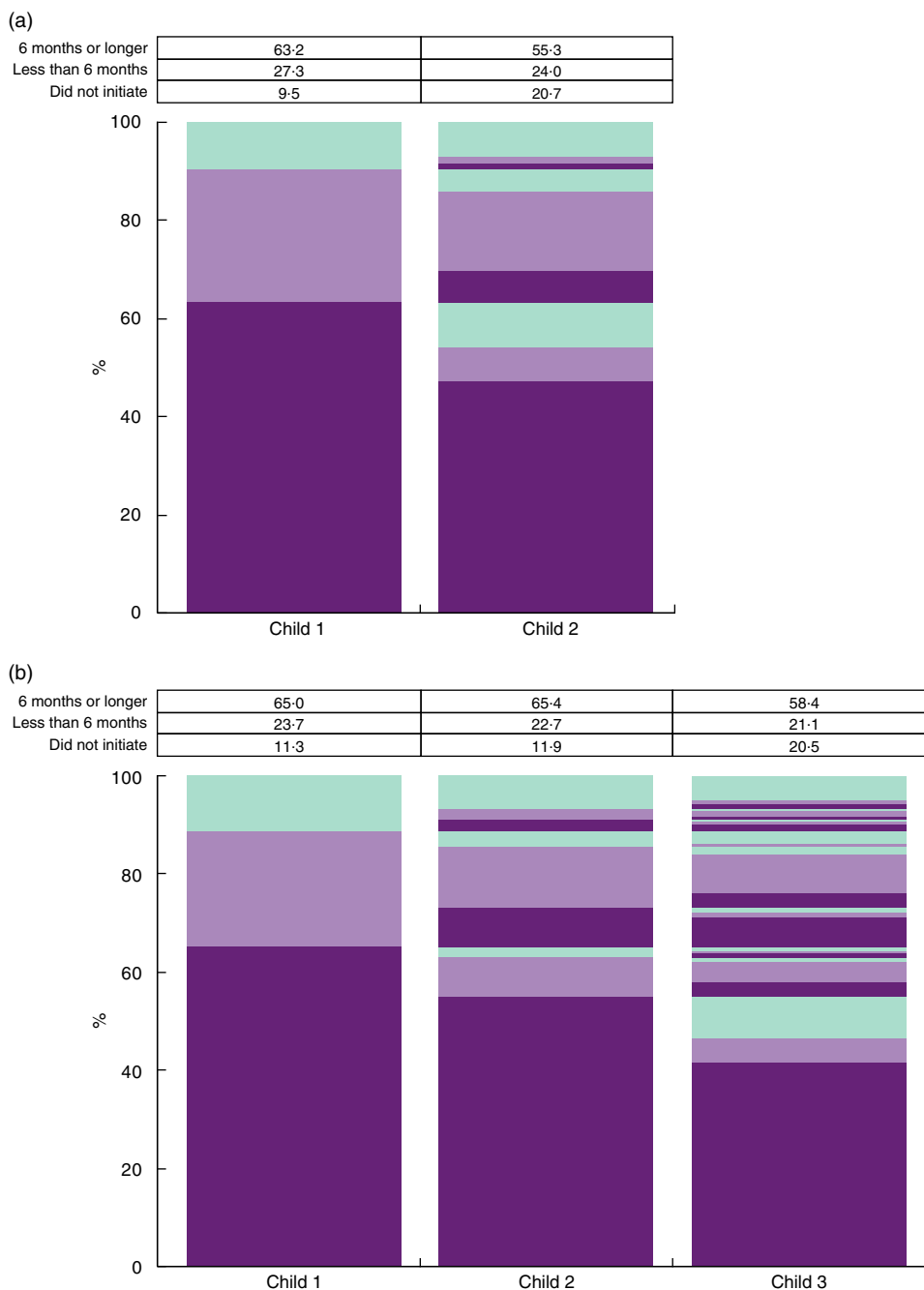
Characteristic	Overall ( <i>n</i> 4777)				Breast-feeding each child											
			Ever breast-fed		Child 1 ( <i>n</i> 4777)				Child 2 ( <i>n</i> 3769)				Child 3 ( <i>n</i> 1408)			
	<i>n</i>	%	Yes (89%)	<i>P</i> value	No (14%)	<6 months (26%)	≥6 months (60%)	<i>P</i> value	No (17%)	<6 months (24%)	≥6 months (59%)	<i>P</i> value	No (21%)	<6 months (21%)	≥6 months (58%)	<i>P</i> value
Country of birth				0.81				0.74				0.76				0.17
Australia	4472	94	89		14	26	60		17	24	59		27	14	59	
Other	305	6	89		13	25	62		17	26	57		20	22	58	
Parental education*				0.008				<0.0001				<0.0001				<0.0001
Very low	1172	25	89		15	30	55		19	26	55		19	27	54	
Low	590	12	90		12	29	59		16	28	56		20	22	58	
Intermediate	1465	31	89		14	24	62		17	23	60		21	19	60	
High	1177	25	91		12	19	69		16	16	68		19	14	67	
Did not know	373	8	84		20	35	45		21	32	47		30	26	43	
Area of residence (baseline)				0.049				0.14				0.25				0.03
Urban (major cities)	2420	51	89		14	25	61		18	22	60		24	19	57	
Rural (inner regional)	1485	31	88		15	27	58		17	25	58		17	25	58	
Remote (outer regional/remote)	872	18	91		12	27	61		16	24	60		18	22	60	
Ability to manage on income (age 34–39 years)				0.102				<0.0001				0.0001				0.54
Easy to manage	2491	52	89		14	23	63		17	29	54		19	20	61	
Sometimes difficult	1662	34	90		14	29	57		18	26	56		22	22	56	
Always difficult	664	14	87		15	31	54		17	21	62		20	23	57	
Highest achieved education† (age 34–39 years)				0.047				<0.0001				<0.0001				<0.0001
Low	786	16	87		19	35	46		20	29	51		22	26	52	
Intermediate	1457	31	89		15	33	52		16	31	53		17	26	57	
High	2534	53	90		12	19	69		17	17	65		22	16	62	
Completed parity				<0.0001				<0.0001				<0.0001				
1	1008	21	71		29	26	45									
2	2361	49	93		10	27	63		21	24	55					
3+	1408	30	95		11	24	65		12	23	65		21	21	58	
Age at first birth (years)				<0.0001				<0.0001				<0.0001				0.004§
<20.0	221	5	86		27	33	40		24	34	42		20	29	51	
20.0–24.99	752	16	91		14	32	54		14	29	57		13	26	61	
25.0–29.99	1717	36	93		10	28	62		13	24	63		20	19	61	
30.0–34.99	1773	37	89		13	21	66		23	18	59		33	16	51	
≥35.0	314	6	64		36	22	42		45	21	34		100	0	0	
Fertility issues (age 34–39 years)				0.038				0.19				0.016				0.31
No	3762	79	90		14	26	60		17	23	60		20	20	60	
Yes: self/partner >12 months	1015	21	87		15	27	58		20	25	55		21	25	54	
Weight status‡ (age 34–39 years)				<0.0001				<0.0001				<0.0001				0.0003
Underweight	109	2	89		14	22	64		18	19	63		15	18	67	
Healthy weight	2333	50	91		12	21	67		16	19	65		20	16	64	
Overweight	1235	26	90		13	28	59		17	25	58		20	22	58	
Obese	1048	22	85		20	34	46		22	30	48		23	28	49	

\*Parental education (highest of mother's or father's) categorised as very low (≤10 years), low (≤12 years/equivalent), intermediate (trade/certificate/diploma), high (degree/higher) and did not know (could not recall).

†Own highest education categorised as low (≤12 years), intermediate (trade/apprentice/certificate/diploma) and high (degree/higher).

‡Weight status defined using the WHO categories<sup>(29)</sup>.

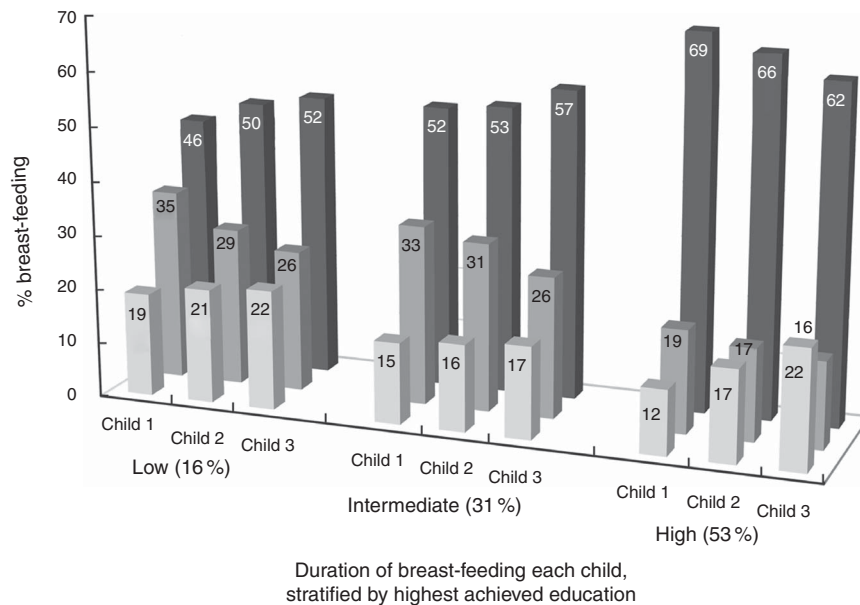
§Mantel–Haenszel  $\chi^2$ .



**Fig. 1** Percentage of multiparous women (born 1973–78) breast-feeding each index child for at least 6 months (■, 6 months or longer; ▒, less than 6 months; □, did not initiate), stratified by parity: (a) parity = 2; (b) parity = 3+, among women from the Australian Longitudinal Study on Women’s Health (*n* 4777). Overall, women who breast-fed their first child for at least 6 months were most likely to also do so with their second child, unless it was their youngest child; multiparous women tended to be less likely to initiate breast-feeding with their youngest child. (Note: among women with one child, 28.6% did not initiate breast-feeding, while 44.9% breast-fed for at least 6 months and 26.5% breast-fed for less than 6 months; data not shown)

Additionally, women with a very low-educated parent had increased odds of not initiating breast-feeding with their first and second child (Table 2) and also of not breast-feeding their first, second or third child for at least 6 months (Table 3). Women who did not know their parent’s education had approximately twice the odds of not initiating breast-feeding with their first and second

child, and ~3.7 times increased odds with the third child (Table 2). These women also had at least 2.5 times increased odds of not breast-feeding for at least 6 months (Table 3). Women who found it difficult to manage on their income had 1.3–1.4 times increased odds of not breast-feeding for at least 6 months with their first and second child (Table 3). Area of residence and SEIFA score



**Fig. 2** Percentage of women (born 1973–78) initiating breast-feeding and breast-feeding for at least 6 months (■, 6 months or longer; □, less than 6 months; □, did not initiate), stratified by highest achieved education, among women from the Australian Longitudinal Study on Women's Health ( $n$  4777)

of SEP were not significantly associated with breast-feeding initiation or duration.

Sensitivity analyses showed marginally stronger associations between SEP and breast-feeding for at least 6 months when analysed among all parous women (see online supplementary material, Supplemental Table 1) and not just among those who had initiated breast-feeding (Table 3). Additionally, analyses using multiply imputed data for all exposures and outcomes showed comparable estimates for the association between SEP and breast-feeding initiation (Supplemental Table 2) and breast-feeding for at least 6 months (Supplemental Table 3).

## Discussion

The present study investigated the association between SEP and parity on breast-feeding initiation and duration among a cohort of Australian women. While 60% of women breast-fed their first, second and third child for at least 6 months, we found differences based on completed parity, where multiparous women were more likely to have met this target. While a higher percentage of high-educated women breast-fed each child for at least 6 months, women were less likely to initiate breast-feeding with their youngest child; a difference which was greatest among higher educated women. Overall, women with a lower education were less likely to initiate breast-feeding or to breast-feed for at least 6 months.

Among our sample, 89% of women had initiated breast-feeding. While a previous Australian study suggested there was an increase in the rate of breast-feeding initiation of infants (to 96% in 2010)<sup>(6)</sup>, our finding of 83% of infants

being breast-fed is in accordance with a 2001 estimate<sup>(32)</sup>. Despite this result, we found an increase in the percentage of infants who were breast-fed for at least 6 months; 59% in our study compared with the 2001 Australian estimate of 50% of infants being breast-fed at 6 months (be it exclusive, full/predominant or complementary)<sup>(32)</sup>. Our results indicate that greater support is required in the early phase to assist women in successfully initiating breast-feeding, but more importantly to overcome difficulties in sustaining breast-feeding, be they medical or otherwise.

Consistent with previous Australian findings<sup>(6)</sup>, we found that low-educated women were less likely to initiate breast-feeding or to breast-feed for at least 6 months. This may be a result of higher educated women being more receptive to advised health behaviours, or conversely to reduced family support and assistance for breast-feeding among the disadvantaged. While adequate milk supply and no feeding difficulties in the first month postpartum<sup>(10)</sup> are positively associated with breast-feeding duration, other factors positively associated with breast-feeding initiation and duration, which may also be socially patterned, include: maternal positive attitude towards breast-feeding<sup>(10)</sup>; not smoking while breast-feeding<sup>(9,10,16)</sup>; and gestational weight gain within the Institute of Medicine's guidelines<sup>(17)</sup>. Higher rates of breast-feeding have been found in Europe and Australia, compared with the USA and Canada<sup>(8)</sup>, which encourages us to consider the importance of social/political contexts in shaping features of the home, work and community environments that may support breast-feeding. This includes not returning to employment early<sup>(10,14)</sup>, parental leave policies and flexible working conditions<sup>(12)</sup>; as well as social support, positive cultural norms surrounding breast-feeding and the

**Table 2** Socio-economic position and odds of not initiating breast-feeding with the first, second and third child among women (born 1973–78), among women from the Australian Longitudinal Study on Women's Health (*n* 4777)

Exposure	First child ( <i>n</i> 4177)				Second child ( <i>n</i> 3769)				Third child ( <i>n</i> 1408)			
	OR1	95 % CI	OR2	95 % CI	OR1	95 % CI	OR2	95 % CI	OR1	95 % CI	OR2	95 % CI
Parental education*												
High	1.00	Ref.			1.00	Ref.			1.00	Ref.		
Intermediate	1.31	1.04, 1.65			1.17	0.92, 1.48			1.43	0.98, 2.10		
Low	1.11	0.82, 1.51			1.07	0.78, 1.46			1.25	0.77, 2.01		
Very low	<b>1.47</b>	<b>1.16, 1.88</b>			<b>1.42</b>	<b>1.11, 1.81</b>			1.31	0.87, 1.96		
Did not know	<b>2.22</b>	<b>1.62, 3.05</b>			<b>1.97</b>	<b>1.39, 2.78</b>			<b>3.68</b>	<b>2.18, 6.22</b>		
Own highest education†												
High	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Intermediate	<b>1.41</b>	<b>1.16, 1.71</b>	<b>1.31</b>	<b>1.07, 1.61</b>	1.13	0.92, 1.38	1.05	0.85, 1.30	0.98	0.71, 1.36	0.88	0.63, 1.24
Low	<b>2.09</b>	<b>1.67, 2.62</b>	<b>1.89</b>	<b>1.49, 2.40</b>	<b>1.78</b>	<b>1.40, 2.25</b>	<b>1.59</b>	<b>1.24, 2.05</b>	<b>1.79</b>	<b>1.25, 2.57</b>	<b>1.53</b>	<b>1.04, 2.25</b>
Area of residence												
Urban	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Rural	1.19	0.99, 1.43	1.14	0.95, 1.37	0.97	0.80, 1.18	0.93	0.77, 1.14	0.77	0.57, 1.06	0.72	0.53, 1.00
Remote	0.93	0.74, 1.18	0.88	0.69, 1.12	0.99	0.79, 1.26	0.94	0.74, 1.20	0.93	0.65, 1.33	0.88	0.61, 1.26
Ability to manage on income												
Easy to manage	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Sometimes difficult	1.05	0.88, 1.26	1.02	0.85, 1.23	1.16	0.96, 1.40	1.13	0.94, 1.36	<b>1.36</b>	<b>1.01, 1.82</b>	1.33	0.99, 1.79
Always difficult	1.16	0.91, 1.48	1.13	0.88, 1.45	1.14	0.88, 1.48	1.11	0.85, 1.44	1.34	0.91, 1.99	1.31	0.88, 1.95
SEIFA ed/occ quintile	<b>0.92</b>	<b>0.87, 0.98</b>	0.95	0.89, 1.01	0.95	0.89, 1.01	0.97	0.91, 1.03	1.05	0.95, 1.16	1.09	0.98, 1.21

OR1, minimally adjusted for baseline age and birth year of the index child; OR2, minimally adjusted + parent's education; SEIFA, Socio-Economic Indexes for Areas (education and occupation); Ref., reference category. Significant results are indicated in bold font.

When we further adjusted for the most recent birth interval, estimates were very similar (fractionally lower).

\*Parental education (highest of mother's or father's) categorised as very low ( $\leq 10$  years), low ( $\leq 12$  years/equivalent), intermediate (trade/certificate/diploma), high (degree/higher) and did not know (could not recall).

†Own education categorised as low ( $\leq 12$  years), intermediate (trade/apprentice/certificate/diploma) and high (degree/higher).

**Table 3** Socio-economic position and odds of not breast-feeding for at least 6 months among women (born 1973–78) who had initiated breast-feeding with each index child, among women from the Australian Longitudinal Study on Women's Health (*n* 4777)

Exposure	First child ( <i>n</i> 4106)				Second child ( <i>n</i> 3112)				Third child ( <i>n</i> 1119)			
	OR1	95% CI	OR2	95% CI	OR1	95% CI	OR2	95% CI	OR1	95% CI	OR2	95% CI
Parental education*												
High	1.00	Ref.			1.00	Ref.			1.00	Ref.		
Intermediate	<b>1.34</b>	<b>1.11, 1.63</b>			<b>1.57</b>	<b>1.24, 1.98</b>			1.50	0.99, 2.26		
Low	<b>1.69</b>	<b>1.33, 2.14</b>			<b>1.99</b>	<b>1.51, 2.63</b>			<b>1.73</b>	<b>1.07, 2.82</b>		
Very low	<b>1.82</b>	<b>1.49, 2.22</b>			<b>1.84</b>	<b>1.45, 2.34</b>			<b>2.34</b>	<b>1.55, 3.52</b>		
Did not know	<b>2.47</b>	<b>1.87, 3.26</b>			<b>2.56</b>	<b>1.85, 3.55</b>			<b>2.86</b>	<b>1.64, 4.99</b>		
Own highest education†												
High	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Intermediate	<b>2.17</b>	<b>1.85, 2.54</b>	<b>2.01</b>	<b>1.71, 2.37</b>	<b>2.03</b>	<b>1.69, 2.44</b>	<b>1.89</b>	<b>1.57, 2.27</b>	<b>1.86</b>	<b>1.35, 2.55</b>	<b>1.64</b>	<b>1.18, 2.27</b>
Low	<b>2.49</b>	<b>2.05, 3.02</b>	<b>2.19</b>	<b>1.79, 2.68</b>	<b>1.97</b>	<b>1.58, 2.47</b>	<b>1.72</b>	<b>1.36, 2.18</b>	<b>2.06</b>	<b>1.43, 2.98</b>	<b>1.72</b>	<b>1.18, 2.52</b>
Area of residence												
Urban	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Rural	1.04	0.89, 1.21	0.98	0.84, 1.14	1.09	0.91, 1.30	1.02	0.85, 1.22	1.26	0.93, 1.72	1.18	0.86, 1.60
Remote	0.97	0.81, 1.17	0.89	0.74, 1.07	1.00	0.81, 1.24	0.92	0.74, 1.14	1.07	0.75, 1.52	0.99	0.70, 1.43
Ability to manage on income												
Easy to manage	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Sometimes difficult	<b>1.40</b>	<b>1.21, 1.62</b>	<b>1.36</b>	<b>1.17, 1.58</b>	<b>1.32</b>	<b>1.11, 1.57</b>	<b>1.30</b>	<b>1.09, 1.55</b>	1.11	0.82, 1.49	1.05	0.78, 1.42
Always difficult	<b>1.46</b>	<b>1.19, 1.78</b>	<b>1.41</b>	<b>1.16, 1.73</b>	<b>1.49</b>	<b>1.19, 1.87</b>	<b>1.45</b>	<b>1.15, 1.82</b>	1.15	0.78, 1.68	1.11	0.75, 1.63
SEIFA ed/occ quintile	<b>0.91</b>	<b>0.87, 0.96</b>	<b>0.95</b>	<b>0.89, 0.99</b>	<b>0.90</b>	<b>0.85, 0.96</b>	<b>0.93</b>	<b>0.88, 0.99</b>	<b>0.88</b>	<b>0.80, 0.98</b>	0.93	0.84, 1.03

OR1, minimally adjusted for baseline age and birth year of the index child; OR2, minimally adjusted + parent's education; SEIFA, Socio-Economic Indexes for Areas (education and occupation); Ref., reference category. Significant results are indicated in bold font.

When we further adjusted for the most recent birth interval, estimates were very similar (fractionally lower).

\*Parental education (highest of mother's or father's) categorised as very low ( $\leq 10$  years), low ( $\leq 12$  years/equivalent), intermediate (trade/certificate/diploma), high (degree/higher) and did not know (could not recall).

†Own education categorised as low ( $\leq 12$  years), intermediate (trade/apprentice/certificate/diploma) and high (degree/higher).



visibility of breast-feeding in public<sup>(1)</sup>. Our finding that all women, particularly those with a high education, were less likely to breast-feed their youngest child may be due to women returning to work soon after having reached their desired number of children, in order to limit their absence from the workforce.

The timing and type of breast-feeding intervention can also influence effectiveness, with a combination of antenatal and postnatal interventions, as well as involving the partner/significant caregiver, being important<sup>(1)</sup>. However, since population-wide interventions can potentially increase social inequalities through greater uptake and improvements among advantaged individuals<sup>(33)</sup>, it is important to identify specific barriers to breast-feeding among the most disadvantaged. Evidence suggests that peer support programmes in combination with professional support are effective in increasing breast-feeding rates<sup>(34)</sup>. With high maternal BMI being associated with socio-economic disadvantage<sup>(16–18)</sup> as well as difficulties in breast-feeding<sup>(35)</sup>, we should not discount this as another key area in reducing inequalities in breast-feeding.

We also found that women with a very low-educated parent, as well as those who did not know their parent's education, were more likely to not initiate breast-feeding. These women, and additionally those with an intermediate- or low-educated parent, were also more likely to not breast-feed for at least 6 months. This is a concern which highlights possible intergenerational chains of risk, with previous studies showing that women who were themselves breast-fed as an infant were more likely to intend to, initiate and persevere with breast-feeding<sup>(36)</sup>. Not knowing their parent's education level may reflect a poor relationship with their parent or increased family dysfunction, or possibly a low level of education which they do not want to disclose.

Despite potential bias in using income measures as a proxy for SEP among women of reproductive age, it is important to estimate the extent to which material circumstances make it easier or more difficult for women to breast-feed. While we acknowledge that our measurement of financial stress is not ideal (due to the uniform timing of data collection, which does not take account of the individual reproductive histories), our results indicate that material circumstances are important for breast-feeding duration. Women who found it difficult to manage on their income were more likely to not breast-feed their first or second child for at least 6 months. We speculate this may be due to single mothers and those on a low income being forced back into the labour market earlier than women with the resources to remain at home. Sensitivity analyses using this same measure of financial stress at earlier time points found that, if anything, the significant estimates reported possibly underestimate the association.

Having a child may introduce financial strain on the family, through additional costs of care and preclusion from the labour market. As such the legislative and regulatory environment, as well as social context, is important

for providing parents with the support required to make positive choices for their offspring. This includes adequate employment leave and entitlements, marketing restrictions for infant formula, reducing discrimination towards those who breast-feed, and creating breast-feeding friendly workplaces and communities<sup>(1)</sup>.

With a higher percentage of multiparous women having initiated breast-feeding and breast-fed their first child for at least 6 months, we further speculate that women with hormonal imbalances may find it more difficult to breast-feed and may also be less fertile.

### **Strengths and limitations**

Despite a higher representation of high-educated women, the ALSWH 1973–78 cohort is a nationally representative sample providing longitudinal data over 16 years for women of reproductive age. Very few studies and registers provide information about breast-feeding patterns and behaviours, and while we lack information for some WHO infant feeding categories (exclusive, predominant and complementary), our analyses still provide valuable information on a national level regarding breast-feeding initiation and duration. From an Australian perspective this is particularly important, since there is a lack of national monitoring of breast-feeding which would be particularly useful for priority groups (i.e. young mothers, low SEP, indigenous Australians)<sup>(1)</sup>. Additionally, despite rates of breast-feeding initiation and duration being available in most Australian states/territories, consistency in the measurement and collection of these data varies<sup>(1)</sup>. We acknowledge the potential for recall bias in using breast-feeding duration recorded when women were in their thirties, particularly for women who may have had their child many years earlier.

### **Conclusion**

While overall rates of infant breast-feeding initiation have not increased substantially in Australia since 2001, a greater percentage of infants were breast-fed for at least 6 months. Despite this, high-educated multiparous women were less likely to breast-feed their youngest child and disadvantaged women (with a lower education or a low-educated parent) were less likely to initiate breast-feeding or to breast-feed for at least 6 months. These groups may need greater attention from health-care professionals in the antenatal and postnatal periods, in order to gain a greater understanding of and overcome SEP-specific barriers to breast-feeding initiation and sustained duration, which may assist in reducing existing inequalities in infant breast-feeding.

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### Supplementary material

To view supplementary material for this article, please visit <http://dx.doi.org/10.1017/S1368980016000367>

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