

# The Employment of Mothers and the Outcomes of their Pregnancies: an Australian Study

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One of the more dramatic structural changes in a number of western industrial societies has involved the increased participation of women in the paid labour force. Little is known about the health consequences of this change. This paper reports the findings of a prospective longitudinal study of 8,556 pregnant women who were interviewed on three occasions; early in their pregnancy, shortly after the birth of the baby and some six months later. Additional data were derived from the medical record of the delivery. The findings suggest that employed women and housewives differ in their health behaviour (e.g. number of missed appointments, attendance at antenatal classes, smoking) and emotional health in pregnancy, but that there are no significant differences between employed women and housewives in their physical health or pregnancy outcomes. Although none of the differences was statistically significant, virtually all of the indices of outcome were slightly more favourable for the housewives than for the employed women.

## Introduction

Changes in the structure of the workforce in many of the developed countries in the last four decades have been dramatic. Increasing numbers of women are entering most sectors of the workforce. In view of these changes it is of some considerable importance to determine whether the health of pregnant women or their progeny have been consequently compromised.

There have been few published papers, using adequately controlled data, which have addressed this issue,[1] though Saurel-Cubizolles and Kaminski [2] have reviewed the available literature. There are no previously published Australian research reports on the health consequences of employment for women. The majority of the available papers fail to control for potentially confounding variables such as social class and lifestyle.

In this report four possible associations between work and health are assessed. Firstly, we determine whether employment status and health related behaviours are associated; secondly, we examine the health of employed women and housewives; thirdly, we assess the association between employment status and the health and well-being of the baby at delivery and finally, we determine whether a baby's chances of surviving and without a disability is related to the employment status of the mother.

## Health Consequences of Work by Pregnant Women

The recent and substantial increase, particularly in married women workers (in Australia up from 6.9% of the labour force in 1954 to 18% in 1971 and 22% in 1977,[3,4] raises important questions about the consequent health of mothers and their children. The hypothesis that women's increased work participation may have significant health consequences is based upon two types of observations.

Firstly, women generally do not shed their housekeeping and childrearing responsibilities when they enter the workforce. It has been suggested that married employed women work substantially more hours than their partners and that such an

increased workload is associated with exhaustion and the more frequent use of mood modifying medications.[5]

Secondly, pregnant women who work may come into contact with an environment which may damage the foetus. For example, a Swedish study found 12 major birth abnormalities in 103 infants born to mothers working in a chemical (pharmaceutical) factory, compared to 3 abnormalities in 297 births ( $P=0.01$ ) in a non-chemical factory comparison group.[6] Other studies have confirmed the elevated risk of foetal deaths in women working in metal, chemical and medical fields.[7] The acceptance of such dangers in the workplace raises questions about the advisability of fecund women working in a wide range of industries, and an indication of the future comes from a West Virginia plant which required five of its female employees to consent to sterilisation in order to retain their jobs.[8]

Despite the probability that working women may have less favourable pregnancy outcomes, previous studies of the health of women workers provide conflicting results and leave the issue unresolved. One British study in the early 1950s [9] found that working mothers had higher rates of perinatal death and prematurity, and for those who worked after the 28th week of gestation, higher perinatal mortality rates. These differences remained after the mother's age, physique and class were considered.

The British Birth Cohort study found that, once there was adjustment for parity, there was no relationship between working and toxæmia in pregnancy, and either the presence or degree of toxæmia or prematurity. However, working mothers with one or more children had significantly higher stillbirth and neonatal death rates.[1] The OPCS record linkage study of 1% of the British population also found that mothers working at the time of the census had higher infant mortality rates. These remained elevated after the age of the mother, social class and parity were eliminated as possible confounders.[10] Data from the US Collaborative Perinatal Project also suggested that work and health were related with full-term infants of working mothers having lower birthweights.[11]

Data from Finland confirm the advantage that housewives have over women employed in physically active jobs. Women in sedentary work (administrative, managerial and clerical) did not differ from housewives but those in physically active jobs had higher rates of spontaneous abortion.[12]

By contrast, a series of other studies suggest that working women have pregnancy outcomes which do not differ from or are more favourable than those of non-working women. In the 1950s an Aberdeen-based study found no evidence that duration of a mother's work was associated with prematurity [13] and more recently research in London has similarly found no association between the mother's employment and the outcome of her pregnancy. [14]

French data indicate that housewives have higher rates of prematurity than working mothers, but cautions that women involved in strenuous work do have high rates of prematurity.[15] Similarly, an Israeli study found no differences between employed women and housewives in pregnancy complications or in their length of gestation, but found that housewives had higher rates of low birthweight children. These higher rates remained after the data had been adjusted separately for parity, smoking and pregnancy complications. In an additional log-linear multivariate analysis which controlled for class, parity and smoking simultaneously, this relationship between work and birthweight was eliminated suggesting that the previously observed differences were attributable to lifestyle differences. [16] Other studies have confirmed the differences in lifestyle between employed and non-employed women, [13,17,18] pointing to the need to consider lifestyle factors in any analysis of work and health.

Thus studies have varyingly suggested that employed women fare worse, better or do not differ from non-employed women in their pregnancy outcomes. These apparently

contradictory findings do not deny the consistent observation that strenuous work or work in particular industries may harm the foetus.

## Data and Methods

Data analysed in this paper were gathered during a longitudinal study of 8,556 pregnancies at one of the two major obstetric hospitals in Brisbane. Details of sampling, data collection and response rates are reported elsewhere, [19] The data were obtained in four phases. Women were initially enrolled in the study at their first antenatal clinic visit at one of the two major obstetric public hospitals in Brisbane, Australia. They completed a second questionnaire three to five days after the birth of their baby and a third questionnaire when the baby was six months old. Data from the medical record of the pregnancy were also derived. The variation in frequencies in Tables III-VII largely reflects variations in response rates over the phases of the study. [19] Data analysis was undertaken with the SAS package [20] and Tables III-VII involve the use of the relative risk method of Mantel-Haenszel. [21]

## Findings

Of the 8,556 women who were originally approached in the clinic, 8381 offered a codeable answer to the question relating to their work status (Table I). Some 26% of our sample described themselves as employed in a full or part-time capacity. A number of preliminary analyses suggested that women employed part-time were similar to those employed full-time and for this reason these categories were aggregated. In the analysis which follows comparisons are restricted to those women who report they are employed or housewives.

**Table I** Employment status of respondents and their partners at first clinic visit

	Mother's employment status ( <i>n</i> =8,381)	Partner's employment status ( <i>n</i> =8,321)
Fully employed	16 }	69 }
Self employed	2 }	11 }
Part-time employed	8 }	3 }
Unemployed	12	11
On pension	5	1
Housewife	56	—
Other	1	5
Total	100	100

Unemployed women or those on a pension (or categorised 'other') were excluded, to allow for a 'fair' comparison.

Clearly, employed women and housewives differ in a number of respects other than their employment status (Table II). Employed women are somewhat younger, have had about half the number of previous pregnancies reported by housewives, are less likely to be married and may differ slightly in the occupational status of their partners.

Table III compares the health relevant lifestyles of employed mothers and housewives. Employed women generally appear to report a healthier lifestyle; they smoke less both early and late in pregnancy, they present to the clinic earlier in their pregnancies and they miss fewer antenatal appointments. Interestingly, employed women were slightly more likely to report smoking marihuana in pregnancy. These differences generally remain after adjustments for the mother's age and number of surviving children.

**Table II** Socio-demographic characteristics of employed mothers and housewives

	Mother employed	Mother housewife
Mean age*	24.9 yrs	26.0 yrs
Mean number of surviving children*	0.56	1.39
Percentage of mothers married**	78%	90%
Percentage of mothers categorised in lowest occupational status***	15%	16%

\* Analysis of variance,  $P < 0.001$

\*\*  $\phi = 0.16$ ,  $\chi^2$   $P < 0.001$

\*\*\* Not significantly different.

**Table III** Health relevant lifestyles of employed mothers compared to housewives

	Rate per 100 women	Unadjusted* RR (95% CL)	Adjusted† RR (95% CL)
Smoking 20 or more cigarettes per day at first clinic visit			
Employed (2,172)	5.9		
Housewives (4,630)	9.4	0.7 (0.6-0.8)	0.9 (0.7-1.0)
Smoking 20 or more cigarettes per day in last week of pregnancy			
Employed (1,949)	8.5		
Housewives (4,109)	12.9	0.7 (0.6-0.8)	0.9 (0.8-1.0)
Drinking at least three or more glasses of alcohol each sitting a few times a week at first clinic visit			
Employed (2,175)	1.2		
Housewives (4,633)	1.1	1.0 (0.8-1.5)	1.2 (0.9-1.7)
Monthly smoking of marihuana at first clinic visit			
Employed (2,180)	3.0		
Housewives (4,656)	1.8	1.4 (1.1-1.7)	1.2 (1.0-1.4)
Gestation at first clinic visit was at 30 weeks or longer			
Employed (2,000)	2.8		
Housewives (4,258)	7.0	0.5 (0.4-0.6)	0.5 (0.4-0.6)
Missed 3 or more antenatal appointments			
Employed (1,867)	3.1		
Housewives (3,881)	5.2	0.7 (0.5-0.8)	0.8 (0.6-1.0)

\* RR = Relative risk of employed mothers reported listed behaviour with 95% confidence limits.

† Adjusted for mother's age and number of surviving children.

**Table IV** Mental and emotional health of employed mothers compared to housewives

		Rate per 100 women	Unadjusted RR (95% CL)	Adjusted††† RR (95% CL)
Moderate or high anxiety† at first clinic visit				
Employed	(2,179)	8.7		
Housewives	(4,635)	10.1	0.9 (0.8-1.0)	0.9 (0.8-1.0)
Moderate or high depression† at first clinic visit				
Employed	(2,171)	2.8		
Housewives	(4,617)	4.1	0.8 (0.6-0.9)	0.8 (0.7-1.0)
Mothers reporting the experience of 5 or more symptoms†† during pregnancy				
Employed	(1,955)	6.0		
Housewives	(4,131)	8.1	0.8 (0.7-0.9)	0.9 (0.8-1.0)

† Items from DSSI. [22]

†† Symptoms were morning sickness, constipation, heartburn, backache, vaginal discharge, leg cramps, feeling generally unwell. A woman was categorised as experiencing a symptom if she reported finding it a moderate or major problem in her pregnancy.

††† Adjusted for mother's age and number of surviving children.

Table IV considers the differences in the mental health of employed women and housewives. Employed women appear to be less anxious and depressed and to report less subjectively perceived symptoms in their pregnancy. These differences are not significant after adjustment, suggesting that the initial differences may reflect demographic variations between employed women and housewives. In Table IV the mental and emotional health variables have been dichotomised with a clinically important subgroup being selected for comparison. Further analysis using analysis of covariance (not presented) using raw scores suggests that there remains a significant association between the mother's emotional state and her employment status (after adjustment) for mother's age and number of surviving children though Table IV suggests that this association is not evident in the extreme clinically relevant group. This possibly more sensitive analysis indicates that there is a (weak) association between the mother's mental and emotional health and her employment status while pregnant, with employed women reporting somewhat better mental health.

Table V examines four measures of the mother's health in pregnancy derived from the medical record. While the unadjusted data suggest that employed mothers more often experience pre-eclampsia, there are no significant differences once the data are adjusted for the mother's age and number of surviving children.

Similarly Table VI lists seven clinically relevant indicators of the health of the baby at birth. While there is a general trend for the unadjusted data to suggest that employed women have a poorer pregnancy outcome, these differences are not significant and they disappear once the data are adjusted for the mother's age and number of surviving children.

**Table V** Physical health of employed mothers compared to housewives in pregnancy

		Rate per 100 women	Unadjusted RR (95% CL)	Adjusted† RR (95% CL)
Essential hypertension noted in the medical record				
Employed	(2,006)	1.6		
Housewives	(4,272)	1.5	1.0 (0.7-1.3)	1.1 (0.8-1.4)
Pre-eclampsia noted in the medical record				
Employed	(2,005)	10.8		
Housewives	(4,272)	6.2	1.5 (1.3-1.6)	1.1 (1.0-1.2)
Bleeding noted in the medical record				
Employed	(2,006)	2.4		
Housewives	(4,272)	2.6	1.0 (0.8-1.2)	1.0 (0.8-1.3)
Two or more antenatal admissions to hospital				
Employed	(2,005)	5.5		
Housewives	(4,272)	5.5	1.0 (0.9-1.2)	1.0 (0.8-1.1)

† Adjusted for mother's age and number of surviving children.

**Table VI** Health of baby at birth comparing employed mothers and housewives

		Rate per 100 women	Unadjusted RR (95% CL)	Adjusted† RR (95% CL)
Birthweight less than 2500 gms				
Employed	(2,005)	5.3		
Housewives	(4,272)	4.9	1.1 (0.9-1.2)	1.0 (0.8-1.1)
Gestation at delivery 33 weeks or less				
Employed	(2,005)	1.7		
Housewives	(4,272)	1.3	1.2 (0.9-1.6)	1.1 (0.9-1.4)
Baby in bottom 5% of weight for gestation				
Employed	(2,005)	4.7		
Housewives	(4,272)	4.4	1.0 (0.9-1.2)	0.9 (0.8-1.1)
Apgar of 6 or less at 5 minutes				
Employed	(2,005)	3.4		
Housewives	(4,272)	2.8	1.1 (0.9-1.4)	1.0 (0.9-1.2)
Time to establish respiration was 3 minutes or more				
Employed	(1,902)	3.8		
Housewives	(4,106)	3.2	1.1 (0.9-1.4)	1.0 (0.8-1.2)
Baby required mechanical resuscitation				
Employed	(2,005)	3.2		
Housewives	(4,272)	2.5	1.2 (1.0-1.5)	1.0 (0.8-1.2)
Baby admitted to intensive care for 15 days or longer				
Employed	(2,004)	2.5		
Housewives	(4,268)	1.8	1.2 (1.0-1.5)	1.1(0.9-1.3)

† Adjusted for mother's age and number of surviving children.

Table VII compares the survival rates of employed women and housewives. While employed women appear to experience higher rates of children with residual handicap, these differences are associated with low frequencies and the resultant large confidence limits suggest that the differences are not significant (though they approach significance).

### Discussion

Previous studies have varyingly argued that employed mothers are healthier and have more favourable pregnancy outcomes, are no different or have less favourable pregnancy outcomes than other women. The findings of many of these previous studies are flawed in at least one or more of three respects. Firstly, a self-selection process could account for the better health of employed mothers, with unhealthy women choosing to leave the workforce. To test this possibility we examined the past obstetrical history of employed women and housewives. Employed women have had fewer previous miscarriages or perinatal deaths when compared to housewives. Verbrugge and Madans<sup>23</sup> also point to the selection of healthy workers, though it is difficult to know the magnitude of the selection effect.

**Table VII** Outcome of pregnancy by mothers' employment status

		Rate per 1,000 pregnancies	Unadjusted RR (95% CL)	Adjusted† RR (95% CL)
Perinatal death of child				
Employed	(2,005)	10.5		
Housewives	(4,271)	9.4	1.1 (0.8-1.5)	1.0 (0.7-1.4)
Obvious/significant residual handicap				
Employed	(1,984)	10.6		
Housewives	(4,231)	6.9	1.3 (0.9-1.9)	1.3 (0.9-1.8)

†Adjusted for mother's age and number of surviving children.

Secondly, some previously observed associations between the employment status of the mother and her health often fail to consider socio-demographic and behavioural differences between women who are employed and their counterparts. Thus employed women have a generally healthier lifestyle, yet the birthweight of their babies is not apparently advantaged. It might be the case that the benefits of working include the reduced need to use substances (cigarettes, alcohol) which might compromise the pregnancy. We could speculate that work itself might represent a risk to the pregnancy, but that the healthier lifestyle of working women provides benefits which exceed this risk. Such benefits might include the increased family income derived from working.

Thirdly, the validity of self-reports of employment status, respondents' subjective perceptions of their health and use of medical services has been questioned. Various sources suggest that work histories may be obtained with a reasonable level of accuracy and where inaccuracies are found these are not systematically related to age, education or socio-economic variables. [24] Similarly, morbidity [25] and health service utilisation reports have reasonable validity. Nevertheless, it may be the case that employed women and housewives differ in their perception of and response to symptoms (perhaps as a consequence of the different time constraints operating for these women). Such a bias might account for some of the observed differences.

The findings of this study were presented under four headings. Housewives, surprisingly, appeared consistently to report a less healthy lifestyle, they smoke more in pregnancy, they delay their first clinic visit longer and they report missing more antenatal appointments. Despite these more adverse health behaviours, the outcomes of the pregnancies of housewives and employed women were not significantly different.

## Conclusion

With increasing numbers of women participating in the employed workforce, it is clearly imperative that the question of the likely impact of employment on pregnancy be addressed. Despite an apparently healthier lifestyle, women employed early in pregnancy appear to have pregnancy outcomes which are similar to those of housewives. Employed women appear to experience better mental health in pregnancy though these differences are unlikely to be clinically important.

Three possible conclusions of these findings warrant consideration. Firstly, it may be the case that employed women are a self-selected healthier group with better outcomes, but that the sample size and magnitude of effect were such that their advantage was not detectable in this study. Verbrugge and Madans [23] in considering data from the American Health Interview Survey (HIS) argue that the employed are healthier both because they are a select group and because employment is satisfying and confers health benefits for those who choose to be employed. Perhaps a more interesting research question would relate to the health consequences of failing to attain the work status a woman might prefer (whether it be employment or non-employment). Secondly, it may be the case that the early findings of detrimental pregnancy outcomes are a reflection of previous types of employment available to women and that, as we have found, work in contemporary industrial societies poses no dangers to pregnant women. Thus women, in Brisbane, have free and accessible public hospital antenatal care, which presumably provides a sensitive response to evidence of problems in pregnancy. Certainly a minority of women did report ceasing employment following advice from their obstetricians. Had these women continued to work the findings may have been different. Thirdly, is it plausible that housewives have better pregnancy outcomes? While not achieving statistical significance, this suggestion is supported by some of the data and it cannot be completely dismissed on the basis of our findings.

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