Socioeconomic characteristics of nulliparous women. (Figures are percentages except where indicated)

	Age (years)							All ages (n=911)*
	16 (n=32)	17 (n=64)	18 (n=85)	19 (n=102)	20-24 (n=392)	25-29 (n=174)	30+ (n=53)	
Marital state:								
Single	84	58	55	52	28	17	13	35
Married	0	16	212	27	56	68	74	48
Stable relationship	6	5	5	8	6	6	4	6
Getting married	6	22	19	14	10	5	2	10
Educational attainment:								
Left school at or before minimum leaving age	100	97	93	88	90	78	70	88
Income sources:								
Receiving only state benefits	78	75	80	58	33	20	21	42
Wages:								
Woman's only	16	14	8	17	13	9	2	12
Partner's only	0	3	2	7	12	12	21	10
Woman and partner	0	6	5	12	34	48	51	29
Employment state:								
Women:								
Full time†	16	19	12	26	44	55	50	38
Stopped during pregnancy	16	19	13	12	16	16	17	16
No of partners:								
Of which, % full time	21	46	70	87	355	160	52	798
Of which, % unemployed	14	26	14	45	60	76	83	56
	81	70	81	53	37	22	15	41

*Age unknown for nine women.
†At time of interview.

Comment

Part of the current concern about teenage pregnancy is associated with the rise in illegitimacy, and, although it has been pointed out that this should not necessarily be equated with single motherhood per se, 70% of the unmarried 17-19 year olds in our survey described themselves as single—that is, neither planning to marry nor living in a stable relationship.

The shortage of jobs means that most teenage women depend on state benefits, but are they adequate? A mother aged 18 years or over with one child and living with her parents is currently entitled to a long term weekly benefit of £33.45; if she lives in her own home overall weekly benefit rises to only £41.10. Thus after an estimated average expenditure on food has been allowed for, £20.25 is left to cover all weekly household and personal expenses, including fuel, clothing, shoes, travel, and recreation for the mother and her child. In view of these income levels and proposed changes in social security benefits it is not surprising that poverty affects many teenage mothers and their children.

Nearly 20 years ago Townsend illustrated the range and extent of poverty in the United Kingdom using a series of case descriptions, one of which was of a single teenage mother living in Glasgow.⁵ What is perhaps most disturbing about the current economic position of teenage mothers is that so little seems to have changed since Townsend's survey in 1968. If poverty does influence the health of women and their children inequalities in health will persist as long as such disadvantage continues.

We thank the midwives and clerical staff at Glasgow Royal Maternity Hospital and our colleagues at the Social Paediatric and Obstetric Research Unit for help and advice. The Social Paediatric and Obstetric Research Unit is supported by a grant from the Scottish Home and Health Department and the Greater Glasgow Health Board.

1 Simms M, Smith C. *Teenage mothers and their partners. A survey in England and Wales*. London: HMSO, 1986.
2 Office of Population Censuses and Surveys. *Birth statistics England and Wales*. London: HMSO, 1974, 1975.
3 Registrar General Scotland. *Annual report*. Edinburgh: HMSO, 1971-85.
4 Durward L. *Poverty in pregnancy: the cost of an adequate diet for expectant mothers*. London: Maternity Alliance, 1984.
5 Townsend P. *Poverty in the United Kingdom: a survey of household resources and standards of living*. Harmondsworth: Penguin Books, 1979.

(Accepted 23 September 1986)

Social Paediatric and Obstetric Research Unit, University of Glasgow, Glasgow G12 8LS

SUSAN WILLIAMS, SRN, SCM, research assistant
JOHN F FORBES, BA, MSC, health economist

Department of Community Medicine, Glasgow Royal Maternity Hospital, Glasgow G4 0NA

GILLIAN M MCILWAINE, MD, PHD, specialist in community medicine

Department of Information Services, Greater Glasgow Health Board, Glasgow G2 4JT

KATHRYN ROSENBERG, BA, PHD, epidemiologist

Correspondence to: Ms Williams.

Campylobacter enteritis in young children living in households with puppies

Animals may be implicated in the spread of campylobacter enteritis infection to man¹; in particular, dogs suffering from diarrhoea have been cited as a likely cause of infection.¹⁻² Most canine campylobacter infections occur in young asymptomatic dogs.³

We studied the possible association between campylobacter enteritis infection in children aged 0-5 and the presence of a young dog in the household.

Patients, methods, and results

Although campylobacter infection is not a statutorily notifiable disease, all cases identified in Darlington are notified to the department of community medicine. In addition, all faecal samples for analysis of "food poisoning" and diarrhoeal illness are tested in the local laboratory and thus a comprehensive record of campylobacter infection in the district is available. After receipt of the campylobacter notification the environmental health officers undertake a detailed, standardised inquiry of cases and contacts. We analysed such inquiry reports of campylobacter notifications for the years 1984 and 1985 retrospectively. A case-control study was undertaken among children aged from 0 to 5 to test the hypothesis that puppies are a major contributory factor in childhood campylobacter infections. To obtain controls all health visitors recorded the age, sex, and details of any household pets of five consecutive children aged from 0 to 5. A dog was classed as a puppy at the discretion of the health visitor.

Eighty two cases of campylobacter infection were notified. Interviews led to seven further positive identifications out of 169 household contacts identified (4%). Of the 89 patients, 48 were boys and 41 were girls (1:17:1). The notification rate was highest for children aged from 0 to 5, at 1.1/1000 a year. Symptomatology was available for 62 (70%) of the cases. The principal symptoms recorded in these cases were diarrhoea (58 (95%)), abdominal pain (45 (73%)), and vomiting (16 (26%)). The average duration of symptoms was eight days.

The distribution of pets showed that nine (60%) of the patients and 48 (43%) of the controls had an adult dog or puppy in the household, and a significant association was found between cases of campylobacter infection in the 0-5 year age group and the presence of a puppy (table).

Number (%) of cases and controls with and without puppy in household

	Puppy in household	No puppy in household
Cases	6 (46)	9 (10)
Controls	7 (54)	83 (90)

χ^2 with Yates's correction = 9.49, 1 df, 0.01 > p > 0.001.

Comment

The case-control study showed a significant association between cases of campylobacter infection in the 0-5 year age group and the presence of a puppy in the household. Puppies have been shown to have a high rate of carriage of campylobacter, and transmission to man may occur.³⁻⁴ This study

supports the suggestion that puppies are a possible source of campylobacter infection in the 0-5 year age group. Young children have particularly close contact with pets and are therefore more susceptible to faecal-oral spread, and the association between puppies, young children, and diarrhoea is strengthened by the identification of campylobacter and diarrhoeal symptoms in some of the puppies.

Although no young child came to any permanent physical harm, at least five were diagnosed as having the infection while in hospital; campylobacter might thus have been a factor contributing to admission. The symptoms of diarrhoea and abdominal pain may be very distressing to both the child and the parent. We suggest that parents should be made aware of this association and that if young children are in contact with puppies the need for hygienic precautions should be emphasised.

- 1 Hastings RH. Campylobacter enteritis in pets. *Lancet* 1978;ii:1249-50.
- 2 Blaser MJ, Cravens J, Powers BW, Wang WL. Campylobacter enteritis associated with canine infection. *Lancet* 1978;ii:979-81.
- 3 Bruce D, Zochowski W. Study A—campylobacter infections in dogs and cats. *Communicable Disease Report* 1979;No 38.
- 4 Baxter DN. The deleterious effects of dogs on human health: 3. Miscellaneous problems and a control programme. *Community Medicine* 1984;6:198-203.

(Accepted 2 October 1986)

Darlington Health Authority, Memorial Hospital, Darlington DL3 6HX

NICK J SALFIELD, MB, BS, senior registrar in community medicine
EDWIN J PUGH, MB, MRCP, senior registrar in community medicine

Correspondence to: Dr E Pugh, Wellhouse, East View, Sadberge, County Durham DL2 1FF.

Lean body mass and non-rapid eye movement sleep

The restorative theory of sleep suggests that sleep is influenced by metabolic rate. Evidence of such an association is provided by cross species phylogenetic studies and the observation of disease states in humans (for example, of hyperthyroidism) and the effect of exercise and fitness on sleep patterns. There are no studies, however, directly linking daily metabolic rate and sleep patterns. Total body mass has been shown to be related to total duration of sleep and duration of rapid eye movement sleep.¹ We have shown a relation between body composition and slow wave sleep, but the methods used (tests for skinfold thickness and urinary creatinine concentration) have limitations, and the relation shown seemed to depend on the subject's fitness.²

In this study we report three separate experiments in which we studied the relation between lean body mass and sleep parameters. In all cases lean body mass was calculated from measurements of total body potassium concentration using a whole body counter to monitor potassium-40 at the Scottish Universities Research and Reactor Centre at East Kilbride. The techniques used have been described.³ The method is considered to be very reliable for the measurement of lean body mass, and lean body mass measured in this way has been shown to have the highest correlation with metabolic rate when compared with seven other relevant anthropometric measures.⁴

Patients, methods, and results

In the first study, which investigated the effect of a nutritional supplement on sleep patterns, 18 subjects (12 men and six women, aged 20-40) had lean body mass measured within one month of having their sleep patterns recorded in the sleep laboratory. A significant correlation was shown between lean body mass and non-rapid eye movement sleep in the first seven hours of sleep (figure), and that between lean body mass and slow wave sleep was 0.44 ($p < 0.04$).

In a second study eight subjects were studied on three occasions nine weeks apart.⁵ These subjects were undergoing their initial army training. On each occasion lean body mass was measured within one week of the sleep recordings. These subjects (aged 17-20), who were untrained initially, showed significant improvement in their anaerobic threshold during the training period in addition to significant changes in lean body mass. In this group lean body mass was shown to be significantly correlated with non-rapid eye movement sleep during the first seven hours of sleep (see figure). Slow wave sleep was not significantly correlated with lean body mass in this group ($p < 0.07$).

In a final experiment 34 men (aged 17-29) were studied. These subjects had participated in various studies in the sleep laboratory. One third of these subjects were competitive athletes. In this group not all subjects slept for over seven hours, and therefore lean body mass was correlated with non-rapid eye movement sleep during the first six hours of sleep. Once again a significant correlation was found (figure).

Correlation of lean body mass and duration of non-rapid eye movement sleep in three groups. —●— First study ($n=18$, $r=0.49$, $p<0.02$). —■— Second study ($n=8 \times 3$, $r=0.37$, $p<0.04$). —▲— Third study ($n=34$, $r=0.48$, $p<0.01$).

Comment

In three separate studies we found a significant correlation between lean body mass and non-rapid eye movement. Although the correlations were not particularly strong, indicating that other factors influence sleep patterns, the uniformity of significance in three very different groups is noteworthy. These results support the suggestion of a relation between metabolic activity and sleep patterns.

We thank the Scottish Universities Research and Reactor Centre, Edblo Ltd, and Glencorse Barracks for the use of facilities. Dr C Shapiro was supported by Roussel Laboratories Ltd, Paris, during the study.

- 1 Adam K. Brain rhythm that correlates with obesity. *Br Med J* 1977;iii:234.
- 2 Paxton SJ, Trinder J, Montgomery I, Oswald I, Adam K, Shapiro C. Body composition and human sleep. *Australian Journal of Psychology* 1984;36:181-9.
- 3 Boddy K, King PC, Tothill P, Strong JA. Measurement of total body potassium with a shadow shield whole body counter; calibration and errors. *Phys Med Biol* 1971;16:275-82.
- 4 Halliday D, Hesp R, Stalley SF, Warwick P, Altman DG, Garrow JS. Resting metabolic rate, weight, surface area and body composition in obese women. *Int J Obes* 1979;3:1-6.
- 5 Shapiro CM, Warren PM, Trinder J, et al. Fitness facilitates sleep. *Eur J Applied Physiol* 1984;53:1-4.

(Accepted 19 September 1986)

Edinburgh University, Morningside Park, Edinburgh EH10 5HF

C M SHAPIRO, PHD, MRCPsych, senior lecturer, department of psychiatry
J CATTERALL, BSC, MRCP, senior registrar, department of respiratory medicine

P WARREN, PHD, lecturer, department of respiratory medicine
I OSWALD, DSC, FRCPsych, professor, department of psychiatry

Department of Psychology, University of Tasmania

J TRINDER, PHD, lecturer
S PAXTON, BSC, PHD, lecturer

Scottish Universities Research and Reactor Centre, East Kilbride

B W EAST, PHD, head, nuclear medicine

Correspondence to: Dr Shapiro.