

- 10 Koenig JQ. Indoor and outdoor pollutants and the upper respiratory tract. *J Allergy Clin Immunol* 1988;81:1055-9.
- 11 Godlee F. Health and the environment—air pollution. II. Road traffic and modern industry. *BMJ* 1991;303:1539-43.
- 12 Statistisches Landesamt der Landeshauptstadt München. *Statistische Taschenbuch München* 1990. Munich: Manz, 1990.
- 13 Umweltschutzreferat der Landeshauptstadt München. *Umweltatlas München*. Munich: TÜV Bayern, 1990.
- 14 World Health Organisation. *Air quality guidelines for Europe*. Copenhagen: WHO, 1987.
- 15 Bayerisches Landesamt für Umweltschutz. *Belastungsgebiet München. Immissionskataster*. Munich: BLfU, 1990.
- 16 TÜV Bayern. *Bericht über "Immissionsmessungen innerhalb der Stadtgrenze der Landeshauptstadt München zur Vervollständigung des Immissionskatasters für das gesamte Stadtgebiet"*. Munich: TÜV Bayern, 1988.
- 17 Mutius E v, Dold S, Wjst M, Stiepel E, Reitmeir P, Frenzel-Beyme-Bauer R, et al. Münchener Asthma- und Allergiestudie. Praevälzenzen atopischer und asthmatischer Erkrankungen im Kindesalter in Bayern. *Münchener Medizinische Wochenschrift* 1991;133:675-9.
- 18 Nicolai T, Mutius von E, Reitmeir P, Wjst M. Reactivity to cold air hyperventilation in normal and asthmatic children in a survey of 5697 school children in Southern Bavaria. *Am Rev Respir Dis* 1993;147:565-72.
- 19 Ng'anga LW, Ernst P, Jaakkola MS, Gerardi G, Hanley JH, Becklage MR. Spirometric lung function. Distribution and determinants of test failure in a young adult population. *Am Rev Respir Dis* 1992;145:48-52.
- 20 SAS Institute. *SAS user's guide: statistics*. Version 6. Cary, North Carolina: SAS Institute, 1989.
- 21 Samet JM. The epidemiologic approach to investigating indoor and outdoor air pollution. In: Gardner DE, ed. *Toxicology of the lung*. New York: Raven, 1933:311-34.
- 22 Bromberg PA. Asthma and automotive emissions. In: Watson AY, Bates RR, Kennedy D, eds. *Air pollution, the automobile, and public health*. Washington, DC: National Academy Press, 1988:465-98.
- 23 Dold S, Reitmeir P, Wjst M, von Mutius E. Auswirkungen des Passivrauchens auf den kindlichen Respirationstrakt. *Monatsschrift für Kinderheilkunde* 1992;140:763-8.
- 24 Wardlaw AJ. The role of air pollution in asthma. *Clin Exp Allergy* 1993;23:81-96.
- 25 Romieu I, Lugo MC, Velasco RS, Sanchez S, Meneses F, Hernandez M. Air pollution and school absenteeism among children in Mexico City. *Am J Epidemiol* 1992;136:1524-31.
- 26 Yokoyama Y, Nitta H, Maeda K, Aoki S. What interaction does indoor nitrogen dioxide have on the effect of the automobile exhaust? *Tokai J Exp Clin Med* 1985;10:379-84.
- 27 Murakami M, Ono M, Tamura K. Health problems of residents along heavy traffic roads. *J Hum Ergol (Tokyo)* 1990;19:101-6.
- 28 Ishizaki T, Koizumi K, Ikemori R, Ishiyama Y, Kushibiki E. Studies of prevalence of Japanese cedar pollinosis among the residents in a densely cultivated area. *Ann Allergy* 1987;58:265-70.
- 29 Nitta H, Sato T, Nakai S, Maeda K, Aoki S, Ono M. Respiratory health associated with exposure to automobile exhaust. I. Results of cross-sectional studies in 1979, 1982, and 1983. *Arch Environ Health* 1993;48:53-8.
- 30 Speizer FE, Ferris BG. Exposure to automobile exhaust. I. Prevalence of respiratory symptoms and disease. II. Pulmonary function measurements. *Arch Environ Health* 1973;26:313-24.
- 31 Evans RG, Webb K, Homan S, Ayres SM. Cross sectional and longitudinal changes in pulmonary function associated with automobile pollution among bridge and tunnel officers. *Am J Ind Med* 1988;14:25-36.
- 32 Ulfvarson U, Alexandersson R. Reduction in adverse effect on pulmonary function after exposure to filtered diesel exhaust. *Am J Ind Med* 1990;17:341-7.
- 33 Gamble J, Jones W, Minshall S. Epidemiological-environmental study of diesel bus garage workers: acute effects of NO₂ and respirable particulate on the respiratory system. *Environ Res* 1987;42:201-14.
- 34 Ames RG, Hall DS, Reger RB. Chronic respiratory effects of exposure to diesel emissions in coal mines. *Arch Environ Health* 1984;39:389-94.
- 35 Samson PJ. Atmospheric transport and dispersion of air pollutants associated with vehicular emissions. In: Watson AY, Bates RR, Kennedy D, eds. *Air pollution, the automobile, and public health*. Washington, DC: National Academy Press, 1988:77-97.
- 36 Atkinson R. Atmospheric transformation of automotive emissions. In: Watson AY, Bates RR, Kennedy D, eds. *Air pollution, the automobile, and public health*. Washington DC: National Academy Press, 1988:99-132.
- 37 Schwartz J. Air pollution and the duration of acute respiratory symptoms. *Arch Environ Health* 1992;47:116-22.
- 38 American Thoracic Society. Guidelines as to what constitutes an adverse respiratory health effect with special reference to epidemiologic studies of air pollution. *Am Rev Respir Dis* 1985;131:666-8.
- 39 Hoppenbrouwers T. Airways and air pollution in childhood: state of the art. *Lung* 1990;68(suppl):35-46.
- 40 Farley JM. Inhaled toxicants and airway hyperresponsiveness. *Annual Review of Pharmacology and Toxicology* 1992;32:67-88.

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Psychosocial predisposing factors for infantile colic

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Abstract

Objective—To study associations between characteristics of families during the first pregnancy and after childbirth and the development of infantile colic.

Design—Randomised, stratified cluster sampling. Follow up from the first visit to a maternity health care clinic during pregnancy to three months after birth with confidential semistructured questionnaires.

Setting—Maternity health care clinics in primary health care centres in Finland.

Subjects—1443 nulliparous women and 1407 partners. Altogether 1333 women and 1279 men returned the questionnaires. When the infants were 3 months old 1208 women and 1115 men returned questionnaires.

Main outcome measures—Marital relationship; personal and social behaviour of parents during the pregnancy and their coping with the pregnancy; mothers' physical health and events, symptoms, and experiences in relation to pregnancy; self confidence and experiences of mothers and fathers in relation to childbirth; and parents' sociodemographic and educational variables. Measure of colic when the infant was 3 months old.

Results—Experience of stress and physical symptoms during the pregnancy, dissatisfaction with the sexual relationship, and negative experiences during childbirth were associated with the development of colic in the baby. None of the sociodemographic factors was associated with colic.

Conclusions—Early preventive health work during pregnancy should attempt to improve parents' tolerance of symptoms of stress and ability to cope and increase their confidence in parenting abilities.

Introduction

Infantile colic (three month colic) is described as a behavioural syndrome characterised by excessive crying, which is paroxysmal in nature, more likely to occur in the evenings, and without identifiable cause, during which an otherwise healthy infant between 2 weeks and 4 months of age is difficult to console.¹ According to Wessel *et al*, a colicky infant is defined as a one who has paroxysms of irritability, fussing, or crying lasting for three hours a day for three days a week over three weeks.²

Most investigators have been concerned with gastrointestinal factors in the aetiology of colic: the immaturity of the gastrointestinal tract,³ type of feeding,^{4,6} intolerance to cows' milk,⁷ and lactose intolerance.^{8,9} The evidence, however, remains weak and contradictory,¹ and there is an increasing tendency for research to implicate non-gastrointestinal factors. Neff postulated that because of an abnormal sensitivity of the central nervous system, minimal stimuli, which are usually without effect, may lead to the development of fussiness in certain infants.¹⁰ This theory is similar to that implicating the infants' own temperament. Carey correlated difficult temperament at 4 to 8 months of age with colic, but the relation between colic and temperament seems to be unclear as yet.¹¹ The transfer of tension from mother to infant has been suggested to be a causative factor.¹² Carey further confirmed this in a prospective study of 103 subjects.¹³ In a study by Paradise maternal emotional factors were not associated, but puerperal emotional tension or depression were.¹⁴

Infantile colic was described by Hewson *et al* as the end result of a complex transaction between infants and their environment, with many factors responsible for the crying and distress.¹⁵ Any single study can

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hardly clarify this complicated network comprehensively so we attempted to approach the subject piece by piece with a methodologically tenable design.

We examined those events related to pregnancy which seemed to be connected to an infant's colic to obtain more information about preventive health care of mother and baby. This work is a part of the Finnish family competence study project, a 10 year follow up study aiming to improve health education of families.

Subjects and methods

STUDY POPULATION

By using a stratified, randomised cluster sampling procedure a representative sample of the study population was collected within the province of Turku and Pori in southwestern Finland. In this area the study population consisted of all nulliparous women who had, on their own initiative, visited their public health nurse at the maternity health care clinic during 1986. Eleven health authority areas, which had been weighted according to the degree of urbanisation, were randomly chosen for the study.¹⁶ Midwives and nurses in 67 maternity health care clinics invited 1582 women to participate in this study. Of those, 1443 supplied informed consent forms while the remaining 139 refused to participate. There were 36 single mothers in this study. Of the 1407 fathers, 1279 responded.

We used three questionnaires (on average, one at the 10th week of pregnancy, another at the 28th week, and another about a week after the delivery) to collect information about the variables under investigation. Mothers, fathers, and nurses or midwives were presented with different questionnaires, which were returned in closed envelopes. After the delivery of the baby 1238 mothers and 1134 fathers returned their questionnaires, and 1115 fathers and 1208 mothers returned their three month follow up questionnaires.

The occupational distribution of those refusing to participate was similar to that of those participating (χ^2 3.918; df 3; $p=0.2705$). Other characteristics of the non-participants were not recorded. The sampling methods and characteristics of the study population have been described in detail in earlier reports.^{17,18}

When the infant was 3 months old the mother was asked to complete a questionnaire inquiring about whether the infant had colic by that time. The question about colic contained a scale of five categories (on a continuum of practically no colic to a lot of colic). Those mothers who indicated 4 (quite a lot of colic) and 5 (a lot of colic) on the scale were perceived as having a colicky infant, and they were selected into the colic group.

The study design was approved by the faculty ethics committee of the University of Turku Medical School.

INDICATORS

Characteristics of families who had colicky infants later on were described by using five different groups of variables (see appendix for details). Firstly, variables which described the marital relationship; most of them were responded to by the women and their partners. Secondly, questions were asked on their way of life during pregnancy and their adaptation to pregnancy. Again these were answered by the women and their partners. Thirdly, we asked just the women about physical health, events, and symptoms during their pregnancy. Fourthly, parents were asked about their experiences during childbirth and projections of self image. These questions were responded to by the mothers and those fathers who were present during the delivery. Finally, both parents were asked questions on sociodemographic variables.

STATISTICAL ANALYSES

The associations between the appearance of colic

and the potential explanatory characters describing the family were assessed by using the Pearson χ^2 test and logistic models.¹⁹ After the study of univariate associations, a multivariate stepwise logistic regression analysis was completed for the significant variables representing the same group. When significant differences between groups were observed, odds ratios (95% confidence intervals) were calculated to measure the differences. When categories of the explanatory variable were ordered, the association was analysed by performing a test for linear trend. Statistical computations were generated by using BMDP statistical software.²⁰

Results

When the study began the mean (SD) age of the 1443 mothers was 25.4 (4.3) years with a range of 16-42, and the mean (SD) age of the 1279 fathers was 27.9 (4.8) years with a range of 17-49. At the time of the first visit to the maternity health care clinic 763 women were married and 633 were living in a marriage-like relationship; the 36 remaining women were single and living alone or with their parents. A total of 1036 women were in paid work. In all, 190 women and 441 men had completed fewer than nine years of primary school; 585 women and 509 men had completed nine years of basic education; and 558 women and 322 men had completed 12 years of basic education. The young women had a better basic education than had the young men.

Since both the mothers' and nurses' assessments of the colicky infants were analogous during the three month assessment only the mothers' estimations of colic were used thereafter. Of the infants, 124 of 1204 had a lot of colic and 214 had moderate colic. In other words, there were 338 babies in the colic group. Method of feeding was not significantly associated with colic.

By using the groups listed above the results were as follows.

MARITAL RELATIONSHIP

Both the mothers' and fathers' responses about their relationship showed that the more positive their mutual sexual relationship was the less colic their infants had. This was seen in the responses both at the beginning and at the 28th week of pregnancy (fig 1). The infants showed less colic when the mothers experienced their femininity in a positive fashion ($p=0.017$) and when they estimated that their partners understood their thoughts very well ($p=0.038$). The independent effect of the variables was tested with a stepwise logistic regression analysis. When a woman was disappointed in being a woman ($p=0.011$; odds ratio 1.3; 95% confidence interval 1.0 to 1.5) and perceived a worsening of her sexual relationship ($p=0.02$; 1.2; 1.0 to 1.4), the independent effect was present. The only significant association among the fathers, however, was the perception about the worsening of the sexual relationship and colic so that a stepwise logistic regression analysis was not possible.

LIFE DURING AND ADAPTATION TO PREGNANCY

Of all those variables that characterised the behaviour of the parents during the pregnancy and their adaptation to that pregnancy, those variables which measured experienced stress, social isolation, and need for outside help were associated with infant colic: the more stress experienced, the more colic (fig 2). Infants were more likely to have colic if the parents were socially isolated during the pregnancy and used few cultural services; and if the mother was insecure after the birth and thought that she would need a lot of outside help just after the delivery. An independent effect was present in all of these variables (table).

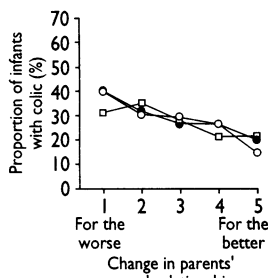
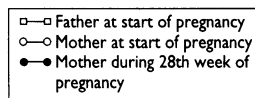


FIG 1—Association between experienced changes in sexual relationship and infant's colic

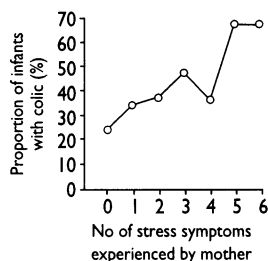


FIG 2—Association between symptoms of stress during pregnancy and infant's colic

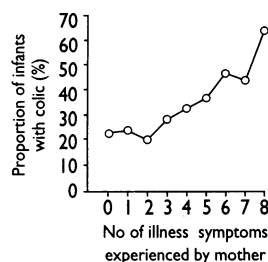


FIG 3—Association between mother's reported symptoms of illnesses and infant's colic

Associations between mother's behaviour during pregnancy and baby's colic

Variable	Univariate associations		Multivariate associations	
	p Value	Odds ratio (95% confidence interval)	p Value	Odds ratio (95% confidence interval)
Need for outside help:	< 0.0001		< 0.0001	
Not at all		1		1
A lot		2.1 (0.9 to 4.7)		2.0 (1.5 to 2.6)
A little		2.0 (1.5 to 2.6)		1.5 (0.6 to 3.7)
Mother's experience of stress:	< 0.0001		< 0.0001	
Increase of risk per one symptom		1.4 (1.2 to 1.6)		1.3 (1.2 to 1.5)
Mother's use of cultural services per year (No of events):	0.006		0.001	
≥ 10		1		1
0-9		1.5 (1.1 to 1.9)		1.6 (1.2 to 2.2)

Among fathers the social isolation ($p=0.015$; 1.4; 1.1 to 1.9), which was measured from social activity, was the only factor significantly associated with colic.

PHYSICAL HEALTH, EVENTS, AND SYMPTOMS DURING PREGNANCY

The physical wellbeing of the mothers during the pregnancy was associated with colic so that the more different symptoms the women had during pregnancy and the more troublesome they experienced being pregnant the more colic occurred ($p<0.0001$; fig 3). Moreover, the baby had more colic if a mother found her work distressing during the pregnancy ($p=0.034$; 1.3; 1.0 to 1.8); if she was on sick leave during the study period of the 28th week of the pregnancy ($p=0.04$; 1.5; 1.0 to 2.2); and the longer the total period of sick leave during the pregnancy (as inquired after childbirth) ($p=0.001$). Perception of symptoms ($p<0.0001$; odds ratio per symptom 1.2; 1.1 to 1.3) and having sick leave ($p=0.02$; odds ratio per additional month of sick leave 1.2; 1.0 to 1.4) contributed to an independent effect in the multivariate analysis.

EXPERIENCES DURING CHILDBIRTH AND PROJECTED SELF IMAGE

Questions about the childbirth and self confidence showed that the more traumatic the experience of childbirth was to both parents the more colic the infant had. Infants had more colic if the mother thought that the staff of the hospital were hostile ($p=0.006$) and the delivery had been a negative experience ($p<0.0001$). A negative experience in childbirth ($p=0.0003$; odds ratio per additional negative experience 1.1; 1.1 to 1.2; 12 experiences measured altogether) contributed to an independent effect in the stepwise multiple regression analysis.

Babies were more likely to have colic or have more colic if the father was disappointed with the birth and thought that he should not have been present ($p=0.006$); if he thought that his participation was not worth it ($p=0.013$; 1.4; 1.1 to 1.8); if he was disappointed with the physical condition (appearance or health) of his baby ($p<0.0001$); and if he estimated his partner's delivery to have been very painful ($p=0.037$). Independent effect could not be calculated for fathers because of a small number of total responses ($n=191$) in this category; only those fathers who were present at the birth had originally been included ($n=649$).

The fact that the parents had hoped for a girl or a boy but did not get the wanted sex had no association with colic.

SOCIODEMOGRAPHIC VARIABLES

No associations between the presence of colic and sociodemographic and educational variables were found.

Discussion

In our study questions about the marital relationship and behaviour of the parents and their experience of

stress, susceptibility to illnesses, and self confidence during the pregnancy and childbirth indicated significant associations in relation to the incidence of the infant's symptoms of colic.

This sample well represented the nulliparous women of the study area, and the number of drop outs remained low. Thus, the study was representative of the families expecting their first child in southwestern Finland in 1986.¹⁸ Also the proportion of colic by infants in this study agrees with the known incidence of colic.^{2,21}

The mothers' estimations of the amount of colic were used, although these had been confirmed with the nurses' estimations at the time of the three month assessment. Clinical diagnosis of infantile colic corresponds with diary recording.²² Thus, the clinical diagnosis of colic can be used as a reliable standard. Since our aim was not to search for causes of colic but to describe those characteristics of the parents which may be associated with the symptoms of colic, the mothers' estimations were adequate. Moreover, colic may also generate more conflicts in the family dynamics of these families than in other families, and for this reason the risks of negative long term consequences for the parent-infant relationship might increase.²³

To exclude breast feeding as a confounding variable in colic, breast feeding, formula feeding, and their combinations with colic were tested in this data but there were no significant associations present. In previous studies, Rubin and Prendergast found that the prevalence of colic was higher in those infants who received breast milk than in other babies.⁴ The findings have not been repeated anywhere. Ståhlberg found that the duration of breast feeding was similar in infants with and without colic.⁵ Hide and Guyer could not find any significant difference in the prevalence of colic between entirely breast fed and entirely formula fed infants, although colic was recorded more often in the infants introduced to mixed feeding before the age of three months than in others.⁶ Wessel *et al*,² Paradise,¹⁴ Thomas *et al*,²⁴ Moore *et al*,⁹ and Matheson and Rivrud²⁵ did not find any correlation between the prevalence of colic and the type of feeding.

Wessel *et al* found that infants with colic were more common in families with "family tension."² As Illingworth pointed out, however, the family tension was probably the result rather than the cause of the colic.²⁶ For this reason it is important to determine characteristics of families who may go on to have a baby with colic. It was possible to investigate this issue within this prospective study design.

The association between the stress of the parents and the parents' dissatisfaction together with the development of infantile colic does not explain the aetiology of colic, but some disorders of family dynamics or low capability of coping may signify factors that provoke or increase colic. The mother may have irrational fears, and she may experience ambivalence towards her infant, especially when stressed by its screaming. Reasons for these ambivalent feelings may, for example, lie in the history of her pregnancy, her body and sexual image, or in her relationship with her partner.¹⁵ It would be wise to recognise this ambivalence, help the mother accept it, and assist her in explaining it to herself. In this study illness, stress, and factors in the relationship during the pregnancy seemed to have a clear association with infantile colic.

Few prospective studies on colic from conception to birth exist and still fewer have included a holistic or a theoretical system research model. According to one theory the disease of one family member also affects the others. Although infantile colic is generally self limiting, it is not necessarily limited to self.²² As a relationship problem, colic may have consequences for the infant and the family even after the crying stops.^{22,27}

Clinical implications

- Infantile colic is characterised by excessive, inconsolable crying over three weeks in an otherwise healthy infant aged 2 weeks to 4 months
- Several psychosocial factors predispose to the development of infantile colic, and these may be detected during the pregnancy
- In this prospective study follow up began in the first weeks of pregnancy until the child was 3 months old
- The mother's experience of psychosomatic stress symptoms during the pregnancy, and the father's dissatisfaction with the sexual relationship, and both parents' negative feelings during the birth had the strongest associations with the development of infantile colic
- Antenatal care should try to help parents cope with stress and increase self confidence in their parenting ability

A family with a colicky infant is a real challenge to the staff of maternity health care and well baby clinics as well as for general practitioners and paediatricians. The key issues include providing support through information and conversation as well as giving encouragement to the parents about coping mechanisms and nurturing skills so that family life may be eased a little and the parents may manage a screaming infant at home. It is also important to continue follow up long enough not to leave the parents alone^{15,27} and to emphasise positive "good enough" parenting rather than perfect parenting.²⁸ Especially with those families who seem to have a lot of problems with childbearing this work has to begin before childbirth.

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Appendix

Groups of variables to assess characteristics of parents.

MARITAL RELATIONSHIP

- How long were you together before the pregnancy?
Have you shared leisure activities with your partner?
Are you pleased to be a woman/man? (1=not pleased, 5=very pleased)
Has your emotional life changed during your pregnancy/your partner's pregnancy? (1=not at all, 5=very much)
What is your relationship like with the child's father now?
Has there been any change during the pregnancy? (1=for the worse, 5=for the better)
Does your partner understand your present way of thinking? (1=not at all, 5=very well)
Do you want to discuss parenthood with your partner and have the conversation initiated by somebody outside the family? (1=not at all, 5=very much)
Has there been any change in your sexual relationship during the pregnancy? (1=for the worse, 5=for the better)
Father may be jealous because of a child (yes/no)
Father can be jealous because of mother-child relationship (yes/no)
My partner/husband will not be interested in child rearing (yes/no)
My partner/husband will support me in my child rearing task (yes/no)
My partner/wife will support me in my child rearing task (yes/no)

WAY OF LIFE DURING AND ADAPTATION TO PREGNANCY

- Do you think your pregnancy and the baby will affect your professional career? (1=negatively, 5=positively)
What is the attitude of your friends as far as the addition to your family is concerned? (1=negative, 5=positive)
Do you feel that you need help during the transition to parenthood? (1=not at all, 5=very much)
How do you assess your relationship with your own mother? (1=distant, 5=close)
How do you assess your mother as an educator? (1=inconsistent, 5=consistent)
How do you assess your own father as an educator? (1=inconsistent, 5=consistent)
Were you given corporal punishment at your childhood home? (never/seldom/now and then/often)
Do you presently feel that you need outside help now? (asked one to two weeks after the delivery) (not at all/a little/a lot)
Do you smoke? (yes/no)
Do you drink alcoholic beverages? (women: before pregnancy, men: currently) (none/seldom/once or twice a month/once a week or more frequently)
A list of 13 symptoms of stress was presented to the mothers and fathers, and they were asked to respond on a four point scale as to how often they felt a given symptom (at least once a week, at least once a month, less often, hardly ever). A respondent received a stress point if she or he felt a symptom once a month or more frequently. Thus each respondent received a sum of points.
Use of cultural service—How many times annually do you go to a cinema, theatre, concert, an athletic competition or match, a library, lectures, or public discussion? Then we calculated the yearly use for every respondent.

PHYSICAL HEALTH, EVENTS, AND SYMPTOMS IN PREGNANCY

- Are you suffering from fatigue, digestive disturbances, heartburn, swelling, constipation, varicose veins, itching skin, itching of palms and soles of feet, tenderness or aches at the pubic symphysis, and severe contractions. (Asked during 28th week of pregnancy and after the delivery. The individual pregnancy trouble points were then calculated.)
Have you experienced migraine, headache, aching joints, pain in wrist, elbow joints and shoulder joints, back pain, backache, swelling in legs or feet, and skin disorder. (Individual symptom points then calculated.)
Are you suffering from diabetes, epilepsy, hypothyroidism, hyperthyroidism, hypertension, allergic disorder, rheumatism, coeliac disease, mental disorder, recurrent urinary tract infections, back disorders, other disorders? Please list.
An amount of sick leave during the pregnancy was calculated as days.
What is your estimation about your own health? (1=ill, 5=healthy)
Have you felt that your work has been more tiring during the pregnancy than before? (yes/no)
Do you take part in some kind of regular exercise (for example, once a week or more) during your pregnancy? (yes/no)

PARENTS' EXPERIENCES DURING CHILDBIRTH AND PROJECTIONS OF SELF IMAGE

- Did you take part in family training?
Fathers were asked about their partners' pains, their experience of the birth, the physical condition of the baby compared with expectations, and their potential participation in future childbirth:
Were you present during the birth of the baby?
How would you estimate the degree of your partner's labour pains?
How were the pains in comparison with your expectations?
How worth while would you perceive your participation during the birth?
Did the birth process correspond to your expectations?
Did your participation in childbirth change your relationship with the newborn (positively/negatively)
A father's estimation about the physical condition of his newborn child was inquired about using eight variables, and a sum variable for each father was calculated
Do you intend to participate when/if your wife gives birth next time?
Mothers were asked about their experience of delivery evaluations about being greeted by the hospital staff and the treatment in the delivery room, labour pains, atmosphere in

the labour ward, getting started in breast feeding, and willingness to deliver another child later.

- Mothers' were also asked:
- Did you have confidence in yourself during your delivery/confidence in the staff? Did you experience tolerable pain/intolerable pain/fear that your delivery would not succeed/fear that your baby would not survive/fear that you would not survive?
 - Did you feel exhausted?
 - Did you feel that your delivery was easier/more difficult than you had expected?
 - Was your childbirth a period of happiness/horror?
 - Was the atmosphere at the hospital reception friendly/encouraging/calm/busy/harsh/nervous/fear inducing and stress inducing/fear reducing and stress reducing?
 - How did you experience your labour pains?
 - How would you assess the atmosphere at the puerperal department?
 - How well did getting breast feeding started succeed?
 - Are you still breast feeding? (At the time of the three month follow up)
 - Would you like to have another baby?

PARENTS' SOCIODEMOGRAPHIC VARIABLES

- Age
- Basic education
- Vocational education
- Occupation
- Estimation about one's own social position.

- 1 Miller AR, Barr RG. Infantile colic, is it a gut issue? *Pediatr Clin North Am* 1991;38:1407-23.
- 2 Wessel MA, Cobb JC, Jackson EB, Jackson EB, Harris GS, Derwiler AC. Paroxysmal fussing in infancy, sometimes called "colic." *Pediatrics* 1954;14:421-34.
- 3 White PJ. The relation between colic and eczema in early infancy. *Am J Dis Child* 1929;38:935-42.
- 4 Rubin SP, Prendergast M. Infantile colic: incidence and treatment in a Norfolk community. *Child Care Health Dev* 1984;10:219-26.

- 5 Ståhlberg MR. Infantile colic: occurrence and risk factors. *Eur J Pediatr* 1984;143:108-11.
- 6 Hide DW, Guyer BM. Prevalence of infant colic. *Arch Dis Child* 1982;57:559-60.
- 7 Forsyth BWC. Colic and the effect of changing formulas: a double-blind, multiple-crossover study. *J Pediatr* 1989;115:521-6.
- 8 Miller JJ, McVeagh P, Fleet GH, Petocz P, Brand JC. Breath hydrogen excretion in infants with colic. *Arch Dis Child* 1989;64:725-9.
- 9 Moore DJ, Robb TA, Davidson GP. Breath hydrogen response to milk containing lactose in colicky and non-colicky infants. *J Pediatr* 1988;113:979-84.
- 10 Neff FC. The treatment of colic in infants. *JAMA* 1940;114:1745-8.
- 11 Carey WB. Clinical applications of infants temperament measurements. *J Pediatr* 1972;81:823-8.
- 12 Spock B. Etiological factors in hypertrophic pyloric stenosis and infantile colic. *Psychosom Med* 1944;6:162-5.
- 13 Carey WB. Maternal anxiety and infantile colic. *Clin Pediatr (Phila)* 1968;7:590-5.
- 14 Paradise JL. Maternal and other factors in the etiology of infantile colic. *JAMA* 1966;197:191-9.
- 15 Hewson P, Oberklaid F, Menahem S. Infant colic, distress and crying. *Clin Pediatr (Phila)* 1987;26:69-76.
- 16 Central Statistical Office. *Statistical yearbook of Finland*. Vol 82. Helsinki: Central Statistical Office of Finland, 1987.
- 17 Rautava P, Sillanpää M. The Finnish family competence study: knowledge of childbirth of nulliparae seen at maternity health care clinics. *J Epidemiol Community Health* 1989;43:253-60.
- 18 Rautava P. The Finnish family competence study: characteristics of pregnant women with low childbirth knowledge. *Soc Sci Med* 1989;29:1105-9.
- 19 Agresti A. *Categorical data analysis*. New York: John Wiley and Sons, 1990.
- 20 Dixon WJ, Brown MB, Engelman L, Jennrich RI. *BMDP statistical software manual*. Vol 1 and 2. Berkeley CA: University of California Press, 1990.
- 21 Ilingworth RS. "Three months' colic." *Arch Dis Child* 1954;29:165-74.
- 22 Hill DJ, Menahem S, Hudson I, Sheffield L, Shelton M, Oberklaid F, et al. Charting infant distress: an aid to defining colic. *J Pediatr* 1992;121:755-8.
- 23 Lester BM, Boukydis CFZ, Carcia-Coll CT, Hole WT. Colic for developmentalists. *Infant Mental Health J* 1990;11:321-33.
- 24 Thomas DW, McGilligan K, Eisenberg LD, Liederman HM, Rissman EM. Infantile colic and type of milk feeding. *Am J Dis Child* 1987;141:451-3.
- 25 Matheson I, Rivrud GN. The effect of smoking on lactation and infantile colic. *JAMA* 1989;261:42-3.
- 26 Ilingworth RS. Infant colic revisited. *Arch Dis Child* 1985;60:981-5.
- 27 Thompson PE, Harris CC, Bitowski BE. Effects of infant colic on the family: implications for practice. *Comprehensive Pediatric Nursing* 1986;9:273-85.
- 28 Winnicot DW. *The maturational processes and the facilitating environment*. Boston: International Universities Press, 1991.

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Changes in ethnic minority membership of health authorities 1989-92

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In 1989 a King's Fund survey concluded that ethnic minority membership of health authorities was already low¹ and suggested that changes proposed in *Working for Patients*² could lead to a further decline. In 1992 we did a similar study of the ethnic composition of health authorities to compare the findings with the earlier data.

Methods and results

The 1992 survey used the same questionnaire as the earlier study, save only for necessary changes to categories of membership. In 1989 there were 14 regional health authorities and 190 district health authorities in England. Each comprised a chairperson and 16 or more members. The members were divided among professional (4-6), local authority (4), and generalist or lay (8) members. In 1992 there were 14 regional health authorities and 179 district health authorities (although several mergers were in progress). Their reduced membership comprised a chairperson, five non-executive members, and up to five executive members. All regional health authorities and 157 district health authorities replied to questionnaires mailed in March 1992.

In 1989 none of the chairs of regional health

authorities and only seven of the 208 other members (3%) were from ethnic minorities. In 1992 there were still no ethnic minority chairs and just two of the 141 members were of ethnic minority origin (1.4%), both holding non-executive appointments (see table). In 1989 none of the chairs of district health authorities and 3% of the other members (89 of 2974) were from ethnic minority groups. Of these 50 (56%) were Asian while a further 24 (27%) were of Caribbean origin. In 1992 one district health authority reported an Asian chair. Thirty seven (2.6%) of the 1405 other members were from ethnic minority groups. Between 1989 and 1992 the proportion of Asian members marginally increased (from 1.6% to 1.7%) but those of Caribbean origin declined from 0.8% to 0.1% (see table). Members from ethnic minorities were twice as likely to be non-executives than executives. The National Health Service and Community Care Act 1990 reduced total numbers of health authority members by nearly half. Between 1989 and 1992 Asian membership also roughly halved (from 50 to 26) but Afro-Caribbean membership fell disproportionately (from 24 to just 2).

Comment

Estimates derived from the 1991 census suggest that *Ethnic origin of members of regional and district health authorities (including chairs) in 1989 and 1992*

	Regional authorities		District authorities	
	1989	1992	1989	1992
White	214 (97)	139 (99)	3066 (97)	1525 (98)
African	1 (0.5)	1 (0.7)	6 (0.2)	2 (0.1)
Caribbean	2 (0.9)	0	24 (0.8)	2 (0.1)
Asian	3 (1.4)	1 (0.7)	50 (1.6)	26 (1.7)
Other	1 (0.5)	0	9 (0.3)	7 (0.4)
Total	221	141	3155	1562