

# General practice

## Association between teenage pregnancy rates and the age and sex of general practitioners: cross sectional survey in Trent 1994-7

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BMJ 2000;320:842-5

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### Abstract

**Objective** To examine variations in teenage pregnancy rates in Trent region and to determine possible associations with local general practice characteristics such as the age and sex of the doctors.

**Design** Cross sectional survey.

**Setting** All 826 general practices in Trent region in existence between 1994 and 1997.

**Subjects** All pregnancies of teenagers aged 13 to 19 between 1994 and 1997 that resulted in an admission to an NHS hospital.

**Main outcome measures** Pregnancy rates for teenagers aged 13 to 19 and general practice characteristics: presence of a female or young doctor (under 36 years old), number of whole time equivalent practice nurses, Townsend score, vocational training status, list size per whole time equivalent doctor, fundholding status, and partnership size.

**Results** On multivariate analysis, lower teenage pregnancy rates were associated with the presence of a female or young doctor and more nurse time. Practices in deprived areas had higher teenage pregnancy rates.

**Conclusion** General practices with female doctors, young doctors, or more nurse time had lower teenage pregnancy rates. The findings may have implications for the mix of health professionals within primary care.

### Introduction

The United Kingdom has the highest teenage pregnancy rate in western Europe.<sup>1</sup> Teenage conception rates in Trent are among the highest in the United Kingdom.<sup>2</sup> The reduction of teenage pregnancies was a target for the Health of the Nation.<sup>3</sup> High conception rates are associated with having a teenage mother,<sup>4</sup> having divorced parents,<sup>5</sup> poor education,<sup>1</sup> and deprivation.<sup>1,6 w1w2</sup> Health professionals may reduce the harmful effects of deprivation and poor education on risk of teenage pregnancy by improving access to effective health education and contraceptive services.<sup>7 8 w3-5</sup>

Since over 70% of consultations for contraception occur in general practice<sup>9</sup> and 98% of doctors provide contraceptive services,<sup>10</sup> the role of primary care services in preventing teenage pregnancies is crucial. Although there is evidence that female patients prefer

to see female doctors<sup>11 w6 w7 w8</sup> and teenagers report high satisfaction with general practice services,<sup>10</sup> little is known about the characteristics of general practices that have high or low teenage pregnancy rates.

We aimed to determine general practice characteristics associated with variations in teenage pregnancy rates. In particular, we investigated the effect of the sex and age of the doctor and the availability of a practice nurse.

### Subjects and methods

#### Study sample

Ethical approval was obtained from Trent multicentre and local research ethics committees. The study sample consisted of all teenage pregnancies from all 826 general practices in Trent region from 1 April 1994 to 31 March 1997. The teenage pregnancies were identified from the admissions database of Trent regional hospital with both Office of Population Censuses and Surveys procedural codes Q09.1; Q10.1; Q10.2; Q11; Q14; Q31.1; R03; R14; R15; R17 to R30; R32; R34 and international classification of diseases diagnostic codes 630 to 639.9; 660 to 669.9; 650 to 652.9 (9th revision) and O00 through to O08.9; O60 to O75.9; O80 to O84.9 (10th revision) for pregnancies resulting in a live birth, stillbirth, termination, or miscarriage. The database contains all details of all hospital admissions for residents in Trent whether treatment was provided in Trent or not.

#### Inclusion and exclusion criteria

Patients were included if they were aged 19 or under at the time of the pregnancy related hospital admission and registered with a doctor in Trent region. Patients from Humberside were not included as Humberside had not been part of Trent for the whole study period. It was assumed that admissions with the same date of birth and the same postcode arising within the same six week period related to the same pregnancy, and duplicate entries were removed.

#### Data collection

We collected the following variables related to teenage pregnancies: the relevant codes from both the Office of Population Censuses and Surveys and the inter-

national classification of diseases (9th and 10th revisions); admission date; age; postcode; and unique identifying code for the patients' registered general practice. The outcome of the pregnancies was coded as termination, miscarriage, or maternity.

We collected the following general practice variables: national general practice code; main surgery postcode; fundholding status (ever or not fundholding); vocational training status; number, age, sex, and whole time equivalent doctors, number of whole time equivalent practice nurses; total list size; number of registered females aged 13 to 19 years; and Townsend score and rurality score<sup>12</sup> associated with the main surgery's postcode.

The location of all of the family planning clinics in Trent was obtained from the Family Planning Association and local community trusts. The distance between each general practice and the nearest family planning clinic was calculated from the grid references associated with the postcode. This distance is a crude measure of the availability of family planning clinics.

### Data validation

To determine the completeness of our data, we compared the total number of NHS terminations performed during 1995 in Trent with data from the Office for National Statistics. Overall, 2472 terminations occurred in females aged 13 to 19 years in 1995 according to data from the Office for National Statistics<sup>13</sup> compared with 1936 (78.3%) from our NHS data. The shortfall is probably owing to pregnancies terminated in the private and charity sectors.

The reproducibility of the clinical coding of the hospital admissions data was tested on a sample of 50 case notes of patients under the care of one consultant (MM) during the study period. Overall, 98% of codes fell within the same two broad categories (maternity or abortive outcome).

### Statistical analysis

We aimed to determine the relation between teenage pregnancy rates and general practice characteristics such as the age and sex of the doctor and the availability of a practice nurse. The principal outcome was the total number of terminations and deliveries to females aged 13 to 19 years in each practice. Miscarriages were excluded from the primary analysis as the data were incomplete—not all miscarriages result in hospital admission. We determined the univariate and multivariate associations with Poisson regression analysis<sup>14</sup> in STATA (version 5.0). Variables such as deprivation, list size, partnership size, rurality, general practice training status, and fundholding status were included in the multivariate analysis because of their potential confounding effect. All variables that reached 0.10 significance on univariate analysis were entered into the multiple regression model. Interactions between the variables were examined. We used  $\chi^2$  tests to test for differences in categorical variables and the Mann-Whitney test for interval data. Given the number of analyses planned, we chose a two tailed significance level of 0.01.

## Results

### Study population

During the three year study period there were 19 805 teenage pregnancies of which 18 692 (94.4%) could be

**Table 1** Characteristics of 826 study general practices in Trent. Values are numbers (percentages) unless stated otherwise

Characteristic	With valid data	With feature
At least one female doctor	795	474 (57.4)
At least one doctor under 36 years old	723	339 (41.0)
Doctor training	815	145 (17.6)
Single handed	798	192 (23.2)
Fundholding	815	423 (51.2)
Urban	815	627 (75.9)
Median list size (interquartile range)	811	4997 (2862-8112)
Median No of whole time equivalent doctors in practice (interquartile range)	750	3.0 (1.5-4.0)
Median No of whole time equivalent practice nurses (interquartile range)	581	1.1 (0.5-1.6)
Median Townsend score of doctor's electoral ward (interquartile range)	815	1.7 (-1.0-4.1)
Median annual teen pregnancy rate per 1000 13-19 year olds (interquartile range)	721	27.4 (15.1-43.9)

allocated to a general practice in Trent. Of these, 10 554 (56.5%) resulted in a delivery, 7155 (38.3%) in a termination, and 983 (5.3%) in a miscarriage. In total, 957 (5.1%) pregnancies were to females under 16 years of age. From our NHS dataset the overall median teenage pregnancy rate in Trent for 13 to 16 year olds was 45.0 per 1000 (interquartile range 25.6-74.1); the rate for 13 to 15 year olds was 1.8 per 1000 (0.0-5.5).

### Characteristics of general practices

In 1997 there were 826 general practices in Trent, of which 627 (75%) were wholly, predominantly, or mainly urban according to Carstairs' categories.<sup>12</sup> The study practices (table 1) had similar characteristics to other practices in England and Wales. For example, 350 practices (42.4% of 826) did not have a female doctor, which is comparable to the national figure of 41.7%.

### Univariate associations

Lower incidence rate ratios (lower teenage pregnancy rates) were associated with more nurse time or female or young doctors (table 2). A young doctor (under 36 years) was defined as a doctor in the lowest quartile for age calculated from the ages of all the general practitioners in Trent for whom we had data. Higher teenage pregnancy rates were significantly associated with increasing deprivation scores and fundholding status.

**Table 2** Univariate Poisson regression analysis for pregnancies (terminations and deliveries)

Main variables	Incidence rate ratio (95% CI)	P value
At least one female doctor v no female doctor	0.84 (0.81-0.87)	<0.0001
At least one doctor under 36 years old v without doctor under 36 years old	0.83 (0.80-0.85)	<0.0001
No of whole time equivalent practice nurses	0.92 (0.90-0.94)	<0.0001
<b>Potential confounders</b>		
Townsend score*	1.08 (1.07-1.08)	<0.0001
Practice ever fundholding v not been fundholding	1.29 (1.21-1.29)	<0.0001
Single handed v more than one partner	1.08 (1.02-1.14)	0.005
Urban practice v rural practice	0.73 (0.70-0.77)	<0.0001
List size per whole time equivalent doctor	0.99 (0.98-1.00)	<0.0001
Doctor training practice v non-training practice	0.95 (0.91-0.98)	0.004

\*Townsend score of ward in which doctor's postcode lies.

**Table 3** Multivariate Poisson analysis for pregnancies (terminations and deliveries)

Main variables	Adjusted incidence rate ratio* (95% CI)	P value
At least one female doctor*	0.94 (0.90-0.99)	0.01
At least one doctor under 36 years old*	0.83 (0.79-0.87)	<0.0001
Number of whole time equivalent practice nurses	0.95 (0.93-0.97)	<0.0001

\*Adjusted for Townsend score, fundholding status, partnership size, list size per whole time equivalent, rurality, and general practice training status.

### Multivariate associations

On multivariate analysis, practices with at least one female doctor, a young doctor, or more practice nurse time had significantly lower teenage pregnancy rates (table 3). Deprivation and fundholding remained significantly associated with higher teenage pregnancy rates.

### Distance to family planning clinics

The distance (km) from each surgery to the nearest family planning clinic was included in the multivariate analysis, adjusting for each of the variables listed in table 2. Overall, practices that were far from family planning clinics had lower teenage pregnancy rates (adjusted incidence rate ratio 0.98, 95% confidence interval 0.97 to 0.99;  $P=0.001$ ). This was mainly due to the effect of rurality since rural practices were far from family planning clinics and had lower rates (0.98, 0.97 to 0.99;  $P=0.003$ ). In urban practices there was no association between teenage pregnancy rates and distance from family planning clinics (1.01, 0.99 to 1.02;  $P=0.15$ ).

### Analysis including miscarriages

We repeated the analyses including the number of miscarriages in the total number of pregnancies per practice. We found no substantial changes in the direction or significance of any of the variables.

### Analysis of excluded practices

Table 1 shows the data available for each practice. It was not possible to calculate teenage pregnancy rates in 116 practices (14%) owing to missing denominators. The number of whole time equivalent practice nurses was similarly unavailable for 255 practices (31%). Practices with and without missing data were similar for all practice characteristics under investigation.

## Discussion

The recent Government report on teenage pregnancy by the Social Exclusion Unit focuses almost entirely on social and educational interventions. Although these are clearly important, we argue that general practice plays a key part in the delivery of contraceptive services to teenagers. Practices with a female doctor, a young doctor, or more practice nurse time had significantly lower teenage pregnancy rates after adjustment for other factors. For example, practices with a female doctor had 91% of the teenage pregnancy rate found in other practices; practices with a doctor under 36 years had 84% of the rate; practices with both a female doctor and one under 36 years had 75% of the teenage pregnancy rate. General practices, pilots for primary

care medical services, and primary care groups with high teenage pregnancy rates can consider using this information when considering recruitment strategies for medical and nursing staff in primary care.

### Methodological issues

Several methodological issues need consideration. Firstly, multiple regression analyses of general practice and sociodemographic data can help to explain variations and unravel complex associations. A causal relation, however, cannot be inferred from a statistical association, particularly in a cross sectional study. Secondly, we have used routinely collected NHS data for our study, which may be limited in terms of accuracy and completeness.<sup>15</sup> We did, however, include two checks for data quality that were reassuring. We were not able to include private terminations as the data were not available at practice level. This may have confounded the results as the proportion of private referrals per practice may be affected by deprivation. Similarly the results may have been confounded by the provision and uptake of school based contraceptive services. Thirdly, we have been unable to identify teenagers with repeat pregnancies in the study period. Repeat pregnancies would have resulted in an underestimate of the standard error. It would not have affected the rate ratio but would have made the results seem unduly significant. As our significance levels were, however, less than 0.001, it is unlikely to have affected our main conclusions. We repeated the analysis for each of the three years of data, since there is less chance of multiple pregnancies occurring to an individual within the same year. The results of the key univariate and multivariate analyses remained unchanged. Strengths of our study include its sample size and duration of sampling.

### Teenage pregnancy and female doctors

General practices with a female partner have lower teenage pregnancy rates than those without a female partner. As our study was cross sectional, we do not know whether female doctors had chosen to work in areas with low teenage pregnancy rates or whether the presence of a female doctor influenced such rates. The association between low teenage pregnancy rate and the presence of a female doctor may be because female doctors tend to have longer consultations and handle more problems per consultation<sup>16</sup> and tend to be more communicative<sup>17</sup> and more patient centered.<sup>18</sup> Female doctors report less difficulty in discussing sexual problems with teenagers and are more likely to provide information about the prevention of sexually transmitted diseases<sup>19 20</sup> and the use of condoms.<sup>21</sup> Our findings might be due to differences in case mix between practices with and without a female doctor since patients presenting to female doctors tend to be younger, more often female,<sup>16</sup> and more likely to have female specific problems than those presenting to practices without a female doctor.

### Teenage pregnancy and age of doctors

Practices with a young doctor have lower teenage pregnancy rates than those without a young doctor. Although younger doctors may be more interested in teenage health issues, little is known about the effect of the age of the doctor on provision of teenage

contraceptive services. Younger doctors tend to have higher rates for smear uptake and immunisation<sup>22</sup> and order more infertility investigations.<sup>23</sup>

### Teenage pregnancy and practice nurses

Practices with more practice nurse time had significantly lower teenage pregnancy rates than those with less practice nurse time. Since 10% of all practice nurse consultations are with teenagers<sup>24</sup> and up to 3% of all nurse consultations are for contraceptive advice, there may be scope for further developing the practice nurse's role in the delivery of contraceptive services to teenagers. We are unable to explain the association between fundholding and higher teenage pregnancy rates.

### Family planning services

Practices furthest from a family planning clinic had lower teenage pregnancy rates despite adjustment for other practice characteristics. This was mainly due to the effect of rural practices, which were both far from a clinic and had low teenage pregnancy rates. We found no evidence to support the introduction of more family planning clinics in rural areas since such practices already have lower teenage pregnancy rates.

We thank Howard Chapman and Andy Nicholson from Trent NHS Executive for their help in accessing the hospital admissions data, and the information officers at the health authorities who were able to provide data on general practice characteristics.

Contributors: All authors were part of the project team. JH-C developed the original idea by MP, had a major input into the study design, did some of the data collection and manipulation, designed and did the analysis, interpreted the results, and wrote the paper; she will act as guarantor for the paper. JA contributed to the design of the study, did the literature review and some of the data collection, checked the data analysis, and commented on the paper. MP conceived the idea for the project and contributed to the design, interpretation of the results, and writing of the paper. DE did the geographical data processing and spatial analysis. MM contributed to the interpretation of the results and the data validation. DC commented on the paper. SB was the nurse adviser. Carol Coupland provided advice on the interpretation of the regression analysis and the potential statistical effect of repeated pregnancies to teenagers.

Funding: Grant from Trent NHS Executive.

Competing interests: None declared.

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### What is already known on this topic

Teenage conception rates in Trent are among the highest in the United Kingdom

Although 70% of consultations for contraception occur in general practice, little is known about the characteristics of general practices that have high or low teenage pregnancy rates

### What this study adds

This cross sectional survey investigated the association between teenage pregnancy rates, the age and sex of doctors, and the availability of practice nurses

Practices with a female or young doctor had significantly lower teenage pregnancy rates than those without such doctors

General practices, pilots for primary care medical services, and primary care groups with high teenage pregnancy rates can consider using this information when recruiting medical and nursing staff in primary care

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- (Accepted 7 December 1999)

### Endpiece

#### The internet may not be the biggest change in the past 150 years

If I place myself in 1900, and then look forward for 36 years, and backward for as many, I feel doubtful whether the changes made in the earlier times were not greater than anything I have seen since. I am speaking of changes in man's minds, and I cannot in my own time observe anything of greater consequence than the dethronement of ancient faith by natural science and historical criticism, and the transition from oligarchic to democratic representation. Yet the generation whose memories went back another 36 years had seen and felt changes surely as great: the political revolution of 1830, the economic and social revolution produced by the railway and the steamship, the founding of the great Dominions.

G M Young, *Portrait of an Age: Victorian England*. Oxford: Oxford University Press, 1953 (second edition).