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## The impact of area deprivation on parenting stress

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**Background:** Area deprivation negatively affects health and lifestyles, among which child behaviours. The latter may aggravate the effects of area deprivation on parental health due to higher rates of parenting stress. However, evidence on the influence of the living environment on parenting stress is mostly lacking. The aim of this study was to examine the impact of area deprivation and urbanization on the occurrence of parenting stress. **Methods:** A cross-sectional multi-level study was conducted using both neighbourhood- and individual-level data. Living areas were categorized into tertiles of deprivation. Data on parenting stress (Parenting Stress Index), child psychosocial problems (Strengths and Difficulties Questionnaire) and family background were collected among 9453 parents prior to a routine health examination of their child (response: 65%). **Results:** In the deprived areas, parents reported parenting stress more often compared with the least deprived tertile (OR = 1.23; 95% CI 1.04-1.46). Adjusted for child problem behaviour, the association decreases (OR = 1.11; 95% CI 0.92-1.34). A small clustering of parenting stress by area was found which increased when child and family characteristics were taken into account. **Conclusion:** Parents from deprived areas were most likely to report parenting stress. Differences by area deprivation were partially accounted for by child problem behaviour and parental concerns about the behavioural and emotional problems of the child. This shows a rather large potential to improve both parental and child health by targeted parenting support in deprived areas.

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### Introduction

Parenting stress is more likely to occur in deprived families.<sup>1</sup> It has been linked to socio-economic issues, family dysfunction and lack of social support.<sup>2</sup> Many parents encounter problems in rearing their children. National population-based studies have revealed that 36-58% of

parents have concerns about parenting, child behaviour or the development of their children in the previous year. Parenthood was experienced as more difficult than expected by 48% of parents and 11% felt they were not up to parenting. As a consequence, 60% of the parents with parenting concerns obtain professional advice or help.<sup>3,4</sup> High parenting stress negatively influences child behaviour problems over time, while high

child behaviour problems increase parenting stress. Increased parenting stress is particularly associated with externalizing behaviour problems in children.<sup>5,6</sup>

Child behavioural problems occur more frequently among young adolescents in deprived areas than in favourable areas.<sup>7–10</sup> According to a review on the influence of the neighbourhood context on child and adolescent health, neighbourhood socio-economic characteristics explained 11% of the variation in child behavioural problems.<sup>11</sup> Area deprivation is considered to be an important factor in explaining differences in population health and lifestyles.<sup>12</sup> It is associated with neighbourhood stressors such as crime, housing density, poor housing quality, anti-social behaviour due to alcohol and drug misuse, green area quality and social participation.<sup>13,14</sup> Neighbourhood structural characteristics (e.g. poverty and instability) could have a negative impact on collective efficacy. Less social cohesion and informal social control may result in less means to cope with parenting stress within families. Moreover, the availability of social and material collective resources (e.g. health services and amenities, and social support) may protect against and solve parenting stress.<sup>15</sup> The latter may be available to a lesser degree in deprived areas. Therefore, consistent with child problem behaviour, parenting stress is also likely to occur more often in deprived areas.

To date, no research has been conducted on whether area deprivation has an independent effect on parenting stress over and above the effect of individual-level variables. Earlier research mainly focused on the effects of area deprivation on health and lifestyle outcomes in urbanized areas. The impact of area deprivation in urbanized area might differ between rural and urban regions, e.g. in urban areas, the high population density may aggravate the accumulation of problems, whereas this would be less the case in rural areas.<sup>16,17</sup> However, research has demonstrated that the relationship between child behavioural problems and area deprivation do not differ in mixed urban and rural areas.<sup>10</sup> Whether urbanization modifies the effect of area deprivation on parenting stress remains unknown.

The aim of this article is to assess the impact of area deprivation and urbanization on the occurrence of parenting stress. Furthermore, the contribution of child and family factors to these differences will be evaluated.

## Methods

### Procedure and sample

Data were collected during the 2008–09 school year within a preventive child health-care (PCH) setting, which is offered periodically and free of charge to all Dutch children. Three PCH organizations covering three provinces in the north of The Netherlands (i.e. Drenthe, Fryslân and Groningen) participated in the study. The birth cohort size of primary school children in the study area was 19 176. Although it is not obligatory, >95% of the parents visit the well-child clinics.

Along with the invitation for a routine health examination by the PCH, a random sample of 14 648 parents of children aged 9–11 years received a screening questionnaire on parenting stress and child psychosocial problems; in a next step, they were offered parenting support in case of problems, as part of a randomized controlled trial on its effectiveness.<sup>18</sup> We obtained cross-sectional data from 9453 parents (response: 65%). The participating parents and children did not substantially differ from the total population regarding family composition, work situation of the parents and child gender. However, immigrant children were under-represented and highly educated parents were over-represented in the sample.<sup>19</sup> The study was approved by the local Medical Ethical Committee.

### Measures

Area deprivation was measured by the national area deprivation score per neighbourhood as published by the Dutch Social and Cultural Planning Office.<sup>10,20</sup> This score was based on unemployment, mean income and educational level per area. For the current study, the 2006 values for the summary factor were used. To assess the occurrence of parenting stress

across the entire range of area deprivation, areas were categorized into tertiles of deprivation: least deprived, medium deprived and most deprived (table 2). Urbanization was determined by the number of residential addresses within 3.14 km<sup>2</sup> (i.e. by drawing a circle with a radius of 1 km around each address).<sup>21</sup> Following the guidelines of Statistics Netherlands, the threshold was set at over 1000 being urban, with the rest rural.

Parenting stress was measured using a subscale of the Dutch Parenting Stress index (PSI).<sup>22</sup> Eleven items on parenting-related depression and stress (Cronbach's  $\alpha = 0.73$ ) were scored on a six-point scale (1 = totally disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree and 6 = totally agree). A sum score (range 0–66) was dichotomized at the 90th percentile.

Psychosocial problems in children were measured by the Strengths and Difficulties Questionnaire (SDQ)<sup>23</sup> (Cronbach's  $\alpha = 0.82$ ). This version of the SDQ has been validated in The Netherlands<sup>24,25</sup> for children aged 7–12 years. The questionnaire consists of 25 symptom items describing positive and negative aspects of child behaviour that can be allocated to five subscales of five items each: emotional symptoms, conduct problems, hyperactivity inattention, peer problems and pro-social behaviour. Each item has to be scored on a 3-point scale (0 = 'not true', 1 = 'somewhat true' and 2 = 'certainly true'). A total SDQ Total Difficulties Score (TDS) can be calculated by aggregating the scores for the first four subscales (range 0–40).

Relevant child background characteristics concerned parental concerns about child behavioural and emotional problems (yes/no), psychosocial problems in at least one of the parents (yes/no), the country of birth of the child (Dutch, Non-Dutch), parental educational level (highest degree obtained by each parent), employment (at least one of the parents working >12 h/week), financial situation (difficulties with managing income), family composition (two or single-parent family) and family size (five members or more).

### Data analyses

In the analyses, we first assessed differences in the occurrence of parenting stress by background. Multilevel techniques, using ML Win 2.20, were applied to assess the degree of clustering by area.<sup>26</sup> The levels concerned were child and area. We fitted these two-level models with a random intercept for each neighbourhood to examine the associations between area deprivation and parenting stress before and after adjusting for individual-level child and family characteristics and socio-demographic variables. To estimate the size of the area-level clustering, the intra-class correlation coefficient (ICC) and the median odds ratio (MOR) were computed. The MOR quantifies the variation between clusters (the second-level variation) by comparing two persons from two randomly chosen, different clusters. It shows the extent to which the individual probability of having parenting stress is determined by residential area. If the MOR is 1, there is no area-level variation. A high MOR means considerable inter-cluster variation.<sup>27</sup>

## Results

The data concerned 9453 children living in 735 areas. In comparison with the mean socio-economic (SE) position of The Netherlands, the SE position of the study region was unfavourable. Mean area deprivation in the study region was 0.37 (SD = 0.91) compared with 0.00 (SD = 1.00) for The Netherlands as a whole. Of the sample, 76.4% lived in rural areas, with the rest living in urbanized areas. The questionnaire was completed by the child's primary caregiver or givers: 77.8% were mothers, 7.1% were fathers and 13.8% of parents completed the questionnaire together. The remaining caregivers (0.3%) were classified as 'other relatives' of the child and 0.8% of the respondents did not specify their relationship with the child. The mean age of the children concerned was 10.13 (SD = 0.776), 50.2% were female, 10.2% of the children were part of a single-parent family, 98.2% were born in The Netherlands and 90.9% of the children had both parents born in The Netherlands. The distribution of most child and parent background characteristics, including child psychosocial problems, was less favourable in deprived areas (table 1).

**Table 1** Distribution of various child background characteristics by levels of area deprivation

	Most deprived N (%)	Medium deprived N (%)	Least deprived N (%)	P-value
All children <sup>a</sup>	3185 (33.7)	3147 (33.3)	3121 (33.0)	
Mean age (SD)	10.15 (0.81)	10.09 (0.77)	10.16 (0.75)	0.001 <sup>b</sup>
Gender				0.021 <sup>c</sup>
Male	1632 (51.4)	1505 (47.9)	1564 (50.2)	
Female	1546 (48.6)	1636 (52.1)	1554 (49.8)	
Family composition				<0.0001 <sup>c</sup>
Two parents	2625 (83.4)	2706 (86.5)	2732 (88.2)	
Single parent	396 (12.6)	314 (10.0)	247 (8.0)	
Coparents <sup>d</sup>	59 (1.9)	65 (2.1)	70 (2.3)	
Two parents of the same sex	8 (0.3)	6 (0.2)	2 (0.1)	
Other	59 (1.9)	36 (1.2)	45 (1.5)	
Education level mother				<0.0001 <sup>c</sup>
Low	1063 (34.7)	865 (28.4)	603 (19.8)	
Medium	1408 (45.9)	1451 (47.6)	1360 (44.6)	
High	595 (19.4)	735 (24.1)	1084 (35.6)	
Education level father				<0.0001 <sup>c</sup>
Low	1006 (35.7)	893 (31.1)	585 (20.1)	
Medium	1180 (41.9)	1150 (40.1)	1104 (38.0)	
High	630 (22.4)	824 (28.7)	1216 (41.9)	
Parental employment				<0.0001 <sup>c</sup>
At least one parent >12 h/week	2626 (95.8)	2737 (97.5)	2805 (98.2)	
No parent employed >12 h/week	114 (4.2)	71 (2.5)	52 (1.8)	
Ethnic background				0.172 <sup>c</sup>
Dutch	3071 (97.9)	3070 (98.4)	3046 (98.4)	
Non-Dutch	67 (2.1)	50 (1.6)	49 (1.6)	
Child psychosocial problems				<0.0001 <sup>c</sup>
No problems	2412 (81.0)	2466 (83.8)	2458 (86.0)	
Subclinical (SDQ $\geq$ 11 and <14)	212 (7.1)	217 (7.4)	185 (6.5)	
Clinical (SDQ $\geq$ 14)	355 (11.9)	259 (8.8)	214 (7.5)	

a: Sum totals differ due to missing data

b: *F*-tests in ANOVA regarding differences by area deprivation

c:  $\chi^2$  tests regarding differences by area deprivation

d: An arrangement in a divorce or separation by which parents share legal and physical custody of a child or children

The rates of parenting stress were higher in single-parent families, parents with low levels of education, parents of immigrant children and in the most deprived areas (table 2). Furthermore, 27.9% of parents with children with an elevated SDQ score ( $\geq 11$ ) reported parenting stress against 7.7% of the parents with children with an SDQ score in the normal range (OR = 4.6; 95% CI 3.99–5.36). The mean PSI sum score was 21.74 (SD = 6.68) and 11.1% of the parents scored above the cut-off. The mean SDQ TDS was 6.16 (SD = 5.14) and 16.4% of the parents reported clinical and subclinical psychosocial problems in their children. Parenting stress and child psychosocial problems were correlated (Spearman's  $r = 0.36$ ;  $P < 0.001$ ).

Multi-level logistic regression analyses revealed that the prevalence rate of parenting stress increased by area deprivation (table 3). Parenting stress was reported statistically significantly more often in the most deprived areas (table 1). After adjustment for child psychosocial problems (SDQ), the relationship between parenting stress and area deprivation lost its statistical significance. The impact of area deprivation on parenting stress further decreased after adjustment for parental concerns about child behavioural and emotional problems. Adjustment for other individual-level factors of importance, i.e. psychosocial problems of the parents, large family size, low educational level of the mother and child immigrant, showed no further decrease of the impact of area deprivation on parenting stress.

MOR indices showed a relatively small clustering by area, but the MOR increased when factors at the individual level, particularly child problem behaviour, were added. Urbanization did not modify the effect of area deprivation on changes in parenting stress. Thus, the impact of area deprivation on parenting stress did not vary between urban and rural areas.

## Discussion

This study showed that parents in deprived areas more frequently have parenting stress than parents in more favourable areas. Urbanization had

no effects on the relationship between area deprivation and parenting stress. Parenting stress in the medium and most deprived areas differed from the least deprived areas. Furthermore, there was some clustering of parenting stress by area though not statistically significant. This might suggest that the context of these areas contributes to parenting stress. Area clustering increased when child and family characteristics were taken into account, but changes in the MOR were small and likely to be due to chance variation. The prevalence of both parenting stress and child psychosocial problems is higher in deprived areas. Child problem behaviour and parenting stress were associated and parents of children with an SDQ score in the clinical range were most likely to report parenting stress. Child problem behaviour and parental concerns about their behavioural and emotional problems explained a substantial part of the differences due to area deprivation on parenting stress.

This study is among the first to examine whether area deprivation affects the occurrence of parenting stress. The results of this study are in line with other studies of the significance of area deprivation on, for instance, child behavioural problems<sup>7–9</sup> and health risk behaviour in general.<sup>14,28,29</sup> In the present study, child psychosocial problems accounted for variance in parenting stress more than neighbourhood-level factors did. This supports the hypothesis that parenting stress is mainly caused by child problem behaviour.<sup>5,30</sup> The importance of information on parental concerns about child behavioural and emotional problems has been emphasized before in earlier research.<sup>31,32</sup> Agreeing with a study on the impact of area deprivation on behavioural problems of adolescents in the north of The Netherlands,<sup>10</sup> this study found no differential effect of the level of area deprivation due to urbanization. This indicates that the effects of area deprivation impact on urban and rural areas, but this does not exclude the possibility that the routes to these effects differ by degree of urbanization. For instance, in urbanized areas a high density of problems could amplify these effects, whereas decreasing population sizes could play the same role in rural areas. Apparently, this requires additional study. The



**Table 2** Prevalence rates of parenting stress by child background characteristics

	All	PSI (>p90)	P-value
All children <sup>a</sup>	<i>N</i>	<i>n</i> (%)	
Gender	9032		0.233 <sup>b</sup>
Male	4501	521 (11.6)	
Female	4531	487 (10.7)	
Family composition	8985		<0.0001 <sup>b</sup>
Two parents	7743	810 (10.5)	
Single parent	907	155 (17.1)	
Coparents	187	18 (9.6)	
Two parents of the same sex	15	1 (6.7)	
Other	133	13 (9.8)	
Education level mother	8817		<0.0001 <sup>b</sup>
Low	2411	321 (13.3)	
Medium	4063	484 (11.9)	
High	2343	168 (7.2)	
Education level father	8260		<0.0001 <sup>b</sup>
Low	2353	296 (12.6)	
Medium	3323	376 (11.3)	
High	2585	213 (8.2)	
Parental employment	8086		0.157 <sup>b</sup>
At least one parent >12 h/week	7871	825 (10.5)	
No parent employed >12 h/week	215	29 (13.5)	
Ethnic background	8962		0.001 <sup>b</sup>
Dutch	8810	973 (11.0)	
Non-Dutch	152	30 (19.7)	
Area deprivation	9045		0.035 <sup>b</sup>
Least deprived (<0.065)	3022	301 (10.0)	
Medium deprived (>0.065–0.075)	3004	346 (11.5)	
Most deprived (>0.075)	3019	361 (12.0)	
Urbanization (number of inhabitants per km <sup>2</sup> )	8975		0.680 <sup>b</sup>
Very urbanized (>2.500)	432	51 (11.8)	
Urbanized (1.500–2.499)	554	52 (9.4)	
Mixed (1.000–1.499)	1122	130 (11.6)	
Rural (500–999)	2386	262 (11.0)	
Very rural (0–499)	4481	506 (11.3)	
Child psychosocial problems	8425		<0.0001 <sup>b</sup>
No problems	7054	545 (7.7)	
Subclinical (SDQ ≥ 11 and <14)	584	115 (19.7)	
Clinical (SDQ ≥ 14)	787	2268 (34.1)	

a: Sum totals differ due to missing data

b:  $\chi^2$  tests

study region did not include the four largest Dutch agglomerations. This may have affected our findings since the scale and nature of area deprivation in big agglomerations may differ from that in provincial towns. However, earlier research showed that differences by area deprivation in prevalence rates of child psychosocial problems did not vary between urban and rural areas.<sup>9,10</sup>

Interestingly, adjustment for individual-level factors, in particular child problem behaviour, did increase area clustering, while the association between area deprivation and parenting stress diminished. This suggests that variation by to area deprivation is largely explained by individual child characteristics. Area effects are not necessarily due to the characteristics of an area but may be connected to the people with similar health and lifestyles actually living in these areas (social selection).<sup>33</sup>

Area deprivation was associated with parenting stress but the association of area deprivation with child psychosocial problems was stronger (table 3). A possible interpretation is that neighbourhood-level factors in deprived areas buffer the effect of child problems on the parenting experience. At the community level, social support and social cohesion could result in a lower likelihood of disorder in an area.<sup>34</sup> Since these mechanisms are mostly associated with affluent areas, this is unlikely.

A lack of institutional resources owing to geographic variations in the availability of institutional resources, e.g. (mental) health services, may contribute to area differences in health and lifestyle.<sup>16</sup> However, in The Netherlands, well-child care clinics are freely accessible to all parents and children, which could affect the experienced levels of parenting stress. Within this setting, increasing attention is paid to parenting problems and parenting support particularly targets groups with low socio-economic status.<sup>35</sup> Further exploration of buffering mechanisms in relation to parenting stress in deprived areas is needed.

People living in deprived areas have to cope with a variety of everyday concerns, such as limited means and more negative life events (e.g. unemployment, divorce, isolation).<sup>36</sup> Parenting stress could be a minor concern but also an additional cause of shame. In addition, norms and collective efficacy in child rearing or managing child problem behaviour could be insufficient in deprived areas (e.g. a lack of social control and disapproval of anti-social behaviour).<sup>16</sup> Parents living in these areas may feel that their situation does not deviate from the norm because neighbours encounter similar parenting problems. Thus, parents in deprived areas may experience relatively less stress given a certain level of child problems since these problems do not seem to exceed the problems that

**Table 3** Occurrence of parenting stress: OR and 95% CIs derived using multi-level logistic regression

	Empty model OR (95% CI)	Area deprivation (AD) OR (95% CI)	Background (BG) OR (95% CI)	AD + BG OR (95% CI)
Area deprivation		*		
Least deprived		1.00 (Ref)		1.00 (Ref)
Medium deprived		1.18 (1.00–1.40)		1.08 (0.87–1.33)
Most deprived		<b>1.23** (1.04–1.46)</b>		0.99 (0.81–1.23)
Score on the SDQ			**	
Normal			1.00 (Ref)	1.00 (Ref)
Subclinical			<b>2.02** (1.55–2.63)</b>	<b>2.02** (1.55–2.63)</b>
Clinical			<b>3.48** (2.78–4.36)</b>	<b>3.49** (2.79–4.37)</b>
Concerns about child behavioural problems (yes vs. no)			<b>2.38** (1.97–2.80)</b>	<b>2.40** (1.97–2.93)</b>
Concerns about child emotional problems (yes vs. no)			<b>1.41** (1.16–1.73)</b>	<b>1.42** (1.16–1.73)</b>
Psychological problems parent			<b>2.41** (1.98–2.93)</b>	<b>2.40** (1.67–3.44)</b>
Large family size (>5 persons)			<b>1.20* (1.02–1.42)</b>	<b>1.20* (1.02–1.41)</b>
Education level mother				*
Low			1.00 (Ref)	1.00 (Ref)
Medium			0.96 (0.80–1.16)	0.96 (0.80–1.16)
High			<b>0.57** (0.45–0.72)</b>	<b>0.57** (0.45–0.72)</b>
Child immigrant			<b>2.04** (1.23–3.39)</b>	<b>2.05** (1.23–3.39)</b>
Urbanization			1.07 (0.87–1.30)	1.06 (0.86–1.29)
Area-level variance (SE)	0.031 (0.030)	0.024 (0.029)	0.050 (0.044)	0.048 (0.043)
MOR	1.182	1.160	1.238	1.231
ICC	0.009	0.007	0.015	0.014

a: Parental concerns about child behavioural problems and child emotional problems

Ref, reference category; SE, standard error

\* $P < 0.05$ ; \*\* $P < 0.001$

their neighbours face with their children (i.e. the area norm regarding child psychosocial problems). This process similar then resembles that of not feeling poor when everyone is poor, i.e. people assessing their relative deprivation. Moreover, norms regarding parenting stress and child problem behaviour in deprived areas could be different from scientific or professional standards. Future research is required to explore parental norms regarding child rearing and managing child problem behaviour in deprived areas.

### Study strengths and limitations

This study's large sample size and high response rate were important strengths. Comparison of the demographic characteristics of the participating parents and children with general population data showed no significant differences for child and parent factors.

A limitation is that the data on differences between neighbourhoods was limited to the deprivation score and the degree of urbanization. We did not have information on neighbourhood stressors, mediating factors and norms and attitudes concerning parenting and parenting stress.<sup>16,37,38</sup> Future research should include these factors since they might play an important buffering role in the relationship between area deprivation and parenting stress, possibly leading to an underestimation of the prevalence of parenting stress. Furthermore, parent-reported child psychosocial problems may be influenced by the emotional state of the parent. Earlier research among distressed parents showed a discrepancy between the number of parent-reported child psychosocial problems and the children's self-report.<sup>39</sup> Multi-informant assessments of child psychosocial problems (e.g. by CHP's and teachers) in future research may provide evidence on whether such information bias indeed occurs.

### Study implications

This study reveals differences in the occurrence of parenting stress by area deprivation irrespective of the degree of urbanization. Child health professionals (CHPs) aiming at the reduction of parenting stress should be sensitive to the problems and concerns of the parents, as well as to child problem behaviour in both urbanized and rural deprived areas. Screening for child psychosocial problems is often a part of routine well-child care clinics by CHPs. This offers an ideal opportunity to verify the latent presence of related parenting stress. To this end, reliable and valid instruments to identify suspected parenting stress or the need for parenting support are required, as well as evidence-based parenting support interventions.

Prevention does not only concern child health care. Since stress-buffering mechanisms are likely to manifest themselves at the neighbourhood level, public policies concerned with the social and physical environment of residents (e.g. social welfare, justice and safety, infrastructure and the environment) can also play an important role.<sup>40</sup> Community-based interventions could be the most efficient and should not only target individuals but also their social context. A community approach requires accurate mapping and knowledge of the characteristics of deprived areas. Properly targeted interventions could contribute to reducing the burden of disease due to parenting stress and related child psychosocial problems. This study shows great potential to improve both parental and child health in this way.

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### Key points

- Parenting stress occurs more frequently in deprived areas.
- Differences in rates of parenting stress by area deprivation are partially accounted for by child problem behaviour and parental concerns.
- The impact of area deprivation on parenting stress is similar in urban and rural areas.
- Both parental and child health may be improved by parenting support in deprived areas.

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## Twenty years of socio-economic inequalities in type 2 diabetes mellitus prevalence in Spain, 1987–2006

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**Background:** To analyse trends in socio-economic inequalities in the prevalence of diabetes among men and women aged  $\geq 35$  years in Spain during the period 1987–2006. **Methods:** We analysed trends in the age-standardized prevalence of self-reported diabetes and obesity in relation to level of education using data from the Spanish National Health Survey for the years 1987, 1993, 1995, 1997, 2001, 2003 and 2006 (86 345 individuals aged  $\geq 35$  years). To assess the relationship between education level and diabetes and obesity, we computed the Slope Index of Inequality and the Relative Index of Inequality (RII) for each year. Additional models were fit to take into account mediator variables in socio-economic position (SEP) diabetes inequalities. **Results:** The prevalence of self-reported diabetes was higher among persons of low educational level, increasing more rapidly over time among people with lower education level (5.0–12.6% in men, and 8.4–13.1% in women between 1987 and 2006) than among those with higher education level (6.3–8.7% in men and 3.8–4.0% in women). Relative inequalities showed a weak tendency to increase. In women, the RII of self-reported diabetes increased from 3.04 (1.95–4.74) in 1987 to 4.28 (2.98–6.13) in 2006, while in men were constant since 1993. Trends in SEP inequalities in diabetes prevalence were attenuated when mediator variables were taken into account in women but not in men. **Conclusion:** SEP inequalities in diabetes existed >20 years ago and have increased, especially among women. These patterns may be explained by trends in health behaviours and obesity, but only to a limited extent.

### Introduction

Diabetes has become an important worldwide health problem due to its high prevalence and associated mortality rate. In Europe in 2000, 6.5%

and 5.1% of all deaths among men and women, respectively, were due to diabetes.<sup>1</sup> Moreover, the global burden of diabetes is expected to increase from 171.2 to 366.2 million cases between 2000 and 2030 (2.8–4.4% of total population).<sup>2</sup>