
Effect of Socio-Economic Status on Quality of Life in People Affected with Respiratory Allergy

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Romana Pawlinska-Chmara, Iwona Wronka,
and Justyna Marchewka

Abstract

In the present study we investigated the impact of respiratory allergy on quality of life in young people, and examined whether socio-economic status modifies the above dependence. The study was conducted in 458 female and 363 male university students, aged 18–25. Information on socio-economic status (SES) was collected using a questionnaire. The occurrence of allergy was determined on the basis of answers to the questions whether the allergy and specific allergens were medically diagnosed. Quality of life (QoL) was based on the Polish version of the SF-36 test. Respiratory allergy or respiratory and food allergy were declared by 19.2 % of women and 19.0 % of men. The prevalence of allergy was higher in students with high SES. The students suffering from allergy obtained lower scores in all domains of QoL, but the differences were statistically insignificant. However, the overall test result in allergic students was significantly lower than that in non-allergic students. Differences QoL were significantly associated with socio-economic variables. In persons with low SES, the differences in QoL between those suffering from allergy and those who did not have allergy were larger than in persons with high SES. The results indicate that the course of allergic diseases is highly dependent on socio-economic status. The prevalence of allergy among students of low status is lower than among those of high status. However, allergy to a greater extent impairs the quality of life of students with low than high SES.

R. Pawlinska-Chmara (✉)
Department of Biotechnology and Molecular Biology,
Opole University, Kominka St., 45-032 Opole, Poland
e-mail: roma@uni.opole

I. Wronka • J. Marchewka
Department of Anthropology, Institute of Zoology,
Jagiellonian University, Krakow, Poland

Keywords

Respiratory allergy • Quality of life • Socio-economic status • University students

1 Introduction

The number of people suffering from allergic problems increases each year (Asher et al. 2006). It is estimated that currently the number of people who suffer from asthma or allergic diseases is more than 700 million worldwide. These diseases are not the cause of high mortality, but significantly affect the quality of life (Majani et al. 2001; Sicherer et al. 2001; Leynaert et al. 2000). Symptoms associated with allergy make it difficult to function in daily life and lower the quality of life.

Research into the causes and consequences of allergic diseases have become the subject of many scientific papers in recent years. This is a consequence of a rapid increase in frequency of allergies in both children and adults. Genetic predispositions appear essential for the development of allergies. The incidence of allergies among children, whose parents do not suffer from these diseases is 5–15 %, when allergy occurs in one of the parents – 20–40 %, and when both of parents suffer from allergy – it is at least 60 % (Pawlinska-Chmara et al. 2008; Steinke et al. 2008). Allergy is a disorder conditioned by a number of genes and its incidence is also influenced by environmental factors. Most of them are linked to the progress of civilization: air and water pollution, addition of preservatives, artificial colorings and other additives, exposure to tobacco smoke, and a massive use of antibiotics. A major role is also attributed to factors related to lifestyle, such as low physical activity, frequent stay in closed rooms with sealed windows or air conditioning, or a diet based on highly processed foods (Samolinski et al. 2012; Strachan 2000; ISAAC 1998).

Allergy is often referred to as a disease of prosperity, due to the fact that the increase in its incidence has been observed mainly in countries with

high levels of life. In addition, within a single country, allergy is observed more often in persons of high socio-economic status (SES), than in low-status groups (Gold 2006; Lannerö et al. 2002; Lewis et al. 2001; Strachan 2000; Heinrich et al. 1998; Ernst 1996). Allergy is one of the few diseases associated with high SES, as such persons, in general, have better health than those of SES (Lynch and Kaplan 2000). That is connected primarily with more health care, arising from both greater knowledge of pro-health behaviors and financial capacity, and thus from better access to medical care, early detection of diseases, and their treatment. Differences depending on the status can also be seen in the diet, physical activity, housing conditions, and working environment. Persons of high SES have the knowledge and adequate financial means, which allow them to maximally minimize the effects of various diseases, including allergic diseases.

The goal of the present study was to examine the dependence between respiratory allergy and quality of life (QoL) in young people and to assess whether the socio-economic status could modify this dependence.

2 Methods

The study protocol was approved by a local Ethics Committee. The study was conducted among students of the University of Opole and the Jagiellonian University in Cracow, Poland. In total, data were collected from 458 women and 363 men aged 18–25. All subjects were surveyed on their socio-economic status. The following variables were considered: the place of residence before the attending a college, the number of siblings, the parents' education, and the self-estimate of a financial situation of his/her

family. The place of residence was defined as a village, town – if fewer than 100 thousand inhabitants, and city – if over 100 thousand inhabitants. The parents' education was considered in three categories: vocational, secondary, and higher education, and the number of siblings in the categories of 0, 1, 2, or more. Financial situation was described by respondents based on the answers to the question: Is the material condition of my family below average, average, good, very good, difficult to identify, or variable. Since the last category was chosen by only two persons, it was omitted and the data of these two persons were discarded from further analysis. Taking into consideration all the socio-economic variables analyzed, the subjects were classified as being of low, average, or high status. The division was introduced on the basis of the value of the first component obtained in the principal components method (PCA).

Quality of life was based on the Polish version of the SF-36 test, which can subjectively evaluate the current physical and emotional state. The questionnaire includes 11 questions and 36 statements, by which the person surveyed determines the following:

1. General health
2. Physical functioning
3. Limitations due to physical health problems (Role-physical)
4. Limitations due to emotional health problems (Role-emotional)
5. Social functioning
6. Bodily pain
7. Vitality
8. Mental health

The sum of points enables the assessment of QoL. The sum of components 1, 2, 3, and 6 constitutes 'physical health', and the sum of components 4, 5, 7, and 8 constitutes – 'mental health'.

The results were normalized according to the formula:

$$\frac{(x - \min)}{(\max - \min)} \times 100$$

where x is the number of points received by a person; $\min$ – $\max$ is the minimum and maximum number of points possible to obtain on the scale. The calculation normalizes the scale range to 0–100, with 0 being the worst and 100 being the best possible score.

The occurrence of allergy was determined on the basis of answers to the questions whether the allergy and its specific allergens were defined on the basis of medical work-up.

The prevalence of allergy in different socio-economic groups was compared with a χ^2 test. Differences in SF-36 scores in relation to the occurrence of allergy were assessed with a t -test. Differences in quality of life in relation to the occurrence of allergy and socio-economic status were tested with a two- factor analysis of variance. A $p < 0.05$ was considered as statistically significant.

3 Results

Respiratory allergy or respiratory and food allergy were declared by 88 (19.2 %) of women and 69 (19.0 %) of men. There were no significant differences in the incidence of allergies in relation to gender, whereas appreciable differences were noted depending on the socio-economic status. The prevalence of allergies was higher in the students of high SES than that in the low SES students (Table 52.1).

The results of the SF-36 test are shown in Table 52.2. The students suffering from allergic reactions obtained lower scores in terms of all domains of QoL, but the differences were small and statistically insignificant. However, these differences were cumulative, and the overall QoL index in the persons suffering from allergies was significantly lower than that in those who did not have allergic reactions (Table 52.2).

Among men, differences in QoL due to the presence of allergic reactions, were larger than those in women. The extent of these differences was also significantly associated with the socio-economic variables (Table 52.2). The results of multivariate analysis of variances for the

Table 52.1 Prevalence of allergy among students in relation to socio-economic status (SES)

SES Factor	Category	Allergy incidence		p
		No n (%)	Yes n (%)	
Mother's education	1. Vocational	197 (87.2)	29 (12.8)	<0.01 ³
	2. Secondary	189 (81.5)	43 (18.5)	<0.01 ¹
	3. University	279 (76.7)	85 (23.4)	<0.01 ²
Father's education	1. Vocational	220 (86.3)	35 (13.7)	<0.05 ³
	2. Secondary	245 (81.1)	57 (18.9)	<0.01 ¹
	3. University	200 (75.5)	65 (24.5)	<0.01 ²
Material conditions	1. Below average	190 (90.9)	19 (9.1)	<0.01 ⁴
	2. Average	189 (81.8)	42 (18.2)	<0.01 ¹
	3. Good	183 (75.9)	58 (24.1)	<0.01 ^{1, 2}
	4. Very good	103 (73.1)	38 (27.0)	<0.01 ^{2, 3}
Place of living	1. Village	196 (88.3)	26 (11.7)	<0.01 ³
	2. Cities <100,000 inhabitants	189 (82.2)	41 (17.8)	<0.01 ¹
	3. Cities >100,000 inhabitants	280 (75.7)	90 (24.3)	<0.01 ²

P-values based on χ^2 test; Superscript by a p-value shows from which other category in a given socio-economic factor the category marked with the superscript is significantly different

Table 52.2 Quality of life in allergic conditions

	Females				Males		
	No	Yes	p		No	Yes	p
General health	66.49 ± 2.24	64.30 ± 2.43	NS		65.23 ± 2.61	62.30 ± 2.43	NS
Physical functioning	83.89 ± 2.17	79.71 ± 1.89	NS		84.01 ± 2.26	77.62 ± 2.03	NS
Role-physical	94.71 ± 3.43	89.02 ± 4.00	NS		95.00 ± 3.77	87.12 ± 3.84	NS
Role-emotional	78.11 ± 4.38	77.24 ± 4.12	NS		77.15 ± 4.17	75.15 ± 4.46	NS
Social functioning	81.17 ± 1.92	78.23 ± 1.89	NS		84.14 ± 2.03	77.43 ± 1.72	NS
Bodily pain	60.00 ± 4.19	58.05 ± 5.12	NS		62.00 ± 3.96	58.60 ± 5.23	NS
Vitality	58.16 ± 4.18	55.32 ± 4.13	NS		64.43 ± 4.00	58.30 ± 4.21	NS
Mental health	66.99 ± 3.41	62.62 ± 3.36	NS		68.01 ± 3.56	63.26 ± 4.06	NS
Sum of physical health	76.84 ± 4.15	66.80 ± 4.22	<0.05		75.69 ± 3.94	64.12 ± 4.87	<0.05
Sum of mental health	71.47 ± 3.62	62.91 ± 4.10	<0.05		75.32 ± 4.03	65.91 ± 4.10	<0.05
QoL	75.60 ± 2.78	63.86 ± 3.11	<0.01		77.12 ± 2.77	65.04 ± 2.62	<0.01

P-values based on *t*-test for the comparison between the presence and lack of allergy, NS nonsignificant

dependent variable 'QoL index' indicate that the pattern of differences in QoL between allergic and non-allergic subjects depended on the SES; the dependence was apparent in both physical and mental domains of health (Table 52.3). In case of low SES, the differences in QoL between the students suffering from allergy and those who did not have allergy were larger than in the groups with high SES. This concerned both women and men.

4 Discussion

Allergic reactions are often associated with pain ailments, notably of head or eyes, difficulties in breathing, or episodes of breathlessness. Frequent attacks of allergy undoubtedly impede the functioning in everyday life and relate to the emotional, vocational, and social sphere (Majani et al. 2001, 2003; Sicherer et al. 2001; Leynaert

et al. 2000). When left untreated, allergic diseases have serious health consequences. Current medical knowledge enables to minimize the frequency of allergic episodes and the severity of symptoms. However, the quality of life in allergic diseases is not merely related with the absence of symptoms, but also with the emotions correspondent with the anticipated occurrence of an allergic episode. The fear resulting from the anticipation is usually the underlying mechanism of deterioration of quality of life, even if symptoms are not present (Farnik-Brodzinska and Pierzchala 2001).

Studies in children and adolescents with allergic rhinitis and bronchial asthma have shown that these diseases affect many aspects of daily functioning of patients, especially in the psychomotor sphere. There may develop inappropriate behaviors, irritability, frequent mood changes, and a decreased interest in school and social activities. Children affected with allergy exhibit a lower ability to learn and memorize new information and deterioration in perception in comparison with healthy children. In addition, children with allergy are prone to depression and have a sense of easy fatigue, even during relatively little efforts (Farnik-Brodzinska and Pierzchala 2002).

In adults reporting various symptoms of allergy, there has been an impairment of psychomotor skills, mainly eye-hand coordination, lack of concentration, and deficiency in decision making and other cognitive functions, clearly apparent during the time of symptoms relapse, e.g., in allergic rhinitis or conjunctivitis, compared with the asymptomatic time (Farnik-Brodzinska and Pierzchala 2002). Studies using the SF-36 test showed that allergy affects nearly all domains of quality of life (Kalpakoglu et al. 2006; Bousquet et al. 1996).

In the presented study, persons affected with allergy scored lower in the SF-36 test than the healthy ones, but the statistically significant differences were revealed only in the total test result. In terms of specific, single aspects of QoL the differences were rather small, not reaching the level of significance. This might be due to the fact that persons affected with allergy were

mostly coming with the higher rather than low socio-economic status; the finding being in accord with other studies on the subject (Gold 2006; Lewis et al. 2001; Strachan 2000; Heinrich et al. 1998; Ernst 1996). The influence of the socio-economic status on the biological condition or state of health is of an indirect nature. The status is a determinant of the conditions and way of life. Numerous studies have shown that the lifestyle of persons of high status reinforces the occurrence of allergy. This involves excessive hygiene or frequent stay in closed, air-conditioned rooms. Although persons of high status are more often affected with allergy, they likely have an adequate knowledge about the disease and the financial means that enable to minimize the effects of disease and the prevent its further episodes. Treatment of allergy by specialists significantly improves the quality of life outcomes (Bagenstose and Bernstein 1999; Bousquet et al. 1996).

In the present study, differences in quality of life due to the occurrence of allergy were much higher in persons of low status than in those of high status. Similar results have been obtained in the U.S. studies which show that allergies are less likely in people of low socio-economic status, but if allergy does exist in such a person, then it runs a stronger course compared with that in a person of high status (Lewis et al. 2001). Likewise, in studies conducted in 13 different countries, there was a significantly higher incidence of allergic symptoms among children from families of low status than among children from families of high status. These differences are largely the result of greater exposure of children from families of low status to risk factors, such as smoking during pregnancy, pet ownership, crowding, mould/moisture in the home, use of gas for cooking, or air pollution (Gehring et al. 2006).

A relationship has also been found between the socio-economic status, the presence of allergy, and the quality of life. A low level of education among patients suffering from allergy and asthma favors reduced quality of life, especially in persons with overweight and obesity in whom the incidence of overweight and obesity is inversely correlated with the level of education

(Kalpakoglu et al. 2006). Moreover, in such persons, allergy often remains undiagnosed or treated. In persons of high status, on the other hand, despite a higher prevalence of atopy, one can rarely observe severe allergic episodes, which is likely due their being under constant medical care. This reasoning is confirmed by the studies that show that asthma, which often develops on the basis of allergy, is more common in persons with low socio-economic status (Ruijsbroek et al. 2011; Basagana et al. 2004).

There are some limitations of the present findings. The study included only students, who may not be a fully representative group of the general public. In addition, persons from families with very low income were not enrolled, since such persons tend to become quickly independent, leave school, and take up jobs at early age. Persons who were severely ill could not participate in the study either due to their health condition. On the other hand, however, testing just young students has some advantages. The quality of life is highly influenced by lifestyle and living conditions. Among students, there is a kind of equalization of the way of spending the leisure time, eating habits, and staying on campus, where they are equally exposed to risk factors for allergy. Thus, other stray factors that could influence the SF-36 test results concerning the influence of allergy on quality of life could be avoided.

In conclusion, the study demonstrates that the course of allergic diseases is highly dependent on the socio-economic status. The prevalence of allergy among students of low status is lower than that among students of high status. Nevertheless, allergy impairs the quality of life of low status students to a greater extent.

Conflicts of Interest No conflicts of interest were declared in relation to this paper.

References

- Asher, M. I., Montefort, S., Bjorksten, B., Lai, C. K., Strachan, D. P., & Weiland, S. K. (2006). Worldwide time trends in the prevalence of symptoms of asthma, allergic rhino conjunctivitis, and eczema in childhood: ISAAC phases one and three repeat multi country cross-sectional surveys. *Lancet*, 368, 733–734.
- Bagenstose, S. E., & Bernstein, J. A. (1999). Treatment of chronic rhinitis by an allergy specialist improves quality of life outcomes. *Annals of Allergy, Asthma & Immunology*, 83, 524–528.
- Basagana, X., Sunyer, J., Kogevinas, M., Zock, J. P., Duran-Tauleria, E., & Jarvis, D. (2004). European community respiratory health survey. Socioeconomic status and asthma prevalence in young adults: The European Community Respiratory Health Survey. *American Journal of Epidemiology*, 160, 178–188.
- Bousquet, J., Duchateau, J., Pignat, J. C., Fayol, C., Marquis, P., Mariz, S., Ware, J. E., Valentin, B., & Burtin, B. (1996). Improvement of quality of life by treatment with cetirizine in patients with perennial allergic rhinitis as determined by a French version of the SF-36 questionnaire. *The Journal of Allergy and Clinical Immunology*, 98, 309–316.
- Ernst, P. (1996). Socioeconomic status and childhood atopy. *Canadian Respiratory Journal*, 3, 5–17.
- Farnik-Brodzinska, M., & Pierzchala, W. (2001). Quality of life in allergic diseases. *Alergologia Współczesna*, 4, 2–6 (in Polish).
- Farnik-Brodzinska, M., & Pierzchala, W. (2002). Assessment of quality of life as a measure of treatment effectiveness in allergic diseases. *Alergologia Współczesna*, 1, 5–9 (in Polish).
- Gehring, U., Pattenden, S., Slachtova, H., Antovae, T., Braun-Fahrlander, C., Fabianova, E., Fletcher, T., Galassi, C., Hoek, G., Kuzmin, S. V., Luttmann-Gibson, H., Moshammere, H., Rudnai, P., Zlotkowska, R., & Heinrich, J. (2006). Parental education and children's respiratory and allergic symptoms in the pollution and the young (PATY) study. *European Respiratory Journal*, 27, 95–107.
- Gold, D. R. (2006). Allergy: The prize paid for longevity and social wealth? *The Journal of Allergy and Clinical Immunology*, 117, 148–150.
- Heinrich, J., Popescu, M. A., Wjst, M., Goldstein, I. F., & Wichmann, H. E. (1998). Atopy in children and parental social class. *American Journal of Public Health*, 88, 1319–1324.
- ISAAC – The International Study of Asthma and Allergies in Childhood. Steering Committee. (1998). Worldwide variation in prevalence of symptoms of asthma, allergic rhino conjunctivitis, and atopic eczema. *Lancet*, 351, 1225–1232.
- Kalpakhoglu, F., Kara, T., Kurtipek, E., & Saygun, M. (2006). Effect of body mass index on quality of life in allergic/asthmatic patients. *Allergy and Asthma Proceedings*, 27, 499–503.
- Lannerö, E., Kull, I., Wickman, M., Pershagen, G., & Nordvall, S. L. (2002). Environmental risk factors for allergy and socioeconomic status in a birth cohort (BAMSE). *Pediatric Allergy and Immunology*, 13, 182–187.

- Lewis, S. A., Weiss, S. T., Platts-Mills, E., Syring, M., & Gold, D. (2001). Association of specific allergen sensitization with socioeconomic factors and allergic disease in a population of Boston women. *The Journal of Allergy and Clinical Immunology*, 107, 615–623.
- Leynaert, B., Neukirch, C., Liard, R., Bousquet, J., & Neukirch, F. (2000). Quality of life in allergic rhinitis and asthma. A population-based study on young adults. *American Journal of Respiratory and Critical Care Medicine*, 162, 1391–1396.
- Lynch, J., & Kaplan, G. (2000). Socioeconomic position. In L. F. Berkman & I. Kawachi (Eds.), *Social epidemiology* (pp. 13–35). New York: Oxford University Press.
- Majani, G., Baiardini, I., Giardini, A., Senna, G. E., Minale, P., D'Ulisse, S., Ciprandi, G., & Canonica, G. W. (2001). Health related quality of life assessment in young adults with seasonal allergic rhinitis. *Allergy*, 56, 313–317.
- Majani, G., Baiardini, I., Giardini, A., Pasquali, M., Toscani, M. A., & Canonica, G. W. (2003). Allergic rhinitis and quality of life: Where are we? *Clinical and Experimental Allergy Reviews*, 3, 90–94.
- Pawlinska-Chmara, R., Wronka, I., & Muc, M. (2008). Prevalence and correlates of allergic diseases among children. *Journal of Physiology and Pharmacology*, 59, 549–556.
- Ruijsbroek, A., Wijga, A. H., Kerkhof, M., Koppelman, G. H., Smit, H. A., & Droomers, M. (2011). The development of socio-economic health differences in childhood: Results of the Dutch longitudinal PIAMA birth cohort. *BMC Public Health*, 11, 225–236.
- Samolinski, B., Fronczak, A., Kuna, P., Akdis, C. A., Anto, J. M., Bialoszewski, A. Z., Burney, P. G., Bush, A., Czapryniak, A., Dahl, R., Flood, B., Galea, G., Jutel, M., Kowalski, M. L., Palkonen, S., Papadopoulos, N., Raciborski, F., Sienkiewicz, D., Tomaszewska, A., Von Mutius, E., Willman, D., Włodarczyk, A., Yusuf, O., Zuberbier, T., & Bousquet, J. (2012). Prevention and control of childhood asthma and allergy in the EU from the public health point of view: An urgent need to fill the gaps. *Allergy*, 67, 726–731.
- Sicherer, S. H., Noone, S. A., & Munoz-Furlong, A. (2001). The impact of childhood allergy on quality of life. *Annals of Allergy, Asthma & Immunology*, 87, 461–464.
- Steinke, J. W., Rich, S. S., & Boris, L. (2008). Genetics of allergic disease. *The Journal of Allergy and Clinical Immunology*, 121, 384–387.
- Strachan, D. P. (2000). Family size, infection and atopy: The first decade of the 'hygiene hypothesis'. *Thorax*, 52, 10–18.