

Hand eczema: prevalence and risk factors of hand eczema in a population of 2274 healthcare workers

Kristina S. Ibler^{1,2}, Gregor B. E. Jemec¹, Mari-Ann Flyvholm³, Thomas L. Diepgen⁴, Askel Jensen⁵ and Tove Agner²

¹Department of Dermatology, Roskilde Hospital, University of Copenhagen, Copenhagen, Denmark, ²Department of Dermatology, Bispebjerg Hospital, University of Copenhagen, Copenhagen, Denmark, ³National Research Centre for the Working Environment, Copenhagen, Denmark, ⁴Department of Social Medicine, Occupational and Environmental Dermatology, University of Heidelberg, Heidelberg, Germany, and ⁵Department of Biostatistics, University of Copenhagen, Copenhagen, Denmark

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Summary

Background. Healthcare workers are at increased risk of developing hand eczema.

Objectives. To investigate the prevalence and severity of self-reported hand eczema, and to relate the findings to demographic data, occupation, medical speciality, wards, shifts, and working hours.

Patients/materials/methods. A survey of 3181 healthcare workers was performed. Data were analysed with logistic regression. Data on sick leave and notification to the authorities were obtained.

Results. The response rate was 71% (2274 of 3181). The 1-year prevalence of hand eczema was 21%, and was positively associated with atopic dermatitis, younger age, male sex (male doctors), and working hours. Eighty nine per cent of subjects reported mild/moderate lesions. Atopic dermatitis was the only factor significantly related to severity. Sick leave was reported by 8% of subjects, and notification to the authorities by 12%.

Conclusions. The 21% prevalence of hand eczema in healthcare workers is double the prevalence in the background population. Eleven per cent of hand eczema patients reported severe/very severe eczema. No significant differences were found between professions or medical specialities with respect to prevalence or severity, but cultural differences between professions with respect to coping with the eczema were significant. Atopic dermatitis was related to increased prevalence and severity, and preventive efforts should be made for healthcare workers with atopic dermatitis.

Key words: contact dermatitis; exposures; hand eczema; healthcare workers; occupational skin disease; risk factors.

Correspondence: Kristina S. Ibler, Department of Dermatology, Roskilde University Hospital, Køgevej 7-13, 4000 Roskilde, Denmark. Tel: +45 50186000; Fax: +45 47322698. E-mail: kristinaibler@hotmail.com

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Occupational hand eczema is the most frequently recognized occupational skin disease in Denmark, with an incidence of approximately 0.56 per 1000 person-years (1) or of 0.7 to 0.8 per 1000 employees per year (2, 3). In 2009, healthcare workers accounted for 33% of the recognized occupational skin diseases in Denmark, and the number of skin diseases reported as occupational has been increasing over the past decade (1). Nurses, assistant nurses and nursing auxiliaries were found to be at particularly high risk in a Danish study, with approximately one-third reporting hand eczema (4). Studies

among nurses in other countries have reported prevalences of hand eczema ranging from 17% to 50% (5–13), and an increased prevalence of hand eczema has been reported in nurses working in intensive care units (7, 13, 14). However, most of the studies have been based on surveys using different outcome definitions and questionnaires, and comparability is therefore an issue. Not much information is available regarding the prevalence of hand eczema in relation to different specialities or professions other than nurses working in the healthcare system. With respect to physicians, a Chinese hospital study found an overall 1-year prevalence of hand eczema of 13% among 361 physicians, with the highest prevalence among those working in gynaecology, followed by internal medicine, intensive care units, surgical units, and orthopaedics (15). A Danish study found a 1-year prevalence of hand eczema among physicians of 16% (4), and other Scandinavian studies have suggested an average prevalence of 10–20% in healthcare workers (6, 16). No previous studies on the prevalence of hand eczema according to inpatient/outpatient clinics, shifts or working hours have, to the best of our knowledge, been published.

In previous studies on occupational hand eczema, severe eczema was found to be related to higher age, decreased quality of life, and male sex (17), as well as to atopic dermatitis and having a positive patch test reaction (18). There are no available data on the severity of hand eczema in healthcare workers.

The aim of this cross-sectional study was to collect data on the prevalence and severity of self-reported hand eczema among healthcare workers, and to relate the findings to sex, age, skin complexion, and atopic dermatitis, as well as to profession, medical speciality, shifts, and working hours. Sick leave and notification to the National Board of Industrial Injuries because of hand eczema was also investigated. The National Board of Industrial Injuries is an agency under the Ministry of Employment in Denmark, and is an impartial authority that makes decisions on workers' compensation claims. It decides whether an injury or disease qualifies for recognition as an industrial injury, and decides the amount of the compensation to be given for an industrial injury.

Materials and Methods

Study population and design

In March 2009, a self-administered questionnaire was sent to all physicians, nurses, nursing auxiliaries and biotechnicians working in three hospitals in the same geographical area of Denmark. A total of 3181 individuals were surveyed, of whom 13% were males and

87% were females. The questionnaire was distributed by email, and for those who did not respond within 14 days, the questionnaire was redistributed by email. Four weeks after the commencement of the study, a paper version of the questionnaire was sent to each non-responder's work address, and if this was not returned, a paper version was sent to the home address. Before commencement of the study, it was announced on the hospital intranet, at staff meetings, and on posters at the hospitals. To encourage respondents, a lottery with a monetary reward was announced (19). The study was approved by the Local Ethics Committee, reference number 1-01-83-0002-07.

The questionnaire

The questionnaire was partly based on questions from the Nordic Occupational Skin Questionnaire (NOSQ-2002) (20) and addressed to healthcare workers. Additional questions were addressed only to healthcare workers with self-reported current or past hand eczema, and included questions on self-evaluated disease severity, change of job, or behaviour at work, and questions on exposures at home and at work. Data on exposures related to the presence of hand eczema have been published elsewhere.

Definitions

The definition of self-reported hand eczema in the study was the answer 'yes' to the question 'Have you had hand eczema within the past year?' Additional questions were 'Do you have hand eczema currently?' and 'Have you ever had hand eczema?' Self-reported eczema has been validated in earlier studies (21–23).

Skin type/complexion was self-evaluated according to the Fitzpatrick Classification (skin types 1–6) (24).

Atopic dermatitis was diagnosed according to the UK criteria, question-only version (25, 26).

Self-evaluated disease severity was reported by use of a photographic guide. The respondents were asked to grade the severity of their hand eczema by choosing one of four groups of photographs representing differing severities of hand eczema. The photographic guide has been validated in a previous study (27).

Statistical analyses

The study was cross-sectional. Probabilities were recognized as significant if the level was <5%, and 95% confidence intervals (CIs) were used. Analyses comprised chi-square tests and multivariate logistic regression. Analyses were performed in PASW STATISTICS version 18.

Results

The response rate to the questionnaire was 71% (2274 of 3181). Eighty-one percent of the questionnaires were responded to by email and 19% by paper. Of the respondents, 17% (387) were doctors, 55% (1239) were nurses, 19% (443) were auxiliary nurses, and 9% (204) were biotechnicians. Most respondents were females (87%), reflecting the sex distribution among the survey population. The three hospitals accounted for 34% (770), 25% (570) and 41% (934) of the respondents, respectively, reflecting the size of the hospitals, and the participation rates from the three hospitals were 73%, 67%, and 73%.

The respondents were older [mean age 46.2 years, standard deviation (SD) 10.3] than the non-respondents (mean age 44.8 years, SD 11.1), and the response rate was statistically significantly higher among males (81%) than among females (70%) ($p < 0.001$). The response rates differed significantly among the professionals ($p < 0.001$); 62% (387 of 621) of the doctors, 74% (1239

of 1672) of the nurses, 70% (443 of 631) of the auxiliary nurses and 80% (204 of 255) of the biotechnicians responded to the questionnaire.

Prevalence of hand eczema

Of the respondents, 397 reported having had hand eczema in the past year. The 1-year prevalence of hand eczema among healthcare workers was 21%, with a 95% CI of 20–23%. One hundred and ninety-five reported current hand eczema, and the point prevalence was 12%, with a 95% CI of 10–14%. Seven hundred and sixty-four reported having had hand eczema during their lifetime, and the lifetime prevalence was 35%, with a 95% CI of 33–37% (Table 1).

Severity of hand eczema

The severity of hand eczema was reported as mild by 50% (201 of 397), moderate by 39% (156 of 397), severe by

Table 1. One-year prevalence of self-reported hand eczema among the respondents

		Respondents, total	Self-reported hand eczema, no. (% of total)	p -value (χ^2)	Odds ratio (95% CI)	p -value
Total		1843	397 (21)			
Sex	Males	242	76 (31)	<0.001	1.8 (1.30–2.54)	<0.001
	Females	1598	321 (20)			
Age (years)	20–29	102	29 (28)	<0.001	2.02 (1.02–4.01)	0.043
	30–39	479	139 (29)			
	40–49	515	110 (21)			
	50–59	829	99 (12)			
	60–65	187	20 (11)			
Profession	Doctors	300	58 (19)	0.227	0.97 (0.43–2.15)	0.948
	Nurses	1009	232 (23)			
	Nursing auxiliaries	349	64 (18)			
	Biotechnicians	169	38 (22)			
Department	Anaesthetics	300	33 (11)	0.194	0.68 (0.43–1.08)	0.105
	Biochemistry/physiology/ pathology/radiology	220	49 (22)			
	Surgical outpatient	135	35 (26)			
	Surgical inpatient	457	89 (19)			
	Medical outpatient	104	19 (18)			
	Medical inpatient	729	172 (24)			
Skin type	1: Fitzpatrick 1 + 2	490	135 (28)	<0.001	2.20 (0.95–5.07)	0.063
	2: Fitzpatrick 3 + 4	1271	252 (20)			
	3: Fitzpatrick 5 + 6	60	7 (12)			
Atopy	Yes	281	115 (41)	<0.001	2.66 (1.98–3.57)	<0.001
	No	1562	282 (18)			
Shifts (predominantly)	Day shift	1482	314 (21)	0.908	1.14 (0.63–2.04)	0.659
	Evening shift	179	40 (22)			
	Night shift	94	19 (20)			
Weekly working hours	<30	296	62 (21)	0.300	0.65 (0.34–1.23)	0.187
	30–39	1749	299 (17)			
	40–60	209	36 (17)			

Univariate analysis and multivariate logistic regression controlled for explanatory variables (sex, age, profession, department, skin type, atopy, and working hours).

Table 2. Severity of hand eczema among the respondents

Covariates		Mild hand eczema (n = 194)	Moderate, severe and very severe hand eczema (n = 200)	Odds ratio (95% CI)	p-value
Sex	Males	40	33	0.76 (0.43–1.35)	0.357
	Females	154	167	1	
Age (years)	20–29	14	15	0.59 (0.17–2.09)	0.422
	30–39	67	72	0.92 (0.33–2.51)	0.876
	40–49	55	55	0.91 (0.32–2.56)	0.872
	50–59	48	48	1.09 (0.38–3.10)	0.861
	60–65 years	10	10	1	
Profession	Doctors	28	29	0.51 (0.21–1.25)	0.143
	Nurses	116	139	0.64 (0.23–1.80)	0.407
	Nursing auxiliaries	27	37	0.98 (0.21–4.61)	0.983
	Biotechnicians	18	20	1	
Department	Anaesthetics	20	12	0.52 (0.21–1.24)	0.141
	Biochemistry/physiology/ pathology/ radiology	24	25	0.47 (0.12–1.73)	0.260
	Surgical outpatient	17	18	1.15 (0.50–2.64)	0.738
	Surgical inpatient	43	45	0.83 (0.47–1.48)	0.543
	Medical outpatient	12	7	0.74 (0.25–2.17)	0.593
	Medical inpatient	78	93	1	
Skin type	1: Fitzpatrick 1 + 2	63	71	2.10 (0.37–11.90)	0.399
	2: Fitzpatrick 3 + 4	125	124	1.87 (0.33–10.38)	0.474
	3: Fitzpatrick 5 + 6	5	2	1	
Atopy	Yes	40	74	2.29 (1.40–3.73)	0.001
	No	154	126	1	
Shifts	Day shift	148	36	1.77 (0.62–5.05)	0.286
	Evening shift	23	16	0.92 (0.27–3.13)	0.906
	Night shift	12	7	1	
Weekly working hours	<30	33	31	0.98 (0.49–1.97)	0.966
	30–39	141	155	0.32 (0.09–1.12)	0.075
	40–60	27	14	1	

Multivariate logistic regression controlled for explanatory variables (sex, age, profession, department, skin type, atopy, and working hours).

9% (36 of 397), and very severe by 2% (8 of 397). Logistic regression analysis was conducted for comparison of two severity groups: those with mild lesions, and those with moderate, severe and very severe lesions (Table 2). The two groups were comparable in size (201 versus 200). Logistic regression analysis was also conducted with exclusion of the 8 individuals reporting very severe hand eczema. As compared with the numbers in Table 2, exclusion of the most severe cases led to a significant decrease of 35% in the odds ratio (OR) ($p = 0.047$) among those with atopic skin disease, underlining an association between atopic skin disease and increased severity of hand eczema. According to department (place of work), it led to a significant decrease of 30% in the OR ($p = 0.018$) among those working in anaesthetics, who reported milder hand eczema than those working in the other departments.

Demographics

Sex and age. Of the respondents, 14% (325) were males and 86% (1946) were females. Of those with hand eczema,

19% (76) were males and 81% (321) were females. The prevalence of hand eczema was statistically significantly higher among the males, and was reported by 31% (76 of 242) of the males and 20% (321 of 1598) of the females (Table 1). No association was found between severity and sex (Table 2).

Healthcare workers with hand eczema were younger ($p < 0.0001$) (Table 1). The median age for those with hand eczema was 42 years, and for those without it was 47 years. No association was found between severity and age (Table 2).

Profession

Hand eczema was present in 19% (58 of 302) of doctors, 23% (233 of 1019) of nurses, 19% (68 of 364) of nursing auxiliaries, and 23% (38 of 167) of biotechnicians.

Profession was not significantly associated with the presence or severity of hand eczema when both sexes were analysed together (Table 2). However, on analysis of males only, a significantly higher prevalence of

self-reported hand eczema was found among male doctors (59%, 13 of 22) than among males of other professions [nurses 28% (40 of 141), auxiliary nurses 35% (16 of 46), and biotechnicians 21% (7 of 33)] ($p = 0.016$). Of the 13 male doctors with hand eczema, 69% (9) were surgeons, which was statistically significant ($p < 0.001$). Of the 45 female doctors with hand eczema, 31% (14) were surgeons. The highest prevalence of hand eczema among female doctors was found in medical inpatient departments (52%, 24 of 45), and the second highest prevalence was found in surgical inpatient departments (31%, 14 of 45). For nurses and nursing auxiliaries of both sexes, those with hand eczema were mainly working in medical inpatient departments. The median numbers of years in the current profession were 11 years among those with hand eczema and 16 years among those without.

Departments

The departments were categorized as medical inpatient, medical outpatient, surgical inpatient, surgical outpatient, anaesthetics, and pathology/radiology/biochemistry/clinical physiology. Most respondents were recruited from medical inpatient wards (Fig. 1). The presence and severity of hand eczema were not associated with hospital or type of department (Table 1). Grouping the departments into three categories only (inpatient ward, outpatient ward, and pathology/radiology/biochemistry/clinical physiology) also showed no association with hand eczema. Those working in anaesthetics reported fewer (15%) moderate lesions than those from the other departments (26–45%) ($p = 0.049$), and reported more instances of very severe hand eczema (9%) than those from the other departments (0–3%) ($p = 0.038$). However, this was based on only a few observations, and no association was found between the severity of hand eczema and type of department in the multivariate logistic regression analysis (Table 2).

Working hours, and day, evening and night shifts

In the multivariate analysis, a statistically significantly lower risk of hand eczema was found among those working 30–39 hr per week (OR 0.54) than among those working 40–60 hr per week (OR 1) (Table 1). Of those with hand eczema, 16% reported working <30 hr per week, which was the case for 12% of those without.

No association was found between the severity of hand eczema and number of weekly working hours (Table 2). Day evening and night shifts were equally reported among those with hand eczema and those without; 84% reported working mainly in day shifts, 11%

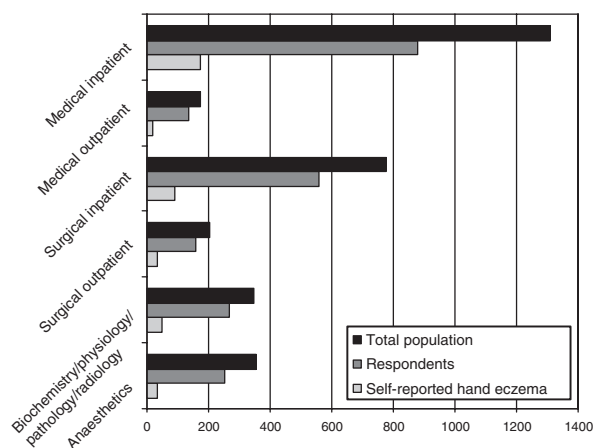


Fig. 1. Distribution of total population and respondents, and prevalence of self-reported hand eczema, according to department.

in evening shifts, and 5% in night shifts. Severity was not associated with day, evening or night shifts (Table 2).

Skin type (self-reported)

The prevalence of hand eczema among those with skin types 1, 2, 3, 4 and 5 was 27% (9 of 34), 28% (126 of 56), 21% (178 of 853), 18% (74 of 418), and 12% (7 of 57), respectively. Skin type 6 was only reported by 3 respondents, and none of those had hand eczema. Because of the low number of respondents in groups 1, 5, and 6, skin types were compiled as 1 + 2 (fair skin), 3 + 4 (medium skin) and 5 + 6 (dark skin) for comparative analyses. A significant association was found between fair skin and hand eczema ($p = 0.0003$). However, logistic regression analysis showed no significant association when the covariate atopic dermatitis was included, although there was still a trend ($p = 0.063$) (Table 1). Severity was not associated with skin type (Table 2).

Atopic dermatitis

A statistically significant association was found between atopic dermatitis and hand eczema ($p < 0.001$) (Table 1). Atopic dermatitis was reported by 29% (115 of 397) of those with hand eczema and by 11% (166 of 1446) of those without. Atopic dermatitis was also found to be significantly related to the severity of hand eczema ($p = 0.001$), with more severity being reported by those with atopic dermatitis (Table 2). A statistically significant association was also found between atopic dermatitis and skin type ($p < 0.0001$). Atopic dermatitis was reported by 25% (151 of 605) of those with fair skin, 16% (249 of 1565) of those with medium skin, and 6% (4 of 72) of those with dark skin.

Sick leave

Ever taking sick leave because of hand eczema was reported by 8% (33 of 397), and 2% (8 of 397) reported sick leave for 1–4 weeks within the past year. Sick leave was statistically significantly associated with profession, and was reported by 15% (1 of 38) of auxiliary nurses, 9% (22 of 233) of nurses, and 3% (1 of 38) of biotechnicians. None of the doctors reported sick leave ($p = 0.013$). Age, sex and severity were not associated with sick leave because of hand eczema.

Improvement in hand eczema during time off work at weekends was reported by 25% (101 of 397), during 1 week off work by 35% (137 of 397), and during longer periods off work by 27% (107 of 397). No association was found between improvement during time off work and severity.

Change of job and tasks at work

Eighty-nine per cent (285 of 397) reported being in the same profession currently as when the first eruption of hand eczema appeared. Change of job because of hand eczema was reported by 3% (13 of 397) and considered by 15% (58/397). Job change was considered by 25% (29 of 114) of those with atopic dermatitis, which was significantly more than those without, of whom 10% (29 of 281) considered job change ($p < 0.001$). Job change was considered by 3% of doctors with hand eczema, which was significantly fewer than for the other professionals, of whom 10–18% considered job change ($p = 0.022$). Change of tasks at work because of hand eczema was reported by 6% (22 of 397). Profession was significantly related to change of tasks, and was reported by 12% (7 of 57) of doctors, 11% (4 of 38) of biotechnicians, 4% (10 of 233) of nurses, and 2% (1 of 68) of auxiliary nurses ($p = 0.02$). Atopic dermatitis was also significantly related to change of tasks, and was reported by 10% (12 of 115) of those with atopic dermatitis and by 4% (10 of 281) of those without ($p = 0.007$).

Notification to the authorities

Twelve per cent (46 of 397) of the healthcare workers with hand eczema were reported to the Danish National Board of Industrial Injuries Registry as having occupational hand eczema. Among the different professionals, the notification rates were as follows: biotechnicians 16% (6 of 38), nurses 12% (27 of 230), auxiliary nurses 12% (8 of 64), and doctors 9% (5 of 58). Sex, profession and atopic dermatitis were not significantly associated with notification. Severity of hand eczema was significantly associated with notification to the authorities ($p < 0.001$).

Discussion

The present study found a 1-year prevalence of hand eczema of 21%, with no significant association with any profession. The presence of hand eczema was positively correlated with younger age, male sex, working hours, and atopic dermatitis. Severity was strongly correlated with atopic dermatitis. Twelve per cent of the cases were registered in the Danish National Board of Industrial Injuries Registry as occupational hand eczema, and sick leave was reported by 8%.

Our data show that the prevalence of hand eczema among healthcare workers in Denmark is approximately twice that in the background population (28). Prevalences of 17–50% among nurses have previously been reported (5–7, 9–12, 29–31), but data are sparse regarding hand eczema among other health professionals. In our study, no significant differences were found in the prevalence of hand eczema among the different health professionals.

The response rates differed significantly among the health professionals, with significantly fewer respondents among the doctors. This finding indicates a lower interest in self-related work environmental problems among doctors, who also had the lowest relative frequency of notified cases of hand eczema and no sick leave because of hand eczema.

Atopic dermatitis was strongly associated with the presence of hand eczema and a higher degree of severity in the multivariate analysis, even when those with very severe eczema ($n = 8$) were excluded from the analysis. This association is not new, and hand eczema patients with atopic skin disease are known to have a poorer prognosis than those without atopic skin disease (32, 33). A history of atopic dermatitis has been a well-known risk factor for the development of hand eczema for several decades, and our data emphasize that there is a need for preventive programmes in atopics, focusing on the prevention of hand eczema.

Healthcare workers with hand eczema were younger, and this corresponds to findings from other population studies (34, 35). A speculative explanation for this may be increased exposure at home, owing to children in the household, or the fact that older healthcare workers with hand eczema leave the job because of skin problems (healthy worker effect).

In the present study, the prevalence of hand eczema was higher among males than among females, in contrast to what has been found in previous population studies (5, 6, 35–38). Of the males with hand eczema, significantly more were doctors. A speculative reason for this could be that male doctors endure hand eczema to a greater extent than males and females of other professions, reflecting

differences in the trade-off between health, status, and job satisfaction. Doctors of both sexes reported significantly less sick leave than the other health professionals, and this supports the impression that doctors do not focus on self-related work environmental problems.

Our data suggested a relationship between fair skin and hand eczema ($p = 0.06$), and this trend is new. However, conflicting findings regarding the association between skin colour and skin barrier function have been reported in previous studies (39–42).

No association was found between the presence of hand eczema and working hours in the univariate analysis. However, in the multivariate logistic regression analysis, a reduced risk of hand eczema was found among those working 30–39 hr per week (OR 0.54) as compared with those working 40–60 hr per week (OR 1), and is most likely explained by exposure time.

It is a general assumption that occupational skin disease is under-reported, and that the notification rate is low. In this study, we had the opportunity to test this hypothesis. The notification rate of 12% is remarkably low in professions with clearly documented work-related irritant exposures to the skin, and with an expected high information level regarding disease. Notification to the authorities is important for the individual, but is also an important cornerstone in disease surveying and the planning of necessary preventive regulations in society.

Limitations and strengths

Cross-sectional studies using questionnaires have several limitations. Critical points are the representativeness of

the respondents and their ability to give correct answers. Information bias may be present, as the healthcare workers may have been aware of some of the research hypotheses, and the answers may have been biased because of an interest in improving the working environment. This could lead to an over-representation of individuals reporting hand eczema. However, under-representation could also be present because of respondents trying to avoid any problems or discussions that might jeopardize their job situation.

The strengths of the present study include a high response rate and the inclusion of different medical professions.

Conclusion

The 1-year prevalence of hand eczema in healthcare workers was 21%, which is more than double what has previously been reported in the background population, but corresponds with previous studies of hand eczema in healthcare workers. Atopic dermatitis was, as found in previous studies, strongly related to the presence as well as increased severity of hand eczema, and this problem should be addressed in future preventive efforts. A higher prevalence was found in younger age groups, in male healthcare workers, and in workers with long working hours. Among males with hand eczema, significantly more were doctors, mostly surgeons. Differences in response rates, sick leave and notification rate between the professions reflect the fact that cultural differences may play a role in coping with disease and that this may be influenced by the level of education.

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