

# ON REGIONAL DIFFERENCES IN DETERMINANTS OF SICK LEAVE FREQUENCY FOR CLEANING WORKERS IN TWO REGIONS OF THE NETHERLANDS: A COMPARATIVE STUDY

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## Abstract

**Objectives:** To explore regional differences in the effects of the sick leave frequency determinants between two homogeneous groups of workers from two comparable socio-economic regions in the Netherlands, namely Utrecht and South Limburg. **Materials and Methods:** Data on sick leave frequency for 137 cleaning workers in the regions of Utrecht (mean sick leave frequency: 0.89 spells) and South Limburg (mean sick leave frequency: 1.66 spells) were obtained from a Dutch social fund, and the data regarding their job, and health-related and individual characteristics were elicited by an interview. **Results:** A statistical analysis of the sick leave frequency in the two regions showed little differences, except for the determinant 'perceived physical workload' which was associated with the sick leave frequency in South Limburg but not in Utrecht. **Conclusion:** A regional difference in the sick leave frequency was noted with respect to 'perceived physical workload' as the study parameter. This would indicate that the findings of our earlier studies performed in the nineties of the last century, are still relevant. In further research, the principles of the new certification system on sick leave frequency should also be considered, as the previous uniform statutory compensation system has been terminated.

## Key words:

Sick leave frequency, Determinants, Regions, The Netherlands

## INTRODUCTION

Sick leave frequency is a measure for absenteeism which generally shows a rather strong relationship with the factors of motivation and indicates the number of sickness spells an employee takes a year. In the Netherlands, regional differences in the sick leave frequency have been observed [1]. However, the studies investigating the determinants that could account for these differences are scarce. The present study compares the sick leave frequency between two groups of workers of the same age and profession but coming from different country regions. The Dutch social fund that registers the frequency of sick leave noted remarkable

regional differences in this parameter for various professions. As the character of these professions does not differ per region, the question was which relevant determinants of the sick leave frequency could explain this finding.

This study is focused primarily on the possible differences in the determinants of sick leave frequency between homogeneous groups of workers from different country regions of the Netherlands. Secondly, these differences are considered in the light of the different socio-cultural background of the two regions. Therefore, it was necessary to define the socio-cultural characteristics in general and investigate which of these can be applied to the regions of

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South Limburg and Utrecht. This subject will be considered in more detail in the Discussion.

As the sick leave frequency is associated with many determinants, a literature search had to be performed in order to identify the determinants relevant to the present study [2]. The literature on the regional differences in sick leave frequency was also reviewed.

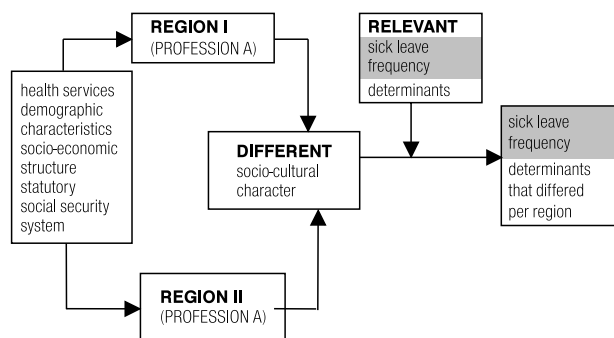
### Regional differences in sick leave frequency

A Finnish study on the sick leave frequency, performed in three demographically comparable municipalities, revealed that the sickness absence practice is the expression of the sickness absence habitus which is deeply rooted in the social history of the locality as well as in the health-related behaviour of the residents [3–4]. In the Netherlands, the mean frequency of sick leave showed regional differences between the provinces of Overijssel and Gelderland (1.72 spells) and between Utrecht, and North and South-Holland (2.00 spells) [5]. These differences were attributed to the economic structure of the region, as well as the characteristics of the population, health services, and cultural differences [6].

Considering the personal well-being [7–11], individual factors [9,12–19] and atmosphere at the workplace [12–13,20–29] as important factors for the sick leave frequency, we assume that the regional differences in the socio-cultural characteristics have influence on the type of relevant determinants of sick leave frequency that are effective per region. The workplace atmosphere is determined by ‘job satisfaction’, ‘support’, ‘autonomy’, ‘pace and pressure’ and ‘relation with colleagues and supervisors’ [2].

With regard to the country regions that are comparable in socio-economic terms and have a similar health care system, and to the study populations that are homogenous in age and profession, one may expect that the sick leave frequency determinants will also be comparable. If not, then the region-specific socio-cultural characteristics are likely to play a role. Figure 1 shows the theoretical model we have considered in this study.

In the regions with comparable health services, demographic characteristics of the residents, and socio-economic structure that share a uniform statutory social security



**Fig. 1.** A theoretical model of the influence of regional socio-cultural differences on determinants of the sick leave frequency.

system, the workers of the same profession live in an environment with different socio-cultural characteristics.

### Research questions

The main research question was: Are there any differences in the determinants of sick leave frequency between homogeneous groups from different regions of the same country and, if so, what are the possible reasons for these differences? This general research question was further considered as five sub-questions: (1) How does the sick leave frequency compare between homogeneous groups from different regions? (2) How do the scores of individual sick leave frequency determinants compare between homogeneous groups from different regions? (3) How does the sick leave frequency relate to relevant determinants for homogeneous groups from different regions? (4) Are there any differences in the determinants that predict sick leave frequency for homogeneous groups from different regions? (5) Is there any correlation between the determinants for which regional differences were found? These questions could only be answered after a literature review that would identify relevant determinants of the sick leave frequency that had been reported until the early 1990s. Apart from this, to evaluate the topicality of the study, we also decided to review the literature from early 1990s onwards [2].

### MATERIALS AND METHODS

We aimed to study the relationship between relevant determinants of the sick leave frequency and the actual frequency of sick leave in two homogenous populations

from two different country regions of the Netherlands. Secondly, the differences in effective determinants of the sick leave frequency were considered in terms of regional differences in the socio-cultural environment.

It can be expected that under comparable socio-economic conditions, the groups of workers with a similar profession (household cleaning) will show similar patterns of the sick leave frequency determinants. In case they do not, the socio-cultural differences might be the cause as they lead to the differences in the type of determinants that affect sick leave. A literature search on the determinants of sick leave frequency was performed in order to establish which of them were relevant according to the literature reports of the last few decades [2]. As for the topicality of the study, the sick leave pattern observed in the nineties of the last century was compared with the present trend. The findings are reported in detail in the Discussion.

### **Profession studied**

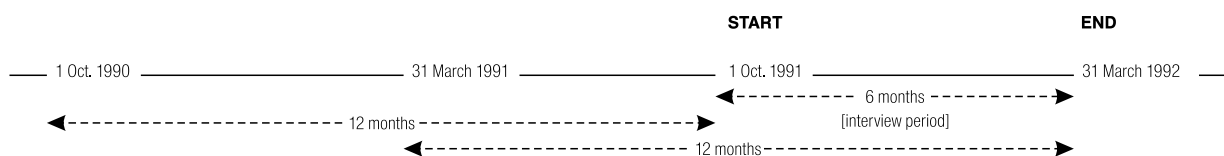
One of the authors worked for a Dutch social fund which registered sick leave frequency per region, for specific professional groups (sales, cleaning, trading workers). Thus we had an opportunity to compare the relations between relevant sick leave frequency determinants and the frequency registered per region, in particular for the regions of Utrecht and South Limburg that were considered in this study. The findings of our earlier studies revealed that the sales workers showed remarkable differences in the sick leave duration in particular country regions [30]. It appeared that the same applied also to the sick leave frequency among cleaning workers. Therefore, in the present study, the cleaning workers from different regions were compared with respect to the sick leave frequency. The rationale of the study was to investigate the same phenomenon as we did in the past, but for another professional group and another measure of sick leave. As a consequence, the remarkable similarities in determinants that affect sick leave per region may indicate the influence of the socio-cultural characteristics of the study populations.

### **Participants**

The workers were enrolled in the study population as soon as they reported their illness. This was the best possible moment because within a week most of those reporting illness (> 95%) were visited by a controlling official. The workers who did not speak Dutch, most of them belonging to other ethnic groups, were not invited to participate as they would be unable to respond to an interview in Dutch. In order to exclude the specific effects of younger (< 20 years) and older (> 40 years) subjects on the results and to enhance the homogeneity of the study group, the participants had to be between 20 and 40 years of age, and the reason why they reported illness had to be 'low back pain' or 'uncomplicated stress' (stress not originating from serious psychic suffering). These diagnostic categories were used for pragmatic reasons: it was assumed that using these commonly found diagnoses, which leave the subject much freedom to act (i.e. to report being ill or not), a substantial number of participants (at least 50 to 100 per region) could be recruited within a relatively short period of time (6 months). Eventually, 137 workers (52 in Utrecht and 85 in South Limburg) agreed to participate. This number was an outcome of the 6 months' selection procedure, based on an interview, in which every worker meeting the enrolment criteria was asked to participate. Some of the workers who initially agreed to take part in the study did not respond to the interview. For this non-responding group, the strictly individual characteristics such as age and gender were the only determinants that were included in the statistical analyses.

### **Questionnaire**

The data on individual and job characteristics of the participants were elicited using a special form for reporting the first day of the sick leave. This form was completed by the employer and sent to the social fund. A standard form was used for this purpose all over the country. Therefore, the forms provided similar data on some individual characteristics (age and gender) and job characteristics (working hours). All the participating workers were asked



**Fig. 2.** A timetable of the study on regional differences in sick leave frequency determinants in two country regions of the Netherlands.

to complete the questionnaire and send it back to the researcher.

The questionnaire items concerned the sick leave frequency determinants that had been identified in the literature review concerning the period till early 1990s [2]. These questions were derived from the validated VAG questionnaire (Vragenlijst Arbeid en Gezondheid, Questionnaire on Work and Health) [31]. Determinants belonging to similar categories were classified into ‘working conditions’, ‘work contents’, ‘working relations’, ‘working circumstances’, ‘health status (perceived workload)’, ‘health status (health complaints)’, ‘motivation’, ‘individual characteristics and circumstances’. Thus categorized determinants constitute the independent variables, while the sick leave frequency is the dependent variable.

(The parameters of the social and demographic development were not investigated because the legal, political and socio-economic status was similar across the country and the study population was homogeneous).

The selected determinants were used as the basis for a statistical analysis.

The questionnaire response rate was 68.2% in South Limburg and 75% in Utrecht.

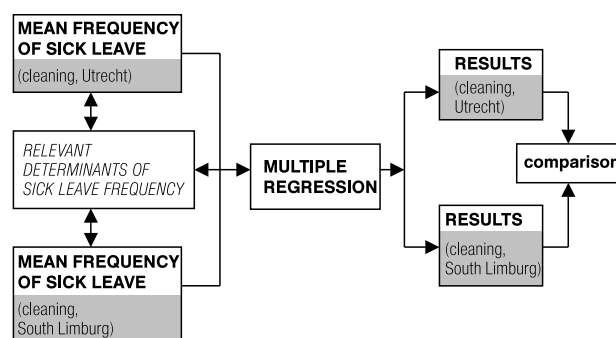
A study of the mean frequency of sick leave requires a certain period of registration which in the present study was a year before the day of reporting illness. For example, if the day of reporting was October 1, 1991, we referred to the period starting on October 1, 1990, and if it was December 1, 1991, the study period started on 1st December, 1990, and so on. In the analysis, the mean frequency of sick leave during the 12-month period was considered. The interview period for both the regions was 6 months, from October 1, 1991 till March 31, 1992. The timetable of the study, including the 12-month period preceding the spell of sick leave, is shown in Figure 2.

### Determinants and study design

For statistical purposes, the questionnaire responses were classified and some were combined to form compound determinants (this was based on a factor analysis not presented here). The compound determinants, with the number of items that constituted them, included ‘appreciation for one’s work’ — 4 items, ‘expectations for one’s future’ — 4, ‘autonomy’ — 8, ‘opinion on supervisors’ — 9, ‘perceived physical workload’ — 10, ‘perceived mental workload’ — 5, ‘questions about perceived health’ — 22, ‘mental balance’ — 21, ‘burnout due to work’ — 6 and ‘home-related factors’ — 8.

A detailed description of the determinants with the direction of the effect per determinant was provided elsewhere [2]. The Cronbach’s alpha coefficients of the independent variables were satisfying ( $> 0.70$ ) [32].

The level of Cronbach’s alpha was fixed at 0.70 as this was a rather safe procedure in the sense that the value is less dependent on the number of items (constituting the compound determinant) than when higher levels are used [33]. A few compound determinants lacked internal coherence (Cronbach’s alpha  $< 0.70$ ) and were eliminated. These were ‘pollution at the workplace’ and ‘air climate/pollution’ category of the ‘working circumstances’.



**Fig. 3.** The design of the study on regional differences in sick leave frequency determinants in two country regions of the Netherlands.

Figure 3 presents the study design. The relations between similar sets of sick leave frequency determinants and the sick leave were analyzed for homogeneous groups in Utrecht and South Limburg. The outcomes for the two regions were then compared.

### Statistical analysis

In accordance with the research subquestions 1 to 5, as formulated earlier in the text, the statistical analysis included successively: (1) a t test for the dependent determinants in both regions; (2) a t test for independent determinants between the two regions; (3) regression analysis (method enter) per region; (4) a comparison of the regression coefficients for the two regions [34] and (5) a regression analysis for the determinants that differed for both the regions, in order to find a possible correlation between these determinants.

A missing data analysis was performed to find out whether the number of missing data might affect the results. Where possible, i.e. if their number did not exceed 10%, the missing data were imputed and in the case they had influence on the outcome, the determinants concerned were excluded from analysis. A boxplot was drawn to check the potential effect of the extreme/outlying scores on the outcome.

## RESULTS

The mean age of the study population was 33.5 years in South Limburg and 33.2 years in Utrecht. The percentage of female participants was 82% in South Limburg

and 73% in Utrecht. In both regions, the majority of participants had a low level of education (vocational school level): 96% in South Limburg and 95% in Utrecht. Thus, as far as the sociodemographic characteristics (age, gender and education) are concerned, the two study populations were remarkably similar. We will now discuss the results regarding the particular subquestions of the present study

1. How does the sick leave frequency compare between homogeneous groups from different regions?

The statistical comparison of the mean frequency of sick leave between the two regions showed a difference (t-value = -1.99,  $p = 0.049$ ) between the mean yearly frequency of sick leave in South Limburg (1.66 spells;  $SD = 2.18$ ,  $N = 81$ ) and that in Utrecht (0.89 spells;  $SD = 1.42$ ,  $N = 38$ ). In a number of cases (4 in South Limburg, 14 in Utrecht), the social fund was not able to provide the exact sick leave frequency data per individual or these data were not reliable, and these were the missing cases.

2. How do the scores of individual sick leave frequency determinants compare between homogeneous groups from different regions?

When the two regions were compared, none of the determinants [2] showed a difference in the score ( $p < 0.05$ ).

3. How does the sick leave frequency relate to relevant determinants between homogeneous groups from different regions?

A regression analysis was applied to examine the relationship between the selected determinants as

**Table 1.** Results of the regression analysis of sick leave frequency determinants per region

Determinants	Utrecht			South-Limburg		
	adjusted R Square	Beta	Sig	adjusted R Square	Beta	Sig
Health status:	0.001			0.04		
Perceived workload	(N = 32)			(N = 50)		
Perceived physical workload ( $p = 0.01$ ) <sup>1</sup>		-0.21	0.25		0.30	0.04*
Perceived mental workload		-0.10	0.58		-0.05	0.68

\*  $p < 0.05$ .

<sup>1</sup> Difference was found when comparing the regression coefficients between Utrecht and South Limburg.

independent variables and the mean frequency of sick leave as the dependent variable (Table 1).

In South Limburg, a higher sick leave frequency was observed in the case the subjects reported poor health condition due to physical workload ('health status': perceived physical workload,  $p = 0.04$ ).

4. Are there any differences in the determinants that predict the sick leave frequency between homogeneous groups from different regions?

The outcomes of the comparisons that were carried out to establish the differences in regression coefficients between the two regions showed some difference (see Table 1) with respect to the determinant expressed as 'perceived physical workload' ( $p = 0.010$ ).

Thus, the regression analysis showed that the regions differed in this particular determinant of the sick leave frequency and so did the regression coefficients.

5. Is there any correlation between the determinants for which regional differences were found? The regions differed in just one determinant; therefore, the regression analysis was not applicable.

After imputing the missing data by the mean value, some determinants showed influence on the results. This refers to such determinants as 'expectations for the future', 'match between work and level of education', 'mental balance', 'alcohol consumption' and 'level of education'. These determinants were excluded from further analysis. The boxplot showed that several determinants had extremes/outliers but none of them affected the outcome.

The main question of the study was: Are there any differences in the determinants of sick leave frequency between homogeneous groups from different regions of the same country and if so, what are the possible reasons for these differences? The results of the statistical analysis made us conclude that the two regions differed in the effect that the determinant 'perceived physical workload' had on the sick leave frequency. The possible influence of the socio-cultural characteristics on the outcomes will be evaluated in the Discussion.

## DISCUSSION

In South Limburg, the cleaning workers reported a higher 'perceived physical workload' leading to a higher sick leave frequency than in respective population of workers from Utrecht. This finding is remarkable if one takes into account that the characteristics of the cleaning profession in Utrecht do not differ from that in South Limburg. The determinant 'perceived physical workload' refers to the health status in the sense that health complaints related to this determinant are the expression of a poor health condition [7,19,35,36]. The regional difference with respect to 'perceived physical workload' that was noted between South Limburg and Utrecht is consistent with earlier findings for sales workers in respective regions for whom a higher level of health service consumption associated with longer duration of sick leave could be noted in South Limburg [30]. This outcome is related to a more general observation that the residents in South Limburg show a poorer health status and more health complaints, probably due to less healthy lifestyles [32].

### Influence of socio-cultural factors

As the outcomes of this study are evaluated in the light of the possible socio-cultural differences between the regions concerned, it was necessary to define the socio-cultural characteristics in general and to investigate which of these can be applied to the regions of South Limburg and Utrecht. The socio-cultural identity of a population is defined by Hofstede et al. [37] as a collective 'programme' of the mind that discriminates groups from each other. Culture, expressed through people's behaviour and opinion, is a common characteristic of the groups of people on the level of a family, company, region or country [38]. Soeters and Felling [38] observed that the region of South Limburg differs somewhat from the rest of the country, due to its specific history. Till 1830 the region was ruled by the surrounding principalities and as a consequence, a remarkable influence could be noted of the German and Flemish/Wallonian socio-cultural traditions, and it was a rather Roman-Catholic oriented region than the western part of the Netherlands which is more of a Calvinistic

character. They also concluded that moral standards are the core of a culture that are less prone to changes.

Stevens and Van der Zee [39] observed that smoking and drinking, as the possible socio-cultural manifestations of a less healthy lifestyle, are a more accepted habit in the daily life in South Limburg. These authors also found that South Limburg residents report more health complaints and show higher disability pension rates. Like in the report by Philipsen (1985) [40], the dominant Roman Catholic culture in South Limburg, with a less healthy lifestyle, seems to be a factor determining the health status of its residents. The Calvinistic north shows a healthier population with a longer life expectation.

People in South Limburg lead less healthy lives than their countrymen [41–43]. This may be an explanation for the higher health service consumption in this region and may lead to a higher sick leave frequency. As far as the possible role of the socio-cultural factors is concerned, one should realize that a disease as such is not a good predictor of the sick leave [12,44–45]. The sick leave frequency is related not only to the disease, but also to one's behaviour that is influenced by individual and socio-cultural characteristics, like habits, traditions and moral standards [46–48]. It is assumed that regional socio-cultural differences may have influence on the predominant determinants and lead to the decision to take a sick leave or not. The socio-cultural factors may have impact on the perception of the work situation and on lifestyle and the perception of one's own health. As a consequence, regional differences may exist in the health status or in the type of diseases as in morbidity and mortality rates [43]. Thus, in the regions that differ in respect of the socio-cultural characteristics, different determinants may play a role in the sick leave behaviour. The participants of this study were considered to share the socio-cultural characteristics of the whole population of the region as they were Dutch-speaking and writing, working in various companies spread over the region and living in the cities and villages located over the region. Therefore, it was presumed that they were representatives of a certain socio-cultural disposition.

The literature search performed showed that the influence of tradition and social class [3–4] or the quality of health

services and the tendency to a higher health service consumption might play a role in the regional differences in sick leave [13,49]. Other studies indicated that such factors as culture and social tradition, or lifestyle, could be considered as having influence on the sick leave pattern within communities [50–51].

As for the earlier finding that health complaints predominate in the South Limburg area, and that lifestyle may be the cause [32], a socio-cultural explanation for this may be the traditional Roman Catholic culture of the region, as was earlier postulated by Soeters and Felling [38]. In 2000, as much as 92.3% of the South Limburg respondents called themselves Catholic, while the respective proportion in Utrecht was 47% [52]. However, the precise character of this phenomenon as a factor determining health behaviour was not further investigated. The results of previous studies [30,32] and of the present study may be interpreted as a recommendation for further research into this problem.

#### **The socio-economic comparability of the regions**

Generally, in the Netherlands, the socio-economic parameters are comparable nationwide. As regards the socio-economic comparability of the two regions under study, in the 1960s and 70s, the eastern South Limburg area belonged to the less economically advanced parts of the country. This was mostly associated with the closing down of the coal mines operating there. However, during 1970s and 80s, the Dutch government strengthened the economic infrastructure of the region by the transfer of government services like Statistics Netherlands (CBS, Centraal Bureau voor de Statistiek) and the social fund for civil servants (ABP, Algemeen Burgerlijk Pensioenfonds) from the Randstad to the eastern South Limburg area. Furthermore, the Dutch government stimulated new economic activities in the region which resulted in higher rates of employment [53]. Although it is presumed that the socio-economic factors are related to a less healthy lifestyle [54], there is no reason to suppose that in terms of the socio-economic situation or the extent of poverty, the socio-economic status of the population of Utrecht in the 1990s differed substantially from that of South Limburg,

as in the latter region the economic conditions have largely improved [53,55]. Consequently, the socio-economic situation of the regions of Utrecht and South Limburg can be regarded as comparable.

### Changes in the social security system

With regard to the changes in the social security system in the two regions, the following aspects have to be considered. The present study was performed at the time when the two regions had the same statutory compensation system and a similar approach was used with respect to the workers reporting illness. Therefore, the study results were not influenced by the differences in procedure as the study populations were selected based on the same criteria, and under the jurisdiction of the same social fund. Besides, the aim was to find differences between the two regions on the basis of socio-cultural characteristics, and not to find an explanation for the frequency of sick leave as such.

In the Netherlands, the rate of sick leave has gradually decreased since 1990s. This decrease is generally attributed to the changes in the organization of social security (Wet Verbetering Poortwachter: Law Improving Gatekeeper). Although these changes affected the whole country and not specific regions, the social security system has become less uniform with respect to the certification of sickness absence. Therefore, future research into regional differences in sick leave will have to address not only the independent determinants discussed in the present study, that are still effective nowadays, but also the determinants related to the statutory compensation system.

Another consequence of the changes within the social security system is the termination of the structural regional registration of sick leave. However, this does not mean that regional differences in sick leave have ceased to exist. The Nationale Verzuimstatistiek (National Statistics on Sick Leave) [1] shows a difference in the sick leave between the region of Limburg and the rest of the country that is consistent with the findings reported by Soeters in 1980 [13]. These differences have even increased as far as the South Limburg area is concerned [56].

Referring to the situation in 2006, there are still some important indicators that the socio-cultural factors have

a similar influence on the behaviour of the residents of the South Limburg area as they had a few decades ago. Compared to the rest of the country, the rate of disability pension is still higher in South Limburg (17.7% vs. 11.9%); the same applies to unemployment rates (11.3% vs. 9%) [56]. Moreover, when considered nationwide, the probability of developing disability is especially high for workers in the cleaning profession and this refers not only to older age workers [57]: in the age group 25–34 years, the rates were 2.5% vs. 1.1% ; and in that of 35–44 years: 2.7% vs. 1.5% (*idem*).

### Methodological remarks

1. 137 cleaning workers (52 in Utrecht, 85 in South Limburg) agreed to participate in the present study. We do realize that the sample size is rather small for a study on the effect that the socio-cultural differences between the regions may have on the type of determinants of the sick leave frequency. For this reason, the study has been performed on homogeneous groups from two geographical regions of the same country that were comparable in the socio-economic terms and under the jurisdiction of a uniform social security system.
2. As a reported case of sick leave was the basis of the recruitment of participants to this study, it seems that they had at least one spell of sick leave during the study period and that the so-called ‘zero’ sick leaves were excluded. This assumption, however, is not correct. The time we referred to was the 12-month period preceding the first day of sick leave, which means that the participants with the ‘zero’ frequency of sick leave were not excluded. Meanwhile, as the people who report sickness-related absence from work show a higher tendency to go on another sick leave than the people who never do [58], the results of this study are representative for the workers who were on sick leave at some point in time rather than for those who had never been on sick leave before. Further on, only those subjects were included who at some point of time had reported being ill. We decided to use this procedure for practical reasons,



as relevant individual data as well as systemically registered individual absenteeism data could easily be obtained from the social fund. The advantage of this approach was that the study results did not depend on a few big companies with their own specific company-related absenteeism. As a matter of fact, it would have been a great disadvantage to study just these few companies because the outcome might have been strongly affected by their specific characteristic.

3. If the entire group of selected determinants were considered in a single regression analysis, it would help us better understand how the determinants were associated with the observed sick leave frequency. However, a regression analysis of all the selected determinants was not a realistic option because the number of participants to be considered in the analysis (N) would be quite small due to the number of the missing data and, consequently, the estimates of the regression analysis would be unreliable. Thus, it was for pragmatic reasons that the determinants were classified according to the categories they belonged to and then analyzed per category. Meanwhile, to investigate a possible correlation between the determinants for which regional differences were found, we decided to extend the scope of research subquestions with this issue.
4. When interpreting the outcomes, one should note that the possible correlations between the independent determinants were not the subject of study, although such correlations are plausible; for instance, the remarkable gender-related effect may correlate with specific working conditions. The future policies for reducing the mean frequency of sick leave in a specific region should take into account the possible correlations between the determinants, before any definite conclusions can be drawn.
5. The number of participants in South Limburg was higher than in Utrecht. Therefore, it could be expected that a larger number of determinants would make the results reach the levels of significance in the study population of South Limburg. However, this was not

the case and, apart from that, the Beta values showed opposite signs (Table 1). This finding supports the conclusion that in comparisons between the regions, different determinants may predict the frequency of sick leave and that the underlying causes are region-specific.

6. As regards the evaluation of the study results, the small sample size and the skewness of the dependent variable has to be taken into account. The finding for the region of South Limburg is not convincing (Table 1: Beta = 0.30,  $p = 0.04$ ). Therefore, further studies, for instance involving other professions and more participants, are necessary to estimate the precise impact of the results discussed here.

## CONCLUSIONS

The present study compared the response to relevant determinants of the sick leave frequency shown by homogeneous groups of workers (cleaning profession) in two country regions with similar socio-economic characteristics. In the case of specific diseases, the sick leave is easier to certificate from the medical point of view and the freedom to report illness or not is less apparent. As the rural and urban qualities of both regions were similar and the same applied to the administrative implementation of the social security regulations and employment contracts, the study populations indeed were of a homogeneous character.

If a study investigates two groups that are homogeneous in age and profession, then the comparable determinants can be expected to affect the sick leave frequency in either group. We found that the study groups differed in the effect of the determinant referred to as 'perceived physical workload'. We concluded that the socio-cultural factors may be a reason for this regional difference in effective determinants. Such differences between the regions have its implications for the nature of interventions to reduce sick leave in particular regions. Especially on a commercial basis, the occupational health services operating nationwide have to take this finding into account, and so should the regional or national social security

authorities. The general measures to be applied all over the country should be developed based on an assumption that the determinants of the sick leave frequency may differ per profession and that only tailored interventions that will focus on the determinants predicting regional sick leave frequency may be effective.

## REFERENCES

1. Statistics Netherlands. *Nationale Verzuimstatistiek*. The Hague: Statistics Netherlands (CBS); 2006 [in Dutch].
2. Beemsterboer W, Groothoff J, Nijhuis F. *A literature review on sick leave frequency determinants of the past decades*. Arch Publ Health 2008;66:26–34.
3. Virtanen P, Nakari R, Ahonen H, Vahtera J, Pennti J. *Locality and habitus: the origins of sickness absence*. Soc Sci Med 2000;50:27–39.
4. Virtanen P, Vahtera J, Nakari R, Pennti J, Kivimaki M. *Economy and job contract as contexts of sickness absence practices: revisiting locality and habitus*. Soc Sci Med 2004;58:1219–29.
5. Brouwer W, Vrijhof B. *Ziekteverzuim 1986–1987; trends, representativiteit, verschillen tussen mannen en vrouwen, risicogroepen, personeelsverloop*. Amsterdam: NIA; 1988 [in Dutch].
6. Vrijhof B, Prins R. *Ziekteverzuim in Nederland: de belangrijkste cijfers*. In: Smulders P, Veerman T, editors. *Handboek ziekteverzuim. Gids voor de bedrijfspraktijk*. The Hague: Delwel; 1993 [in Dutch].
7. Schalk M. *Determinanten van veelvuldig kortdurend ziekteverzuim*. The Hague: Delwel; 1989 [in Dutch].
8. Hoverstad T, Kjolstad S. *Use of focus groups to study absenteeism due to illness*. J Occup Med 1991;33:1046–50.
9. Kentner M. *Frequency of absenteeism — value and modification by work disability data*. Dtsch Gesundheitsw 1991;61:26–31.
10. Hornquist JO, Zar M, Hansson B. *Precursors of repeated short-term sick leave: an empiric review of some background, job and well-being characteristics*. Scand J Soc Med 1993;21:164–70.
11. Reynolds S. *Psychological well-being at work: is preventing better than cure?* J Psychosom Res 1997;43:93–102.
12. Feeney A, North F, Head J, Canner R, Marmot M. *Socioeconomic and sex differentials in reason for sickness absence from the Whitehall II Study*. Occup Environ Med 1998;55:91–8.
13. Soeters J. *Absenteeism due to illness in the reform area South-Limburg*. Maastricht: Rijksuniversiteit Limburg; 1980 [in Dutch].
14. Smulders P. *Balance of 30 years sickness absence research; the results of 318 summarized studies*. Leiden: NIPG/TNO; 1984 [in Dutch].
15. Schröer C. *Absenteeism due to stress. A study of the character of stress, support and absenteeism*. Maastricht: University of Maastricht; 1993 [in Dutch].
16. Muller C, Monrad T, Biering-Sorensen F, Darre E, Deis A, Kryger P. *The influence of previous low back trouble, general health and working conditions on future sick-listing because of back trouble. A 15-year follow-up study of risk indicators for self-reported sick-listing caused by low back trouble*. Spine 1999;24(15):1562–70.
17. Virtanen M, Kivimaki M, Elovainio M, Vahtera J, Cooper C. *Contingent employment, health and sickness absence*. Scand J Work Environ Health 2001;27(6):365–72.
18. Boedeker W. *Associations between workload and diseases rarely occurring in sickness absence data*. J Occup Environ Med 2001;43(12):1081–8.
19. IJzelenberg W, Molenaar D, Burdorf A. *Different risk factors for musculoskeletal complaints and musculoskeletal sickness absence*. Scand J Work Environ Health 2004;30(1):56–63.
20. Kaiser C. *Insurance medicine and the duration of sick leave*. Maastricht: University of Maastricht; 1992 [in Dutch].
21. Geurts S, Buunk B, Schaufeli W. *Health complaints, social comparisons, and absenteeism*. Work & Stress 1994;8(3):220–34.
22. Rael E, Stansfeld S, Shipley M, Head J, Feeney A, Marmot M. *Sickness absence in the Whitehall II study, London: the role of social support and material problems*. J Epid Comm Health 1995;49(5):474–81.
23. North F, Syme S, Feeney A, Head J, Shipley MJ, Marmot MG. *Psychosocial work environment and sickness absence among British civil servants: the Whitehall II study*. Am J Publ Health 1996;86(3):332–40.

24. Stansfield S, Fuhrer R, Head J, Ferrie J, Shipley M. *Work and psychiatric disorder in the Whitehall II study*. J Psychosom Res 1997;43(1):73–81.
25. Vahtera J, Kivimaki M, Koskenvuo M, Pentti J. *Hostility and registered sickness absences: a prospective study of municipal employees*. Psychol Med 1997;27(3):693–701.
26. Kivimaki M, Elovainio M, Vahtera J. *Workplace bullying and sickness absence in hospital staff*. Occup Environ Med 2000;57(10):656–60.
27. Kivimaki M, Elovainio M, Vahtera J, Ferrie J. *Organisational justice and health of employees: prospect cohort study*. Occup Environ Med 2003;60(1):27–33.
28. Melchior M, Niedhammer I, Berkman L, Goldberg M. *Do psychosocial work factors and social relations exert independent effects on sickness absence? A six-year prospective study of the Gazel cohort*. J Epid Comm Health 2003;57(4):285–93.
29. Eriksen W, Bruusgaard D, Knardahl S. *Work factors as predictors of sickness absence: a three-month prospective study of nurse's aides*. Occup Environ Med 2004;61(5):398–404.
30. Beemsterboer W, Stewart R, Groothoff J, Nijhuis F. *On regional differences in duration of sick leave: the role of work, individual and health characteristics*. Arch Publ Health 2005;63:293–312.
31. De Winter C. *Arbeid, gezondheid en verzuim als voorspellers van uitval uit het werk [dissertation]*. Maastricht: Rijksuniversiteit Limburg; 1991 [in Dutch].
32. Beemsterboer W, Stewart R, Groothoff J, Nijhuis F. *On regional differences in sick leave: the role of work, individual and health characteristics and socio-cultural environment*. Int J Occup Med Environ Health 2008;21(4):345–61.
33. Cortina J. *What is Coefficient Alpha? An Examination of Theory and Applications*. J Appl Psychol 1993;78(1):98–104.
34. Zar JH. *Biostatistical Analysis*. Prentice Hall; 1999.
35. Hopstaken L. *Willens en wetens. Ziekmelden als beredeneerd gedrag*. Groningen: Rijksuniversiteit Groningen; 1994 [in Dutch].
36. Feuerstein M, Berkowitz S, Haufler A, Lopez M, Huang G. *Working with low back pain: workplace and individual determinants or limited duty and lost time*. Am J Ind Med 2001;40(6):627–38.
37. Hofstede G, Neuijen B, Ohayv D, Sanders G. *Measuring Organizational Cultures*. Adm Sci Quarterly 1990;35:286–316.
38. Soeters J, Felling A. *Het eigene van Limburg*. In: Soeters J, Spoormans H, Welten R. *Het nieuwe Limburg. Herstructurering en ontwikkeling*. Schiedam: Scriptum; 1990 [in Dutch].
39. Stevens F, Van der Zee J. *De gezondheidszorg in nationaal en euregionaal perspectief*. In: Soeters J, Spoormans H, Welten R. *Het nieuwe Limburg. Herstructurering en ontwikkeling*. Schiedam: Scriptum; 1990 [in Dutch].
40. Philipsen H. *Gezondheid en gezondheidszorg in België. Enige addertjes onder het zo groen gewaande gras van een systeemvergelijking*. Gezondheid en Samenleving 1985;6:228 [in Dutch].
41. Bloemberg B, Doornbos G, van Oostrum M. *Regionale gezondheidsprofielen*. Bilthoven: National Institute of Public Health and the Environment (RIVM); 1993 [in Dutch].
42. Statistics Netherlands. *Permanent Onderzoek Leef Situatie*. The Hague: Statistics Netherlands (CBS); 1993 [in Dutch].
43. Municipal Health Services Limburg. *Sterfte in Limburg. Trendrapportage 1985–1999*. Limburg; 2005 [in Dutch].
44. Van Deursen C, Smulders P, Bongers P. *Vormt een slechte gezondheid een ziekteverzuimrisico?* Tijdschr Soc Gezondheidsw 1997;75(4):157–64 [in Dutch].
45. Boot C, Van der Gulden J, Vercoulen J, Akkerman R, Van Weel C, Folgering H. *Asthma and chronic obstructive pulmonary disease: differences between workers with and without sick leave*. Intern Arch Occup Environ Health 2004;77(5):357–62.
46. De Groot MJW. *Kwantitatieve benadering van het verzuim door neurosen bij Nederlandse fabrieksarbeiders*. Leiden: NIPG/TNO; 1958 [in Dutch].
47. Philipsen H. *Afwezigheid wegens ziekte [dissertation]*. Groningen: University of Groningen; 1969 [in Dutch].
48. Veerman TJ. *Theorieën over ziekteverzuim*. In: Smulders P, Veerman T, editors. *Handboek ziekteverzuim. Gids voor de bedrijfspraktijk*. The Hague: Delwel; 1993 [in Dutch].
49. Tordoir W, Van der Klaauw, Van Maanen-Boekestein. *Gezondheidszorg en lange ziekteduren*. Leiden: NIPG/TNO; 1978 [in Dutch].
50. Hofstede G. *Culture's consequences; international differences in work-related values*. Newbury Park: Sage publications; 1980.
51. Hofstede E. *De groei van de Nederlandse bevolking*. In: den Hollander AN. *Drift en koers. Een halve eeuw sociale verandering in Nederland*. Assen: Van Gorkum; 1961 [in Dutch].

52. SOCON. *Sociaal-culturele Ontwikkelingen in Nederland, 1985–2000*. Amsterdam: KNAW; 2000 [in Dutch].
53. Van de Vooren FWJ, Hanraets PCM. *Het Limburgse herstructureringsbeleid: heeft het de werkgelegenheid vergroot en de werkloosheid verminderd? [The Limburg reform policy: did it increase employment and diminish unemployment?]*. In: Soeters J, Spoormans H, Welten R. *Het nieuwe Limburg. Herstructurering en ontwikkeling [Renewed Limburg. Reform and development]*. Schiedam: Scriptum; 1990. p. 30–51.
54. Programmacommissie SEGV-II (Commissie Albeda) Sociaal-economische gezondheidsverschillen verkleinen. *Eindrapportage en beleidsaanbevelingen. [Reduce socio-economic related differences in health status. Final report and recommendations for policy]*. ZorgOnderzoek Nederland: Den Haag; 2001.
55. Derks WM. *Arbeidsmarkt, verstoord evenwicht [Labour market, disturbed balance]*. In: Soeters J, Spoormans H, Welten R. *Het nieuwe Limburg. Herstructurering en ontwikkeling [Renewed Limburg. Reform and development]*. Schiedam: Scriptum; 2001. p. 52–64.
56. Department for Strategy and Innovation. *Limburg in cijfers*. Maastricht: 2006 [in Dutch].
57. Selten R, Copinga M. *Wie komen er in de WAO?* The Hague: Statistics Netherlands (CBS); 2003 [in Dutch].
58. Van Deursen C, Reuling A, Veerman T. *SZW-Werkgeverspanel 1998–1999; ziekteverzuim, arbeidsomstandigheden, reïntegratie, arbeidsongeschiktheid*. Tilburg: Ministerie van Sociale Zaken en Werkgelegenheid; 2000 [in Dutch].