ILLNESS IN CHILDREN

AND

PARENTAL RESPONSE

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ILLNESS IN CHILDREN AND PARENTAL RESPONSE

(ziekte bij kinderen en de reactie van ouders)

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Manuscripts based on the studies described in this thesis

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Chapter 3 Bruijnzeels MA, Wouden JC van der, Foets M, Prins A, Heuvel WJA van den. Validity and accuracy of interview and diary data on children's medical utilization in The Netherlands. Journal of Epidemiology and Community Health [in press].

Chapter 4 Bruijnzeels MA, Foets M, Wouden JC van der, Heuvel WJA van den, Prins A. Everyday symptoms in childhood: occurrence and GP consultation rates. British Journal of General Practice [in press].

Chapter 5 Bruijnzeels MA, Wouden JC van der, Foets M, Prins A, Heuvel WJA van den. Parental responses to everyday symptoms in children [submitted].

Chapter 6 Bruijnzeels MA, Foets M, Prins A, Heuvel WJA van den, Wouden JC van der. Changes in symptom evaluation and parental care in case of illness in children [submitted].

Chapter 7 Bruijnzeels MA, Wouden JC van der, Foets M. General practice consultation in childhood in The Netherlands: sociodemographic variation. Journal of Epidemiology and Community Health 1995; 49: 532-3.

Chapter 8 Suijlekom-Smit LWA van, Bruijnzeels MA, Wouden JC van der, Velden J van der, Visser HKA, Dokter HJ. For what health problems in children is the GP consulted, and how often? [in Dutch] Nederl Tijdsch Geneesk 1995; 139: 1684-89.

Chapter 9 Bruijnzeels MA, Suijlekom-Smit LWA van, Mheen H van der, Wouden JC van der, Velden J van der. Influence of parental socioeconomic status indicators on children's medical consumption [submitted].

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CHAPTER 1

INTRODUCTION

Introduction and general aim

Most children suffer from illnesses from time to time. In only a small part of these ill children parents decide to seek professional help.[1] So, most child health care is carried out by parents. In general, this phenomenon is called the iceberg of symptoms.[2] The part of the iceberg under the surface is the illness that is experienced but not brought to the attention of a health care provider. Often this illness is of a self-limiting nature and medical attention is not necessary. The part above the surface consists of the illnesses brought to the attention of a health care professional, which in The Netherlands is the general practitioner (GP) for adults as well as for children.

The picture becomes more complicated if one considers that the size of the iceberg and the proportion under the surface may differ from person to person, from group to group and from symptom to symptom. First, the part under the surface is unequally distributed over children in the community.[3] Some children experience a lot of morbidity, whereas others almost never suffer from any illness. Second, the proportion above the surface is affected by the parental decision to seek help. Parents that are confronted with the same ill child can behave differently. For example, in case of a feverish child parents may either do nothing, put the child in bed or give the child an aspirin or even take the child to a doctor. Parents can seek help immediately or after a few days.

Figures from the Central Bureau of Statistics of The Netherlands showed that the percentage of people that consult the GP at least once a year increased from 70% to 76% between 1981 and 1995.[4] This increase was mainly caused by the youngest age group (0-19 years), which showed an increase from 59% to 69%. Additionally, the number of GP consultations per person increased as well in the same period and age group. Next to this rising GP attendance rate, the same figures showed an enormous increase in medication in this youngest age group. For children, the reported use of any prescribed medication in the last 14 days increased from 13% in 1981 to 16% in 1995 and the use of non-prescribed medicines doubled from 11% to 22%. Also, consultations with alternative practitioners increased, from 5% to 14%. Ramifications of the Central Bureau of Statistics predict that the proportion of

children that consult the GP yearly will increase by 28% up to the year 2030.[5] This increase for children is mainly caused by changing behavioural patterns, in contrast to the elderly for whom the increase is mainly caused by demographic changes (more people over 65). Since for most illnesses medical interference is not necessary, this trend of increasing medical utilization of children is undesirable. Accordingly, the workload of the GP who is the first responsible health care provider for children in The Netherlands has increased and will undoubtedly increase further. Also, the more children consult the GP, the more children will be referred for specialistic care (7%) in absolute numbers.[6] Consequently, the workload of paediatricians and other specialists involved with the care for children will also increase. Hence, all these figures show that changing responses to illness in children have important consequences for the utilization of health services and medication. Which factors are related to *differences* in parental response patterns has hardly been investigated and is poorly understood. Insight into factors leading to various forms of medical consumption would enable us to understand these trends of increasing use. Understanding is a prerequisite to develop measures to control this increasing trend.

Next to this trend of increasing use, one should consider that illness experienced and the parental response, and possibly the increase in use as well, is affected by various sociodemographic factors. Starfield demonstrated that certain children are consistently high users of medical care, whereas others are low users over a period of many years.[7] Due to biological and developmental factors young children experience more illness than older children, and the nature of the symptoms changes during childhood. So, the illness experienced is unequally distributed by age of the child. Also, biological factors cause differences in illness experienced between boys and girls. Besides, parental responses are affected by age: young children are more often taken to the GP than older children, regardless of the severity of the illness. Whether there are differences in responses for sons and daughters is unknown.
For other characteristics, such as degree of urbanisation, socioeconomic status, and ethnicity, relations with illness experienced and parental response are less clear. Probably, the amount of illness experienced is affected by these factors, but the extent is unknown.[7] Whether there is variation in parental response by these sociodemographic factors is largely unknown, in The Netherlands as in the rest of

the world.

It is said that children in the larger cities are worse off than children in the countryside, but empirical evidence is missing. Whether parents living in urban areas respond similarly as parents living in the countryside is also unknown.

It is a well-established fact that there are differences in health, morbidity and mortality due to socioeconomic differences, for which the conditions may be formed during childhood.[8 9] But, how large these differences are in terms of illness experienced already in childhood and whether these sociodemographic factors are related to different parental responses is unknown. Two other recent demographic developments in The Netherlands might influence the size of the iceberg of children. First, the number of children from ethnic minorities (often with a low socioeconomic status) will grow in the near future. Although the birth rate of ethnic minorities is falling, it is still higher than the birth rate of Dutch people.[10] Whether parents of these children of non-Dutch origin experience other illnesses and respond differently is unknown. Second, in The Netherlands more and more women stay working after they have delivered one or more children. Whereas in the beginning of the eighties 75% of the mothers stayed home after the birth of their first child, in the nineties only 50% stayed home.[11] Additionally, 20% of the housewives start working again when the child becomes five years of age. Thus, the caring role of the mother changes partly to a working role with possible consequences for her behaviour in case of illness in a child. If the influence of the aforementioned sociodemographic developments on illness experience and parental response could be predicted, measures to control the increasing trend of medical utilization can be more efficiently applied to these groups with the highest needs. Measures to control this increasing trend could be adaptations in the supply of health care services, health promotion activities in the community aimed at reducing use, and information for GPs on how to contribute to turning this trend.

Therefore, the general aim of this study is to investigate illness experienced in children and parental response, and the sociodemographic variation. This aim is schematically presented in figure 1.

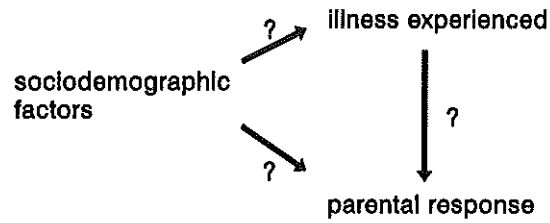

Figure 1. Aim of the study

Research on illness behaviour

The subject of this study concerns illnesses in children. Illness refers to the subjectively experienced symptoms of ill health.[12] This concept has to be distinguished from disease, that refers to a biological abnormality in the function of the body organs and systems. Next to illness and disease, a third concept 'sickness' has to be considered. Sickness refers to the social consequences of the acceptance of the sick role, that is often expressed in restrictions in behaviour. Research on illness experience of parents has scarcely been investigated. Locker, Blaxter and Cunningham-Burley performed studies using qualitative research methods to investigate illness experience and illness behaviour of parents.[13 14 15] For adults, more studies have been performed. An important finding of these studies is that the *reporting* of illness of adults is subject to variations in behaviour. Hence, illness experienced should be expanded with illness reporting. Van der Zee and Kooiker demonstrated that in measuring symptoms of illness a combination of physical complaints and psychological distress or neuroticism is measured.[16 17 18] This leads to higher reporting levels of symptoms by people who experience more psychological distress, but not necessarily more physical complaints. Whether psychological distress of parents affects the reporting of illness for children is unknown.

Studies investigating parental responses are also scarce. Campion and Gabriel used GP consultation data in combination with interviews of 120 mothers to distinguish

between families with high and low consultation rates.[19] Recently, in Sweden and Denmark several studies using health diaries were performed on illness behaviour of parents.[20 21 22] Probably due to the small numbers, the results of these studies were restricted to an overall description of the illness experienced by children and major parental responses (giving medication and consulting the GP), without a more detailed analysis of the influence of separate symptoms, evaluations and other factors. Hence, a large scale quantitative approach of parental illness behaviour has never been carried out.

Research of responses to illness in adults has a longer tradition and is better known as research on illness behaviour. The most often used definition of illness behaviour links perfectly to the aim of this study. Mechanic formulated illness behaviour as

> "the manner in which individuals monitor their bodies, define and interpret their symptoms, take remedial action, and utilize sources of help as well as the more formal health care system".[23]

A response to illness starts when an abnormality of the body (a symptom) is experienced. The first step people take is monitoring and defining the symptom. We could not find any study that describes the occurrence of symptoms in children in general. For separate symptoms such as headaches, diarrhoea, fever, colds, separate studies using retrospective interview data provided occurrence and consultation rates. An extensive overview of illness in childhood is still lacking.

The second part of the definition refers to the interpretation and actions undertaken in response to symptoms. In general, Dean distinguished between four main types of action: decisions to do nothing about symptoms, to take self-medication, non-medication self-treatment and decisions to consult professional health care providers.[24] Additionally, she acknowledged an important position for lay care, not as a separate treatment action but as an intermediate action leading to a treatment action. For children, the aforementioned Scandinavian studies produced some rough empirical data.
For the explanation of this decision making process of illness behaviour in general a number of theoretical frameworks were developed in the sixties and seventies. For

a complete overview of these models I refer to the overview of Becker and Mainman.[25]

The major criticism on these models was that illness behaviour was treated as a series of static decisions in stead of a dynamic process involving response and feedback from the environment.[26] The frameworks and studies viewed illness behaviour as an enumeration of static decisions which lead people through various stages, but in reality illness behaviour occurs every day again in case of an illness and the whole decision process returns every day as well. Additionally, there is no empirical evidence reported how well the models resembled the decision making processes. On the contrary, qualitative studies emphasized and demonstrated dynamic features of illness behaviour.[13] In elaborating on this process character Chrisman restricted his model to a description of the major health seeking elements and the major directions of influence instead of a detailed enumeration of all possible steps and influences a person might go through in response to an illness.[27] When placed in a chronological context, the evaluation process would effect the temporal sequence and repetition of elements. This model did not try to explain

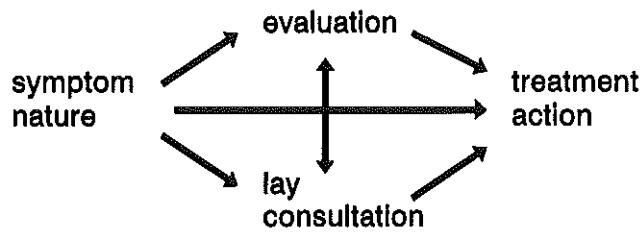

Figure 2. Hypothesized model of illness behaviour

(and predict) illness behaviour, but to describe the influences on the various steps of the health seeking process that happens every day. Campion and Gabriel showed a similar approach specifically for mothers in case of an illness in their child.[19] Both these models started as a symptom is experienced and reported and subsequently distinguished various options people have in evaluating and handling the illness. Also, the models acknowledge the recurrence of this process if symptoms persist to exist. In our study we approach illness behaviour similarly as Chrisman and Campion.[19 27] Accordingly, we developed our own model of illness behaviour. Deviating from the model of Chrisman and Campion, we clearly distinguished between the reporting of an illness (symptom's nature) and the evaluation phase of illness behaviour (figure 2). Previous studies have emphasized the importance of this evaluation phase in illness behaviour.[13 15]

Parental illness behaviour

Special attention for illness behaviour of parents for their children is justified because there are some obvious differences compared to illness behaviour of adults.

First, in case of a symptom in a child, parents have to become aware of the symptom, label it, report it and subsequently act upon it. In other words, illness behaviour is not only performed by the person who is ill, but also by somebody else (the parent). Studies demonstrated that in making decisions for others in comparison with decisions that concern yourself other factors might play a role.[28]
Second, illness behaviour of parents is copied to next generations.[14 29] This implies that by describing trends in actual parental response patterns, indications of future response patterns can be obtained. Mechanic demonstrated in a longitudinal study that the reported perception of symptoms by mothers was partly learned in their childhood, partly shaped by their location in society and in part conditioned by psychological stress.[18]
Third, the morbidity of children is so different from that of adults, that specific attention is justified. The nature of the symptoms in childhood differs from symptoms people experience later in their lives. The developmental stages a child goes through in its first years of life cause age specific common symptoms and diseases. Consequently, this different morbidity might result in different responses.

Sociodemographic variation of illness in children and parental response

Variation in illness in children

Besides variations in (the reporting of) illness experienced according to the age and gender of the child, there is very little knowledge on variation associated to other sociodemographic factors.
Studies using more objective indicators of health as morbidity, mortality and health examination measures showed variations according to income levels (poorer parents, worse health) and parental education (lower educational levels, worse health).[7 9 30] These results are in line with the recent studies on socioeconomic health differences for all age groups.[31] Childhood morbidity and mortality rates vary with degree of urbanisation, but the nature of the relationship is changing over time.[7] Recently, for The Netherlands empirical evidence showed that adults living in suburbs and rural areas have a better health status than adults living in the larger cities.[32] For ethnicity, a sociodemographic factor of growing importance in The Netherlands, recent empirical data showed that the children from ethnic minorities have substantial higher mortality rates than children from Dutch origin.[33] For adults, a few studies were performed demonstrating that Turkish and Moroccan people rated their general health status worse than Dutch people.[34]
Based on these data using more objective measures of health for children and adults, variations in illness experienced during childhood for these factors presumably exist, but these were never assessed for The Netherlands.

Variation in parental response

Sociodemographic factors related to parental response have scarcely been investigated. Determinants of the decision to seek professional care for their children (or medical utilization) have been object of many empirical studies in other countries. Determinants of other decisions, such as doing nothing, giving medication or non-medical self treatment, have hardly been investigated. An overview of empirically demonstrated results of sociodemographic factors related to the decision to seek professional care is presented in table 1. The overview is restricted to studies that were published after 1975, could be found in Medline, had an outcome measure in

terms of primary care use and investigated at least two determinants simultaneously in a multivariate model. A brief overview of some methodological features of these studies is summarized in table 2, located at the end of this chapter.

The studies originated from various countries with different health care systems. Most studies were carried out in the United States, followed by the United Kingdom and some Scandinavian countries. For The Netherlands, we could only trace one study focusing on sociodemographic factors influencing the parental decision to seek professional care.[35] Because the settings and designs of the studies differ largely, any judgement concerning the quality of the studies would be based on arbitrary decisions. The aim of this review is to identify all possible investigated determinants with their effects to support our selection of determinants in this study.

Table 1 shows the relations between the sociodemographic determinants and medical utilization of the various studies. The child's age shows the expected relation with utilization: with increasing age the utilization decreases. For the child's gender four of the 13 studies yielded a significant relation: boys had higher utilization rates. Birth order should be considered simultaneously with family size, since they are interrelated. Almost all studies that considered either birth order or family size found a significant relation: smaller families or first born use more medical care than larger families or later born. Race is a factor that has been studied exclusively in the studies from the USA, the distinction was between black and white children. Most studies found that white children had higher utilization rates than black children. Given the demographic composition of the population in The Netherlands, it is more relevant to look at ethnic minority instead of race. Very few studies considered this factor and they are all of American origin. For maternal age, the relation is clear in that there is no effect on the utilization rate. The educational level of the mother has been investigated rather often (12 times). In seven studies the data produced significant relations but the direction of the relation differed between studies from North America where mothers with a high education used more care and studies from European countries where mothers with a low education used more care. A similar obscurity was found for maternal occupational status. Half of the studies that considered this factor reported significant results with

Table 1. Review of determinants affecting medical utilization for children

Determinant	Number of studies Total	sign*	More use if:	Studies
Age	14	10	younger	Colle[36] Tessler[37] Wolfe[38] Campion[39] Starfield[40] McCue[41] Cafferata[42] Alexander[43] Newachek[44] Diaz[45] Duncan[46] Woodward[47] Kelleher[48] Newachek[49]
Gender	13	4	boys	Colle[36] Tessler[37] Wolfe[38] Starfield[40] McCue[41]Cafferata[42] Alexander[43] Newachek[44] Duncan[46] Kelleher[47] Newachek[48] van den Bosch[35] Bruusgaard[50]
Birth order	3	2	first born	McCue[41] van den Bosch[35] Osman[51]
Race	10	7	white	Colle[36] Tessler[37] Wolfe[38] McCue[41] Cafferata[42] Alexander[43] Newachek[44] Diaz[45] Newachek[49] Riley[52]
Ethnic minority	3	1	ambiguous	McCue[41] Newachek[44] Osman[51]
Maternal age	7	0	none	Wolfe[38] Campion[39] McCue[41] Cafferata[42] Alexander[43] Duncan[46] Schor[53]
Maternal educational level	12	7	USA/Canada: higher levels UK: lower levels	Colle[36] Wolfe[38] Campion[39] McCue[41] Cafferata[42] Alexander[43] Newachek[44] Diaz[45] Woodward[47] Newachek[48] Bruusgaard[50] Osman[51]
Maternal working status	6	3	not working	Wolfe[38] Cafferata[42] Alexander[43] Newachek[44] Diaz[45] Duncan[46]
Paternal educational level	4	0	none	Campion[39] McCue[41] Diaz[45] Bruusgaard[50]
Paternal occupational status	3	1	lower status	Diaz[45] van den Bosch[35] Osman[51]
Family size	13	12	smaller families	Colle[36] Wolfe[38] Campion[39] McCue[41] Cafferata[42] Alexander[43] Newachek[44] Diaz[45] Duncan[46] Woodward[47] Newachek[49] Riley[52] Leach[54]
One-parent family	8	2	single parents	Wolfe[38] McCue[41] Alexander[43] Newachek[44] Diaz[45] Duncan[46] Woodward[47] Newachek[49]
Poverty/Income	9	5	rich (USA)	Colle[36] Tessler[37] Wolfe[38] McCue[41] Cafferata[42] Newachek[44] Woodward[47] Newachek[55] Newachek[49]
Metropolitan status	2	2	more urban	Newachek[44] Woodward[47]

* Number of studies with a significant relation

changing directions. The educational level and the occupational status of the father were considered a few times in relation with a child's primary care use. One study reported a significant relation for occupational status of the father. The last indicator of socioeconomic status is income level or poverty. Five out of nine studies produced a significant result, indicating that children from higher income groups (less poverty) used more medical care than children from low income groups. The determinant one-parent family was included in eight studies. Two studies yielded a significant relation: children from one-parent families consulted more often. Metropolitan status is a factor that was considered in two studies (one American and one Canadian). In both studies this determinant indicated that children in larger cities used more medical care.

The choice of sociodemographic factors considered in this study is guided by three motives. First, a number of factors were selected for their proven consistent relation with professional health care use. Table 1 showed that age, birth order and metropolitan status are consistently related to use. Family size has been left out of the study, because the close interrelationship with birth order. A second group of factors was chosen because the relation with use is inconclusive. Maternal educational level, maternal working status and paternal occupational status showed changing relations with use. Since these factors are all related to socioeconomic status, we decided that all socioeconomic features (including paternal educational level) are included. Third, we added ethnic minority, a factor of specific relevance for The Netherlands. The factors from table 1 that are not considered in this study are race, maternal age, family size, one-parent family and poverty/income.

Methodological considerations

The data collection method should cover the occurrence of illness experience in its most comprehensive form as well as the daily process character of response. Verbrugge showed that a daily report of health problems yields the most comprehensive view of all illness experienced and gives a more reliable picture of the iceberg of symptoms than other data collection methods.[56] The period of recall is minimized. Also, diaries are uniquely suited to capture the sequential processes that

happen in response to illness.[23] Each time the diary is filled in all aspects of illness behaviour should be reported.

In studies on illness behaviour of elderly and adults, the diary was used for a more detailed description of illness behaviour.[57-60] Interpretations as familiarity, discomfort, seriousness and interference with daily activities turned out to be related to various forms of illness behaviour as taking non prescribed or prescribed drugs, restricting activities, taking home remedies, doing nothing or consulting a health care professional. In case of illness in children, parental response patterns of evaluations and treatment actions in relation to specific symptoms using diaries have never been assessed yet.

A major drawback of the use of health diaries is that validity and reliability of the measurements are hardly known. In her review about health diaries Verbrugge listed results of studies that studied validity for diaries and retrospective interviews compared to medical records (part of the iceberg above the surface).[55] Both, interviews and diaries produced undercounts of events, but evidence is not clear cut. For community morbidity (part of the iceberg under the surface), validity tests have not been carried out yet.

Summarizing, diaries are to be preferred over other data collection methods given their conceptual advantages. However before using the diaries, the validity of the instrument has to be assessed. Consequently, the results of this validity study will influence the use of the diary for further analyses.

Next to this method to measure the illness experience and parental response of the iceberg under the surface, a GP registration will be used for measuring the part of iceberg of illness above the surface. The GP registration will be used for investigating sociodemographic differences in professional care use for children. Additionally, this GP registration will serve as golden standard in the validity study of diary estimates.

Research questions

In conclusion, given the societal developments, theoretical and methodological considerations, and lack of knowledge, the following three research questions will be addressed in this study.

1. How valid are estimates of illness of children and parental response measured through a diary?

2. What illnesses do parents report for their children and how do parents respond to illness in their children?

3. Which sociodemographic factors are related to illness reported in children and parental response?

Structure of the thesis

The design of the study that provided data for this research project, the Dutch National Survey of Morbidity and Interventions in General Practice, is presented in the appendix. The research questions are answered in nine chapters. In each chapter a different part of the research questions is addressed and a subset of the data is used. Because all these nine chapters have been written as papers that were published in or submitted to scientific journals, the reader may expect some overlap regarding the description of the methods.

The chapters 2 & 3 deal with the first research question. In chapter 2 community morbidity assessed by a diary and a retrospective interview is compared. In chapter 3 medical consultation rates assessed by the diary and interview method are compared with medical records. In chapters 4, 5 & 6 the second research question is adressed. In chapter 4 the relation between illness experienced and GP consultation is discussed and broken down by sociodemographic factors based on diary data. Chapter 5 describes the experiencing of symptoms and various treatment actions and the role of interpretations and lay referral. Chapter 6 elaborates on this

topic and considers the dynamic character of response: changes in evaluations and actions that occur within one illness episode are considered. Chapters 7, 8, 9 & 10 focus on sociodemographic influences on the decision to seek professional care. In chapter 7 various sociodemographic determinants are related to medical utilization in a multivariate model. Chapter 8 investigates the relation between the nature of symptoms in general practice and sociodemographic factors based on medical records. Chapter 9 discusses specifically the influence of socioeconomic characteristics of the parents, including work status of the mother, on medical utilization. Special attention to the relation between ethnicity of the child and medical utilization is given in chapter 10. In the final chapter the results of this study are summarized and possible implications for future research, interventions and policy decisions are discussed.

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Table 2. Overview of Studies on medical utilization of children

Author	Country and year	Sample	Data collection method	outcome measure	Number of determinants	data analysis technique
Colle & Grossman	USA 1978	839 children aged 1 to 5 (overrepresenting inner city children)	health survey	at least one ambulatory contact in 1970	32	logit models
Tessler & Mechanic	USA 1978	336 children under 12 year and 175 mothers (all subscribers to a prepaid group practice)	household interviews linked with medical records	symptomatic and mother-initiated visits (continuous and yes-/no) in last 12 months	29	stepwise regression models
Wolfe	USA 1980	814 children between ages 1 and 11 (community sample)	health interview	- any use of physician services in last year	19	logit models
Campion & Gabriel	UK 1984	113 families with children aged 0 to 11 years (listed in a university general practice)	household interview linked with contact registation	mean number of patient-initiated contacts during study year	7	t-test between high and low quartiles
Starfield et al	USA 1985	2591 children aged 0 to 12 years (enrolled in a prepaid group practice HMO)	medical records	number of face-to-face contacts with a primary health care professional during six years	6	multiple regression analysis
Campion & Gabriel	UK 1985	113 families with children aged 0 to 11 years (listed in a university general practice)	household interview, health diary and medical record	patient-initiated family consultation index	7	stepwise linear multiple regression
McCue Horwitz et al	USA 1985	513 children under 5 years of age (using a prepaid practice open for students and university staff)	health interview and medical records linked with contact registration	log of the annual acute visit rate (restricted to first visits per health problem)	41	linear regression model
Cafferata & Kasper	USA 1985	5538 children aged 1 to 11 years from a national survey	six health interviews during 18 months	any physician in an ambulatory setting in 1977	20	logistic regression
Alexander & Markowitz	USA 1986	210 mothers aged over 20 years with children aged 1.5 to 5 years using the pediatric clinic frequently (predominantly low-income working class population in the inner city)	three health interviews covering six months, a four week diary and a medical record	four or more patient-initiated illness-related visits to the pediatric clinic during six months versus less than four	12	bivariate zero-order correlations
Newachek & Halfon	USA 1986	25,892 children aged 2 to 16 years of the National Health Interview Survey 1978	health interview	- any physician visit during the last year - log of number of visits in last year	22	multiple regression models

Diaz et al	USA 1986	757 children aged 0 to 12 years (enrolled in a prepaid group practice HMO)	household interview	three groups: consistently low, middle and high users during six years	19	Analysis of variance (not multivariate)
Duncan et al	UK 1987	178 mothers with children aged for nursery school and less than five years of age	medical records	two groups: 0-2 and more than six patient initiated visits in one year for youngest child	10	Canonical discriminant function technique
Schor et al	USA 1987	693 children aged 0 to 12 years (enrolled in a prepaid group practice HMO)	medical records	individual utilization index: log of ratio of individual's average number of yearly visits to geometric mean the same age and sex group	7	several bivariate analyses
Woodward et al	Canada 1988	children aged 4 to 16 years (census of Ontario)	health survey	any visit to a medical doctor in the previous six months	9	multiple least squares regression
Newachek & Starfield	USA 1988	15,146 children under the age of 18 (community sample)	health survey	number of physician visits per year based on a two week recall period	2	bivariate analyses
Kelleher & Starfield	USA 1990	2059 children aged 5 to 11 years (enrolled in a prepaid group practice HMO)	medical records	total visits in last two years	6	multiple linear regression
Newachek	USA 1992	17110 children under the age of 18 (community sample 1988)	health interview	two groups based on the annual volume of ambulatory visits: no visits versus 10 or more	23	multiple linear regression
van den Bosch et al	NL 1993	1513 children under the age of 5 (listed in 4 general practices)	medical records	high versus low users defined as more or less than the median use of the population	7	logistic regression
Riley et al	USA 1993	480 children aged 5 to 11 years (enrolled in a prepaid group practice HMO)	medical records linked with questionnaire	number of visits during the two-year retrospective period	35	stepwise multiple linear regression
Bruusgaard et al	Norway 1993	183 children born in a community in southern Oslo	GPs'bills for insurance office linked with questionnaire every six months	number of contacts with the GP during the first four years	7	multiple linear regression model
Leach et al	UK 1993	134 mothers with children aged 3 to 6 years (listed in a military general practice)	medical records	consultation rate over six months	5	stepwise multiple linear regression
Osman & Hunt	Australia 1995	150 mothers with children aged 11 to 26 months recruted from a maternal and child health centre register	interview and four week diary	at least one of contact with a doctor	10	stepwise multiple logistic regression

CHAPTER 2

MEASURING MORBIDITY OF CHILDREN IN THE COMMUNITY

A COMPARISON OF INTERVIEW AND DIARY DATA

Introduction

Most estimates of morbidity experienced at home by children are based on parental retrospective interviews. The reliability and validity of these socalled communnity morbidity estimates are difficult to assess, since comparable figures are hard to get. Previous research demonstrated that people tended to overreport events in retrospective data collection methods like health interviews compared to medical records, but that underreporting occurred as well.[1-3] For community morbidity a comparison of interview data with medical records is not available, since community morbidity is not registered in medical records. An alternative data collection method to measure community based morbidity is through a health diary, in which people register their illness symptoms on a daily basis. Several investigators claimed that diary data are valid and reliable and yield a more comprehensive view of community morbidity than other data collection methods, but empirical evidence is lacking.[4 5] The aim of this study was to compare estimates of community morbidity in one group of children assessed both by a retrospective interview and a health diary in two successive weeks.

Known factors that are related to morbidity estimates of children are age, gender, birth order and ethnic origin of the child, and educational level of the mother.[6] Coughlin stated that age, educational level and socioeconomic status of the respondent also influence reporting accuracy in retrospective interviews.[7] Sullivan et al reported that people with low literacy skills (e.g. ethnic minorities) and lower educational levels have difficulty completing self-administered questionnaires such as diaries.[8] If these factors influence both morbidity estimates and reporting accuracy, than the estimates of community morbidity are probably critically biased by the data collection method.

Furthermore, Mechanic argued that symptom reports are in part dependent on the respondent's mental state.[9] Kooiker demonstrated that symptom checklists in health interviews are sensitive to psychological distress rather than to physical illness alone.[10] For children, usually the mother is the respondent. Whether the mental state of the mother influences the responses for her children is unknown yet, but crucial for evaluating the accuracy of the responses.

So, the following questions were addressed in this study. (1) Do a retrospective interview and a prospective diary (self-administered) yield comparable estimates of community morbidity of children? (2) Are these estimates influenced by the age, gender, birth order or ethnic origin of the child, the educational level or the mental state of the mother?

Methods

In 1987 and 1988 the Dutch National Survey of Morbidity and Interventions in General Practice was carried out in a sample of 161 general practitioners (GPs).[11] In The Netherlands almost everybody is listed with one GP, thus the practice population of a GP can be used for community surveys. For this study we used data from two different measurement instruments: a health interview and a diary. Subjects were obtained by a random sample of 100 persons of each practice list of the 161 participating general practitioners. The sample contained 2561 children aged 0 to 14 year. People were asked to participate with a letter from their GP. One of the parents was approached to fill out a structured questionnaire about their child (proxy interview). The interview addressed, among other items, experienced health symptoms in the past two weeks. The questionnaire had a response rate of 87% resulting in 2227 children. The parents of these 2227 children were also asked to keep a structured health diary for three weeks, starting the day after the interview. During this diary keeping period the interviewer phoned twice to motivate and solve any problems. Completeness was checked when collecting the diaries. The response rate for the diary was 81% (1805 children). We restricted the study population to those children for which the mother was the respondent. So we ended up with 1630 children for whom both questionnaire and diary were completed by the mother.

The health interview included a checklist of 42 precoded symptoms. For each symptom parents indicated whether it had bothered their child during the last fortnight. For the health diary parents received a 21 paged booklet with a simple one-page questionnaire to complete each day. For this study the following questions were relevant: "did your child have any symptoms about his/her health today?" If

so, the parents were asked to describe what symptom in their own words, with a maximum of two different symptoms per day. Symptoms that lasted more than one day were afterwards combined into episodes of illness. Since the reference period in the interview was two weeks, we considered the first two weeks of the health diary. An episode of illness was included if the first day with symptoms reported fell within the first two weeks.

Ideally we wanted to compare the nature of the morbidity reported by both methods to check on any differences. But since the amount of symptoms per health problem that could be reported was much higher on the checklist in the interview than in the diary, we had to restrict this comparison to one symptom per child. Taking into account these different assessments of community morbidity, we were able to compare two things. First, the occurrence of *any* symptom during the 14-day period and second, the nature of the *most pronounced* symptom reported in the two weeks. We ranked the symptoms from most pronounced (somatic) to least pronounced (psychosomatic) in the following order: ear problems, musculoskeletal problems, diarrhoea, fever, cold/flu, stomach problems, headache, tiredness, vomiting, toothache, other problems (rest group), weakness and nervousness. In case of more symptoms reported, we only considered the most pronounced. Consequently, all other (less pronounced) symptoms were neglected.

Age, gender, birth order, ethnic origin of the child, and educational level and mental state of the mother were determined in the health interview. Age was grouped into three categories: 0-4 years, 5-9 years and 10-14 years of age. Birth order was divided into first born and later born. The maternal educational level was categorized into three classes: low (elementary education), middle (continued/-secondary education) and high (vocational/university education). The mental state of the mother was assessed by the General Health Questionnaire (28 item version) in the interview.[12] We considered a respondent with a score higher than five as having a problematic mental state.

We tested whether the methods yielded the same estimates (overall and broken down by the factors) by means of Pearson X^2 test of association with a .05 threshold for statistical significance. Differences due to the methods in occurrence of

specific symptoms were tested by means of a binomial test of proportions.

Results

The characteristics of the 1630 children for whom both morbidity estimates were available, are presented in table 1. Table 2 shows that parents reported the occur

Table 1. Main characteristics of the research population (N=1630)

	#	%
total	1630	100
age		
0-4 yrs	514	32
5-9 yrs	575	35
10-14 yrs	541	33
gender		
boys	889	54
girls	741	46
birth order		
first borns	751	46
later borns	879	54
ethnic origin of the child [a]		
Dutch	1410	95
non-Dutch	75	5
education of the mother [a]		
low	179	11
middle	1237	77
high	189	12
mental state of the mother		
GHQ-score < 5	1401	86
GHQ-score > 4	229	14

a education of the mother 25 missing cases; ethnic origin 145 missing cases

rence of symptoms for more children in the interview (65%) than in the diary (54%). Subdivided by most pronounced illness, parents reported substantially more ear problems, colds/flu and weak- and nervousness as having occurred during two weeks in their children in the interview than in the diary. In the diary, only diarrhoea was reported more often.

Table 3 shows the influence of child and maternal features on the occurrence of any illness as determined by both instruments. Given the lower occurrence in the diary, age and gender of the child yielded no modifying effect. Parents reported

Table 2. Percentage of children having any symptom and reporting most pronounced symptom in a 14-day period determined by a health interview and diary

	Interview %	Diary %	Sign[a]
Children having any symptom	65	54	<.01
Most pronounced illness			
ear poblems	10	3	<.01
musculoskeletal problems	6	7	>.01
diarrhoea	6	8	<.01
fever	5	3	<.01
colds/flu	22	18	<.01
stomach problems	3	2	<.05
headache	4	4	>.05
tiredness	2	2	>.05
vomiting	0	0	>.05
toothache	1	1	>.05
other problems	2	7	<.01
weakness	1	0	<.05
nervousness	3	0	<.05

a: statistical significance assessed by X^2

more problems for first borns and non-Dutch children, but these relations were established in more or less the same magnitude by both instruments. The last two factors, maternal mental state and educational level, influenced the occurrence differently in the interview than in the diary. In case of a higher GHQ-score, both instruments registered more children with any illness. However, the difference in

Table 3. Reporting any illness during two weeks in interview and diary by child's age, gender, birth order, ethnic origin and educational level and mental state of the mother (N=1630)

	Interview %	Diary %	X^2
total	65	54	
age			
0-4 years	66	57	
5-9 years	66	53	
10-14 years	64	53	>.05
gender			
boys	65	55	
girls	65	54	>.05
birth order			
first borns	69	57	
later borns	62	52	>.05
ethnic origin of the child			
Dutch	64	54	
non-Dutch	67	60	>.05
educational level of the mother			
low	66	45	
middle	65	54	
high	70	67	<.05
mental state of the mother			
GHQ-score < 5	63	53	
GHQ-score > 4	82	66	>.05

children with any symptom between the respondents with a normal and a higher GHQ-score was larger in the interview case (19%) than in the diary case (13%), though not statistically significant. The most notable difference between both instruments was found for educational level of the mother. In the interview case the percentages of children with symptoms were almost equal over the various educational categories, whereas in the diary case a clear gradient became apparent. The lower educated mothers reported much less children with symptoms in the diary (45%) compared to the interview (66%) as well as compared to the higher educated mothers in the diary (67%), whereas the higher educated mothers reported comparable figures in the interview and diary. To check whether any symptom was systematically underreported in the diary by the lower educated mothers, we compared the distributions of most pronounced symptoms by maternal educational level. We observed more or less similar distributions for each category of educational level, so no specific symptom was underreported by low educated mothers.

Discussion

The main conclusion of this study is that a health interview and a self-administered diary yielded different estimates of community morbidity. The same mothers reported more morbidity for their children in the interview than in the diary. Age, gender, birth order and ethnic origin of the child did not influence the reporting of morbidity in both methods differently. The mental state of the mother and, most strongly, the educational level of the mother influenced the comparability. A more problematic mental state of the mother yielded somewhat more morbidity as reported in the interview. A low maternal educational level yielded much less morbidity in the diary, whereas a high maternal educational level yielded equal estimates of morbidity in interview and diary.

The difference in morbidity estimates questions the validity of both instruments. Both instruments are assumed to measure the same community morbidity in a specific time span. Our first major finding, that in the interview more and different morbidity is reported than in the diary, contradicts this assumption. Also, these results contradict the statements of Verbrugge and Dahlquist who claimed that a

diary yields more symptoms ('more comprehensive picture') than an interview.[4 5 13] Since we lack a gold standard for measuring community morbidity, we do not know what the true prevalence is in this group of children. Therefore, we cannot say which instrument is most valid. Several mechanisms may cause higher estimates for specific morbidity categories in an interview than in a diary. First, a forward telescoping effect in an interview causes more morbidity in general because respondents recall events as having occurred more recently than they actually did. In combination with the principle that more salient illnesses are recalled better than less salient illnesses, which is even more pronounced in proxy interviews, resulted this mechanism in more morbidity of salient problems reported by a parent for its child.[14] The higher prevalences of the salient illnesses ear problems, fever and colds/flu in the interview supported the presence of this mechanism. Second, the different manner of reporting symptoms (filling in a check list in the interview versus an open-ended question in the diary) causes a non-uniform definition of symptoms. A check list of symptoms in an interview, being an aid to recall minor symptoms, encompasses more (trivial) symptoms than a respondent would probably consider when answering an open-ended question in a diary. Our data showed that trivial symptoms as weakness and nervousness (symptoms on the check list) are reported only in the interview and not in the diary. Thus, probably parents did not consider these symptoms as health problems suitable for the health diary. Third, as demonstrated in our data, the mental state of the respondent resulted in some more problems reported in the interview than in the diary. In contrast to speculations that the mental state only affects symptom checklist scores, we demonstrated that this relation was also present for the open-ended question diary data, though less notable.[10 15] Fourth, reporting more morbidity in the interview could also be a consequence of structurally reporting less morbidity in the diary, for which a common cause is simply forgetting to fill in the diary each day.

The second major finding is that the reported morbidity in the diary is highly related to the educational level of the mother. Based on the diary data only, the conclusion would be that children from mothers with higher educational levels have more health problems. This conclusion totally contradicts the established fact that children from mothers with lower educational levels (as indicator for lower socioeconomic groups) have more health problems than children from mothers with

higher educational levels.[6] Together with the absence of the relation in the interview data, we must conclude that these diary-based community morbidity estimates are seriously biased. These results support the conclusion of Sullivan et al that, due to literacy limitations, self-administered questionnaires should not be used in lower educated people.[8]

A limitation of the presented material is that the instruments referred to different time periods, which might cause an invalid comparison. Because the time periods were short (two weeks) and successive, we assumed that this limitation did not cause any problems.

A second limitation is that in the diary people reported maximally two health problems per day, whereas in the interview people ticked 42 symptoms on a checklist concerning perhaps more health problems. To deal with this incompatibility of methods we assumed that both methods registered at least the most pronounced health problem. Hence, we restricted the analysis on the nature of the symptoms to the most pronounced health problem per child. The order of pronounced health problems was set arbitrarily, so the absolute prevalences are probably incorrect. Nevertheless, we were only interested in the comparison of the prevalences and these results showed that, besides the overall difference in the reporting of any symptom, the comparisons differed by specific symptoms. Thus, we conclude that also the reporting of specific symptoms is subject to various methodological biases.

Unfortunately, we must conclude that prevalence estimates of community morbidity of children reported by their mothers are strongly affected by the data collection method used.

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CHAPTER 3

VALIDITY AND ACCURACY OF INTERVIEW AND DIARY DATA ON CHILDREN'S MEDICAL UTILIZATION IN THE NETHERLANDS

Introduction

Estimates of medical utilization (frequency and morbidity) of children are derived from parental interviews or medical records and used to monitor the occurrence of diseases and to assess the need for health services.[1 2] Despite the use of different methods, the validity and accuracy of children's medical utilization estimates have not been assessed yet. Since Tennant showed that proxy and saliency effects are larger if a household member reports for other household members (which is often the case for children), special attention on the validity and accuracy of parental responses for their children is justified.[3] Another way to determine children's medical utilization is using a health diary.[4] The validity and accuracy of a medical utilization estimate from a diary has also never been assesed.

Comparisons between health interviews and medical records, concerning medical conditions, dietary habits, obstetric histories, hospitalization, medication usage and chronic diseases, demonstrated that the general population tends to underreport medical events, but that overreporting occurs as well.[5-7] In an Australian study, O'Toole et al compared the nature of morbidity presented to the general practitioner (GP) as reported in medical records and patient interviews and concluded that no large differences were found between both methods.[8] However, they did not ask whether the consultation took place according to the parent. Hence, we do not know whether medical utilization estimates (and consequently morbidity estimates) derived from different sources are comparable.[9]

An important factor that influences the validity and accuracy of self-reported data in interviews is recall bias expressed by omission of events and telescoping, which means that events are recalled as having occurred either more recently or longer ago than they actually did.[10] Since omission leads to underreporting and telescoping may lead to under- and overreporting of events, the effect of recall bias on utilization estimates is ambiguous. For health diaries, omission of events or fatigueness (reduced willingness to complete diaries in the same detail as time passes) are threats to validity.[11] Also, respondent characteristics as age, gender and socioeconomic status might influence validity and accuracy of self-reported data. However, consistent relationships for interview data have not been found.[10 12] For diary data,

effect of respondent characteristics is never investigated yet.

So, in this study we assessed the validity and accuracy of estimates of children's medical utilization from a health interview and diary by comparing them with medical records. We established the consequences for morbidity estimates. Also, we investigated whether and how respondent characteristics influence these medical utilization estimates.

Methods

In the Netherlands each inhabitant is listed with his own GP and a consultation with a GP is the point of entry into the Dutch health care system. We used data from the Dutch National Survey of Morbidity and Interventions, carried out in 1987 and 1988, for which a non-proportional stratified sample of 161 general practitioners (GPs) was drawn form the Dutch GP-population (n=5826).[13] The practices of the participating GPs contained 63,753 children between 0 and 14 years of age. All participating GPs registered all contacts with their patients during three months (GP registration). A random sample of 100 persons per participating GP was drawn. In this sample 2561 children were represented. Parents of these children were asked to answer a health interview about their child: parents of 2282 children participated (response 89%). Subsequently, these parents were asked to keep a diary during three weeks about their child's health. Parents of 1805 children cooperated (response 79%). One general practice had to be excluded as a result of non-overlapping registration periods, ending up with 1765 children and 160 GPs.

In the GP registration all consultations were registered by either GP or receptionist/nurse on a specially designed form. Among the registered items were date of the consultation and the reason for consultation as expressed by the parent, which was afterwards coded according to the International Classification for Primary Care (ICPC).[14] The health interview took place after two months of GP registration. In the health interview questions regarding a GP consultation were whether, how long ago and for what reason the child had contacted the GP during the last two months. The diary started the day after the interview took place. It consisted of a one-page

questionnaire for every day. Precoded questions of interest were among others whether the child had suffered from a health problem that day and if so, what kind of health problem and whether the child had gone to the GP for that problem that day.

Interview and diary referred to different time spans (two months and three weeks); these data were not directly comparable for our purpose. Because the diary concerned three weeks, we restricted the comparison between interview and GP registration to three weeks as well (most recent). A consultation was included if it took place within three weeks according to one of the methods. Figure 1 shows the overlapping time periods of the three data collection methods. We considered only consultations during surgery hour and home visits as reported by parent or GP. Thus, telephone consultations were excluded.

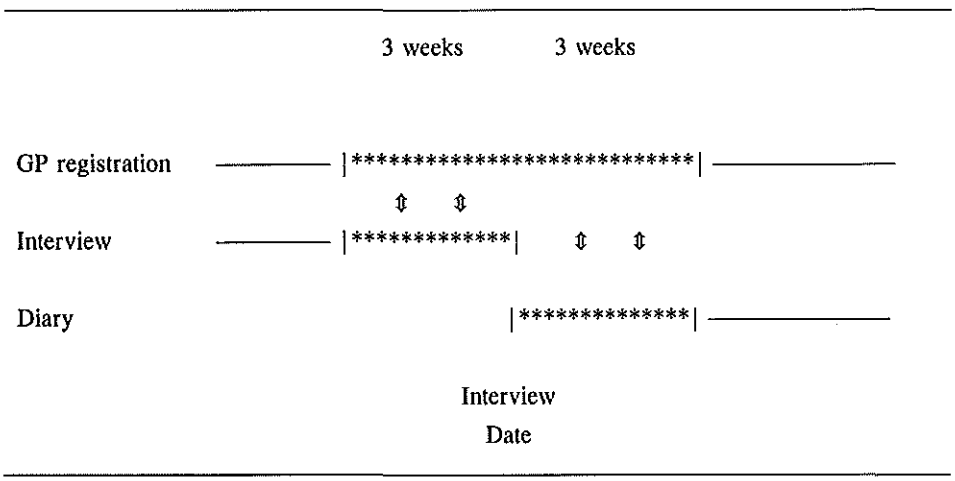

Figure 1. Overlap of the registration periods of the various methods, used in the Dutch National Survey carried out in 1987 and 1988

We matched the consultations from the different methods by the reported consultation date. Next, we classified the matches into a perfect match (same date in both instruments), an almost perfect match (maximum three days of difference between

both methods), a problematic match (more than three days and less than 15 days difference) and a mismatch (consultation is reported by one instrument only or the difference is larger than 14 days).

For the validity, we calculated sensitivity and specificity with the GP registration as the gold standard, because the organisation of the GP registration yields probably the most accurate data.[15] We calculated Cohen's kappa statistic (as an indicator for the accuracy) for all matches.[16] To assess morbidity differences between the methods, we compared prevalences of specific diagnostic groups classified by the ICPC according to all methods and calculated relative risks with 95%-confidence intervals indicating the risk for each diagnostic group of being reported more often by the parent than by the GP.

We checked whether telescoping in the interview and/or fatigueness in the diary occurred by comparing the number of consultations that parents reported during the registration period. The influence of respondent characteristics is assessed separately for under- and overreporting parents and is expressed by odds ratios resulting from bivariate logistic regression analyses with the matched group as reference category. The respondent characteristics studied are child, maternal and family characteristics. For the child age, gender, birth order (first borns versus later borns) and ethnicity were considered. Ethnicity was divided into children belonging to an ethnic minority or not.[17] For the mother age (over and under 35 years of age), educational level (elementary versus continued/universitary) and working status (has a paid job or not) were considered. For the family the socioeconomic status level according to the profession of the wage earner (high/middle versus low),[18] and the composition (one or two parent family) were considered. Characteristics with $p < 0.25$ in the bivariate analysis were added to a multivariate logistic regression model.[19]

Results

For the 1765 children, parents reported 355 consultations of 281 children (mean 1.3;SD 0.6) in the interview and 213 consultations of 160 children (mean 1.3; SD 0.6) in the diary. GPs registered 216 consultations of 183 children (mean 1.2; SD 0.5) during the interview period and 191 consultations of 165 children (mean 1.2; SD 0.4) during the diary period. The number of matched consultations was in the

interview period 177 and in the diary period 133. So, parents reported more consultations exclusively than the GPs, more pronounced in the interview (178 versus 39) than in the diary (80 versus 58). If we breakdown the matches by perfectness, in the diary period 81% matched perfectly, 17% almost perfectly and only 2% matched problematically whereas these percentages are for the interview period 36%, 46% and 18% respectively. Figure 2 shows a possible explanation for these differences in perfectness. The reported consultations in the interview clustered around seven, 14 and 21 days ago, whereas in the GP registration and diary the number of consultations were constant over all days. Also in the figure, an indication of telescoping is present, since the number of consultations in the interview increased between 15 and 21 days ago.

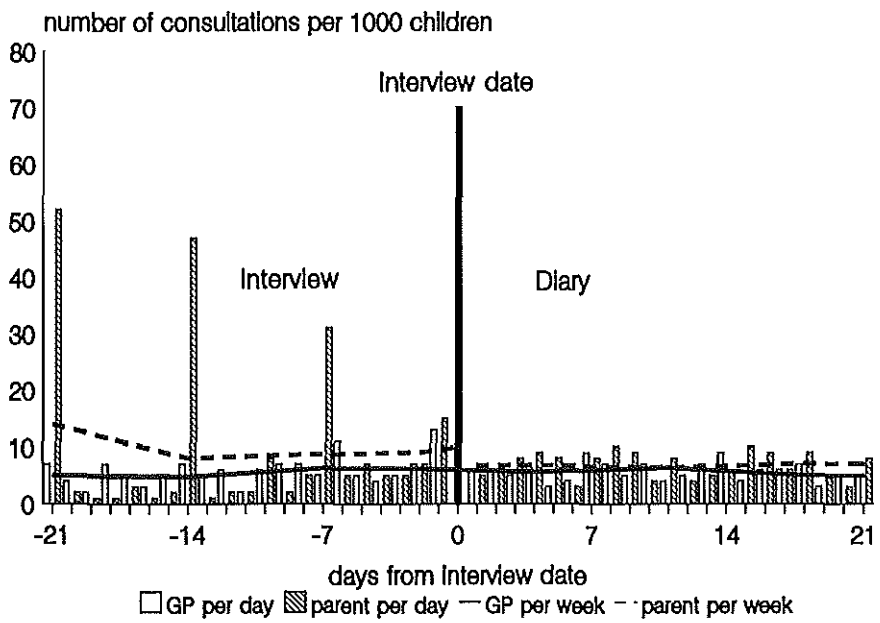

Figure 2. Number of consultations per day (bars) and mean number of consultations per week (lines) per 1000 children as reported by parent in interview and diary (each during three weeks) and by GP (during six weeks)

Table 1 shows the distribution of the children with and without consultations according to the reporter. Since more consultation reports per child occurred, the numbers do not correspond to the distribution of consultations. The validity of both parental methods is satisfactory, but slightly better for the interview than for the diary. The sensitivity is higher for the interview method (0.82) than for the diary method (0.70), whereas the specificity is higher for the diary. The kappa is higher for the diary method (0.64) than for the interview method (0.58), although the confidence intervals for both kappas overlap. The number of false positives (GP no, mother yes) is much higher in the interview than in the diary, in contrast to the false negatives (GP yes, mother no). The consequences of these larger number of consultations in the interview for the morbidity estimates are presented in table 2. All categories had higher prevalences according to the interview than according to both other methods. Three diagnostic categories show a deviant pattern. First,

Table 1. Validity and accuracy of interview and diary regarding GP consultation in 1765 children

	1. Interview versus GP registration			2. Diary versus GP registration		
	GP			GP		
	Consult	No consult		Consult	No Consult	
Mother						
Consultation	140	137	277	108	60	168
No Consultation	30	1458	1488	46	1551	1597
Total	170	1595	1765	154	1611	1765
			95%-CI			95%-CI
Sensitivity		.82	.76;.88		.70	.62;.77
Specificity		.91	.90;.92		.96	.95;.97
Kappa		.58	.52;.64		.64	.57;.71

musculoskeletal problems had an even higher prevalence according to the interview, than was expected. Second, skin problems had according to both parental methods lower prevalences than according to the GPs. Third, 'other problems' had higher prevalences in both parental methods.

Table 2. Prevalence of reasons for encounter per 1000 children by diagnostic category and relative risks of a health problem being reported more often by parent than by GP for both comparisons (1765 children)

1. interview/GP registration	Prevalence parent (N=355)	GP (N=216)	RR*	CI*
General and unspecified problems	32	19	1.7	1.1-2.6
Digestive problems	22	12	1.8	1.1-3.0
Eye problems	9	5	1.7	.7-3.8
Ear problems	15	10	1.4	.8-2.6
Musculoskeletal problems	20	8	2.6	1.4-4.8
Respiratory problems	51	29	1.8	1.3-2.5
Skin problems	26	29	.9	.6-1.3
Other problems	26	10	2.7	1.6-4.7
2. diary/GP registration	(N=213)	(N=191)		
General and unspecified problems	13	11	1.2	.6-2.1
Digestive problems	12	11	1.2	.6-2.1
Eye problems	2	3	.7	.2-2.4
Ear problems	14	12	1.1	.6-2.0
Musculoskeletal problems	12	11	1.2	.6-2.1
Respiratory problems	40	29	1.4	.9-1.9
Skin problems	11	24	.5	.3-.8
Other problems	16	6	2.6	1.3-5.3

* RR=relative risk; CI=95%-confidenceinterval

Table 3 shows what respondent characteristics caused over- or underreporting. In case of the interview, parents reported over if they have a high socioeconomic status. The educational level of the mother had no effect. The multivariate analysis of the interview data yielded similar odds ratios. In the multivariate analysis of the diary data, no characteristic was statistically significant ($p < 0.05$) related to overreporting, although in the bivariate analysis parents more consultations reported for their girls and first borns. Resulting from the bivariate analysis, parents reported under if their child belonged to an ethnic minority, if the educational level of the mother was low, if they were jobless and if they had a low socioeconomic

Table 3. Bivariate ORs with 95%-CIs of parental under- and overreporting for respondent characteristics

	Health Interview-GP registration				*Diary-GP registration*			
	overreporting (N=277)		underreporting (N=170)		overreporting (N=168)		underreporting (N=154)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95%-CI
child characteristics								
age (> 4 years)[a]	0.9	0.6-1.5	1.3	0.6-2.8	0.8	0.4-1.4	0.7	0.3-1.4
gender (boys)[a]	0.9	0.5-1.4	0.8	0.4-1.8	1.8 *	0.9-3.4	1.2	0.6-2.5
birth order (first born)[a]	0.7 *	0.5-1.2	0.6 *	0.3-1.4	1.8 *	0.9-3.4	1.3	0.7-2.7
Ethnicity (minority)[a]	1.2	0.4-3.1	†		0.8	0.2-3.1	1.8 *	0.5-5.9
maternal characteristics								
age (< 35 years)[a]	1.0	0.6-1.6	1.2	0.5-2.9	1.2	0.6-2.2	1.2	0.6-2.4
educational level (low)[a]	1.1	0.5-2.4	1.4	0.4-4.6	0.5 *	0.1-2.5	3.9 *	1.4-11.0
work status (doesnot work)[a]	1.1	0.6-2.1	0.9	0.3-2.6	0.5	0.2-1.4	2.8 *	1.3-6.2
family characteristics								
socioeconomic status (low)[a]	0.6 *	0.3-1.2	1.4	0.5-3.4	0.4 *	0.1-1.2	2.3 *	1.0;5.3
composition (one parent family)[a]	0.9	0.3-2.5	1.8	0.5-7.4	2.8	0.5-17.2	2.4	0.3-17.7

* Wald $p < .25$; † no cases in exposure category

a: reference categories: 0-4 years, girls, later borns, Dutch, >35 years, high educational level, works, high socioeconomic status, two-parent family.

status. Odds ratios for these characteristics resulting from the multivariate analysis (not in table) remained high, though not statistically significant: ethnic minority 1.6 (95-% CI 0.4-5.9), low maternal educational level 2.6 (95-% CI 0.7-9.4), jobless mothers 2.3 (95-% CI 1.0-5.3) and for low socioeconomic status 1.4 (95-% CI 0.5-3.9).

Discussion

This study is the first to check on the accuracy and validity of medical utilization data for children. The utilization rates determined by different methods vary, especially between GP and interview. The results indicate that consultation rates of the past three weeks reported by the parent are overestimated by about 60 % (355/216). Consultations reported in the diary yielded a better result. Obviously, utilization rates of various methods are not comparable.

Considering the accuracy of the measurements, the kappa indicated a substantial agreement between the diary and medical record and only a moderate agreement between the interview and the medical record, which is strengthened by the much larger number of perfect matches for the dairy-GP registration comparison than for the interview-GP registration comparison. This difference in accuracy between both parental methods can be explained by heaping or clustering of the reported consultations in the interview to exactly one, two and three weeks back. Since the kappa statistic is invariant to asymmetry between the disagreements, the sensitivity and specificity are more informative for validity aspects.[20] The lower sensitivity of the diary contradicts general statements that in a diary more valid data are collected than in an interview.[4 11] A typical error of the diary data was simply missing the whole illness episode or forgetting to tick the GP-item. This deviant finding compared to other studies is probably caused by the fact that false negative consultations (recorded by the GP, but not by the parent) in diary and interview could not be detected in previous studies. The organisation of the Dutch health care system enabled us to determine these false negative consultations. The higher sensitivity but lower specificity for the interview than for the diary indicate that there are relevant differences between both methods, most pronounced by the large overreporting in

the interview. This overreporting can partially be explained by telescoping. Another explanation is that parents tend to forget less salient reasons like skin problems and overreport more salient reasons like musculoskeletal and 'other' problems compared to the GP. Probably, a combination of telescoping, the proxy effect and the saliency principle strengthens the reporting of consultations for more salient illnesses, even more for problems that also affect the parent's activities.[3] If the period of reference is longer the saliency principle will probably influence this recall bias more heavily. Hence, consequences of these incomparable results for prevalence estimates are large.

Another important finding is that some respondent characteristics were related to reporting behaviour. The underreporting of the parent in the diary was higher for parents with children belonging to an ethnic minority, which is probably due to language problems. That mothers with a low education and who are jobless report less consultations may be caused by literacy limitations. Other studies subscribe these statements for self-administered questionnaires, while these limitations can be avoided with face to face interviews.[21] Our results cast doubt on the usefulness of a self-administered diary for low educated respondents and ethnic minority groups. Also we found that the overreporting of the parent was positively associated with socioeconomic status. Perhaps, these parents report a lot of consultations to demonstrate that they are good parents.[10]

In evaluating these results some remarks should be made. First, we excluded telephonic and preventive consultations. However, since these consultations mostly involve less salient problems, inclusion of these consultations would probably have worsened the validity of the self-reported data. Second, given the organisation of the GP registration (during or directly after the consultation with a weekly check by a research associate), we assume that the GP registration is the most accurate. However, the GP may have under- or overreported consultations as well. Overreporting by the GP is unlikely, because than he would have had to make up consultations. Underreporting (forgetting to fill out the registration form) might have taken place. In case of substantial underreporting by the GP, the number of false negatives would increase and the specificity of both diary and interview would be higher. Nevertheless, the large discrepancy in false negatives between interview and diary

indicates that parental overreporting in the interview remains substantial. Finally, not all parents were willing to co-operate in the diary and interview study. Non-response is often due to motivational and time constraints. In case of participation of the non-responders, these constraints would probably have caused an even worse outcome.

This study indicates that medical utilization rates and derived prevalence estimates of health problems for children are critically influenced by the method of data collection used. GP registrations, if well organised, can provide reproducable estimates of utilization rates, although some systematic underreporting may be present. Interviews produce too high rates and should be handled with caution. Utilization rates of especially more salient problems are prone to be overestimated. Diaries should only be used in populations with an adequate level of literacy. Hence, given their consistency we recommend to use medical records if possible.

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CHAPTER 4

EVERYDAY SYMPTOMS IN CHILDHOOD:

OCCURRENCE AND GP CONSULTATION RATES

Introduction

Most children occasionally attend a medical doctor. For children a few studies indicated that between one and 20 percent of all illness experienced at home reach the attention of a professional health care provider.[1 2 3 4] However, whether specific symptoms are more prone to reach the professional health care system or in other words whether the size of the iceberg is symptom specific for children is poorly understood.

Illness in children differs from adult morbidity and should be studied separately for at least two reasons. Firstly, hospital and primary care statistics have demonstrated that the occurrence of illness in childhood is associated with the child's development, especially with the child's age and gender.[1] Young children (boys more than girls) experience more health problems than older children (girls more than boys). Secondly, most children do not make their own decisions regarding health matters, especially in their young ages. Parents, mostly mothers, deal with their health and illness: they often recognise the early stages and make daily decisions regarding these illnesses.[5] Birth order of the child influences these decisions: in case of an illness parents consult a physician more often for first borns than for later borns.[6] Other factors that influence the size and composition of the iceberg are seasonal and urbanisation effects: e.g. colds occur more often in autumn and winter and in larger cities.[7]
In this study we investigate whether and how these factors influence the size and composition of the iceberg of everyday symptoms in childhood.

For professional health care of children (the visible part of the iceberg) the general practitioner (GP) is the point of entry in the Netherlands, which is easily accessible for all people. Preventive care is organised through well baby clinics and school services.
The amount of illness in children in the population is mostly estimated from retrospective interviews or medical records. Studies of medical records have demonstrated that for children the most frequent reasons the GP is consulted are cough, fever, earache, sore throat and general weak/tiredness.[8 9] For specific symptoms that also prompt self care or no care at all, like headaches, fever, colds

and diarrhoea, retrospective interview data provide occurrence and consultation rates.[10 11] However, these retrospective sources have several limitations,[12] such as recall bias and saliency probably resulting in an overestimation of more severe problems and an underestimation of less salient problems. An alternative method to investigate the occurrence of symptoms is by means of prospective health diaries. The major advantages of a diary are that a more comprehensive picture of people's health problems can be collected, including all minor symptoms and that it minimizes recall bias.[12]

In this paper we address two questions: (1) what are the occurrence and consultation rates of specific symptoms in childhood? and (2) are the occurrence and consultation rates related to age, gender, birth order and place of living of the child and to season of the year?

Methods

We made use of health diaries, collected within the framework of the Dutch National Survey of Morbidity and Interventions in General Practice. This survey was carried out in 1987 and 1988 by the Netherlands Institute of Primary Health Care.[13] For this survey a sample of 161 GPs was drawn. For the health diary study a random sample of 100 persons per GP was drawn from his practice list. Among this random sample of approximately 16 000 persons 2561 children were aged 0 to 14 years. Of these children one of the parents was asked to answer a structured questionnaire about their child and to keep a diary about the health of their child during the following three weeks. During this period the interviewer phoned the parents twice to motivate or answer questions they might have. Parents of 1805 children participated (response rate 70%).

The diary was a 21 page booklet with a simple one page questionnaire to be completed each day by one of the parents. They were asked whether their child suffered from any symptoms that day. If so, they had to describe the nature of the symptom in their own words, with a maximum of two symptoms per day. Afterwards we grouped the symptoms into 14 categories. The one page questionnaire

finished with a question regarding actions that were undertaken in response to the symptom. Sixteen possible actions were precoded of which one was whether the parents had consulted the GP that day for the symptom mentioned. Afterwards we combined symptoms lasting more than one day concerning the same health problem into episodes of illness.
The occurrence of symptoms was calculated as the number of episodes reported within the three week period. Consultation rates were based on the first consultations made with a GP within an episode and calculated as the number of first GP consultations divided by the number of episodes for that symptom.

Age of the child was divided into categories according to international standards: 0-4 years, 5-9 years and 10-14 years of age. Birth order was divided into first borns and later borns. Degree of urbanisation was determined by the number of inhabitants and categorized into two groups, cities with less than 50 000 inhabitants and cities with more than 50 000 inhabitants. As a consequence of the design of the study data were collected in four months spread over different seasons: June, September, December and March.

The occurrence by risk indicators is presented per 1000 children with 95%-confidence intervals. The effect of the risk indicators on consultation rates is expressed by relative risks and 95%-confidence intervals.

Results

Parents of 1805 children reported on 5147 days (13.6%) symptoms for their children. The reported symptoms contained 1504 episodes of illness.
Table 1 shows the occurrence of the ten most frequent reported episodes in three weeks by risk indicators. Colds/flu and respiratory problems occurred most frequently with a peak occurrence in young children. Most colds/flu and respiratory symptoms occurred in December. Diarrhoea occurred in almost 10 percent of all children with higher occurrences in girls and larger cities. Musculoskeletal problems and headaches also occurred frequently with an increasing occurrence

Table 1. Occurrence of episodes of symptoms in children perceived by the parents per 1000 children in three weeks by risk factors

	Colds/flu (n=267)		Respiratory tract problems (n=195)		Diarrhoea (n=161)		Musculoskeletal problems (n=121)		Headaches (n=113)	
	/1000	95%-CI	/1000	95%-CI	/1000	95%-CI	/1000	95%-CI	/1000	95%-CI
total	157	141-174	114	99-129	99	85-112	75	63-87	68	57-80
age										
0-4 years	228 *	194-262	134 *	106-162	85	62-108	21 *	9-33	3 *	0-8
5-9 years	134	107-160	103	79-127	127 *	101-153	55 *	37-73	68 *	48-87
10-14 years[a]	115	90-140	107	82-131	82	60-104	146	118-174	130	103-156
gender										
boys	155	132-178	113	93-133	90	72-108	83 *	65-100	63	48-78
girls[a]	160	135-185	115	93-137	109	88-131	66	49-82	74	56-92
birth order										
first borns	156	131-181	122	100-145	104	84-125	68	51-86	73	56-91
later borns[a]	158	135-181	107	88-126	94	75-112	80	63-97	64	48-79
degree of urbanisation										
< 50 000	163	144-181	111	95-127	92 *	77-106	71	58-84	65	52-77
> 50 000[a]	132	94-169	129	91-166	132	94-169	93	61-126	84	53-114
registration month										
june	115 *	87-143	97	70-123	84	60-109	97	70-123	66	44-88
september[a]	167	133-202	111	82-140	87	61-113	73	49-98	56	34-77
december	178	142-215	150 *	116-184	117 *	87-148	59	36-81	77	52-103
march	174	139-209	102	73-130	108	79-137	68	44-91	74	50-99

	Tiredness (n=77)		Fever and other child diseases (n=72)		Skin problems (n=66)		Stomach/ nausea (n=53)		Ear problems (n=50)	
	/1000	95%-CI	/1000	95%-CI	/1000	95%-CI	/1000	95%-CI	/1000	95%-CI
total	47	37-57	41	32-50	38	29-46	30	22-38	28	20-35
age										
0-4 years	56 *	37-74	80 *	58-102	38	23-54	17 *	7-28	30 *	16-43
5-9 years	56 *	38-74	37 *	22-52	45 *	29-61	29	16-42	40 *	25-56
10-14 years[a]	30	16-43	8	1-15	30	16-43	43	27-59	13	4-22
gender										
boys	50	36-64	43	30-55	36	24-47	37 *	25-48	28	17-38
girls[a]	44	30-58	39	26-52	40	27-53	22	12-32	28	17-39
birth order										
first borns	55 *	40-71	47	32-61	41	27-54	31	19-43	28	16-39
later borns[a]	40	28-52	36	24-48	35	23-47	29	18-39	28	17-38
degree of urbanisation										
< 50 000	50	39-61	39	29-49	38	28-48	29	20-37	27	19-36
> 50 000[a]	32	13-52	51	27-76	35	15-56	35	15-56	29	10-48
registration month										
june	53	33-73	66 *	44-88	51	32-71	23	9-36	27	12-41
september[a]	56	34-77	33	17-50	42	24-61	36	18-53	16	4-27
december	40	21-58	35	18-53	31	14-47	33	16-50	40 *	21-58
march	36	20-56	27	12-42	25	10-39	29	14-45	29	14-45

a reference categories; * statistically significant deviating from reference category: $p < .05$

with age. For boys, in larger cities and in June more episodes of musculoskeletal problems were reported. For typical child symptoms, such as fever, the occurrence in the youngest age group was tenfold the occurrence in the highest age group.

Table 2. Occurrence of any illness reported by parents of 1805 children during three weeks by age, gender, birth order and place of living of the child and season

	Children		Occurrence of any illness episode (n=1082)		Number of episodes per 1000 children (n=1504)	
	N	%	/1000 children	95%-CI	/1000 children	95%-CI
total	1805	100	599	577-622	833	816-850
age						
0-4 yrs	575	32	640*	601-679	821	790-852
5-9 yrs	621	34	593	554-631	833	803-862
10-14 yrs[a]	609	34	568	529-607	846	817-874
gender						
boys	981	54	600	570-631	840	817-863
girls[a]	824	46	598	565-632	825	799-851
birth order						
first borns	833	46	616	583-649	863*	840-886
later borns[a]	972	54	585	554-616	808	783-832
degree of urbanisation						
< 50 000 inhabitants	1494	83	588*	563-613	817*	798-837
> 50 000 inhabitants[a]	311	17	653	600-703	910	878-942
registration month						
june	487	27	577	533-621	821	787-855
september[a]	449	25	590	545-636	804	767-841
december	426	24	641*	595-686	899*	870-928
march	443	25	594	548-639	813	776-849

a reference categories; * statistically significant deviating from reference category: $p < .05$

These episodes occurred most often in June. The occurrence of symptoms, such as toothache, vomiting and eye problems, was lower than 20 per 1000 children within the three week period (not shown in the table). Table 2 shows the total occurrence of illness by several risk indicators. Of 599 per 1000 children at least one episode of illness was reported in three weeks. On average children with illness suffered from 1.4 episode per child, resulting in 833 episodes reported per 1000 children. More children aged 0 to 4 years were reported to suffer from illnesses than children from 10 to 14 years of age, though older children suffered from more episodes than younger children. No difference between boys and girls was found. Episodes were reported more frequently for first borns, children living in larger cities and in December.

The consultation rates per symptom differed considerably (table 3). Most often the

Table 3. Symptom specific consultation rates and relative risks for age and gender

Symptoms	Consultation Rates	Relative Risks					
		Age[a]				Gender[b]	
		0-4	95%-CI	5-9	95%-CI	boys	95%-CI
Colds/flu	10	3.0	.9-10.3	2.0	.5-7.6	2.1	.9-4.7
Respiratory tract problems	23	1.4	.7-2.8	.9	.4-2.1	1.5	.8-2.7
Diarrhoea	10	1.0	.4-3.5	.5	.2-1.7	.7	.3-1.7
Musculoskeletal problems	13	3.0	.9-9.5	1.1	.3-3.3	.3	.1-.9
Headaches	2	†					
Tiredness	1	†					
Fever	24	27%[c]		27%[c]			
Skin	28	1.4	.4-4.9	1.3	.4-4.3	1.1	.4-2.6
Stomach/nausea	2	†					
Ear problems	36	2.8	.3-23.5	3.5	.5-27.3	1.3	.5-3.5

a) reference category: 10-14 year; b) reference category: girls; c) no cases in reference category; † too few cases to subdivide

GP was consulted for ear and skin problems. One in every three children with ear problems was taken to the GP. Also fever and respiratory tract problems were often triggers to consult. Despite the frequent occurrence of colds and diarrhoea in only ten percent of the episodes the GP was consulted. Headaches, stomach/nausea and tiredness seldomly were reason to consult the GP. For all symptoms the

Table 4. Percentage of children regardless of symptoms and with symptoms that consulted the GP at least once during three weeks and relative risks for the risk factors

	Consultation rates of children regardless of symptoms (n=1805)			Consultation rates of episodes with illness (n=1504)		
	%	RR	95%-CI	%	RR	95% CI
total	11			13		
age						
0-4 yrs	15	2.1	1.5-3.1	20	2.3	1.6-3.4
5-9 yrs	10	1.5	1.0-2.1	13	1.5	1.0-2.2
10-14 yrs[a]	7	1.0		8	1.0	
gender						
boys	11	1.0	.8-1.3	14	1.0	.8-1.3
girls[a]	11	1.0		13	1.0	
birth order						
first borns	11	1.0	.8-1.4	13	1.0	.7-1.3
later borns[a]	11	1.0		14	1.0	
degree of urbanisation						
< 50 000 inhabitants	11	1.0	.7-1.5	14	1.1	.8-1.6
> 50 000 inhabitants[a]	11	1.0		12	1.0	
registration month						
june	10	1.1	.7-1.6	13	1.1	.7-1.6
september[a]	10	1.0		12	1.0	
december	13	1.3	.9-2.0	16	1.3	.9-2.0
march	11	1.1	.7-1.7	13	1.1	.7-1.7

a reference categories; * significantly deviating from reference category: $p < .05$

relation between age and consultation rates was comparable. Children from 0 to 4 years of age were taken to the GP twice as often as children aged 10-14 years of age. For gender two things are noteworthy. First, boys were taken more often to the GP for colds and respiratory tract problems, and girls consulted the GP more often in case of a musculoskeletal problem. For birth order, degree of urbanisation and registration month no significant variations were found (not in table).Table 4 shows the overall consultation rates. Of all children 11 percent (194 children) consulted the GP. This percentage varied according to age. Untill the age of five 15% of all children consulted the GP in three weeks, while between the age of 10 and 14 only seven percent of the children consulted the GP. These proportions did not differ according to gender, birth order, registration month and degree of urbanisation. A similar pattern resulted for illness episodes. For episodes occurring in children aged 0 to 4 years the GP was consulted 2.3 times as many as for children from 10 to 14 years of age.

Discussion

To our knowledge this is the first study that describes the occurrence and consultation rates of everyday symptoms in a group of children based on a prospective structured diary. We demonstrated that 60% of all children suffered from an illness episode during the three week period. The most common episodes of children were colds or flu and other respiratory tract problems, followed by diarrhoea, musculoskeletal problems and headaches. Further only one in every six children with symptoms consults the GP during an illness episode.

Comparison of the results of this study with previous studies is difficult because only a few studies reported occurrences of specific symptoms in childhood in the general population. In these previous studies the methods used vary substantially, especially the use of a diary versus retrospective interviews or medical records, and the use of episodes versus symptom day count.
Nevertheless the overall consultation rates of 11 percent we found corresponds with consultation rates reported in other studies.[1 2 3 4] The variation in consultation rates by various symptoms indicates that for some symptoms the GP is consulted more

often than for other symptoms; notably ear and skin problems lead to GP consultations. If we compare the morbidity spectrum parents report for their children at home with the spectrum the GP encounters in his daily practice two important differences arise: earache is an important problem in general practice, but less often reported at home and headaches are often reported at home but relatively seldomly seen by the GP. Probably parents perceive earache as a more severe problem (for fright of hearing complaints), occurring often in combination with fever. Often a child with earache has sleeping problems which is an additional burden for the parent, resulting more often in a consultation. Usually headaches last shortly and do seldomly result in sleeping problems.

As expected for more younger children episodes were reported than for older children mainly caused by colds and fever. This may be attributed to the developing immune status of the very young and the vulnerability to viral infections. However in older children more episodes occurred indicating that illness tends to cluster in children when they get older.[14] Older children suffered most from headaches and musculoskeletal problems, as trauma and contusions. The occurrence of headaches of 12% in the oldest age group we found corresponds very well with the prevalence found by Abu-Arefeh.[10] Also age of the child influences the decision to consult the GP or not. Independent of the occurrence of various symptoms younger children are taken twice as often to the GP than older children. Other studies report the same result.[15] Anxiety and inexperience of the parents in their young children may be explaining mechanisms, together with the biological fact that the severity of the illness differs by age.[16]
Overall differences in occurrence of symptoms between boys and girls were small. It is remarkable that although musculoskeletal problems occurred more often in boys, girls were more often taken to the GP in case of a musculoskeletal problem. In a GP registration study also higher incidence rates of musculoskeletal problems in girls compared to boys were reported.[17] Probably parents perceive injuries less worrying in boys than in girls.

Despite the evidence in the literature we found no relation between consultation rate and birth order.[6] Although for first borns more episodes were reported than for later borns, the difference was too small to yield any significant difference in

consultation rates. Thus we hypothesize that the relation between birth order and consultation rate as found in other studies may be explained by differences in perceived complaints. Parents are probably more sensitive to symptoms in first borns than in later borns which results in a higher occurrence.

The season specific occurrences of all kinds of symptoms makes clear that results of morbidity studies that focus on everyday illnesses are very sensitive to seasonal influences. In autumn and winter colds/flu, respiratory and ear problems occur more often than in other parts of the year, while the opposite is true for musculoskeletal, fever and skin problems.

Taking into account the demographic changes in the western populations (more ethnic minorities and one parent families with different behaviours) periodic research investigating consultation behaviour using prospective data collection methods may support health care professionals and policy makers in planning the health care system.
In conclusion we want to place emphasis on the enormous amount of everyday illness that occurs in children. Parents, mostly mothers, deal with more than 80% of all illnesses in their children outside the scope of the professional health care system. Education and advice for parents how to cope with illness in their children remains very important.

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CHAPTER 5

PARENTAL RESPONSES TO EVERYDAY SYMPTOMS IN CHILDREN

Introduction

Self-care provided in the community makes up the dominant proportion of care in response to illness.[1] Previous research demonstrated that only a relatively small proportion of symptoms leads to professional health care. In research on illness behaviour using health diaries mainly adults and elderly have been subject of study.[2-4] In this study health diaries are analysed to obtain more insight into the illness behaviour of parents.

Following Mechanic, we defined illness bahaviour as "the manner in which individuals monitor their bodies, define and interpret their symptoms, take remedial action, and utilize sources of help as well as the more formal health care system".[5] Parents, mostly mothers, perform illness behaviour in case of illness in their children: often they recognise the early stages of illnesses and make daily decisions regarding these illnesses.[6] Children vary in their sensitivity to bodily sensations ranging from extreme sensitivity and responsiveness to inattention and denial. Parents respond to this in various manners. By means of a limited number in-depth interviews some authors investigated the process of illness behaviour concerning children; they described the considerations and forms of actions undertaken by mothers for their children.[7-9] Quantitative research focusing on illness behaviour for children was mostly done in cross-sectional surveys and limited to an enumeration of treatment actions. It proved that parents dealt with 90 percent of all illnesses in their children outside the professional health care system. In more than 50 percent of all illnesses parents gave some form of medication.[10-12] We aim at describing illness behaviour in more detail.

Mostly, the outcome of illness behaviour is a treatment action. Dean distinguished between four main types of action: doing nothing, applying self-medication, applying non-medication self-treatment, and consulting a health care professional.[1] Chrisman posed a general model of helpseeking behaviour that encompassed all aspects of illness behaviour mentioned, including lay referral.[13] A comparable theoretical model was developed by Campion and Gabriel specifically for parents in case of illness in their children, including an evaluation phase,[14] which also was emphasized as an important feature of illness behaviour by various qualitative

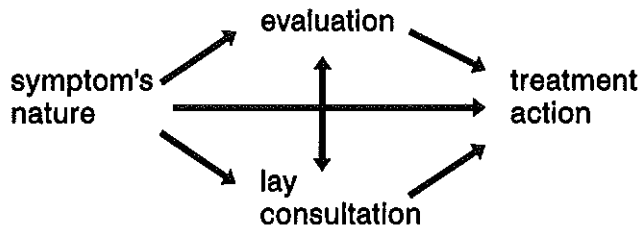

Figure 1. Hypothesized model of illness behaviour

studies.[7 8] In this study, we combined both models and developed our own hypothetical model of illness behaviour (figure 1). In this model the treatment action is likely to be influenced by the nature of the symptom, the evaluation of the symptom and by performed lay referral. Considering the influence of the nature of the symptom, various studies demonstrated that specific symptoms prompted parents to consult a health care professional[10-12]. Regarding the evaluation phase, Mechanic posed that the apparent seriousness, the degree of discomfort, the familiarity of the symptoms, and their persistence and course may influence the treatment decision.[5] About the influence of lay referral, the large amount of literature does not give univocal answers. For example, Gottlieb concluded in a review that lay consultation can either expedite or delay utilization or even both.[15] Next to the direct influences of these aspects on the treatment decision, interrelationships between these aspects could have their own influence. Dean argued that there is an interplay between symptom recogition, evaluation and treatment action.[1] It is very likely that the symptom's nature influences the evaluation and that a consultation with a lay person also affects the evaluation, as it may affect the treatment. In the proposed model the interplay is projected by the lines from symptom's nature through evaluation to treatment action, as well as the lines from symptom's nature through lay referral to treatment action. Another line illustrating this interplay is the one between lay referral and evaluation.

In this study we tested the hypothesized model of illness behaviour for parents in case of illness in their children. First, we assessed the interrelationships between the symptom's nature, evaluation and lay referral. Second, we assessed the contributions of these three factors on treatment action, accounting for possible interrelations and indirect relations.

Mechanic suggested that illness behaviour should be described rigorously and quantitatively by means of diaries,[9] in order to adjust for the diversity in responses and to assess causal processes in a larger population. Roghmann[16] and Verbrugge[17] proved that health diaries are efficient and reliable for recording a wide range of everyday health events. Sequences of treatment actions can become visible by combining forms of action on successive days. Thus, to test the hypothesized model we used diaries that were filled out by parents for their children.

Methods

Subject recruitment

We made use of health diaries collected in the Dutch National Survey of Morbidity and Interventions in General Practice. This survey was carried out in 1987 and 1988 by the Netherlands Institute of Primary Health Care.[18] For this survey a sample of 161 general practitioners (GPs) was drawn. In the Netherlands nearly all inhabitants are listed with a GP and the GP is the first responsible for the curative care for children outside the hospital. Additionally, a random sample of 100 persons per GP was drawn from his practice list, independent of consultation. This random sample of app. 16,000 persons consisted of 2561 children aged 0 to 14 years. One of the child's parents was asked to answer a structured questionnaire about their child. Parents of 2227 children participated (response rate 87%). At the end of the interview 1 parent was asked to keep a diary about the health of his child during the following 3 weeks. Parents of 1805 children (81% of interviewed) participated.

Description of the health diary

The diary was a 21 paged booklet with a simple 1 page questionnaire to be

completed each day. In case of a diary for children, parents were instructed to consider the child's health and their own considerations and behaviour in response to the child's health (for an outline of the diary see page 195). Because this 1 page questionnaire was meant for people of all ages and no specific adjustment was made for children, some questions were less relevant for children. The first question relevant for this study was whether any symptoms occurred that day in their child. If so, parents had to describe the type of symptom in their own words, with the limitation of 2 symptoms per day. We combined symptoms lasting more than 1 day concerning the same health problem into episodes of illness. We excluded episodes having a symptom reported on the first day of the registration, because these episodes could have started before the registration period. For similar reasons we excluded episodes having a symptom reported on the last day of the registration period.

Next, parents were posed 6 precoded questions with a simple yes or no answer concerning the evaluation of the symptom, viz. whether the symptom was new/-unknown, lasted longer than 1 year, irritated, gave reason for concern, was self-limiting and whether the reason of the symptom was known. The 1 page questionnaire finished with a question regarding treatment actions that parents could undertake in response to the symptom. Sixteen treatment actions were precoded and parents could tick more than 1 action.

Variable definition

The four aspects of illness behaviour described in our model are operationalised as follows.

Symptom nature. Because an illness episode could last more than one day and the symptom label could differ over various days, we defined the nature of the illness episode according to the label reported on the first day of the episode. Subsequently, we categorized all episodes into 11 groups of illnesses, namely colds/flu, other respiratory symptoms, diarrhoea, musculoskeletal problems (including injuries), headaches, tiredness, fever and other child diseases, skin problems, nausea, ear problems and a remaining group with illnesses that could not be classified.

Symptom's evaluation. All six aforementioned evaluation aspects were considered.

Because evaluations could change during an episode, we considered only the principal evaluations that were reported on the first day of the episode.

Lay consultation. in the question regarding treatment actions, two actions related to lay consultation: 'talked to others' and 'received support from family/-friends/neighbours'. We considered lay consultation to have taken place if either one or both of these actions were ticked.

Treatment action We distinguished two different decisions regarding treatment: choice of strategy of care and choice of category of self-care. First, for the choice of strategy of care, we grouped all actions ticked on all days of the episode into 4 mutually exclusive categories of care: 1. no care (doing nothing or exclusively reading on all days of an episode); 2. self-care (restricting daily activities, taking bed rest, changing eating and/or drinking habits or giving self-medication without professional care in the entire episode); 3. professional care directly (consulting the GP or another health care provider on first day of episode); and 4. professional care later in an episode (consulting the GP or another health care provider not on first day of episode). Second, for the choice of category of self-care we specified 3 categories: 1. restricted activity exclusively (all forms of self-care without medication); 2. self-medication exclusively (over-the-counter medication, previously prescribed medication or home remedies); and 3. both restricted activity and self-medication.

Statistical methods

First, to assess the interrelationship between the symptom's nature and the evaluation of the symptom and lay consultation, we applied Pearson's X^2 tests of association. Second, to assess the contributions of the symptom's nature, evaluation, and lay consultation to the choice of strategy of care and category of self-care, we performed two sets of multivariate analyses.[19] In the first set we assessed the separate direct effects of the symptom's nature, evaluation and lay consultation on both treatment decisions. In the second set, we assessed the contribution of the interrelationships and indirect effects by testing a separate multivariate model for each treatment decision including all contributions that were statistically significant in the previous analyses. The results are expressed as odds ratios with 95%-confidence intervals resulting from polychotomic logistic regression models. Statistical significance was assessed using the likelihood ratio test. In all analyses

we controlled for the child's age and gender.

Results

Parents reported symptoms on 5147 of 37905 registration days (13.6%). We combined the reported symptoms into 1504 episodes of illness and, subsequently, excluded 454 episodes with symptoms on the first and/or last day of the 21-day registration period. These 1050 episodes referred to 823 children, equally distributed over the age groups (0-4 years: 32%, 5-9 years: 34% and 10-14 years: 34%) consisting of more boys (54%) than girls (46%). For 628 children (76%) 1 illness episode was reported; 168 children (20%) had 2 episodes; 22 and 5 children had 3 and 4 episodes, respectively. The 1050 episodes contained 2434 days with symptoms. The episodes had a mean duration of 2.3 symptom days and 49% consisted of 1 day. Seventeen percent lasted longer than 3 symptom days.

Parents performed most often self-care (55%). Next in rank is no care (32%). In 13% of the episodes parents sought professional care; of which 46% (6% of all strategies) consulted the GP on the first day of the episode. In case of a consultation later in the episode, parents performed in 77% some form of self-care before they consulted the GP. In case of self-care, parents chose restricted activity most often (41%), followed by a combination of self-medication and restricted activity (31%). Self- medication only was also performed in 28% of the self-care episodes. In case of self-medication (either only or in combination with restricted activity), parents gave a previously prescribed medicine in 12% of the episodes.

Table 1 shows the occurrence and interrelation of the symptom's nature, evaluation items and lay consultation. Parents reported most often colds/flu, diarrhoea, headaches and other problems of the respiratory tract, followed by musculoskeletal problems and tiredness. Parents perceived 23% of the episodes as new, 78% as self-limiting and 69% as irritating. Eight percent of the episodes gave reason for concern. In 25% of all episodes parents called on the lay referral system.
The interrelationsip between these aspects is demonstrated by the p-values at the bottom of the table. Five of the 6 evaluation aspects were statistically significant

associated with the nature of the symptom. Parents perceived musculoskeletal problems, skin problems, nausea and fever and other child diseases more often as new. In contrast, they considered colds and respiratory symptoms less often new. Colds, diarrhoea and especially tiredness irritated less than other symptoms. Ear problems, fever and other child diseases gave most reason for concern. Except ear and skin problems, parents perceived most of the symptoms as self-limiting. Parents used more often the lay referral system in case of musculoskeletal problems, diarrhoea and nausea and less often in case of colds/flu, ear and skin problems. Musculoskeletal problems, diarrhoea and nausea were more often object

Table 1. Percentages of parents' principal evaluation of symptoms and lay consultation by symptom's nature in 1050 episodes

Principal evaluation ->	new	lasts > 1 year	irritates	concern	self-limiting	reason known	lay consultation
	(n=893)	(n=869)	(n=925)	(n=871)	(n=964)	(n=914)	(n=1050)
	% yes	% yes	% yes	% yes	% yes	% yes	% yes
Symptom's nature[a]							
Colds/flu (n=159)	8	7	60	4	82	44	13
respiratory symptoms (n=114)	12	15	68	5	72	46	25
Diarrhoea (n=150)	18	9	63	8	80	36	33
Musculoskeletal probl (n=91)	43	8	80	12	82	61	39
Headaches (n=130)	19	13	76	4	81	43	26
Tiredness (n=75)	14	6	48	0	77	61	19
Fever/child diseases (n=41)	44	0	79	16	87	50	22
Skin problems (n=37)	48	7	82	10	63	56	16
Nausea (n=37)	39	0	77	3	92	34	32
Ear problems (n=27)	21	22	88	17	52	52	15
Total (n=1050)	23	9	69	8	78	47	25
p-value*	<.001	=.103	<.001	<.001	<.001	<.001	<.001

* resulting from Pearson's X^2 test of association; a) 189 other symptoms not classified

Table 2. Odds ratios expressing the influence of principal evaluation, symptom's nature and performed lay consultation on strategies of care and forms of self-care in 1050 episodes

1. strategies of care	No Care	Self-Care		Prof Care directly		Prof Care later	
	OR	OR	95%-CI	OR	95%-CI	OR	95%-CI
New	1.0	0.7	0.5-1.1	3.4	1.6-7.1	0.6	0.3-1.3
Lasts > 1 year	1.0	1.0	0.6-1.7	0.4	0.1-1.7	0.6	0.2-1.9
Irritates	1.0	1.4	1.0-1.9	3.3	1.3-8.6	1.0	0.5-1.9
Concern	1.0	1.3	0.6-2.7	6.2	2.4-16.2	2.8	1.0-7.7
Self-limiting	1.0	0.7	0.4-1.0	0.1	0.1-0.2	0.3	0.1-0.5
Reason is known	1.0	1.0	0.7-1.4	1.6	0.8-3.2	0.3	0.2-0.6
Musculoskeletal problems	1.0	0.6	0.4-1.0	1.9	0.9-4.2	0.3	0.1-1.4
Other respiratory problems	1.0	2.0	1.2-3.3	2.0	0.8-4.8	4.4	2.1-9.1
Ear problems	1.0	0.8	0.3-2.1	5.3	1.7-16.6	2.5	0.7-9.0
Lay consultation	1.0	1.5	1.0-2.1	1.1	0.5-2.3	4.5	2.4-8.6

2. forms of self-care	Restricting activities	Self-medication		Both	
	OR	OR	95%-CI	OR	95%-CI
New	1.0	0.6	0.3-1.2	1.7	1.0-3.0
Lasts > 1 year	1.0	1.3	0.6-3.1	2.1	0.9-4.6
Irritates	1.0	1.1	0.7-1.7	1.3	0.8-2.1
Concern	1.0	0.7	0.2-2.6	1.9	0.7-4.9
Self-limiting	1.0	0.5	0.3-0.8	0.7	0.4-1.2
Reason is known	1.0	1.1	0.7-1.7	0.9	0.6-1.5
Colds/flu	1.0	4.2	2.3-7.5	3.1	1.7-5.6
Nausea	1.0	0.1	0.0-0.6	0.2	0.1-0.7
Diarrhoea	1.0	0.2	0.1-0.4	0.5	0.3-0.8
Tiredness	1.0	.1	0.0-0.3	.2	0.1-0.4
Other respiratory problems	1.0	6.6	3.3-13.3	3.4	1.7-7.1
Lay consultation	1.0	0.5	0.3-0.8	1.1	0.7-1.9

reference categories: not new, doesnot last longer than 1 year, doesnot irritate, no concern, isnot self-limiting, reason isnot known and no lay consultation

of lay consultation, whereas in case of colds/flu, skin and ear problems less often lay consultation was performed. The association between evaluation and lay consultation is not shown in the table, although there were two associations that were statistically signifcant. Compared to the 25% of all episodes in which lay consultation was performed, lay consultation was more often performed if the symptom irritated (31%) and if the symptom gave reason for concern (42%).

Table 2 shows the direct effects of the symptom's nature, evaluation and lay consultation on the treatment decisions. Regarding the choice of strategy of care, no care was more often performed in case of longer existing symptoms and if the illness was perceived as self-limiting. The symptom's nature and lay consultation were not related to no care. Self-care was more performed if the symptom irritated, although the relation is weak. Other respiratory problems were more often treated with self-care. Also in case of lay consultation, more self-care was performed.
Professional care directly was more often performed in new episodes, episodes that irritated and more pronounced in episodes that gave reason for concern. Perceived self-limiting episodes were not taken to a health care professional. Musculoskeletal, other respiratory and ear problems were more often reason to consult a health care professional immediately than other episodes. Performed lay consultation did not relate to immediately professional care seeking.
The only evaluation aspect that contributed significantly to professional care later in the episode was if parents were concerned. Again, other respiratory symptoms were more often reason to consult later in the episode. Performed lay referral contributed positively to self-care and to professional care later in the episode. Adding interaction terms of lay referral and evaluation aspects did not result in a better fit of the model.

The second part of table 2 shows the contributions of these factors to the choice of category of self-care. In case of new episodes parents applied more restricted activity in combination with self-medication. Parents treated perceived self-limiting illnesses less with medications. The other evaluation aspects did not relate statistically significant. Colds and other respiratory problems were more often treated with self-medication either or not in combination with restricted-activity. In contrast, diarrhoea, tiredness and nausea were more often reason for the parent to restrict

Table 3. Odds ratios indicating the influence of principal evaluations, lay consultation and symptom's nature on strategy of care and forms of self-care, controlled for child's age and gender (1 multivariate analysis with statistically significant bivariate factors)

1. strategies of care	No Care	Self-Care		Prof Care Directly		Prof Care Later	
	OR	OR	95%-CI	OR	95%-CI	OR	95%-CI
New	1.0	0.8	0.5-1.2	4.1	1.9-8.8	.9	.4-1.9
Irritates	1.0	1.4	1.0-2.0	2.9	1.1-7.5	.9	.5-1.8
Concern	1.0	1.4	0.6-3.0	5.9	2.2-15.6	2.8	1.0-8.4
Self-limiting	1.0	0.7	0.4-1.0	0.1	0.1-0.2	.3	.2-.6
Reason is known	1.0	1.1	0.8-1.5	1.6	0.8-3.2	.3	.2-.7
Respiratory symptoms	1.0	1.9	1.1-3.4	2.4	0.7-7.5	6.0	2.5-14.1
Musculoskeletal problems	1.0	0.6	0.3-1.0	1.7	0.6-4.7	.5	0.1-2.5
Ear problems	1.0	0.8	0.3-2.2	2.9	0.6-13.6	5.2	1.2-21.9
Lay consultation	1.0	1.8	1.2-2.6	1.4	0.6-3.1	7.4	3.7-14.6

2. forms of self-care	Restricting activities	Self-medication		Both	
	OR	OR	95%-CI	OR	95%-CI
New	1.0	0.8	0.4-1.6	1.9	1.1-3.4
Self-limiting	1.0	0.4	0.2-0.8	0.5	0.3-0.9
Colds/flu	1.0	3.2	1.6-6.6	2.5	1.2-5.1
Diarrhoea	1.0	0.2	0.1-0.5	0.4	0.2-0.8
Tiredness	1.0	0.1	0.0-0.4	0.2	0.1-0.5
Nausea	1.0	0.1	0.0-1.2	0.2	0.1-0.8
Respiratory symptoms	1.0	5.7	2.5-13.1	2.6	1.1-6.2
Lay consultation	1.0	0.5	0.3-0.9	1.3	0.8-2.1

for reference categories see previous tables

activities. In case of lay referral parents gave less medication to their child. Additionally, interaction effects between lay consultation and evaluation aspects did not contribute statistically significant.

A third analysis with one multivariate model including all statistically significant symptoms and factors did not generally result in different effects in comparison with the previous analyses (table 3). Some minor changes were for ear problems and lay consultation.

Discussion

In this study we tested a model of illness behaviour using parental responses to episodes of everyday symptoms in 823 children reported in a 3-week diary. The relations in the model were empirically demonstrated. Parents performed in almost all episodes only one form of care: most often no care or self-care (restricted activity and/or self-medication). Whether parents performed no care, self-care, or professional care was mostly influenced by the evaluation of the symptoms, whereas the nature of the symptom affected most strongly the choice of self-care category. Lay consultation influenced both the strategy of care and the choice of self-care. Adding the interrelations between symptom's nature, evaluation and lay consultation did not result in a better prediction of the treatment choices.

The distribution of strategies found in this study corresponds to results from other studies using symptom counts from either health diaries or retrospective data sources.[10-12] In about one third of all episodes no care at all was performed. In more than half of the episodes parents treated the child's illness with some form of self-care without consulting the professional health care system. One third of all episodes were treated with some self-medication. Besides over-the-counter medication and home remedies, we considered previously prescribed medication as self-medication, because in those episodes no interference of a health care professional took place. Parents decide themselves whether this prescribed medication should be given, e.g. for problems like chronic eczema or asthma attacks. Some comment should be made about the substantial use of self-medication in general. Since the

scientific proof for the effectiveness of certain over-the-counter medications and the risks of improper use of self-medication, including previously prescribed medication, has not been established, special attention of doctors and pharmacists for parent education directed at an appropriate use of self-medication is required.[20]

In one in every seven episodes parents consulted a GP. Unfortunately, the diary did not distinguish between a vis-a-vis contact with the GP and a telephonic consultation. Nevertheless, also in case of a consultation by telephone the decision to seek professional care has been made. Noteworthy is that parents exercised some form of self-care in more than half of the episodes before they consulted the GP. Cunningham-Burley demonstrated that in children consulting the GP the vast majority had done something of lay treatment.[21] These results indicate that most parents try to care for the illness in their children themselves and do not consult the GP lightly.

If we consider the contributions of the factors to the strategy of care, the hypothesized model was tested succesfully.[13] As expected, we found an interplay between the symptom type, evaluation, and lay consultation. So, we confirmed the first part of the model empirically. The contributions of these factors to various strategies resulted in clear relations. A choice between no care, self-care, and professional care (directly or later) was strongly determined by the evaluation aspects and less strongly by the symptom's nature. Perceptions like novelty, irritation and concern are important reasons to seek professional care, while in case of perceived self-limiting symptoms frequently no care is performed. Previous research showed similar relations: concern and perceived severity were triggers for parents to seek professional medical care immediately.[22 23] More familiar symptoms were dealt with routinely by some form of self-medication or keeping the child in bed.[5] Especially the relation between concern of the parents and more professional care was very strong in our results and demonstrated in many studies.[22 23 24] Considering the symptom's nature, other respiratory and ear problems resulted in more professional care (either directly or later) and other respiratory symptoms resulted also in more self-care. The explanation for these independent relations is unknown. We do not assume more serious pathology in these symptoms, because the a priori chance for serious diseases is not higher for these problems than for other. Other possible

explanations as extra irritation or concern are ruled out by the multivariate analyses.

In contrast to strategies of care, the symptom's nature contributed more clearly than the evaluations to specific forms of self-care. Regarding the symptom's nature, some underlying rationale for the parental behaviour becomes apparent. The parents' responses are similar to the symptomatic treatment the GP would have performed for specific symptoms: in case of colds, other respiratory problems and skin problems parents and GPs perform forms of medication; diarrhoea, nausea and tiredness are treated with restricting daily activities (e.g. keeping the child in bed).[25] This copying behaviour is probably influenced by protoprofessionalism,[26] by previous consultations and the role of the media. Helman described how the treatments of GPs based on the biomedical model were incorporated in the folk model of illness and actually reinforced it.[27]

Lay referral contributed to both decisions on strategy of care and form of self-care and was also associated to the symptom's nature and evaluation. Talking to other lay people resulted in more self-care and less professional care directly, but to more professional care later in the episode. These results are similar to those found by McCue Horwitz.[28] She demonstrated that the tendency to call on network members diminished an individual's propensity to seek care directly, especially for minor pediatric medical problems. Nevertheless, we should be careful in interpreting these results, since our operationalization of lay consultation was very limited. More information about the content of the advice and the relation of the lay person with the parent would be necessary to understand more about this influence.

This study used episodes of illness instead of symptom counts. The clear advantage is that various treatment actions can be analysed in a time perspective. Only a small part of the parents performed more than one form of care, indicated by 7% of the illness episodes in which the GP was consulted later in the episode. Besides, most episodes lasted shorter than four days. Also, the lack of the influence of the interrelation between symptom's nature, evaluation and lay consultation on the treatment decisions supports the view that most illness is dealt with straightforwardly. So, the hypotheses postulated by Mechanic and Chrisman that

many symptoms lead to a process of inquiry and that types and sources of treatment actions are likely to be variable are not confirmed in this study.[5 13]

Several limitations of our approach have to be discussed.
First, there is probably diversity in when parents report that they perceive a health problem in their child. In other words, the starting point of the illness episode will vary between parents.[29] Especially in responses where no care was performed one may doubt whether all these episodes were reported.
Second, only a limited number of evaluation dimensions were included in the diary. Addition of other dimensions, such as belief in health care, efficacy or expected benefit from the treatment may result in better predictions.
Third, and probably the most important one, there is the question of causality. As in other studies we assumed that the parents assessed the type and evaluation of the symptom before they chose the strategy. However, usually parents filled in the diary at one moment during the day. Especially in case of a direct professional consultation or lay referral, the reported type and evaluation are probably influenced by the outcome of the consultation.
A final limitation is that the diary was not especially designed for parents regarding their children, but for people of all ages. Consequently, some items in the diary may be misunderstood as concerning the parent instead of the child (e.g. Today my mood was ..). However, we think that the items used in this study that concerned illness symptoms and symptom specific behaviour are not subject to this misunderstanding, also because the health interview that was conducted before the interview concerned only the child as well.

In conclusion, this study demonstrates that most of everyday symptoms in childhood are dealt with within the popular health care system. Consultation of the professional health care system should be considered as the exception to the norm responses. In determining whether the professional health care system is consulted evaluation of the symptom seems to be the core factor. This finding has implications for medical practice and for health promotion activities advocating appropriate use of health care services. Attention should not only be paid to the illness of the child, but also to the concern of the parent. The type of self-care performed in the popular health care system appears rational, since parents apply similar treatments

as GPs. However, careful monitoring of and education about these self-care practices remains necessary.

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CHAPTER 6

CHANGES IN SYMPTOM EVALUATION AND PARENTAL CARE IN CASE OF ILLNESS IN CHILDREN

Introduction

In less than 10% of illnesses in children, parents decide to consult a physician.[1-4] More than 50% of the illnesses are treated with some form of self care, either self medication or restricting activities. In the remaining 30-40%, parents do nothing at all or restrict to watchfull waiting to handle illness in their children. Research based on retrospective interviews demonstrated that concern of the parents and unfamiliarity with the symptoms are important triggers to consult a physician.[5 6] Also for adults and elderly, concern and familiarity together with the level of pain and interference with daily activities are cues for consulting.[7-9]

Up to now studies into the relation between symptom evaluation and care have been based on retrospective interviews that completely neglected possible changes in symptom evaluation and performed care during an illness episode. Locker concluded from his in-depth interviews with mothers that evaluations may change during one illness episode with consequences for the succeeding forms of action.[10] Mechanic posed that illness behaviour is often considered as an isolated action instead of a subtle definitional and interactional process through which a person becomes aware of his need.[11]

Verbrugge and others argued that health diaries are uniquely suited to capture in a rigorous quantitative form many of the sequential processes that take place in illness behaviour.[12 13] However, all health diary studies carried out for children had a descriptive character. [2-4 14] Stoller has performed health diary studies on changing evaluations for the elderly.[7] For children, no attempt has been made yet to analyse health diaries with the emphasis on changing evaluations and consequences for care.

Thus, in this paper we take this dynamic view of changing evaluations and care to focus on the relations demonstrated in the retrospective interviews. Based on a three week kept health diary by parents, we assessed whether and how changes in evaluations were related to changes in care.

Methods

We made use of the health diary, collected within the framework of the Dutch National Survey of Morbidity and Interventions in General Practice. This survey was carried out in 1987 and 1988 by the Netherlands Institute of Primary Health Care.[15] From the practice population of 161 general practitioners (GPs) a random sample of 100 persons per participating GP was drawn. Among this sample of app. 16 000 persons there were 2561 children, aged 0 to 14 years. Of these children one of the parents was asked to answer a health interview and subsequently keep a diary during the next three weeks about the health of his/her child. Parents of 1805 children were willing to participate (response 70%). In the health interview the sociodemographic characteristics of the child were collected.

The diary was a 21 page booklet with a simple one page questionnaire to be completed each day. The parent was asked whether or not any health problem occurred that day in the child. If so, the parent had to describe the nature of the symptom in his/her own words, with the limitation of two health problems a day. Afterwards, we combined symptoms that were related to the same health problem and occurred within a time span of seven days into illness episodes. We excluded episodes which had a symptom day on the first day of the registration, because the moment these episodes started was unclear. For similar reasons we excluded episodes with a symptom reported on the last day of the registration period.

In the diary the question on the nature of the symptom was followed by a block of six precoded items concerning the evaluation of the symptom, viz. whether the symptom was new/unknown (novelty), lasted longer than one year (duration), irritated (irritation), gave reason to worry (concern), was selflimiting (selflimiting) and whether the reason of the symptom was known (known cause). Parents answered each item with "yes" or "no" each day they reported a symptom. A change in evaluation took place if parents changed a "yes" into a "no" or a "no" into a "yes" during an illness episode. So, for each evaluation item four sequences could be distinguished: (1) "no" during the whole episode, (2) a change from "no" to "yes", (3) a change from "yes" to "no", and (4) "yes" during the whole episode. For matters of simplicity, we considered only the first change within an episode. Since

a change in duration with a cut-off point of one year makes no sense in a three week period, we did not consider this item.

The one page questionnaire ended with a question which action was undertaken in response to the symptom. Sixteen possible actions were precoded, ranging from doing nothing, talking to others or reading about the symptoms, taking rest or restrict the daily activities, changing eating or drinking habits, applying home medication or prescribed medication, receiving help from family and friends to consulting the GP or another health care professional. More than one action per day could be ticked. We collapsed the 16 precoded actions into three types of care: (1) no care (doing nothing, reading, talking to others or receiving support), (2) self care (restricted activity, bed rest, changing eating or drinking habits, home remedies, over-the-counter medication or previously prescribed medication), (3) professional care (gp-consultation or consultation of another health care provider). These three groups of care are mutually exclusive, but may co-occur on the same day. Hence, we distinguished three kinds of changes in action or in other words three kinds of care changes:

(1) a change of no care (either from no care at all to self or professional care or from another form of care to no care);
(2) a change of self care (either from self care to no or professional care or from another form of care to self care), and
(3) a change of professional care (either from no or self care to professional care or from professional care to another form of care).

To assess whether a and which change in evaluation was related to any change in care, we performed several analyses of variance. We adjusted these ANOVAs for the length of the episode, since both evaluation and care changes occurred more often in longer episodes. Based on the percentages resulting from multiple classification analyses, we calculated first the relative risks of a change in care in episodes with a change in evaluation compared to episodes without a change in evaluation. Second, we calculated the relative risks (RR) of a change in care in the separate evaluation sequences. Finally, we investigated which evaluation sequences were related to what kind of care change. We compared percentages of no, self and professional care before and after a change in evaluation and calculated relative

risks indicating the chance of a change to that type of care after a change in evaluation.

Results

The parents of 1805 children reported illness symptoms on 5147 days. We combined these days into 1504 episodes of illness. In 454 episodes the first or last day of the registration period was involved and thus excluded. For our analysis, 1050

Table 1. Main characteristics of the research population (N=823)

	#	%
age		
0-4 yrs	260	32
5-9 yrs	282	34
10-14 yrs	281	34
gender		
boys	448	54
girls	375	46
birth order		
first borns	385	47
later borns	438	53
education of the mother[a]		
low	74	9
middle	612	75
high	127	16
socioeconomic status family[b]		
low	117	14
middle	480	58
high	224	27

a: education of the mother is based on the highest completed school level (10 missing cases); b: socioeconomic status of the family is based upon the profession of the wage earner (2 missing cases)

episodes consisting of 2671 days with symptoms were eligible. These 1050 episodes refer to 823 children; 628 children (76%) suffered from one illness episode, 168 children (20%) suffered from two episodes, for 22 children (3%) three episodes and for five children (1%) four episodes were reported during three weeks. Some characteristics of these 823 children and their parents are reported in table 1.

Table 2. Evaluation sequences and the relation with length of episode in 1050 episodes

		N	%	mean episode length in days
Novelty	no	655	73	2.9
	no → yes	36	4	7.6
	yes → no	46	5	4.7
	yes	147	18	2.1
Irritation	no	232	25	2.5
	no → yes	55	6	6.1
	yes → no	55	6	6.0
	yes	583	63	2.8
Concern	no	774	89	2.8
	no → yes	31	4	7.3
	yes → no	22	3	6.7
	yes	44	5	3.1
Selflimiting	no	178	18	2.7
	no → yes	40	4	4.8
	yes → no	64	7	7.3
	yes	686	71	2.7
Cause known	no	432	47	2.9
	no → yes	50	5	6.3
	yes → no	48	5	6.2
	yes	387	37	2.5

Parents changed evaluation items in 24% of all episodes. Table 2 shows the occurrence of the evaluation changes per item. Parents changed most often in irritation (12%). Concern showed the least changes (7%). With the exception of self-limiting, a change from yes to no occurred as often as a change from no to yes. For the self-limiting item, a change from self-limiting to not self-limiting (7%) occurred more often than the other way around (4%). As expected the length of the episode is longer in episodes with changing evaluations.

Parents changed care in 25% of the episodes (table 3). In case of one type of care, self care was most often carried out (38%), followed by no care (31%). In case of changing care, a mixture of no and self care was most frequently performed (14%). Parents consulted a health care professional in 13% of all episodes. Noteworthy is that in 71% of the episodes with professional care, other forms of care were also performed. In mixed episodes with professional care, self care is the most dominant other type of care. As expected, an increasing length of an episode is positively

Table 3. Percentage of combination of actions occurring in one episode and their mean episode length and mean number of actions performed (n=1050 episodes)

	N	%	mean length
Total	1050	100	3.1
No change in care	790	75	2.1
no care	356	34	2.2
self care	397	38	2.1
professional care	37	4	1.2
Change in care	260	25	6.0
no care and self care	161	14	5.6
no care and professional care	17	2	3.6
self care and professional care	56	5	5.7
no care, self care and professional care	26	3	11.1

related to the variety of care performed in an episode.

In 21% of the episodes without a change in evaluation a change in care took place, whereas in 37% of the episodes with a change in evaluation a change in care took

Table 4. Percentage of episodes in which care changes and relative risks of evaluation changes on any change of care adjusted for the length of the episode in 1050 episodes

					Change in Care			
Changes in interpretation		%	RR	95%-CI		%	RR	95%-CI
Novelty	no change	25	1.0		no	25	1.0	
	change	33	1.3	1.1-1.7	no → yes	44	1.8	1.3-2.5
					yes → no	26	1.0	.8-1.4
					yes	24	1.0	.8-1.1
Irritation	no change	24	1.0		no	21	1.0	
	change	37	1.5	1.3-1.9	no → yes	45	2.1	1.6-2.9
					yes → no	29	1.4	1.0-1.9
					yes	26	1.2	1.1-1.4
Concern	no change	24	1.0		no	24	1.0	
	change	48	2.0	1.5-2.6	no → yes	48	2.0	1.4-2.9
					yes → no	48	2.0	1.3-3.1
					yes	34	1.4	1.0-1.9
Selflimiting	no change	24	1.0		no	22	1.0	
	change	35	1.5	1.2-1.8	yes → no	33	1.5	1.2-1.9
					no → yes	38	1.7	1.3-2.4
					yes	31	1.4	1.2-1.7
Cause	no change	23	1.0		no	23	1.0	
known	change	38	1.7	1.3-2.0	no → yes	35	1.5	1.1-2.0
					yes → no	41	1.8	1.3-2.4
					yes	20	.9	.8-1.0

place (RR 1.8 (95%-CI 1.5-2.0)). Which change in evaluation is related to a change in care is shown in table 4. The RRs on the left part of the table show that for all separate evaluation items a change increased the risk of a change in care. A change in concern is related most strongly to a change in care (RR 2.0). The right part of the table shows which evaluation sequence relates to changes in care. For novelty, a change towards newness increased the chance on a care change, whereas a change to no novelty did not relate to any change. For the other items, changes in both directions related to care changes. The highest risks for changes in care were related to a change to more irritation (RR 2.1), a change in both directions in concern (RR 2.0) and a change to more often unknown cause (RR 1.8).

Table 5. Changes in interpretation and percentages of care performed

	P (no care)			P (self care)			P (prof care)		
	before Δ %	after Δ %	RR	before Δ %	after Δ %	RR	before Δ %	after Δ %	RR
novelty									
no → yes (n=36)	31	31	1.0	61	40	.7	8	29	3.6*
yes → no (n=44)	34	29	.9	57	53	.9	9	18	2.0
irritation									
no → yes (n=53)	53	30	.6	45	50	1.1	2	20	10*
yes → no (n=54)	33	36	1.1	48	51	1.1	19	13	.7
concern									
no → yes (n=31)	16	7	.4	71	37	.5*	13	57	4.4*
yes → no (n=22)	18	18	1.0	32	59	1.8	50	23	.5*
selflimiting									
no → yes (n=38)	29	39	1.3	55	51	.9	16	10	.6
yes → no (n=64)	44	25	.6*	52	38	.7	5	37	7.4*
cause known									
no → yes (n=48)	35	22	.6	52	56	1.1	13	22	1.7
yes → no (n=47)	30	36	1.2	64	51	.8	6	13	2.2

Δ = first change in evaluation * $p < .05$

Which changes in care are caused by which evaluation sequence is indicated in table 5. We compared the percentage of episodes with a specific form of care before the first change in evaluation with the percentage of episodes after the first change. For example, consider the episodes in which a change in concern from no to yes occurs. In 13 percent of these episodes professional care was sought before the change (in other words when parents did not worry). After the evaluation changed to more concern, parents consulted a health care professional in 57 percent of the episodes (in other words, when parents *became* more concerned). We calculated that if a change in concern from no to yes occurs, parents consulted a health care professional increased 4.4 times as much as before the change. The relative risks in the last column show that for almost all items chances on professional care increased substantially if the evaluation changes. More professional care is performed if the evaluations changes to more novelty (RR 3.6), to more irritation (RR 10.0), to more concern (RR 4.4) and to less selflimiting (RR 7.4). A change to less concern and more selflimiting is followed by less professional care (RRs .5 and .6 respectively). Complementary, chances on no care decreased if chances on professional care increased. Chances on self care decreased if an evaluation changed to more concern (RR .5). A change in known cause did not cause any specific care change.

Discussion

This is the first study that we know of that focussed on changes in symptom evaluations and their consequences for the care in a group of parents in response to illness in their children. The main conclusion is that parents change the care for their children almost twice as often in episodes where they change the evaluation of the illness compared to episodes without a changing evaluation. Consulting a health care professional is mostly affected by changes in novelty, irritation, concern and the perceived selflimiting character of the illness.

Most illness episodes are handled rather straightforward with one type of care: self care or no care at all. Our data support this in that parents changed their choice of care only in one quarter of all episodes. This is in line with other studies that

reported that almost 90% of all illness in children are treated outside the professional health care system with either self or no care.[1-4] Choices of self and no care are barely affected by the symptom evaluation. Hence, the assumption of most theoretical models that persons pass through a subtle definitional and interactional process with chronological ambiguity or various stages in case of illness behaviour seems to occur only in a minority of cases.[11 16]

Also, in 70% of the episodes in which a GP is consulted other forms of care (before or after the consultation) are also applied. Also, Cunningham-Burley showed that most parents had done something to treat the symptoms before they consulted the GP.[17] In contrast to decisions for self and no care, the decision to consult a physician is strongly affected by changes in symptom evaluation. Our results showed two important response patterns in which professional care is involved in case of changing evaluations. First, the illness is evaluated as familiar and without concern (not new, selflimiting, not irritating and not concerned) and is handled with no care or self care, but doesnot improve after some days. Parents change their evaluation towards more concern (less self-limiting, more irritating and concern) and decide to consult the GP. Especially, a change to concern leads in 57% to a consultation. Second, parents are concerned and do not recognise the illness (concern, new and not selflimiting). Often parents consult the physician immediately.[10] After some days (often with GP consultation) the illness betters and parents change their evaluation into less concern (less concern, irritation and novelty) and restrict the care to no or self care. For adults, Jones also identified these two dimensions as most important for persons in evaluating symptoms.[9] Stoller demonstrated in health diary studies among the elderly that these evaluations are important triggers for illness behaviour in general.[7] Hence, we conclude that decisions to consult a GP of parents are determined by concern and familiarity (novelty and recognising the self limiting nature). For medical practitioners, this means that if they are confronted with children (whose illnesses are mostly self limiting), they should also pay attention to the concern of the accompanying parent, since this is often the main reason why the child is in his office at that moment.[5]

This study suffers from some methodological shortcomings. First, parents did not have to indicate in the diary whether the symptom they reported was related to a symptom they reported on another day. So, we had to construct episodes of illness

afterwards and based them on arbitrary criteria. We assumed that symptoms belonged to the same illness episode if the nature of the symptoms reported on different days was alike and if the symptoms were reported within seven days, which we assumed as the mean period of healing process. In only 2% of the diaries we encountered problems in this episode construction, in which an expert panel decided on the episode construction. Since the number of problems in episode construction was that small, we do not think that our results are biased by this construction. Second, for matters of simplicity, we only considered the first evaluation change in an illness episode. Given the small number of episodes with more than one change in a specific evaluation item, we assume these extra changes would not have affected our results. Third, we combined all possible actions into three types of care. Professional and self care are commonly distinguished in illness behaviour research.[18] The combination of lay care items and no care into one type of care is rather unusual. We did not consider lay care separately, since we were interested in treatment actions involving the child. Lay care is an intermediate to such a treatment action and not a treatment in which the child is involved.[19] But because in the diary lay care was a possible treatment action, we solved this problem by combining it with no care. Fourth, the choice of the evaluation items in the diary was based on previous research into illness behaviour. Because studies investigating evaluations concentrated on decisions to consult, the evaluation items concentrated as well on this decision. Perhaps other evaluation items that were not considered in this diary affect the decisions of self and no care, for example level of interference of the symptom in the daily activities of the parent or previous experience of the parent with this symptom and care. Finally, we assumed that the symptom evaluation precedes the care applied. Theoretically, this assumption is probably true: parents first recognise and evaluate the symptom and then act. However, the diary is filled out at one moment during the day, e.g. during the evening. So, the evaluation reported that day can be influenced by the action applied on that same day. This could mean that actual fluctuations in evaluation are not reported. As we do not know how large this problem is, we have to consider the results carefully.

Regardless of these methodological shortcomings, we believe that we proved that health diaries are a valuable tool in research into illness behaviour. But at the same

time, in using health diaries one is challenged with complex data analysis that requires arbitrary choices.

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CHAPTER 7

GENERAL PRACTICE CONSULTATION IN CHILDHOOD IN THE NETHERLANDS: SOCIODEMOGRAPHIC VARIATION

Introduction

As in the UK the consultation with a GP is the point of entry into the Dutch health care system also for children. We studied sociodemographic differences in gp-consultation rates for children and questioned what the main cause is of the difference. The characteristics that are examined are age, gender, socioeconomic status, health insurance, degree of urbanisation and ethnicity.[1] The morbidity for which the gp is consulted is considered.

Methods

We used data for children 0 to 14 years of age from the Dutch National Survey of Morbidity and Interventions in General Practice, carried out by the Netherlands Institute of Primary Health Care (NIVEL) between April 1987 and March 1988.[2] A random, non-proportionally stratified sample of 161 GPs was drawn. All persons listed in the practices participating provided basic sociodemographic data. The 161 GPs (103 practices) were divided into four groups of approximately 40 GPs. Each group registered every contact between practice and patient during three months consecutively, so one whole year was covered. The registration was episode-oriented, thus more consultations concerning the same health problem are grouped into episodes of care. We only had considered episodes of which the first contact took place within the registration period for a new or relapse problem. The diagnosis considered in this study was the diagnosis made in the last contact registered of the episode. To assess the nature of the problem the episode diagnoses were grouped into clusters. The clusters of interest were acute somatic complaints, infections, chronic problems and traumas.

Results

The table shows that in bivariate analyses all factors yielded differences in consultation rates. In a multivariate analysis the association of ethnicity with consultation rate disappeared. For three out of four different diagnosis clusters the

Table. Percentages, bivariate and multivariate odds ratio's of children who consulted the gp for all episodes and by morbidity category by sociodemographic factors

		All episodes		Acute Somatic Complaints	Infections	Chronic problems	Traumas
Percentage children	32			8.6	20.9	10.1	4.3
	%	Bivar OR	Multivar OR	Multivariate Odds Ratios			
Age (ref cat: 0-4 years)	43	1.00					
5-9 years	31	.60 **	.60 **	.92 *	.55 **	.64 **	.98 ns
10-14 years	24	.42 **	.42 **	.74 **	.26 **	.73 **	1.32 **
Gender (ref cat: boys)	32	1.00					
Girls	33	1.04 *	1.04 *	1.19 **	1.03 ns	.99 ns	.81 **
Socioeconomic status (ref cat: high)	29	1.00					
Low/middle	33	1.24 **	1.15 **	1.11 *	1.22 **	1.07 ns	1.12 ns
Health insurance (ref cat: private)	28	1.00					
Sick funds	35	1.40 **	1.31 **	1.34 **	1.27 **	1.25 **	1.20 **
Urbanisation (ref cat: < 50,000)	31	1.00					
> 50,000 inhabitants	36	1.21 **	1.23 **	1.12 **	1.25 **	1.14 **	.85 *
Ethnicity (ref cat: Dutch)	32	1.00					
Non-Dutch	36	1.14 **	.99 ns	.99 ns	1.04 ns	1.00 ns	.86 ns

ns not significant; * p<.05; ** p<.01

relations showed the same direction with different magnitudes. Traumata showed deviant relations for age and degree of urbanisation.

From analyses including interaction effects, we deduced that health insurance, socioeconomic status and degree of urbanisation were linked with each other in their relation with consultation rates. If we combined these factors the percentages of children who consulted the GP at least once in three months, adjusted for age and gender, showed that the largest differences exist between on the one hand children who are insured through the sick funds and live in the larger cities (39%) and on the other hand children who are privately insured and live in the smaller cities (26%). Within these two groups children with a low socioeconomic status consulted more often than children with a high socioeconomic status.

Conclusions

Three conclusions may be drawn from this study.
Firstly, relatively large differences in consultation rates exist between different subgroups. Children who live in a large city and are insured through the sick funds do consult their GP one and a half time as often in three months than children who live outside the large cities and whose parents are privately insured. This difference has implications for the children, but also for the burden on the health care system in different areas. GPs who work in socioeconomic deprived areas in larger cities are consulted for children more often than their colleagues in socioeconomically better areas.
Secondly, if the relation between ethnicity and consultation rate is studied multivariately, the effect of ethnicity disappears. In the Netherlands allochtoneous children do consult the GP more often compared to all autochtoneous children, but not more often than autochtonics who live under the same socioeconomic and urban circumstances. The cultural differences between Dutch and autochtonic children do not affect their consumption rates.[3]
Thirdly, the subdivision into morbidity categories shows some small deviant relations. So the subdivision seems relatively unimportant, when studying medical consumption.[4]

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CHAPTER 8

FOR WHAT HEALTH PROBLEMS IN CHILDREN IS THE GP CONSULTED, AND HOW OFTEN?

Introduction

Over the past decades the number of children has decreased to 18% of the Dutch population, mainly due to the decreased birth rate and increased life expectancy. Children do not consult the GP more frequently than adults.[1] Notwithstanding, there are several reasons that justify special attention for the morbidity of children. The morbidity spectrum of children not only differs from other age groups, but differs also substantially between children of different ages.[2] Besides, living conditions change and the proportion of children belonging to an ethnic minority increases, especially in the larger cities.

Insight into health problems presented at the general practitioner (GP) can contribute to the quality of care for children, within general practice as well as in the practice of paediatrians, other specialists and doctors working in preventive health care services, such as well-baby clinics and school health services. Since 1949 studies into morbidity presented in general practice have been carried out.[4-10] Methods of these studies differed largely, mainly because of different aims and practical applications.[11 12] These studies were carried out in a limited number of practices. Also, the length of registration periods differed. Most studies included children, but did not pay specific attention to this group.

Hence, due to these differences in methodology, comparison between these studies is difficult. Detailed information of the morbidity presented to the GP of the 0-4 and 5-9-year-olds can be obtained from the Nijmegen Continuous Morbidity Registration, that also described factors influencing the morbidity and trends of the morbidity over the last 40 years.[13] These kind of data can only be derived from longitudinal research in a stable population. Inevitably, the number of participating general practices is limited.

The Netherlands Institute of Primary Health Care carried out the Dutch National Survey of Morbidity and Interventions in General Practice in 1987 and 1988. The aim was to gain insight on a national scale into the morbidity, symptoms and health problems in Dutch general practice.[14] Using these data, we addressed the following questions:

- How often do children consult the GP?
- Which health problems do these children present?
- Are the presented health problems influenced by age, gender, season, socioeconomic status and degree of urbanisation?

Methods

For the Dutch National Survey a non-proportionally stratified sample of 161 GPs was drawn from all 5826 officially registered self-employed GPs on January 1st 1985 in The Netherlands. Sociodemographic data from the practice population of all 103 participating general practices (161 GPs) were collected. A weighting procedure based on age, gender, period of registration, degree of urbanisation and region was applied to the research population to provide a representative picture of the Dutch population.[15]

For a detailed registration of the consultations, 161 GPs were divided into four groups of ca 40 GPs. Each group registered every contact between patient and practice during three months in four consecutive periods. So one whole year, between April 1st 1987 and March 31st 1988, was covered. Each contact was registered on a specially designed registration form, containing among others general contact characteristics, symptoms as expressed by the patient and (provisional) diagnoses made by the GP. The GP wrote down the symptoms and (provisional) diagnosis literally and subsequently well trained coders coded the symptoms and diagnosis according to the International Classification of Primary Care (ICPC).[16]

The Dutch National Survey was an episode-oriented registration to estimate incidence rates accurately. One episode could contain more contacts. For the description of the morbidity the diagnosis made in the last registered consultation of the episode was used.

For a general overview we grouped the diagnoses into ICPC-categories. In this paper the most frequent occurring diagnoses of each of the six largest ICPC-categories are described in detail. All numbers concern weighted numbers. Age specific incidence rates are computed as the number of new and relapse episodes divided by the number of person years. The influence of gender, season, socioeconomic status and degree of urbanisation on the morbidity presented are expressed as relative risks (RRs) with for each factor the least frequent occurring category as reference category. RRs were calculated by dividing the incidence rates. Socioeconomic status of the child was based on the occupation of the wage earner and grouped into three classes: low, middle, high. The degree of urbanisation of the location of the general practice was determined by the number of inhabitants and

grouped into three categories: less than 30,000 inhabitants, 30,000-50,000 inhabitants and more than 50,000 inhabitants.

Results

The weighted research population consisted of 63,746 children aged 0 to 14 years. These children had 44,634 contacts, concerning 29,834 episodes for a new or relapse health problem. The mean number of consultations per child was 2.8 per year. Figure 1 shows the variation by age and differences between boys and girls. Zero-year-olds had the most consultations (mean 3.8 per year). With increasing age, the number of consultations decreased until the eleventh year of life (mean 1.5 per year). Subsequently, for girls the mean number of consultations increased until 2.1 per year.

A general outlook of the presented morbidity by ICPC-category is given in table 1.

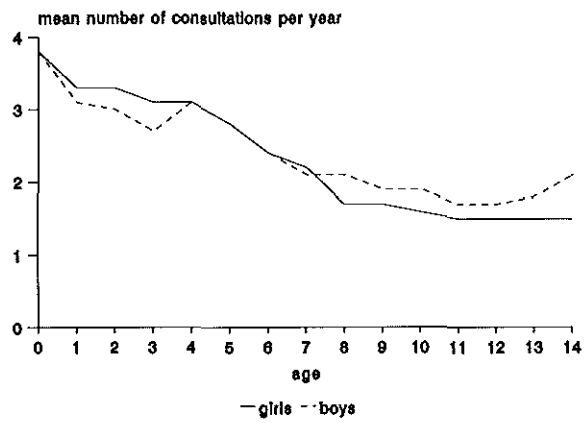


Figure 1. Mean number of consultations per year by age and gender

Table 1. Morbidity of children in general practice during three months by ICPC-category

ICPC-category	#	per 1000 children
A General and unspecified	4923	77,2
B Blood and blood-forming organs	511	8,0
D Digestive	3428	53,8
F Eye	1420	22,3
H Ear	3590	56,3
K Circulatory	144	2,3
L Musculoskeletal	2927	45,9
N Neurological	573	9,0
P Psychological	699	11,0
R Respiratory	11145	174,8
S Skin	6506	102,1
T Endocrine, metabolic and nutritional	430	6,7
U Urological	520	8,2
W Pregnancy, child-bearing, family planning	46	0,7
X Female genital (including breast)	221	3,5
Y Male genital	288	4,5
Z Social problems	187	2,9
no diagnosis reported	98	
Total	37,656	

Table 2 shows the ten most frequent occurring incident diagnoses. These ten diagnoses account for almost half (43%) of all morbidity presented. Figure 2 shows the age specific distribution of the six most frequent occurring disease categories. Health problems in the categories A (general and unspecified) and R (respiratory) occurred most frequently until the age of four, after which their occurrence decreased rapidly. Musculoskeletal problems showed an opposite pattern: an

Table 2. The 10 most frequent new diagnoses in children in general practice by ICPC code

		#	per 1000 children
R74	Upper respiratory tract infection	3912	61,4
H71	Acute otitis media	1884	29,6
R78	Acute bronchitis/bronchiolitis	1267	19,9
A77	Other viral diseases	1002	15,7
R05	Cough	872	13,7
R76	Acute tonsillitis	825	12,9
A97	No disease	810	12,7
S03.1	Warts	767	12,0
D74	Other presumed digestive infections	727	11,4
D73	Worms, pinworms, other parasites	645	10,1

increase in occurrence with increasing age.
Table 3 shows the RRs for the factors considered. Girls presented somewhat more

Figure 2. Morbidity presented in general practice by age group for the six most occurring ICPC-categories

Table 3. Relative risks of the morbidty presented by sociodemographic factors (95% confidence intervals between brackets)

	total	general (A)	digestive (D)	ear (H)	musculoske- letal (L)	respira- tory (R)	skin (S)
gender							
boys	1,00	1,00	1,00	1,00	1,00	1,00	1,00
girls	1,03	1,04	1,08	1,07	1,12	0,96	1,01
	(1,00;1,05)	(0,98;1,10)	(1,01;1,15)	(1,00;1,14)	(1,04;1,20)	(0,92;1,00)	(0,96;1,06)
season							
Jan-March	1,31	1,43	1.44	1.64	1.32	1.43	0.92
	(1,27;1,35)	(1,32;1,55)	(1,31;1,59)	(1,49;1,81)	(1,19;1,47)	(1,35;1,51)	(0,86;0,99)
Apr-June	1,23	1,39	1,33	1,29	1,34	1,25	1,03
	(1,19;1,27)	(1,28;1,51)	(1,21;1,47)	(1,17;1,43)	(1,21;1,49)	(1,18;1,33)	(0,96;1,11)
July-Sept	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Oct-Dec	1,28	1,20	1,13	1,42	1,11	1,81	0,86
	(1,24;1,32)	(1,10;1,31)	(1,02;1,25)	(1,29;1,57)	(1,00;1,24)	(1,71;1,91)	(0,80;0,92)
socioeconomic status							
low	1,17	0,98	1,12	0,93	1,20	1,36	1,06
	(1,13;1,21)	(0,90;1,07)	(1,01;1,25)	(0,84;1,03)	(1,07;1,35)	(1,28;1,44)	(0,98;1,15)
middle	1,17	1,07	1,17	1,08	1,17	1,23	1,13
	(1,14;1,20)	(1,00;1,15)	(1,08;1,27)	(1,00;1,17)	(1,07;1,28)	(1,17;1,29)	(1,06;1,20)
high	1,00	1,00	1,00	1,00	1,00	1,00	1,00
degree of urbanisation							
< 30 000	1,00	1,00	1,00	1,00	1,00	1,00	1,00
30-50 000	1,01	1,02	1,04	1,14	1,14	1,00	0,93
	(0,99;1,03)	(0,95;1,09)	(0,96;1,13)	(1,05;1,24)	(1,05;1,24)	(0,96;1,05)	(0,88;0,99)
> 50 000	1,14	1,06	1,06	1,36	1,04	1,33	0,96
	(1,11;1,17)	(0,99;1,14)	(0,97;1,15)	(1,25;1,48)	(0,95;1,14)	(1,27;1,39)	(0,92;1,01)

problems than boys. Regarding seasonal effects, in July until September (the reference category) the smallest number of problems were presented. The highest

RR concerned respiratory problems in the period October until December. Lower socioeconomic groups presented more problems to the GP than higher socioeconomic groups. The largest difference was found for respiratory problems. Considering the degree of urbanisation, in larger cities with more than 50,000 inhabitants the GP was more often confronted with problems, especially with respiratory and ear problems. Skin problems were more often presented in cities with less than 30,000 inhabitants.
From each of these six ICPC-categories we selected the most frequently occurring diagnoses. For the ICPC-category musculoskeletal problems, sprains and strains of the wrist, hand or fingers had the highest incidence. Also, other sprains and strains occurred frequently. Hence, we decided to present figures of sprains and strains injuries together (ICPC-codes L77-L79.9). Figure 3 shows the age-specific incidence rates of all six selected diagnoses. The course of the incidence rates demonstrates a different pattern for each of the diagnoses.

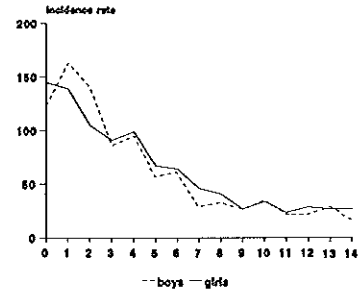
Discussion

In this paper an overview of the consult frequency and morbidity presented to the GP of children is given. A more extensive overview is available.[15] The mean consult frequency of 2.8 consultations per child per year and the age variation that this study demonstrated corresponds with figures found in other morbidity studies in general practice.[10 13]

It appeared that the GP was confronted with a large diversity of health problems, although a few diagnoses accounted for the largest part of all morbidity. Respiratory problems occurred most frequently. Four diagnoses of the ICPC-category 'respiratory problems' were among the ten most frequent diagnoses made by the GP: upper respiratory tract infection, acute bronchitis, cough and acute tonsillitis.

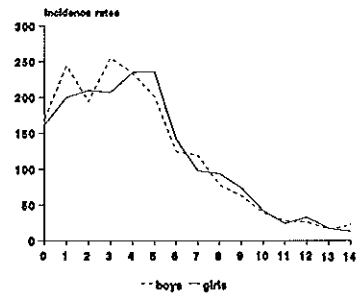
Age was an important factor affecting the number of consultations: young children consulted the GP most often. Infections of ear, nose and throat and of the respiratory tract were often reasons for consultations of this age group, as is also demonstrated by the age specific incidence rates of viral infections, acute otitis media and-

a. Other viral diseases, NOS (A77)

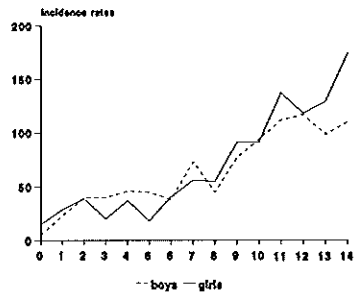


b. Worms,pinworms,other parasites (D73)

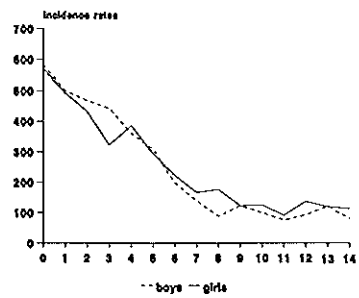
c. Acute otitis media (H71)



d. Sprains,strains (L77-79.9)



e. Upper respiratory tract infection (R74)



f. Warts (S03.1)

Figure 3. Age and gender specific incidence rates of six frequent occurring diagnoses

upper respiratory tract infections. Young children acquire immunity for common diseases during their first years of life. Besides that, insecurity of parents plays probably also a role in consulting behaviour: their lack of experience for judging the seriousness of the disease prompts their decision to consult. However, symptoms in young children are often unspecified, which makes them difficult to interpret for parents.

Not all diseases occurred most frequently in younger children: musculoskeletal problems showed an increase with age, especially caused by the higher occurrence of trauma in older children. In general, many diseases have their own age specific occurrence pattern. Consequently, secondary care providers are confronted with age specific referral rates: young children are mostly referred to the paediatrician and the ENT-specialist, whereas older children are more often referred to the surgeon.[13]

Differences between boys and girls were small. Even so, we observed an age specific gender variation in consultation rates in childhood: boys consulted more often than girls in the young ages and girls consulted more often than boys in the older ages. The most remarkable difference was for musculoskeletal problems. Partly due to the number consultation for trauma, we expected more consultations for boys. On the contrary, girls consulted the GP 1.12 times as often for musculoskeletal problems than boys (table 3). Apparently, girls are more vulnerable regarding the musculoskeletal system.[18]

We were not surprised by the seasonal variation, which corresponded with previous studies.[9] The occurrence in general practice of respiratory and ear problems was mostly affected by the season. They occurred most frequently in autumn and winter. The specific diagnosis with the highest RR was acute otitis media, that occurred 2.28 times as often in winter than in summer.

The influence of socioeconomic status and degree of urbanisation on the morbidity presented was most obvious for respiratory tract problems. Children from lower socioeconomic strata and children living in larger cities confronted the GP more often with respiratory tract problems than other children. Factors such as lifestyle, living and housing conditions, and knowledge regarding health problems may

probably explain partly these differences in morbidity presented.[19] These differences offer opportunities for preventive interventions. However, it appears that seasonal variation caused larger differences in RRs than socioeconomic status and degree of urbanisation, which indicates the limitations of these kind of interventions.

With data of the Dutch National Survey many questions can be answered. Nonetheless, this survey has its limitations. Incidence rates concern only morbidity presented to the GP. Due to the relatively short registration period of three months, incidence rates of chronic health problems may be underestimated.
Another disadvantage of this survey is that no strict diagnostic criteria were used to diagnose problems.[20] This could be a problem for precise estimations of incidence of more rare diseases. However, it does resemble the daily work in general practice, in which often a provisional diagnosis or diagnosis based on symptoms is made.

In conclusion, children under the age of 15 confront the GP with a great diversity of health problems. Variation in different ages of consult frequency and morbidity presented makes clear that for an optimal understanding of children in general practice more detailed data is necessary than usually reported. The understanding enlarges if factors such as season, socioeconomic status and degree of urbanisation are also taken into account.

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CHAPTER 9

INFLUENCE OF PARENTAL SOCIOECONOMIC STATUS INDICATORS ON CHILDREN'S GP CONSULTATION IN THE NETHERLANDS

Introduction

In general, in The Netherlands children from lower socioeconomic strata have higher medical utilization rates than children from higher socioeconomic strata.[1-3] A problem in the assessment of the influence of socioeconomic status (SES) of children is the choice of the indicator. Because different indicators of SES refer to separate dimensions, it is important for the explanation of differences to know the contribution of different indicators on medical utilization rates. Knowledge about the different contribution of various SES indicators (and dimensions) may affect health promotion interventions and future research decisions.

Frequently used indicators are the educational level of father or mother, occupational level of the wage earner and income of family or either parent, but these are seldomly used simultaneously in one study.[1-7] Occupational level of the mother is rarely used as an indicator. These studies showed that the influence of both indicators of the father are more or less similar: lower levels are related to more utilization. For the maternal educational level, the results are ambiguous. American studies showed that more education was related to more primary care use,[4 5] whereas British studies showed the opposite relation: higher educational levels were related to less use.[6] For The Netherlands, van der Lucht investigated the relation between health of children aged 10-11 and all four SES indicators in one multivariate model.[7] He showed that paternal indicators were more strongly correlated to several health parameters than maternal indicators.

However, SES is not a unidimensional concept. Hence, specific SES indicators probably refer to separate dimensions. It is assumed that education refers more to a coping and knowledge dimension, whereas income refers to a more financial-materialistic dimension.[8] Occupation refers to the "status"-component, that is the place in social hierarchy. So, although empirical relations of different indicators might be similar, different explaining mechanism are probably affecting the relations simultaneously.

A second problem in investigating the relation between socioeconomic status and GP consultation rates for children is that during childhood morbidity and consulta-

tion patterns may change. Young children have more and different morbidity and accordingly their parents may consult the general practitioner (GP) more often than for older children with a modifying effect of gender: until about the age of seven, boys have more problems than girls, after this age girls have more problems.[9] Also, van den Bosch demonstrated that the specific role of father and mother with respect to GP consultation probably changes with increasing age of the child and is different for boys and girls.[10] Whether age and sex of the child have a modifying effect on GP consultation rates has never been investigated, as far as we know, and is looked upon in this study.

To determine the impact of various parental socioeconomic indicators on their children's GP consultation rates in different age- and gender groups a large study population is necessary. In 1987 and 1988 the Dutch National Survey in General Practice was carried out, which resulted in a database with several socioeconomic indicators of father and mother known and GP consultation rates of more than 36,000 children.[11] The organisation of the Dutch health care system is such that everybody (also children) is listed with one GP and that a consultation with this GP is the obligatory point of entry to medical care. This organisation and the National Survey enabled us to assess the GP consultation rates for whole practice populations.

Given the lack of studies containing all relevant socioeconomic indicators, our aim was to assess the contributions of several parental socioeconomic indicators for the children's GP utilization in The Netherlands and whether the relationships found were constant for various age and gender groups.

Methods

We used data of children aged 0-14 years from the Dutch National Survey of Morbidity and Interventions in General Practice.[11] For this survey a randomly non-proportionally stratified sample of 161 GPs was drawn from the Dutch GP-population. The 161 GPs (103 practices) were divided into four groups of approximately 40 each. Each group registered every contact between practice and patient during

three consecutive months in 1987 and 1988, such that one whole year was covered. All persons listed in the participating practices provided basic sociodemographic data.

We calculated consult frequency as the number of consultations with a GP in three months. We grouped the children according to their number of consultations into four categories: 0 consultations, 1 consultation, 2 to 4 consultations, and five or more consultations. As indicators of socioeconomic status, the educational level and the occupation of both father and mother were collected on specially designed family registration forms. The educational level was classified into three groups based on the highest completed school level: low (no or primary school), medium (secondary school) and high (higher vocational and university). For the occupational level the profession actual performed of father and mother were collected in detail. In case of retirement, unemployment or disabled, the last performed profession was considered. The literally written down professions were afterwards coded according to the EGP code (ten categories).[12] We classified them into three socioeconomic groups: non manual (EGP categories 1,2 and 3); manual (EGP categories 7,8,9 and 10); self-employed (EGP categories 4, 5 and 6). A dummy category was added for unknown occupations. All fathers and mothers that indicated that they were 'househusband' or 'housewife' were categorized in a separate group, regardless of a reported profession. This enabled us to distinguish between working and non-working fathers and mothers.

The number of children in the whole study was 63,756. Due to problems linking data of the children with data of their parents, for a large number of these children no indicators of the father and mother were known. These linking problems were caused by the use of individual registration forms to collect sociodemographic data in several practices which hindered the linking, whereas in other practices family registration forms were used which facilitated the linking. For this analysis, we selected only those 36,274 children who could be linked to their parents and for whom at least the educational indicators of both father and mother were registered. Also, we restricted the analyses to children from two-parent families.

We assessed the relations between the parental SES indicators and the child's

medical utilization rate adjusted for age and gender using polychotomic logistic regression with for all indicators the highest level as reference category. Since the various SES indicators may refer to the same underlying concepts, we checked for the problem of collinearity, which is supposed to exist by a $\rho > .9$.[13] First, we assessed the contribution of each indicator adjusted for the child's age and gender. Second, we assessed the independent contribution of each indicator adjusted for the child's age, gender *and the other parental SES indicators*. The effect is expressed as odds ratios with 95% confidence intervals. The odds ratios indicate the chance that the GP is consulted for e.g. more than four consultations by parents of the lower level compared to parents of the highest level. Statistical significance was assessed using the likelihood-ratio test. To detect a possible modifying effect of gender and age and their interaction, we performed separate analyses for boys and girls, for two age groups (0-4 and 5-14 years) and in four age-gender groups (boys 0-4 years, girls 0-4 years, boys 5-14 years, girls 5-14 years).

Results

Table 1 shows that the study population (N=36,274) was equally distributed over the age and gender groups. As expected, young children had more consultations than older children. More specific, young boys had higher consultation rates than young girls, while older boys had lower consultation rates than older girls. The standard deviations indicate that consultation rates in the younger age groups show more variation than in older age groups. The relation between the socioeconomic indicators and consultation rates adjusted for the child's age and gender is consistent and statistically significant for all indicators: higher levels yielded lower consultation rates. For the occupational indicators, the self-employed did not fit in the linear trend. For the 'housewifes', the mean consultation rate of .74 was within the range of consultation rates of the working mothers. Since the categories 'househusband' for fathers and 'self employed' for mothers is very small, we excluded these groups in the further analyses. The group 'unknown' for father's occupation consisted for 74% of not filled out the question (partial non-response), in 8% the occupation was not classifiable according to our scheme and in 18% fathers indicated that they were jobless or disabled. These numbers are for the mothers 89%, 6% and 5% respectively.

Table 1. Distribution and consultation rates of all children studied by age, gender and socioeconomic indicators of both parents (N=36,274)

			Population		Consultation Rates	
			N	%	mean	SD
Total population			36274	100	.74	1.4
Age and gender	0-4 years	boys	6202	17	1.05	1.7
		girls	5810	16	.99	1.7
	5-14 years	boys	12374	34	.58	1.2
		girls	11888	33	.63	1.3
Socioeconomic Indicators						
Educational level father*						
	high		6878	19	.59	1.2
	medium		24245	67	.77	1.5
	low		5151	14	.82	1.6
Educational level mother*						
	high		3320	9	.61	1.2
	medium		27637	76	.75	1.4
	low		5317	15	.78	1.5
Occupational level father*						
	nonmanual		15713	43	.66	1.3
	manual		16683	46	.83	1.5
	self employed		2125	6	.64	1.3
	househusband		55	.2	$	$
	unknown		1698	5	.84	1.6
Occupational level mother*						
	nonmanual		18515	51	.71	1.4
	manual		8851	24	.85	1.6
	self-employed		344	1	.69	1.3
	housewife		6361	18	.74	1.5
	unknown		2203	6	.67	1.3

* F-test (anova, adjusted for age and gender): $p < .01$ $: numbers too small to calculate

The correlation coefficients between the SES indicators ranged from .29 to .54 (not in table). Hence, we establish that the problem of collinearity was not present.

Table 2 shows the odds ratios for each SES indicator separately, adjusted for age and gender only and the odds ratios for the SES indicators also adjusted for the other SES-indicators. For the group with one consultation, all SES indicators indicated the same strength. For the groups with 2-4 consultations and more than 4 consultations the odds ratios of the educational indicators (1.4-2.9) are larger than the odds ratios of the occupational indicators (1.3-1.9) in the unadjusted analyses. This difference increased with more consultations. Remarkably, there are no differences between the indicators of both parents: the educational level of father is as strongly related as the educational level of the mother, which is also the case for the occupational levels as far as the comparison is between non-manual and manual. As seen also in table 1, the self employed group fathers are not different from the group non-manual. The group 'housewife' had higher odds ratios than the non-manual working mothers, but lower odds ratios than the manual working mothers. The children for which the maternal occupational level was unknown showed only in the group more than four consultations significantly more consultations than the non-manual working mothers.

The results of the adjusted analysis, including all educational and occupational indicators at once, showed that all odds ratios dropped compared to the previous analyses. The educational level of the father had a strong and substantial relation with the consult frequency. All other odds ratios dropped to values between 1.1 and 1.3, with the exception of a low occupational level of the mother which was strongly related to children with more than four consultations (OR 1.6). Due to the large study population, some other relatively low odds ratios reached statistical significance as well. They indicated the same trend of lower levels of socioeconomic status having more consultations.

A possible modifying effect of age and gender is shown in table 3. The educational level of the father still had the strongest relation with the number of consultations, though this relation was more pronounced in girls than in boys. Additionally, an effect of the educational level of the mother became apparent for boys, in case of

Table 2. Odds ratios controlled for the child's age and gender of socioeconomic indicators for consult frequency in three months. 1. Unadjusted for the other socioeconomic indicators and 2. adjusted for the other socioeconomic indicators

	1 consultation (N=7331)			2-4 consultations (N=5274)			> 4 consultations (N=892)		
socioeconomic indicators	unadj OR	adj OR	95%-CI	unadj OR	adj OR	95%-CI	unadj OR	adj OR	95%-CI
educational level father									
high	1.0	1.0		1.0	1.0		1.0	1.0	
medium	1.2	1.1	1.0-1.2	1.4	1.3	1.2-1.4	1.9	1.5	1.1-1.9
low	1.3	1.1	1.0-1.2	1.7	1.4	1.2-1.6	2.9	2.0	1.5-2.8
educational level mother									
high	1.0	1.0		1.0	1.0		1.0	1.0	
medium	1.2	1.1	1.0-1.2	1.4	1.1	1.0-1.3	2.1	1.3	1.0-1.8
low	1.3	1.1	.9-1.2	1.7	1.2	1.1-1.4	2.7	1.2	.8-1.8
occupational level father									
non-manual	1.0	1.0		1.0	1.0		1.0	1.0	
manual	1.3	1.2	1.1-1.3	1.3	1.1	1.1-1.2	1.6	1.2	1.0-1.4
self-employed	.9	.8	.7-1.0	.9	.8	.7-.9	1.2	.9	.7-1.3
unknown	1.1	1.1	.9-1.2	1.1	1.0	.9-1.2	1.7	1.3	1.0-1.9
occupational level mother									
non-manual	1.0	1.0		1.0	1.0		1.0	1.0	
manual	1.2	1.1	1.0-1.2	1.3	1.1	1.0-1.2	2.0	1.6	1.4-1.9
housewife	1.0	1.0	.9-1.1	1.1	1.0	.9-1.1	1.4	1.1	.9-1.4
unknown	1.0	1.0	.9-1.1	1.0	.9	.8-1.0	1.4	1.1	.8-1.5

the most frequent attenders, but not for girls. For the occupational levels, the relations did not change.

For young children (0-4 years) the effect of the educational level of the father was stronger than for older children. In contrast to the full group analysis, an effect of the maternal educational level became apparent: in young children a lower maternal

Table 3. Odds ratios with 95%-confidence intervals of socioeconomic indicators for consult frequency in three months separately for girls and for boys, adjusted for the child's age and separately for children under the age of 5 and between 5 and 14 years of age, adjusted for the child's gender

	1 consultation				2-4 consultations				> 4 consultations			
	♂	♀	0-4	5-14	♂	♀	0-4	5-14	♂	♀	0-4	5-14
numbers	3743	3588	2755	4576	2668	2606	2378	2896	454	438	486	406
	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR
educational level father												
high	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
medium	1.1	1.1	1.2	1.1	*1.3*	*1.3*	*1.4*	*1.2*	1.1	*2.0*	*1.7*	1.3
low	1.1	1.1	1.0	1.1	*1.4*	*1.3*	*1.4*	*1.3*	*1.7*	*2.5*	*2.4*	1.6
educational level mother												
high	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
medium	1.1	1.0	1.1	1.0	1.1	1.2	1.1	1.1	1.6	1.1	1.6	1.0
low	1.1	1.0	1.2	1.0	1.2	*1.3*	1.3	1.2	1.6	.9	1.6	.9
occupational level father												
non-manual	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
manual	*1.2*	*1.2*	1.1	*1.2*	1.1	*1.2*	1.1	1.1	1.1	1.2	1.1	1.3
self-employed	.8	.9	1.0	.8	.8	.8	.7	.8	.9	1.1	1.0	1.0
unknown	1.2	1.1	*1.3*	1.2	1.2	1.1	1.2	1.1	1.5	1.4	1.4	1.4
occupational level mother												
non-manual	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
manual	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	*1.6*	*1.7*	*1.7*	*1.5*
housewife	.9	1.1	1.0	1.0	1.0	1.0	.9	1.0	1.2	1.1	1.2	1.2
unknown	.9	1.0	.9	1.0	.8	.9	1.0	.8	1.0	1.2	1.2	1.0

odds ratios that are statistically significant are printed in italics

educational level is related to more consultations. The effects of the occupational levels remained constant over the various age groups.

Additional analyses that investigated a possible modifying effect of the interaction between age and gender on the relation of socioeconomic indictors with consult frequency yielded no extra relations.

Discussion

This study compared the contributions of maternal and paternal educational and occupational indicators on medical utilization for children in a very large sample. The bivariate analyses showed that educational indicators are stronger than occupational indicators, with no distinction between paternal or maternal indicators. The multivariate analysis showed that the educational level of the father is the strongest explanatory SES indicator for variations in medical consumption of children aged 0 to 14 years. Additionally, we demonstrated a modifying effect of the child's age and gender.

In the Dutch socioeconomic status literature on adults' health and utilization, it is recommended to use the educational indicator for SES.[8] Since in our data the effect of the occupational indicators (which was already smaller in the bivariate analyses) diminished almost completely in the multivariate analyses, this study supports the superiority of the educational indicators over the occupational indicators in case of children's medical utilization. These results are completely in line with the findings of van der Lucht concerning the child's health status.[7] This superiority of education may be caused by an artefact, in that occupation is more difficult to classify into socioeconomic categories than education. However, occupation was asked literally and treated according to international codes. So, we assume that this measurement aspect may only explain part of the differences. Traditionally, educational indicators are linked to explanations concerning life style, and knowledge, and coping aspects. So, following this line of thought our results indicate that parental behavioural differences are probably important explaining mechanisms for utilization differences of children. This explanation is supported by various health promotion experiments in Sweden and Denmark that reached substantial utilization reductions through the supply of information booklets about illness in children.[14 15]

A second obvious result found is that the difference between the socioeconomic groups enlarged when the number of consultations increased. As Van der Meer showed for adults in The Netherlands and several American studies showed for children,[4 16 17] a worse health status is an important cause of higher consultation rates. Unfortunately, we have no data on the morbidity experienced at home or health status of these children, so we cannot investigate to what extent health status (higher need) and behavioural aspects (in case of morbidity more utilization in lower educational groups) explain these enlarging differences with increasing number of consultations. Nevertheless, we conclude from these data that there is a larger need for more health services in lower educated groups.

Also, our results demonstrated that lower maternal educational levels of the mother were related to more utilization. This is in line with results from the UK[6] and contrasts with results from the USA[4 5]. This deviant pattern between the European and American continent can be explained from the organisation of the health care and insurance system. In The Netherlands almost everybody is insured for health care, either obligatory or voluntarily, which guarantees, as in the UK, no financial barrier if professional care is sought. In the USA there is a financial barrier to health care for every socioeconomic group, except for certain specific insurance plans. Additionally, our results did not demonstrate an extra effect of maternal educational level, next to paternal education; a relation other investigators claimed to exist.[18 19] Probably, these other investigators based their speculations on studies not adjusting for *all* other indicators. More empirical data is necessary to assess whether this absence of the specific role of maternal education is consistent.

Another relevant result is that the working status of the mother yielded no different utilization pattern in the Netherlands. Assuming that the category housewifes contained potentially women of both working groups, the in-between-position of their odds ratios supports this statement. This contradicts results from the USA that demonstrated that working mothers used more health care services than non-working mothers.[18] An explanations for this difference might be the different composition of the groups. In the Netherlands a very large group of mothers (over 50%) does not have paid jobs, while in other countries more women have paid jobs. Probably, the Dutch non-working group is more heterogeneous with respect to

socioeconomic status than non-working groups in other countries.

The second question was whether age and gender of the child modified the effects. For children under the age of four, a lower educational level of the mother was obvious related to a higher consult frequency, while for older children the relation disappeared (as for the whole group). A first explanation may be a change in role of the mother for her children with increasing age of the children.[19] For younger children the caring role of the mother, and hence *her* influence on consult frequency, is very important. Whereas in older children the importance of this caring role decreases and the influence of other socioeconomic indicators increases, in our case the educational level of the father. A second explanation may be that illness symptoms in young children are more aspecific compared to symptoms in older children. Since lower educated mothers have probably less understanding and knowledge about children's health (and perhaps less ability to use reference books or absorb information from magazines), the more difficult interpretation of these aspecific symptoms makes them probably more insecure than higher educated mothers.[6] Because insecurity is the most important reason to seek medical care for children, lower educated mothers utilize more health care services.[20] Next to this age effect, we were suprised to find also a modifying effect of gender. In general, it is well known that young boys have more morbidity than young girls and that with increasing age the gender component inverts. Our bivariate results confirmed this pattern. However, for the socioeconomic indicators a remarkable effect of gender yielded. For boys the educational level of the mother and for girls the educational level of the father showed the largest effects in the most frequent attender groups. This phenomenon has not been previously described and the explanation for this gender-specific interaction is unknown.

Two other important sociodemographic indicators should be mentioned in this respect. In our study, we restricted ourselves to two-parent families. The effect of socioeconomic status in one-parent families on the child's health and utilization needs specific attention.[21] Similarly, the effect of socioeconomic status in families with various ethnic origins is likely to differ caused by classification and cultural differences, but remained outside the scope of this study.

We conclude that the educational levels of the parents, with most pronounced the educational level of the father, are more important than parental occupational indicators in explaining medical utilization differences for their children. Consequently, health promotion activities directed at increasing knowledge in these lower socioeconomic groups could be useful in reducing utilization rates. However, more studies on utilization of children including various measures of health status are necessary to determine the contribution of need and behavioural causes to differences between socioeconomic groups. Additionally, the age and gender of the children have clear modifying effects which cause interesting theoretical speculations.

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CHAPTER 10

GENERAL PRACTICE CONSULTATION OF CHILDREN FROM ETHNIC MINORITIES

Introduction

In the Dutch population the number of children from ethnic minorities has increased rapidly during the past decades. In 1993 11.5% of all newborn children had a father or mother from an ethnic minority.[1,2] The limited number of studies regarding helpseeking behaviour of ethnic minorities, children and adults, offer ambiguous results. People from ethnic minorities would consult the general practitioner (GP) more often, but the extent varied.[3-6] Additionally, the design of the studies differs, especially with respect to adjustment for socioeconomic status, despite the fact that this is an important confounder. Specific disorders that occur more often in children from ethnic minorities are (iron deficiency) anemia and nutritional deficiencies.[5,7] In general, children from ethnic minorities would present more respiratory and digestive symptoms and less ear symptoms.[3,6]

In a study carried out in the spring of 1994 in the largest cities (Amsterdam, Rotterdam and The Hague), ethnic minorities are identified as a patient group that increases the workload of GPs.[8] Ethnic minorities would more often consult the GP outside normal office hours. A GP in a socially diasadvantaged neighbourhood is confronted with a language or communication problem once every ten consultations, which hinders history taking and the understanding of advice. Consequently, the length of consultations is affected.

The aim of this study is to investigate whether helpseeking behaviour of children from ethnic minority groups differs from sociodemographically similar Dutch children.

Methods

We used data of the Dutch National Survey of Morbidity and Interventions carried out by the Netherlands Institute for Primary Health Care in 1987 and 1988.[9] The study population with basic sociodemographic characteristics of the 103 participating general practices was listed.

Four groups of 40 GPs (of the 103 practices) registered every contact during three months consecutively on a specially designed registration form. Among other characteristics that were recorded were general contact data (weekday or weekend,

time of day, length and type of the consultation), symptoms as expressed by the patient and (provisional) diagnosis made by the GP. The GP wrote down the symptoms (with a maximum of three symptoms per diagnosis) and (provisional) diagnosis literally and subsequently well trained coders coded the symptoms and diagnosis according to the International Classification of Primary Care (ICPC).[10] A distinction was made between contacts and episodes. One episode could contain more contacts. For the description of the morbidity the symptom expressed in the first consultation and the diagnosis made in the last registered consultation of the episode were used.

We used data of children aged 0 until 14 years (N=63,753). In order to determine whether a child belonged to an ethnic minority we applied published criteria, that considered next to the nationality and country of birth of the child, the country of birth of father and mother.[11] In this study we restrict ourselves to the three largest groups of ethnic minorities: children from Turkish, Surinam and Moroccan origin.

Control groups. To adjust for confounding, we selected at random for each child from an ethnic minority a Dutch child, that was similar according to the following characteristics: age (0-4, 5-9, 10-14 years), gender, socioeconomic status (based on the occupation of the wage earner: low, middle, high), degree of urbanisation of the place where the general practice was located (< 30,000, 30-50,000, > 50,000 inhabitants, three largest cities (Amsterdam, Rotterdam and The Hague)), registration period (April-June, July-September, October-December, January-March) and health insurance coverage (sick funds or privately insured). Hence, three Dutch control groups were constructed, for each ethnic minority group one Dutch group.

Helpseeking behaviour was determined according to the following aspects: (a) consult frequency; (b) number of consultations per episode; (c) presented morbidity; and (d) length and point of time of the consultation with the GP.

Results

Table 1 shows the distribution of the characteristics for each ethnic minority group and their Dutch control group. We could not find for each ethnic minority child a Dutch counterpart in the database. The ethnic minority groups differed from each other, especially regarding socioeconomic status and degree of urbanisation.

Table 1. Composition of the three ethnic minority study groups and their Dutch reference groups by the characteristics on which the children were matched.

	Dutch N=696	Turkish N=712	Dutch N=633	Surinam N=667	Dutch N=693	Moroccan N=726
	%	%	%	%	%	%
age and gender						
0 years ♂	4	4	2	3	4	4
♀	3	3	3	4	4	4
1-4 yrs ♂	15	15	16	16	15	15
♀	15	15	13	13	12	11
5-9 yrs ♂	18	18	16	16	17	18
♀	16	16	15	15	18	18
10-14 yrs ♂	15	15	17	16	16	16
♀	14	14	18	18	14	14
socioeconomic status						
low	60	61	34	35	57	58
middle	27	26	42	41	23	22
high	3	3	10	10	4	4
unknown	11	10	14	14	16	17
health insurance coverage						
sick funds	96	96	83	83	95	95
privately	4	4	17	17	5	5
degree of urbanisation						
< 30,000	28	27	17	16	19	19
30-50,000	29	29	38	36	44	43
> 50,000	34	33	26	25	23	23
Amsterdam, Rotterdam or The Hague	9	11	19	23	13	16

Children from Surinam had a higher socioeconomic status and lived more often in the larger cities than Morrocan and Turkish children.

Table 2 shows the mean yearly consult frequencies and mean number of consultations per episode for each ethnic minority and corresponding Dutch group. We did not detect any statistically significant difference between the ethnic minority groups and the Dutch groups.
In table 3 gives relative risks with 95% confidence intervals for the morbidity presented by the ethnic minorities compared to the Dutch groups. Turkish children presented more often digestive and respiratory problems and less often ear problems than their Dutch reference group. The difference in digestive problems was mainly caused by symptoms as stomach ache (RR 2.28; 95%-CI 1.10-5.19), vomiting (RR 1.85; 95%-CI 0.82-1.14) and worms/parasites (RR 7.82; 95%-CI 0.98-62.53).

Table 2. Mean number of consultations per year and mean number of consultations per episode for each ethnic group

		Dutch (N=696)	Turkish (N=712)	Dutch (N=633)	Surinam (N=667)	Dutch (N=693)	Moroccan (N=726)
number of consultations per year							
0-4 yrs	♂	6.2	6.4	4.5	4.8	4.4	4.4
	♀	4.1	5.5	5.2	5.6	4.2	4.4
5-14 yrs	♂	2.8	2.4	2.4	3.1	2.6	2.0
	♀	2.8	2.5	3.5	2.5	3.4	2.7
number of consultations per episode							
0-4 yrs	♂	1.62	1.40	1.36	1.38	1.39	1.33
	♀	1.34	1.39	1.43	1.51	1.39	1.38
5-14 yrs	♂	1.33	1.33	1.28	1.23	1.30	1.17
	♀	1.38	1.26	1.31	1.18	1.37	1.29

Table 3. Comparison of presented morbidity for ethnic minority groups with Dutch reference group expressed as relative risks with 95%-confidence intervals for symptoms and diagnoses

	Turkish/ Dutch	Surinam/ Dutch	Moroccan/ Dutch
	RR 95%-CI	RR 95%-CI	RR 95%-CI
symptom in first consultation of episode			
general	1.22	0.84	1.21
	0.95-1.57	0.63-1.10	0.92-1.59
digestive	1.81	1.24	1.11
	1.27-2.58	0.87-1.76	0.74-1.64
eye	0.63	1.63	1.08
	0.35-1.14	0.80-3.33	0.59-1.97
ear	0.54	1.00	0.51
	0.33-0.87	0.65-1.55	0.33-0.78
musculoskeletal	0.92	0.65	1.01
	0.65-1.29	0.46-0.91	0.71-1.43
respiratory	1.27	1.20	0.91
	1.03-1.57	0.97-1.50	0.73-1.13
skin	0.88	1.21	0.85
	0.64-1.19	0.88-1.67	0.63-1.16
diagnosis in last consultation of episode			
general	0.87	0.65	0.83
	0.64-1.19	0.45-0.93	0.57-1.21
digestive	1.43	1.07	1.42
	0.96-2.13	0.72-1.58	0.90-2.24
eye	0.72	1.79	0.77
	0.36-1.44	0.80-4.02	0.41-1.46
ear	0.57	1.38	0.58
	0.33-0.98	0.87-2.18	0.37-0.91
musculoskeletal	0.91	0.52	0.92
	0.55-1.51	0.32-0.85	0.54-1.56
respiratory	1.30	1.24	0.89
	1.05-1.61	0.99-1.55	0.72-1.11
skin	0.88	1.11	0.97
	0.63-1.24	0.78-1.57	0.70-1.34

In case of respiratory symptoms, Turkish children consulted the GP more often for cough (RR 1.53; 95%-CI 1.15-2.02) and sore throat (RR 2.27; 95%-CI 1.16-3.69), but less often for repeat prescriptions (RR 0.20; 95%-CI 0.02-1.67). Turkish children confronted the GP less often with ear ache (RR 0.40; 95%-CI 0.24-0.82) and the GP made less often the diagnosis otitis media (RR 0.59; 95%-CI 0.29-1.20).

Children from Surinam presented less often musculoskeletal problems, but consulted the GP more often for respiratory symptoms than Dutch children. No specific symptoms were mainly responsible for this difference. The difference in respiratory symptoms is partly caused by a difference in the presentation of cough (RR 1.47; 95%-CI 1.08-2.01).

Moroccan children consulted the GP less often for ear problems. Differences in symptoms were caused by ear ache (RR 0.62; 95%-CI 0.37-1.05) and in diagnoses by otitis media (RR 0.62; 95%-CI 0.35-1.09). Repeat prescriptions for respiratory symptoms were less often given to Morrocan children than to their Dutch counterparts (RR 0.49; 95%-CI 0.22-1.09). Moroccan children did not consult the GP for warts (RR 0.10; 95%-CI 0.01-0.76). Both Moroccan and Turkish children were

Table 4. Length and point of time of consultations for each ethnic group

	Dutch (N=541)	Turkish (N=599)	Dutch (N=498)	Surinam (N=503)	Dutch (N=507)	Moroccan (N=478)
	%	%	%	%	%	%
length						
less than 10 min	83.9	94.3	80.7	91.8	86.2	88.9
more than 10 min	16.1	5.7 *	19.3	8.2 *	13.8	11.1
point of time						
office hours	92.7	90.0	93.4	94.5	91.7	93.3
out of office hours	7.3	10.0	6.6	5.5	8.3	6.7

* $p < 0.05$

less often known to the GP with asthma (RR 0.60; 95%-CI 0.40-0.91). Also, the GP made less often the diagnosis asthma in these children (RR 0.39; 95%-CI 0.22-0.68).
Table 4 shows length and point of time of the consultations for each ethnic group. Compared to Dutch children, consultations with Turkish and Surinam children lasted more often less than 10 minutes.

Discussion

In this study we compared the consult frequency and morbidity presented to the GP of Turkish, Moroccan and Surinam children with Dutch children, who were comparable regarding socioeconomic status, age, gender, degree of urbanisation, registration period and insurance coverage. The merit of this study design was the individual matching on all these factors, that has not yet been applied in other studies.

We did not find a difference in consult frequency in either ethnic minority group compared to the Dutch. Also, the number of consultations per episode did not differ. Differences of our results with other studies that reported higher consult frequencies for ethnic minorities can be explained by differences in matching procedures. It is well known that in general people from lower socioeconomic classes, insured by the sick funds and living in the larger cities consult a physician more often.[12] Also ethnic minorities belong often to this higher consuming group. These results imply that the workload of a GP is more affected by the socioeconomic status of his patients than by their ethnic background.
The morbidity presented differed between children from ethnic minorities and Dutch children. Turkish children consulted the GP more often for respiratory and digestive problems and less often for ear problems than Dutch children. These figures are in line with results from other Dutch studies.[3 6 13] These differences could be caused by a difference in true prevalence or by cultural differences in experiencing, interpreting and reporting symptoms. Dutch parents would be more concerned about ear problems, whereas Turkish parents regard digestive problems as more concerning.

Moroccan children showed a similar low consultation rate for ear problems as the Turkish children. Especially Dutch children consulted the GP for this condition. The low consultation rate for warts of Moroccan children could be due to a cultural difference. Moroccans are used to their own traditional Arabic medicine.[14] Remarkably, both Moroccan and Turkish children were less often labelled with asthma in Dutch general practice. Also, other studies recognised this difference in morbidity.[15] In a large survey it was demonstrated that people from western Europe had a higher prevalence of asthma than people from Asia, while people from northern Africa had the lowest prevalences.[16] More research is suggested to find a satisfying explanation.

Children from Surinam consulted the GP less often for musculoskeletal problems than Dutch children. Possibly, mothers from Surinam apply more home remedies in case of sprains and strains or they may use their own traditional medicine.[14] However, it is noticeable that they consulted the GP more often for respiratory symptoms, especially for cough.

The length of a consultation was significantly shorter for children from ethnic minorities than for Dutch children. A consultation of a Turkish, Moroccan and Surinam child lasted more often shorter than 10 minutes than a consultation of a Dutch child. This is in contrast to the expectation that due to the language problems a consultation with an ethnic minority child would last longer. A possible explanation for this relatively short consultation length is that GPs do not invest much time in a history taking and switch rather quickly to the treatment plan.[17]

In our study we compared exclusively Turkish, Surinam and Moroccan children with Dutch children. If we like to compare between the ethnic minority groups, another matching procedure would be needed. Nevertheless, it is obvious that the various non-Dutch groups may not be considered as one homogeneous group, considering their differences in socioeconomic status and presented morbidity. The absence of a deviant morbidity pattern of the Surinam children from the Dutch children for ear and digestive problems could be a consequence of the higher socioeconomic status of this group as a result of which they would follow a more Dutch pattern.

The criteria on which children were categorised in ethnic groups in this study have the main advantage that childern always can be classified, also in case of one-parent families or in families with parents from different ethnic origins, although the mixture of ethnicity is not taken into account.[11] Also, these criteria neglect that mostly the mother is the most important attendant of the child.

In conclusion, several indicators for the workload of GPs, like consult frequency, length and point of time of the consultation are not higher for children from ethnic minorities than for Dutch children. Other indicators of workload like communication problems, demanding behaviour and consultations for trivial symptoms were not considered in this study and may cause differences. More research is needed to determine whether these other indicators occur more often in consultations with ethnic minorities than in consultations with Dutch people. Additionally, more research is necessary to determine whether differences in presented morbidity are caused by cultural differences in medical utilization or by true higher prevalence rates of respiratory symptoms in Turkish and Surinam children, digestive symptoms in Turkish children and ear problems in Dutch children and lower prevalence rates of asthma in Moroccan and Turkish children.

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CHAPTER 11

SUMMARY, GENERAL DISCUSSION AND IMPLICATIONS

In this final chapter the main findings of this study will be summarised, followed by a general discussion, in which also possible implications for future research, medical practice and health policy will be given.

1. Summary of the main findings

The principal aim of this study was to investigate illness in children and parental response, and its sociodemographic variation. In *chapter 1* several reasons for investigating this aim were given. First, in The Netherlands there are specific demographic developments and recent developments in medical consumption behaviour especially of parents for their children. The changing composition of the population (more ethnic minorities in especially lower socioeconomic strata), the changing role of parents due to more working mothers and the increasing use of over-the-counter medication and GP services are examples of these changing patterns. To establish the effect of these developments for parental illness behaviour, with consequences for health promotion activities and planning of health care services, more insight is necessary into the parental decisions in case of illness in their child. Differentiation into sociodemographic characteristics could lead to more insight into specific groups. Second, theoretical and methodological considerations justified this study. Research into illness in children and parental responses is scarce. Studies that were based on quantitative data used mostly cross-sectional research methods, whereas the use of diaries is advocated to incorporate the process character of illness behaviour. The recurrent process of illness behaviour if symptoms persist for more days should be taken into account. Results from qualitative studies support this dynamic approach. Third, the validity of estimates based on diaries has hardly been assessed.
This aim and reasons resulted in the following questions, that were addressed in this thesis:

1. How valid are estimates of illness of children and parental response?
2. What illnesses do parents report for their children and how do parents respond to illness in their children?
3. Which sociodemographic factors are related to illness reported in children and parental response?

To answer these questions we made use of a health diary study preceded by a health interview and a registration of GP consultations, collected within the framework of the Dutch National Survey of Morbidity and Interventions in General Practice in 1987 and 1988. An overview of the various measurement instruments is given in the *appendix*. In chapters 2 to 10 various parts of these research questions were addressed.

1. How valid are estimates of illness of children and parental response measured through a diary?

This question is addressed in two chapters (2 & 3). *Chapter 2* dealt with the measurement of community morbidity, in other words with the reporting of illness. We compared the illness reported by 1630 mothers through a checklist in a retrospective interview and an open-ended question in a self-administered prospective health diary. Because the symptom checklist referred to the last two weeks, diary reports were also restricted to two weeks. In general, more mothers reported illnesses for their child in the interview (65%) than in the diary (54%). Especially ear problems, weakness and nervousness were reported more often in the interview. Regarding sociodemographic differences, the largest differences in reporting levels were found for lower educated mothers: 66% reported any illness in the interview versus 45% in the diary. Also, mothers with an indication of more mental problems (GHQ > 4) reported more illnesses, both in interview (82% vs 63%) and in diary (63% vs 53%).

Chapter 3 dealt with the measurement of a consultation with the GP. In contrast to the illness reports, consultation data were collected regarding the last two months in the interview. Because the diary was limited to three weeks, we compared the reporting of a GP consultation over a period of three weeks by 1765 parents in interview and diary with the reporting of a consultation by the GP concerning the same period and for the same children. In general, in the interview parents reported 60% more consultations than the GPs, whereas in the diary parents reported similar results as the GPs. Nevertheless, assuming the GP registration as the golden standard, the sensitivity of reporting a consultation in the interview (0.84) is higher

than the diary (0.72), while specificity and kappa are somewhat higher in the diary (0.96;0.64) than in the interview (0.91;0.58). Recall bias, expressed as telescoping and heaping, is present in the interview data. Also, prevalence estimates of all morbidity encountered by the GP are much higher in the interview, except for skin problems. The GP reported more consultations for children from ethnic minorities (OR 1.6), jobless and less educated mothers (ORs 2.3 and 2.6 respectively) than the parents did in the diary.

The main conclusion of these chapters is that measurement of community morbidity and medical utilization are critically influenced by the data collection method used. Overall, the interview yielded higher prevalence and consultation rates than the diary. Despite the lower sensitivity, we assume that the estimates based on the diary were more accurate than those based on the interview, because the diary estimates corresponded better with data from the GP registration. Unfortunately, the diary estimates suffered from another problem, namely that the estimates were unreliable for certain subgroups: especially lower educated mothers and for children from ethnic minorities. Hence, the answer to the first question is ambiguous. A consequence of these findings was that breaking down parental diary reports by socioeconomic factors was not possible.

2. What illnesses do parents report for their children and how do parents respond to illness in their children?

Chapters 4, 5 & 6 addressed this question. Based on reconstructed illness episodes of the diary data, *chapter 4* demonstrated that 60% of the children suffered from an illness episode during the three week period. The illnesses reported most were problems of the respiratory tract as colds/flu (157/1000 children) and other respiratory symptoms (114/1000), followed by diarrhoea (99/1000), musculoskeletal problems (75/1000) and headaches (68/1000). More young children (0-4 years) and children living in the larger cities (> 50 000 inhabitants) suffered from any illness. For 11 percent of all children and in 13 percent of all illness episodes the GP was consulted. Consultation rates differed extensively by the nature of the symptom. For ear (36%) and skin (28%) problems most often and for headaches (2%) and

tiredness (1%) least often a physician was consulted. Regardless of symptoms young children (0-4 years) were taken twice as often to a GP than older children (10-14 years). This chapter emphasized the enormous amount of illness that occurs in children. Most illness is handled without the consultation of any health care professional.

Chapter 5 assessed the parental response following our model of illness behaviour presented in the introduction (chapter 1). The contributions of the nature and evaluation of the symptom, and lay consultation to various strategies of care and to forms of self-care undertaken by parents are assessed. The symptom's nature was categorized in ten types of illness. The evaluation of the symptom was assessed by six different items: novelty, duration, irriration, concern, self-limiting character and reason known. Lay consultation had taken place if parents had talked to others or had received support. In 1050 episodes of illness, we distinguished between four different of strategies of care: no care, self-care, professional care immediately and professional care later in the episode. The three distinct forms of self-care were restricted activity, self-medication or both. The strategy most often followed was self care (55%). Next in rank were no care (32%), professional care later in the episode (7%) and professional care on the first day (6%). Parents performed more often no care in case of longer existing and perceived self-limiting illnesses. Professional care on the first day of the episode was more often performed when symptoms were new (OR 4.1) or bothering (OR 2.9), and most often in symptoms that gave reason to worry (OR 5.9). Also, professional care later in the episode was more often applied in case of worrying parents (OR 2.8). Lay consultation resulted in more self care (OR 1.8) and remarkably often in professional care later in the episode (OR 7.4). Independent of the contribution of symptom evaluations and lay consultation, respiratory and ear problems prompted parents to consult the GP. In case of self-care, newly evaluated symptoms were treated with both restricted activities and self-medication (OR 1.9). Perceived self-limiting illnesses were not treated with self-medication (OR 0.4). Considering the symptom's nature, colds/flu and respiratory problems were treated with self-medication (ORs 3.2 and 5.7 respectively), whereas diarrhoea, tiredness and nausea were not treated with self medication (ORs 0.2, 0.1 and 0.1 respectively).

Chapter 6 considered the dynamic nature of parental response in 1050 episodes of illness. We examined the relation between a change in symptom evaluation and consequences for the care performed. During an illness episode parents changed their evaluation in 24% and their choice of treatment in 25% of the episodes. The treatment was changed 1.8 times more often in episodes with a changing evaluation than in episode without. Evaluation changes that caused changes in treatment were changes to more novelty (RR 1.8), more irritation (RR 2.1), more and less concern (RRs 2.0), and less familiarity (RR 1.8). The decision to consult a physician was largely influenced by all these changes, e.g. in episodes in which a change to more irritation took place, parents consulted the GP ten times more often after that change than before that change. The decision to perform self-care was not influenced by changes in evaluation.

In summary, the answer to the second research question was that parents reported most often illnesses like colds, respiratory problems, diarrhoea, musculoskeletal problems and headaches in their children. The main response was a bothering situation but not worrisome enough to consult a GP, instead self or no care were applied. The largest influence on the decision whether to consult the GP, either at the beginning or later in an illness episode, was a combination of (increased) concern, irritation and novelty, together with a perceived non-selflimiting character of the illness. Regardless of these evaluations, ear and respiratory problems prompted parents more often to consult the GP. Lay consultation led often to a visit to the GP later in the episode. Evaluations and lay consultation affected choices of no care and self-care to a lesser extent, whereas the symptom's nature affected the choices of self-care more strongly.

3. Which sociodemographic factors are related to illness reported in children and parental response?

For answering this question our intention was to analyse the diary data regarding relations between sociodemographic factors and the illness reported and the parental responses. But, given the results of chapter 2 & 3, that indicated that children from mothers with a lower education reported fewer illnesses than children from mothers

with higher educational levels (45% versus 67%) and reported substantially less GP consultations than the GP (OR 3.9), we questioned the validity of these data. Therefore, we decided not to use these diary data to answer this question. The influence of the sociodemographic factors was analysed with data derived from the GP registration (chapters 7 to 10). The major drawback of using these data is that information about the situation in the community is lacking. Only information about which groups consulted the GP more often than other groups could be derived and insight into the process of illness behaviour is missing.

In *Chapter 7* the influence of age, gender, socioeconomic status of the child, degree of urbanisation, health insurance coverage and ethnicity of the child on medical utilization in a three month period is considered. A multivariate analysis concerning more than 47 000 children with all factors known resulted in statistically significant contributions of all factors, except for ethnicity. Younger children (OR 2.4), girls (OR 1.04), children belonging to a lower socioeconomic status (OR 1.2), insured through the sick funds (OR 1.3), and living in larger cities (OR 1.2) consulted the GP more often in three months. We calculated that children from lower socioeconomic strata, living in large cities and insured through the sick funds consulted the GP half as much again than children from higher socioeconomic strata, living in rural areas and privately insured (39% versus 26% in three months).

In *Chapter 8* we investigated the diagnoses the GP reported for children broken down by sociodemographic factors. In three months children presented most often problems of the respiratory tract (175/1000 children), skin problems (102/1000), general and unspecified problems (77/1000), ear problems (56/1000), digestive problems (54/1000) and musculoskeletal problems (46/1000). In general, young children (0-4 years of age) presented most often general child diseases and unspecified problems as well as problems of the respiratory tract. Generally, the incidence of all problems decreased with an increasing age, except for musculoskeletal problems. Children from lower socioeconomic strata presented more often respiratory tract problems (RR 1.4) and musculoskeletal problems (RR 1.2). Children living in larger cities consulted the GP also more often with respiratory tract problems (RR 1.3) and with ear problems (RR 1.4).

Chapter 9 focused on the relative contribution of the various indicators of socioeconomic status of the parents on the child's medical utilization. Results from a multivariate polychotomic logistic regression model showed that the educational level of the father was most strongly related to medical utilization. The odds ratios increased with the number of consultations for the lowest educational level compared to the highest educational level from 1.1 for 1 consultation to 2.0 for more than 4 consultations. Separate analysis for boys and girls showed that the educational level of the mother was more strongly related to medical utilization for boys, whereas the educational level of the father was more strongly related to medical utilization for girls. Separate analysis for young (0-4 years of age) and older (5-14 years of age) children showed that the role of the educational level of the father was even more pronounced for young children and besides that, the educational level of the mother was also related to medical utilization for this age group.

In *Chapter 10* specific attention was paid to the consult frequency and morbidity presented at the GP by children from ethnic minorities. We matched each child from Turkish, Moroccan or Surinam origin to a Dutch child which was similar according to age, gender, socioeconomic status, degree of urbanisation and health insurance. We found no significant differences in consult frequency by ethnicity, but the morbidity presented differed. Turkish children consulted the GP more often for gastrointestinal problems (RR 1.8) and respiratory problems (RR 1.3), but less often for ear problems (RR 0.5). Surinam children consulted the GP less often for musculoskeletal problems (RR 0.6), but more often for respiratory problems (RR 1.2). Moroccan children consulted the GP less often for ear problems (RR 0.5).

Hence, we could partly answer our third research question. The utilization rates showed clear variations according to all sociodemographic factors studied, except for ethnicity. Parents consulted the GP more often for younger children (boys more than girls) than for older children (girls more than boys). Lower socioeconomic groups, most strongly determined by the educational level of the father, had higher consultation rates. Also, children living in larger cities consulted the GP more often. For ethnicity we could not find a difference in utilization rates, independent of socioeconomic status. Respiratory problems (including colds) and/or infections are more often presented to the GP by the lower socioeconomic groups and in the

larger cities. Also, Turkish and Surinam children presented more respiratory problems.

2. General discussion

This study revealed a new problem in the use of diaries for the description of the iceberg of symptoms. The general thought that diaries produce *more valid* data than health interviews is doubtful.[1,2] As this study showed, the validity of the estimates regarding illness reports and consultation rates in lower educated groups and in ethnic minorities can be questioned, probably due to literacy problems and compliance problems to fill out a questionnaire every day. The more common alternative data collection method, a health interview, suffered from other problems as saliency, proxy and telescoping, leading to an overestimation of more salient events. Also, less salient problems are probably overestimated in the interview. As shown in our results and by previous studies of Kooiker and Van der Zee,[3,4] symptom checklists in an interview are sensitive to psychological distress of the respondent and may lead to overreporting of 'vague' symptoms. We demonstrated that the diary data also suffered from this problem. For other parental responses besides consulting the GP we did not perform any validity tests, but we assume that the quality of the assessment of these responses is also associated with the educational level and ethnic origin of the parent.

The consequences of these findings for estimating prevalence and consultation rates through interview and diary data are substantial. Nowadays, most estimates from the Central Bureau of Statistics are based on large scale interviews. De Bakker demonstrated that adults tend to overestimate their use of medical services in health interviews.[5] Hence, in using these data for e.g. political decisions regarding planning and distribution of health care facilities this overestimation has to be taken into account.

But then how should we assess community morbidity and consultation rates? For consultation rates, we hold the opinion that medical records have to be preferred, since they produce the most consistent results over a longer period (also for sub-

groups). Recent legal and computer developments in general practice stimulate and facilitate the registration of all contacts between patient and practice, thus enhancing various kinds of research possibilities.[6 7]

For the assessment of community morbidity and parental responses, a more comprehensive approach is necessary. The use of different measurement instruments simultaneously to adjust for the problems of the separate data collection methods could be an alternative. For example, as performed in a Belgian study,[8] a combination of a diary and a regularly scheduled interview incorporating the diary data during the interview may produce more accurate estimates. In the health diary salient and less salient problems will be reported and telescoping plays no role. Also besides consultation rates, other responses to illness can be collected accounting for their sequential occurrences. To deal with the problem of completing diaries every day, one should motivate participants constantly by frequent telephone calls or random home visits to check on completeness. During a, for example, weekly interview mothers with literacy or compliance problems can be supported to fill up the diary. Additionally, more detailed qualitative context information about the quantitative diary data regarding the symptoms and the response can be obtained. Weekly successive interviews have also the advantage that only in the first interview telescoping might play a role, because the second and later interviews only look at the last seven days. Events that happened longer ago have been covered in previous interviews. This more comprehensive approach is probably very expensive and intense. Nevertheless, to obtain valid and reliable estimates of the amount of illness in the community, especially in the context of socioeconomic health differences, we think it is necessary to develop valid research instruments.

This study has fulfilled the lacking overview of illness reported in children. Based on a health diary we presented a most comprehensive picture of the underwater part of the iceberg of morbidity, despite considerable measurement problems. Comparisons of these prevalence rates with other studies is not possible, because no other overviews are known to us. If we add to these data the referrability rates (the frequency of referring a child with a given problem per 100 episodes of this condition encountered in general practice) also based on the Dutch National Survey, an even more complete overview of the iceberg of children (ranging from at home to specialistic care) can be obtained.[9]

Following the development in general practice research of using episodes of care instead of single consultations for calculating occurrence rates,[10] in this study episodes of illness instead of daily counts led probably to a closer resemblance of the true prevalence and consultation rates, because the length of the episode did not influence the rates. Additionally, illness episodes collected with a diary as used in this study allowed us to explore the sequential features of illness behaviour in case of longer lasting illnesses. Future studies aiming at a description of the occurrence of illness and response patterns should also use episode counts instead of daily counts.[11] Consequently, the data collection method has to be adjusted to this episodic approach. Because diaries are better suited to assess these episodes prospectively than interviews, diaries are the preferred data collection method provided that they include items that allow respondents to link symptoms occurring on different days but belonging to the same illness episodes.

We studied the response patterns of parents in the illness episodes reported in the diaries. To handle the enormous amount of different response patterns (depending on our operationalization, we encountered 262 different response patterns), we departed from a theoretical model conform the models of Chrisman and Campion.[12] [13] Given our results, we propose a revised model of illness behaviour of parents (figure 1).

The first step for parents is to become aware of the presence of a symptom in their child. Then, parents enter our model of illness behaviour. Regardless of the nature of the symptom, parents evaluate the symptom on two dimensions: concern and familiarity. We suggest that parents have a threshold of concern. When this threshold is reached, professional health care is sought. As our results indicated, the threshold level to consult can be reached on the first day of the episode, but also later in the episode. The effect of the sequences of evaluations on the threshold level, which was most pronounced by changes in irritation and concern, support the importance of this time effect in illness behaviour. The model should be viewed as a recurrent process as long as the symptom persist. Each day (or even within a day) the illness situation can change, evaluations can change and treatment actions can change.

The relation between perceived concern and familiarity and the decision to consult the GP is very strong and has also been found in various other studies regarding

parental, adults and elderly behaviour, in various subpopulation in various countries.[3 14 15 16] Then, other factors, such as age, gender, birth order and socioeconomic status, are not likely to affect the decision any more. The amount of concern that is necessary for parents to reach the threshold to consult or in other words the level of threshold differs between parents. Richtsmeier showed that financial and employment indicators as well as experience with past events influenced the level of parental anxiety.[17] Mechanic posed that prior knowledge based on learning and past experience as to the cause and the likely course of the symptoms may influence the extent of concern.[18] Probably, higher educated people or mothers with more children have more knowledge based on learning and past experience. Accordingly, they may have higher (or perhaps lower?) concern thresholds. Consequently, they consult the GP less often in case of illness. On the other hand Goldman demonstrated that the presence of an anxiety trait in parents before they had children predicted an increased incidence of unscheduled acute care visits in the infancy period.[19] Future studies investigating the contribution of factors such as knowledge, past experience and personality traits, including the time dimension, on

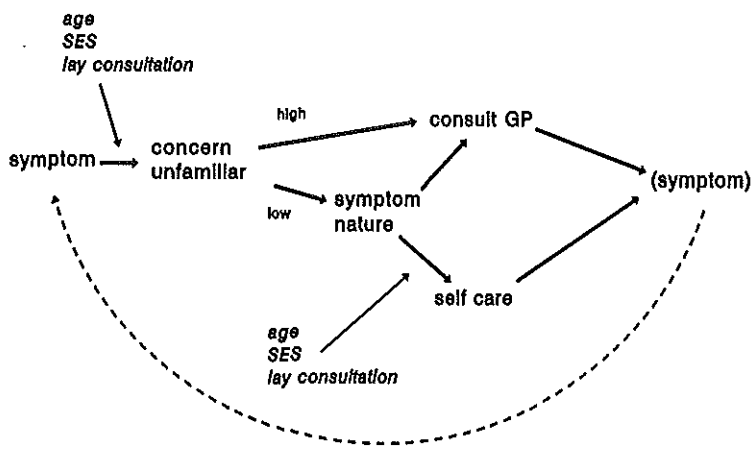

Figure 1. Proposed theoretical model of illness behaviour

this concern threshold are needed to determine which aspects should be emphasized in interventions aiming at influencing this threshold level.

The implication for medical practice of this relation is that if parents decide to consult a GP for their child, the GP should not only treat the illness in the child, but he should also pay explicit attention to the perceived concern of the parents, because that is the main trigger for consultation. Next to the GP, professionals in well-baby clinics (physicians and nurses) could pay attention to concern and unfamiliarity in their regular contacts with parents of young children. An advantage of well-baby clinics is that nearly all parents visit these clinics several times during the first four years of their child. These preventive health education actions could be closely linked to the developmental status of the child and characteristics of the parents.

If a parent does not reach the threshold of concern, then alternative treatment options are various forms of self care or no care at all. The symptom's nature predicted more strongly the choice of self care than the evaluation of the symptom. Especially, changes in evaluation of the symptom did not affect choices of self-care. Parents treated diarrhoea, headaches, tiredness and nausea with restricting activities, whereas respiratory symptoms were more often treated with self-medication. If we compare the treatment of parents and GPs, a remarkable similarity appears. In a previous publication we showed that GPs treated children with respiratory symptoms in almost 75% of the episodes with some form of medication; diarrhoea, headaches, tiredness and nausea are treated in less than 50% with some form of medication and more often with advice or rule of life.[20] Assuming that most of the illnesses encountered by the GP are also of a self-limiting nature and thus do not require intensive treatment, we postulate that the similarity in responses to minor illnesses has a common cause, namely the folk model. Responses to minor illnesses from parents and GPs are mostly learned from the previous generation. Parents learn from their parents how to handle.[21 22] Helman described how treatments of GPs based on the biomedical model are incorporated in the folk model of illness and actually reinforced it, because the treatments of the GPs for colds and chills were based on the same folk model.[23] Whereas in previous generations often a mother or grandmother was most influential, nowadays the GP takes over this role

partly. Another possible explanation for this similarity is the increased confidence of people in the efficacy of medication. A recent survey concluded that the general public 'overestimates the part of symptoms for which treatment is desirable, seeks treatment for symptoms that are self-limiting and expects solace of appliances that do not have the desired effect'.[24] Perhaps, this overestimating of the effect of treatment by parents is also influenced by unnecessary treatment of GPs for self-limiting symptoms. Also, in popular television programs as 'Koffietijd', 'Top Santé' and 'De 5-uurshow' all kinds of publicity for medications, often without scientific proof, are made. Hence, this similarity in responses give way to several hypotheses about the behaviour of parents and the role of the GP.

Whether other evaluation items than those we considered are related to the choice of self care is unclear. Based on the theory of reasoned action and the Health Belief Model,[25 26] evaluation items such as belief in, efficacy or expected benefit of the treatment may predict choices of self care better.

The role and position of lay consultation is not very clear in our adjusted model. The influence can take place at various moments in the process: in the evaluation phase and in the treatment phase. A lay consultant could influence the extent of concern of the parent in opposite directions. Gottlieb concluded in a review that lay consultation can either expedite or delay utilization or both.[27] We showed that lay consultation did not lead to more GP consultations directly, but was strongly related to more consultations later in the episode. Freidson argued that the composition and cultural aspects are most determining the outcome.[28] Hence, more information about the reason for lay consultation, the content of the advice and the relation with the lay person is necessary to reflect more about the influence. Accordingly, consequences of differences in illness behaviour according to having lay consultation possibilities can only be judged if more detailed information is known.

Variation in parental response according to sociodemographic factors could only be studied partly and had to be derived from the GP registration. The implications of the differences in consultation rates for general practice between the various socioeconomic groups in combination with the urban-rural difference are far-reaching. Assume a standard general practice of 2350 patients with approximately

500 children is located in a rural area with a well-educated practice population. According to our results 130 of these children (26%) consult their GP in three months. If this practice is situated in a large city with a low educated practice population (e.g. a deprived neighbourhood) 195 children (39%) consult their GP during three months. Taking into account that the mean consult frequency of a consulting child is about 1.8 consultations in three months in both situations, the GP in the large city in a deprived neighbourhood has approximately 65 times 1.8 consultations is 117 consultations more than a GP in a rural better-off area, which is almost more than two consultation more per weekday, only for children. Obviously, the workload for children of GPs in these deprived areas is much higher than of GPs in better-off situations. Next to the greater workload caused by simple consultation rates, evidence from the UK showed that the absolute difference in costs for socially disadvantaged patients increased if more detailed measures of workload such as distinguishing between contacts with GPs at the surgery and home visits, and with the practice nurse, and of drug treatment, such as distinguishing between new and repeat prescriptions, were considered.[29] Other workload increasing developments are the enlarging number of ethnic minorities in larger cities with specific communication problems and knowledge deficits. If one considers, next to the increased GP utilization, that parents also may go directly (without a referral from the GP) to the hospital for their children in the larger cities than the request for professional health care is much larger in these areas.[30]

How this larger request for professional care in socioeconomically deprived areas should be tackled depends on its causes. We elaborate on two major causes. First, this larger need for services may depend on a higher occurrence of health problems that are serious enough to be taken to the GP or hospital in these areas (van Vliet 1991). Second, this larger need may depend on behavioural differences between parents. For example, parents may reach quicker and more often the concern threshold for similar illness situations in lower socioeconomically areas and as a result consult the GP more often.

Which of these causes contributes mostly to variations in medical utilization is not clear. Several, mostly American, studies on medical utilization of children included various health indicators in a multivariate model. The results suggested that health indicators are the most important factors in explaining differences, but not

exclusively. Other factors, as shown in table 1 in the introduction, remain also important. For adults in The Netherlands, Van der Meer reported that about 40% of the variation in GP consultation rates by socioeconomic status can be explained by differences in health.[31] Complementary, the other 60% remains to be explained and future research is necessary to understand more about the backgrounds of differences in GP utilization rates for children. Based on the present empirical evidence, we assume that both causes are likely to contribute to differences and that interventions to handle this larger request should be developed in both directions.

To deal with the first cause, the higher occurrence of health problems in socioeconomic disadvantaged groups, we enter the area of socioeconomic health differences. Next to all other possible measures to tackle these differences, we restrict ourselves to measures within the health care system. If the need for services is larger in socioeconomically deprived areas than in better-off areas, re-allocation of resources seems justified to give people in deprived neighbourhoods equal opportunities to receive care. Measures as smaller practices and more supportive health personnel may improve the equity in health care. Recently, this fact has been acknowledged and extra resources are being allocated to GPs in deprived areas.
The specific sociodemographic composition of children in these areas (large amounts of the children belong to an ethnic minority) requires specific attention. Empirical data indicating that pregnant women in deprived areas (often ethnic minorities) are less often under control of a obstetrician and that children from ethnic minorities are more often vaccinated incompletely than Dutch children,[32 33] imply that still much can be done in health promotion for specific ethnic groups. Also, specific measures for high risk groups, such as preventive vaccinations for children from ethnic minorities who spend their holiday in their parents' homeland with increasing risk for hepatitis B, are nowadays considered.[34]

If on the other hand medical utilization rates differ because of varying thresholds between socioeconomic groups, various forms of health education can be applied. Assuming that lower socioeconomic groups have lower threshold levels, resulting in more consultations with the GP, the aim of the health education is to raise their level of threshold. Supporting our result that concern is an important trigger to consult the GP, Kai demonstrated with qualitative interview data in a group of 95

mothers in a disadvantaged inner city community in London that also in these areas perceived concern and personal control over the illness were the cues to consult.[35] Hence, interventions directed at the community aiming at a raise in threshold level should not only be directed at knowledge about illness and appropriate forms of self care, but also at mechanisms to cope with this concern. Examples of these interventions were carried out in Denmark and Sweden.[36 37] Young families received booklets and self care lessons with information on illness in their children. The Swedish experiment showed that mothers who did read the booklet were more inclined to rely on self care and less prone to seek medical care when not recommended. The Danish experiment showed that supplying information led to a 30% reduction in the number of consultations with the GP. However, given the literacy capacities of certain subgroups in these areas (ethnic minorities and low educated Dutch mothers) interventions using written information (booklets) are perhaps less appropriate. Given the specific composition of the children in the lower socioeconomic strata, alternative interventions should be developed. One intervention, using the setting of a well-baby clinic, is organising group sessions in the well baby clinics for ethnic homogeneous groups under guidance of a physician or nurse.[38] Other possible interventions are assigning a community nurse or health visitors or educators to specific neighbourhoods to educate individual families. These health visitors or educators could be linked to several general practices or health centres. Hence, interventions, combining the supply of information with coping lessons aiming at raising threshold levels with specific attention for the needs of subgroups, should be developed, implemented and carefully evaluated. Municipal Health Services have a legal task to promote health in the community and should, in collaboration with the GPs and universities, develop, implement and evaluate these kind of interventions, taking into account the needs of specific socioeconomic and ethnic groups.

In conclusion, this study showed that most illnesses in children are treated by their parents. The large variation in response patterns of parents needs further exploration in a dynamic manner in order to understand the reasons for this variation. Rigorous measurement of this variation in reponse patterns is crucial for the quality of the data and for the validity of our conclusions. Improving our understanding is necessary in order to be able to develop interventions promoting the appropriate treatment for illnesses in children. Especially the larger request for GP services of

children in lower socioeconomic groups living in larger cities requires specific attention of policy makers and researchers.

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CHAPTER 12

SAMENVATTING

De doelstelling van deze studie was om het voorkomen van (alledaagse) gezondheidsproblemen bij kinderen en de reactie van de ouders op deze gezondheidsproblemen te bestuderen. Drie redenen die ten grondslag lagen aan dit onderzoeksdoel zijn in *hoofdstuk 1* beschreven. De eerste reden betreft de demografische ontwikkelingen en recente ontwikkelingen in de medisch consumptie van ouders voor hun kinderen. Voorbeelden van deze demografische ontwikkelingen zijn de veranderende samenstelling van de bevolking (meer kinderen van etnische minderheden in met name de laagste sociaal-economische klasse) en de veranderende rol van de ouders veroorzaakt door onder andere meer werkende moeders. Veranderingen in medische consumptie zijn het toegenomen gebruik van vrij verkrijgbare medicijnen en het toegenomen huisartsbezoek. Om het effect van deze ontwikkelingen op reactiepatronen van ouders vast te stellen, is meer inzicht nodig in de besluitvorming van ouders als hun kind ziek is. Differentiatie naar sociaal-demografische kenmerken kan het inzicht voor specifieke groepen vergroten. De tweede reden om deze studie uit te voeren komt voort uit theoretische en methodologische overwegingen. Het aantal onderzoeken naar (alledaagse) gezondheidsproblemen bij kinderen en de reactie van ouders daarop is schaars. In kwantitatief georienteerde studies werd meestal gebruik gemaakt van cross-sectionele onderzoeksmethoden, terwijl juist voor dit type onderzoek het gebruik van dagboeken wordt gepropageerd om met name het dynamische karakter van ziektegedrag te incorporeren. Op die manier kan rekening worden gehouden met het terugkerende besluitvormingsproces indien symptomen meerdere dagen aanhouden. Resultaten van kwalitatief georienteerd onderzoek ondersteunen deze dynamische aanpak. De derde reden voor dit onderzoek is dat over de validiteit van gegevens verzameld via een gezondheidsdagboek nog weinig bekend is.

Deze overwegingen resulteerden in de volgende onderzoeksvragen:

1. Hoe valide zijn schattingen van gezondheidsproblemen bij kinderen en de reactie van ouders?
2. Welke gezondheidsproblemen rapporteren ouders voor hun kinderen en hoe reageren ouders op gezondheidsproblemen bij hun kinderen?
3. Welke sociaal-demografische factoren zijn geassocieerd met ziekten gerapporteerd voor kinderen en de reactie van ouders?

Voor de beantwoording van deze vragen maakten we gebruik van gegevens uit

gezondheidsdagboeken ingevuld door ouders, interviews met ouders en contactregistraties ingevuld door de huisarts. Dit materiaal werd verzameld binnen de Nationale Studie naar Ziekten en Verrichtingen in de Huisartspraktijk uitgevoerd door het Nederlands Instituut voor Onderzoek in de Gezondheidszorg in 1987 en 1988. Een overzicht van de diverse meetinstrumenten is gegeven in de *appendix*. In de hoofdstukken 2 tot en met 10 zijn verschillende onderdelen van deze onderzoeksvragen aan de orde gesteld.

1. Hoe valide zijn schattingen van gezondheidsproblemen bij kinderen en de reactie van ouders?

Deze vraag is behandeld in twee hoofdstukken (2 & 3). *Hoofdstuk 2* beschouwde de meting van morbiditeit in de open populatie door middel van de rapportage van gezondheidsproblemen door ouders. We vergeleken de gezondheidsproblemen gemeld in een symptoomvragenlijst tijdens een retrospectief interview met de gerapporteerde gezondheidsproblemen in een open vraag in een zelf bijgehouden prospectief gezondheidsdagboek betreffende een periode van twee weken in een groep van 1630 moeders. Moeders rapporteerden voor meer kinderen problemen in het interview (65%) dan in het dagboek (54%). Met name werden oorproblemen, lusteloosheid en nervositeit vaker gerapporteerd in het interview. Met betrekking tot sociaal-demografische verschillen vonden we het grootste verschil bij de laagst opgeleide moeders: 66% rapporteerde gezondheidsproblemen in het interview tegenover 45% in het dagboek. Bovendien rapporteerden moeders met meer psychische problemen meer gezondheidsproblemen bij hun kinderen, zowel in het interview (82% vs 63%) als in het dagboek (63% vs 53%).

Hoofdstuk 3 beschouwde de meting van huisartsbezoek. Gegevens over huisartsbezoek van 1765 kinderen betreffende een periode van drie weken zoals gerapporteerd door de ouders in het interview en in het dagboek werden vergeleken met dezelfde gegevens gerapporteerd door huisartsen in een contactregistratie. Ouders rapporteerden in het interview 60% meer consulten dan de huisartsen, terwijl in het dagboek de ouders vergelijkbare resultaten als de huisartsen rapporteerden. Als we uitgaan van de huisartsregistratie als de gouden standaard is de sensitiviteit van de rapportage van een consult in het interview (0,84) hoger dan in het dagboek (0,72),

terwijl de specificiteit en de kappa hoger zijn in het dagboek (0,96;0,64) dan in het interview (0,91;0,58). Er bleek sprake te zijn van herinneringsbias in het interview, hetgeen tot uiting kwam in telescoop-effecten en opeenhoping van consulten op bepaalde dagen. De prevalentieschattingen van alle morbiditeit aangeboden aan de huisarts, met uitzondering van huidproblemen, zijn veel hoger in het interview. Betreffende sociaal-demografische verschillen rapporteerde de huisarts meer consulten dan de ouders in het dagboek voor kinderen van etnische minderheden en voor kinderen van werkloze en laag opgeleide moeders.

De belangrijkste conclusie van deze beide hoofdstukken is dat de meting van - morbiditeit in de open populatie en medische consumptie sterk wordt beïnvloed door de gebruikte dataverzamelingsmethode. In het algemeen leverde het interview hogere prevalentie- en consumptieschattingen op dan het dagboek. Omdat de dagboekschattingen beter overeenkwamen met de gegevens uit de huisartsregistratie nemen we aan dat de schattingen gebaseerd op de dagboekjes nauwkeuriger zijn dan de schattingen gebaseerd op het interview, ondanks de lagere sensitiviteit van deze dagboekschattingen. Helaas zijn de schattingen gebaseerd op dagboekgegevens onbetrouwbaar voor bepaalde subgroepen, met name voor lager opgeleide moeders en voor kinderen van etnische minderheden. Aldus is het antwoord op de eerste onderzoeksvraag dat de validiteit van de schattingen niet optimaal is. Een consequentie van deze bevinding is dat de uitsplitsing van de dagboekgegevens naar sociaal-economische factoren niet mogelijk is.

2. Welke gezondheidsproblemen rapporteren ouders voor hun kinderen en hoe reageren ouders op gezondheidsproblemen bij hun kinderen?

In de hoofdstukken 4, 5 & 6 is deze vraag beantwoord. Gebaseerd op gereconstrueerde ziekte-episoden van de dagboekgegevens is in *hoofdstuk 4* vastgesteld dat 60% van alle kinderen minimaal één ziekte-episode in drie weken doormaakte. De ziekten die het meest frequent zijn gerapporteerd zijn verkoudheid/griep (157/1000 kinderen) en andere respiratoire problemen (114/1000), gevolgd door diarree (99/1000), bewegingsapparaatproblemen (75/1000) en hoofdpijn (68/1000). Meer jonge kinderen (0-4 jaar) en kinderen die in de grote stad wonen (> 50.000 inwoners) hadden een gezondheidsprobleem. De huisarts is in drie weken geconsul-

teerd door 11% van alle kinderen en in 13% van alle ziekte-episoden. Het percentage huisartsconsulten varieerde aanzienlijk naar het soort probleem; de huisarts werd het meest frequent geconsulteerd voor oor- en huidproblemen (respectievelijk 36% en 28%) en het minst frequent voor hoofdpijn (2%) en moeheid (1%). Onafhankelijk van de aanwezigheid van ziekten kwamen jonge kinderen (0-4 jaar) twee keer zo vaak bij de huisarts als oudere kinderen (10-14 jaar). Dit hoofdstuk benadrukt de grote hoeveelheid gezondheidsproblemen die bij kinderen worden aangetroffen. De meeste problemen worden opgelost zonder dat het professionele gezondheidszorgsysteem geraadpleegd wordt.

Hoofdstuk 5 ging over de reactie van de ouders, waarbij het voorgestelde model van ziektegedrag zoals dat is gepresenteerd in de introductie is getoetst. In dit model wordt gesteld dat de uiteindelijke actie van de ouders wordt beïnvloed door het soort symptoom, het oordeel over het symptoom en het eventuele advies van het lekennetwerk. Aan de hand van de dagboekgegevens zijn de invloeden van het soort symptoom, het oordeel over het symptoom en het lekennetwerk op verschillende zorgstrategieën vastgesteld. Het soort symptoom is onderverdeeld in tien soorten symptomen. Het oordeel is bepaald aan de hand van zes verschillende aspecten, waarop de ouders het symptoom hebben beoordeeld: nieuwigheid, duur, irritatie, bezorgdheid, zelflimiterend karakter en bekendheid met de oorzaak. Of het lekennetwerk is geraadpleegd, is vastgesteld door het antwoord op twee items: hebben de ouders met anderen over de situatie gesproken en hebben de ouders steun ontvangen. We hebben in 1050 ziekte-episoden vier verschillende zorgstrategieën onderscheiden: niets doen, zelfzorg, direct professionele zorg en professionele zorg later in de ziekte-episode. In het geval van zelfzorg, zijn drie afzonderlijke vormen onderscheiden: beperking van activiteiten, zelfmedicatie of een combinatie van beiden. De meest gevolgde strategie was zelfzorg (55%), gevolgd door niets doen (32%), professionele zorg later in de episode (7%) en professionele zorg op de eerste dag van de ziekte-episode (6%). Ouders pasten vaker zelfzorg toe als de symptomen langer bestonden en deze als zelflimiterend werden beoordeeld. Professionele zorg op de eerste dag vond vaker plaats bij nieuwe symptomen, symptomen die irriteerden en bij symptomen waarover de ouders bezorgd waren. Tevens consulteerden ouders vaker professionele zorg later in de episode als zij bezorgd waren. Het raadplegen van het lekennetwerk resulteerde vaker in zelfzorg

en opvallend vaak in professionele zorg later in de episode. Onafhankelijk van de bijdrage van het oordeel en lekenconsultatie consulteerden ouders vaker de huisarts voor kinderen met luchtweg- en oorproblemen. In het geval van zelfzorg werden nieuw ervaren symptomen behandeld met een combinatie van rust houden en zelfmedicatie. Zelflimiterende symptomen werden niet behandeld met zelfmedicatie. Aangaande de aard van het symptoom reageerden ouders op verkoudheden en andere luchtwegproblemen met zelfmedicatie, terwijl op diarree, moeheid en misselijkheid niet werd gereageerd met zelfmedicatie.

Hoofdstuk 6 beschouwde het dynamische karakter van de reactie van de ouders in 1050 ziekte-episoden. We onderzochten de relatie tussen een verandering in het oordeel over een symptoom tijdens een ziekte-episode en de gevolgen hiervan voor de verleende zorg. Gedurende een ziekte-episode veranderden ouders hun oordeel in 24% en de verleende zorg in 25% van de episoden. De aard van de verleende zorg veranderde 1,8 keer zo vaak in episoden met een verandering in oordeel dan in episoden zonder zo'n verandering. Veranderingen in oordeel die veranderingen in verleende zorg veroorzaakten waren een toename in nieuwigheid, een toename in irritatie, een toe- en afname in bezorgdheid en een afname in bekendheid. Het besluit de huisarts te consulteren werd in sterke mate beïnvloed door veranderingen in oordeel. Zo resulteerde een toename in irritatie van de klacht in een tien keer zo grote kans de huisarts te consulteren dan vóór de toename. Het besluit zelfzorg toe te passen werd niet beïnvloed door oordeelsveranderingen.

Samenvattend is het antwoord op de tweede onderzoeksvraag als volgt. Ouders rapporteren vaak gezondheidsproblemen van hun kinderen, zoals verkoudheden, luchtwegproblemen, diarree, bewegingsapparaatproblemen en hoofdpijn. De meest voorkomende reactie van de ouders op gezondheidsproblemen was irritatie, maar deze was meestal niet erg genoeg om de huisarts te consulteren. In plaats daarvan paste men zelfzorg toe of deed men helemaal niets aan het probleem. De grootste invloed op de beslissing de huisarts te consulteren, onafhankelijk van het tijdstip in de episode, was een combinatie van (toegenomen) bezorgdheid, irritatie en nieuwigheid, terwijl men de ziekte als niet-zelflimiterend beoordeelde. Onafhankelijk van de oordelen leidden oor- en luchtwegproblemen vaker tot consulten met de huisarts. Het raadplegen van het lekennetwerk leidde vaker tot een huisartsbezoek later in de

episode. Het oordeel over het symptoom en het raadplegen van het lekennetwerk beïnvloedden in mindere mate keuzes van geen zorg of zelfzorg, terwijl juist de aard van het symptoom de keuze van zelfzorg in sterke mate beïnvloedde.

3. Welke sociaal-demografische factoren zijn geassocieerd met ziekten gerapporteerd voor kinderen en de reactie van ouders?

Voor de beantwoording van deze vraag was het plan de dagboekgegevens te analyseren. Als gevolg van de resultaten van de hoofdstukken 2 & 3, die aangaven dat moeders met een lage opleiding minder gezondheidsproblemen rapporteerden dan moeders met een hogere opleiding (45% versus 67%) en minder consulten met de huisarts rapporteerden, twijfelden wij aan de validiteit van deze gegevens. Derhalve besloten wij deze dagboekgegevens niet te gebruiken voor de beantwoording van deze vraag. De invloed van de sociaal-demografische factoren is onderzocht met gegevens van de contact- en patiëntenregistratie (hoofdstuk 7 tot en met 10). Het grootste nadeel van deze gegevens is dat geen informatie over de thuissituatie bekend is. Er is uitsluitend informatie over welke groepen de huisarts vaker consulteerden dan andere groepen. Inzicht in het proces van ziektegedrag in relatie tot sociaal-demografische factoren is dan ook afwezig.

In *hoofdstuk 7* is de invloed van leeftijd, geslacht, sociaal-economische status, urbanisatiegraad, vorm van ziektekostenverzekering en etniciteit van het kind op de consultfrequentie van de huisarts bestudeerd. Een multivariate analyse betreffende meer dan 47000 kinderen resulteerde in een statistisch significante bijdrage van alle genoemde factoren, met uitzondering van etniciteit. Jongere kinderen, meisjes, kinderen met een lagere sociaal-economische status, verzekerd via het ziekenfonds en wonend in steden met meer dan 50.000 inwoners consulteerden de huisarts vaker in drie maanden. Wij berekenden dat kinderen uit lagere sociaal-economische klassen, wonend in grotere steden én verzekerd via het ziekenfonds anderhalf maal zo vaak de huisarts consulteerden als kinderen uit hogere sociaal-economische klassen, wonend in minder verstedelijkte gebieden en particulier verzekerd (39% versus 26% in drie maanden).

In *hoofdstuk 8* is gekeken naar de sociaal-demografische variatie van de door de

huisarts gerapporteerde morbiditeit van kinderen. In drie maanden presenteerden kinderen het meest frequent luchtwegproblemen (175/1000 kinderen), huidproblemen (102/1000 kinderen), algemene en niet-gespecificeerde problemen (77/1000 kinderen), oorproblemen (56/1000 kinderen), maagdarmproblemen (54/1000 kinderen) en bewegingsapparaatproblemen (46/1000 kinderen). Jonge kinderen (0-4 jaar) presenteerden vaker algemene en niet-gespecificeerde kinderziekten, alsmede luchtweg problemen. De incidentie van alle problemen verminderde met een oplopende leeftijd, met uitzondering van bewegingsapparaatproblemen. Kinderen van een lagere sociaal-economische klasse presenteerden vaker luchtweg- en bewegingsapparaatproblemen. Kinderen wonend in grotere steden bezochten de huisarts tevens vaker met luchtweg- en oorproblemen.

In *hoofdstuk 9* is de relatieve bijdrage van diverse indicatoren van sociaal-economische status van de ouders op het huisartsbezoek van kinderen bepaald. Opleiding en beroep van zowel vader als moeder zijn beschouwd. Resultaten van een multivariate polychotome logistische regressie toonden dat het opleidingsniveau van de vader het sterkst was gerelateerd aan huisartsbezoek: een lagere opleiding van de avder resulteerde in een hoger huisartsbezoek. Bovendien namen de verschillen in huisartsbezoek tussen het hoogste en laagste opleidingsniveau toe naar mate het aantal consulten toenam. Afzonderlijke analyses voor jongens en meisjes toonden dat het opleidingsniveau van de moeder sterker was gerelateerd aan het huisartsbezoek voor jongens, terwijl het opleidingsniveau van de vader sterker was gerelateerd aan het huisartsbezoek van meisjes. Afzonderlijke analyses voor jonge (0-4 jaar) en oudere kinderen (5-14 jaar) lieten zien dat de rol van het opleidingsniveau van de vader meer uitgesproken was voor jonge kinderen en dat tevens het opleidingsniveau van de moeder voor deze leeftijdsgroep significant was gerelateerd aan het aantal huisartsbezoeken.

In *hoofdstuk 10* is speciale aandacht besteed aan de consultfrequentie en aangeboden morbiditeit van kinderen van etnische minderheden. Wij selecteerden bij elk Turks, Marokkaans en Surinaams kind afzonderlijk een Nederlands kind dat vergelijkbaar was wat betreft de volgende kenmerken: leeftijd, geslacht, sociaal-economische status, urbanisatiegraad, seizoen van registratie en verzekeringsvorm. Wij vonden geen significante verschillen in contactfrequentie tussen de drie allochtone groepen

en de Nederlandse vergelijkingsgroep. De aangeboden morbiditeit verschilde wel. Turkse kinderen kwamen vaker wegens maag-darmklachten en luchtwegklachten, maar minder vaak wegens oorproblemen. Surinaamse kinderen kwamen minder vaak wegens klachten met betrekking tot het bewegingsapparaat, maar vaker met luchtwegproblemen. Marokkaanse kinderen kwamen minder vaak met oorproblemen.

De derde onderzoeksvraag is hiermee gedeeltelijk beantwoord. De consultfrequenties toonden duidelijke variaties met diverse sociaal-demografische factoren. Ouders consulteerden de huisarts vaker voor jonge kinderen (jongens meer dan meisjes) dan voor oudere kinderen (meisjes meer dan jongens). Lagere sociaal-economische groepen, meest sterk bepaald door het opleidingsniveau van de vader, hadden hogere consultfrequenties. Tevens consulteerden kinderen uit de grotere steden de huisarts vaker dan kinderen uit minder verstedelijkte gebieden. Wij vonden geen verschillen tussen etnische groepen indien we corrigeerden voor sociaal-economische status. Luchtwegproblemen en andere infecties werden vaker gepresenteerd aan de huisarts door lagere sociaal-economische groepen en in de grotere steden. Ook Turkse en Surinaamse kinderen presenteerde vaker luchtwegproblemen.

Tenslotte worden in *hoofdstuk 11* de conclusies van dit onderzoek bedisussieerd en worden implicaties voor de huisarts, toekomstig onderzoek en beleid aangegeven.

APPENDIX

A DESCRIPTION OF THE MEASUREMENT INSTRUMENTS OF THE DUTCH NATIONAL SURVEY

The data used in this study were collected in the framework of the Dutch National Survey of Morbidity and Interventions in Primary Care carried out by the Netherlands Institute of Primary Care in 1987 and 1988.[1] One of the aims of this national survey was to assess which patient factors influence morbidity presented to the GP. Because this study made use of the data collected within this survey, this study could be seen as a result of this aim.

The purpose of this chapter is to describe the various data collection methods of the Dutch National Survey as far as relevant for this study. Also, we present non-response analyses of the various data sources. Finally, to replicate the parental responses in a more dynamic manner by means of health diaries, we had to construct illness episodes after the diaries were completed by the parents. The description of this episode construction is also given in this chapter.

Measurement instruments of the Dutch National Survey

The Dutch National Survey included four main data collection methods, of which three are used in this study. The first data collection method was a contact registration. A non-proportionally stratified sample of 161 GPs (in 103 general practices) out of the Dutch GP-population (January 1 1985: 5826 GPs) registered all contacts between patient and practice during three months. These 161 GPs were divided into four groups of ca 40 GPs, which registered in 4 successive periods of three months all contacts between patient and practice. In this way one whole year was covered. The contacts were registered on a specially designed registration form, that included among other items reason for encounter as expressed by the patient and (provisional) diagnosis made by the GP.

Next to the contact registration, there was a patient registration. From all patients listed in the practices of the 161 participating GPs sociodemographic characteristics were recorded, included were among others date of birth, gender, occupation (in case of children occupation of the wage earner), educational level, health insurance, and ethnicity (nationality, country of birth and country of birth of the parents). An outline of the patient registration form is added on page 194 of this thesis. Additionally, the location and accordingly the degree of urbanisation of each general

practice was known, which served as an indicator of the degree of urbanisation of the individual patient. Since our study is restricted to children, we followed the internationally accepted age criterium in health research of 14 years. The study population consisted of 63,753 children who had 49,295 contacts with the practices of the participating GPs during three months. For an extensive description of these data we refer to a publication of 1993.[2]

The third data collection method was the health interview in combination with the health diary. For this instrument a random sample of 100 persons per participating GP (n=161) was drawn. These approximately 16000 persons were invited to participate in a health interview that lasted about one and a half hour. Specially trained interviewers came to the house of the participants to interview. This sample consisted of 2561 children. For these children parents were invited to participate and answer the questions regarding their children (proxy interview). Parents of 2282 children agreed to participate (response 89%). An extensive description of this patient interview for adults was published in 1994.[3]

At the end of the interview parents (as all other participants of the interview) were asked to keep a diary concerning the health of their child during three weeks. Of the 2282 parents, 1805 agreed to keep a health diary for their child (response 79%). An outline of the diary is given on page 195 of this thesis. Parents had to answer question the first three question blocks each day. Block 01 was about the date, block 02 concerned three questions on general feelings 'Today I experienced my health as', 'Today my usual activities went' and 'Today my mood was' and block 03 was about health problems experienced that particular day 'Did you have any complaints about your health today?'. In case they answered question 03 with 'yes', question blocks 04, 05 and 06 had to be filled out. Question block 04 asked the nature of the symptoms experienced that day: 'Today I experienced the following symptoms'. Question block 05 concerned six different interpretations of the symptom. Parents had to answer whether the symptom was new/unknown to them, lasted longer than one year, bothered or irritated, gave reason to worry, whether they thought the symptom being self-limiting and finally whether they knew what the symptom caused. In question block 06 parents had to tick on a list of 16 distinct actions which actions they had undertaken concerning the mentioned symptom. The

16 distinct actions were (1) 'didnot do anything', (2) 'talked to others', (3) 'read about it in a book/magazine' (4) 'took it easy (went early to sleep', (5) 'did relaxation exercises', (6) 'suspended my daily activities', (7) 'stayed ill in bed', (8) 'paid more attention to my food', (9) 'didnot take alcoholic drinks', (10) 'used a home remedy', (11) 'used prescribed medication', (12) 'used over-the-counter medication', (13) 'received support from family/friends/neighbours', (14) 'went to the GP today', (15) 'went to another health care provider' and (16) 'did something else'. Parents could report maximally two separate health problems each day. In the instructions there was not prescribed when during the day the diary had to be filled out. During this three week period the specially trained interviewers phoned the parents twice to motivate and solve any problems.

Missing data

The patient population consisted of the practice population of the participating general practices. These practices have an up to date registration of their patients. Indeed, for all children dates of birth, sexes, degree of urbanisation and insurance coverages were available.

Table 1 shows the missing data for the sociodemographic characteristics used in this study. Socioeconomic status of the child is based upon the profession of the wage earner and grouped into two classes, low/middle and high, according to the EGP-

Table 1. Missing data for characteristics in the source population (N=63,753)

Characteristic	% missing data
Socioeconomic status of the child	16
Educational level of the mother	36
Ethnic origin of the child	14

code.[4] For 16% this item is missing. The educational level of the mother is missing in 36% of the children. The ethnicity of the child is determined by looking at consecutively the nationality, country of birth of the child and the country of birth of the child's parents. If one of these features is not the Netherlands the child is considered allochtoneous. For 14% of the children this item is missing.

There are several explanations for these missing data. First, the large amount of missing data concerning the educational level of the mother can partly be explained by problems of linking children's data to their parents' data. On the registration form for children no item like parental education was included. Unfortunately, in the first registration period of three months concerning approximately 25% of the study population individual registration forms were used also for children and linking to their parents' forms was impossible. Thus, for all these children the educational level of the mother was missing. In the second, third and fourth period of three months mostly family registration forms were used and linking was mostly possible. In case of family registration forms educational level of the mother was present. A second cause of missing data is due to people who did not attend the general practice within the registration period of three months. Everybody who attended the GP within the three month registration period was asked to fill out the patient registration form. People who did not attend in three months were sent the patient registration form by mail and asked to return it to the practice. Not all these people returned their form. A final source of missing data is caused by not filling out this item on the registration form. Again, for an extensive review of non-response, the reader is referred to a previous publication.[2]

Table 2 shows some sociodemographic characteristics of the two most important populations used in this study: the source population of the patient registration and the sample that kept the diary during three weeks. For most sociodemographic characteristics both populations are comparable. Educational level of the mother and ethnicity of the child showed some differences. The health diary is kept by less mothers with a low education than we would expect from the distribution in the source population. Also, less children of non-Dutch origin participated in the health diary study. Chapters 3 & 4 focus on this subject in more detail.

Table 2. Comparison on main characteristics of populations used in this study

	children listed in participating practices	children whose parents kept diary
Number of children	63753	1805
	%	%
Age of the child		
0-4 years	34	32
5-9 years	33	34
10-14 years	34	34
Gender of the child		
boys	51	54
girls	49	46
Degree of urbanisation		
<30,000 inhabitants	38	39
30,000-50,000 inhabitants	44	44
> 50,000 inhabitants	15	14
three largest cities	3	3
Educational level of the mother		
low	16	12
middle	75	76
high	9	13
Socioeconomic status of the child		
low	17	16
middle	60	62
high	23	22
Ethnicity of the child		
Dutch	90	93
non-Dutch	10	7

The remainder of this chapter deals with a description of the non-response of the health diary. Parents of 1805 children agreed to keep the health diary for three weeks. As shown in health diary studies of adults, not all respondents completed the diary every day.[5 6] Since parents had to complete the remainder of the diary if question 03 'did your child experience any health complaints today?' was answered positively, we considered the response to this question as crucial. We looked upon the response rate for this question (table 3).

Table 3. Number of days parents kept the diary

Number of days	Number of children (N=1805)	%
1-6	5	0
7-14	15	1
15-18	27	1
19-20	120	7
21	1638	91

This question was answered by 91% of the parents on all 21 days. Only two percent filled out the diary on less than 19 days. So, completion was very high, which was probably a consequence of the intensive (weekly) contacts of the field workers with the parents. Next, we checked all diaries by hand and decided that all diaries were appropriate.

In total, parents reported health problems on 5147 days. In case of a reported health problem, parents had to fill out the remainder of the one page questionnaire. Table 4 shows the item response rates for the remaining questions. The question on the nature of the health problem had the most missing cases (12%). On three percent of all 5147 day answers to all evaluation items were missing; the question regarding the action undertaken was only in 1% of all days missing. The evaluation item-

specific non response rates ranged from 10% to 15%. In a next analysis (not shown) we checked whether a few parents were responsible for these missing data to get an indication of a possible partial non response. Fortunately, less than one percent of the parents reported completely nothing on evaluation or action items on more than one day. Hence, these missing data were scattered over many days in the diary and over much parents. In conclusion, the symptom label is missing rather often, but the other items are reported satisfactory. Although it seems that the evaluation items are also rather often missing, there are no indications that partial non-response is present.

Table 4. Item non response on 5147 days with reported health problems

Item	% data missing
Symptom label	12
Evaluation items	
any evaluation item ticked	3
is new/unknown to me	14
lasts longer than one year	15
bothers me	10
worries me	15
is of a self limiting nature	10
I know what caused this symptom	13
Action undertaken	
any action ticked	1

Episode construction of the diary data

Following the suggestions made by Mechanic and Dean, we needed data on episodes of illness, instead of daily counts. Illness episodes can be defined as the period between the onset and the ending of an illness. An episode could last longer than one day and to link information about decisions and considerations regarding illness behaviour may deepen our insight. A second advantage of using episodes instead of daily counts is that occurrence rates of longer lasting illnesses are overestimated using daily counts. Following the episode-oriented registration in general practice, we decided to reconstruct episode in our diary data. Unfortunately, the diary did not contain a question that enabled us to directly link health problems that were reported on several days. To deal with this
problem, we formulated two criteria which were applied to the completed health diaries to reconstruct the episodes of illness. The two criteria were:
1. were the symptoms reported on successive days or were the symptoms reported alternated with days without symptoms? In case of a period without symptoms of less than eight days, it still could belong to the same episode. Because we assume that the mean healing process of an illness is about a week, we chose as a cut-off point seven days.If the period between two reported symptoms was more than seven days, we decided that these symptoms belonged to different episodes.
2. In case of more reported symptoms within eight days, did the symptom label of the various symptom reports belong to one health problem or to several health problems? On face value we decided whether various symptoms belonged to one health problem. In case of a similar health problem we considered it as one episode. In case of different health problems, a panel of four experts decided on the number of episodes.

In 1082 of the 1805 diaries parents reported symptoms. With the criteria in 1049 diaries illness episodes could be reconstructed, which were all checked by hand in order to see whether any dubious episodes occurred. In 33 cases (or diaries) the criteria did not reveal in a episode reconstruction and the panel of experts had to decide. These cases were judged by four raters independently from each other. In case of a diverging episode reconstruction, the reconstruction most raters indicated was chosen. In this way, 5147 days with health problems were collapsed into 1504

episodes of illness. Figure 1 shows the variation in length of episodes that we encountered. Obviously, most episodes lasted at the most four days (72%). A total of 25 episodes lasted the whole 21 days of the registration period.

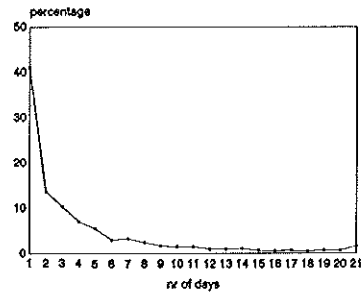

Figure 1. Length of episodes in number of days

Next, we had to decide on the label of the episode, because on several days parents could label the health problem in their child differently; in other words, what was the name of the episode? Also for this decision we formulated criteria. The criteria were applied in the following order:

1. if on one of the days parents reported measles, scarlet fever, asthma, ear complaints or mumps, this was the name of the illness episode.
2. the name of the episode is equal to the name of the symptom reported on the last day of the episode.
3. if the name of the episode is headache, stress or 'otherwise' and there are other symptoms reported during the episode, we decided that the last reported other symptom determined the name of the episode.

Finally, we categorised these different episodes into 14 groups of illnesses.

Table 5 shows the labels of the health problems on 5147 days compared with the labels of the 1504 episodes with the mean length of the episode in 14 groups. As expected the length of the episodes differs somewhat by label of health problem.

The 1504 episodes form the basis of the data needed to answer the research questions regarding the health diary.

Table 5. Label of health problems on 5147 days and of 1504 constructed episodes and mean length of the episodes by label

Label	days		episodes		mean length
	N	%	N	%	(days)
Colds/flu	1097	21	284	19	4.8
Other respiratory tract	1070	21	206	14	6.0
Diarrhoea	395	8	178	12	2.9
Musculoskeletal problems	343	7	135	9	3.6
Headaches	392	8	123	8	2.9
Tiredness	392	8	85	6	3.5
Fever/common child diseases	210	4	74	5	4.6
Skin problems	251	5	68	5	4.6
Stomach/nausea	89	2	54	4	3.5
Ear problems	130	3	50	3	3.9
Tooth ache	72	1	32	2	3.6
Eye problems	52	1	16	1	4.3
Vomiting	38	1	14	1	2.5
Otherwise	616	12	185	12	3.2

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OUTLINE OF THE PATIENT REGISTRATION FORM

FIRST FILL THIS OUT

Questions regarding your living and housing situation

Do you live:

☐ single
☐ as a (married) couple
☐ in a family
☐ in a one-parent family
☐ in a family with residents
☐ in a one-parent family with residents
☐ in a commune

Do you live in a:

☐ room
☐ flat/apartment
☐ house
☐ detached house: villa, farm
☐ elderly home
☐ other

Is your house

☐ a rental house
☐ privately owned
☐ other

Name Date of Birth Gender

.....M/F

1. Current civil status
☐ unmarried ☐ divorced
☐ married ☐ widow

2. Highest finished educational level
☐ none (yet)
☐ primary school
☐ secondary school
☐ vocational and university

3. Health insurance
☐ none
☐ sick funds
☐ privately with GP coverage
☐ privately without GP coverage

level of own contribution:
☐ < *f* 250 ☐ > *f* 750
☐ *f* 250 - *f* 750 ☐ other
☐ don't know

4. Since when are you listed in this practice?
☐ < 1 year ☐ 1-5 years ☐ > 5 year

5. Only if more GPs are working in this practice: who do you mostly consult? .....

6. Last time moved in: 19 ..

7. Nationality: .....
Country of birth: .....
Since when do you live in The Netherlands? 19 ..
Country of birth father: .....
Country of birth mother: .....

8. What is or was your last paid job? (for children and students: fill out the wage earner's job)
.....
For how many hours per week?
☐ 0-20 ☐ 21-31 ☐ > 32

9. What is or was the last paid job of the partner?
.....
For how many hours per week?
☐ 0-20 ☐ 21-31 ☐ > 32

10. Only for those who do not have a job at the moment:
☐ child/student ☐ housewife/husband
☐ military service ☐ unemployed
☐ disabled ☐ retired

OUTLINE OF THE DIARY

01 .....day | date .... - .... - 19....					
02	excel-lent	good	mode-rate	bad	very bad
Today I experienced my health as	☐	☐	☐	☐	☐
Today my usual activities went	☐	☐	☐	☐	☐
Today my mood was	☐	☐	☐	☐	☐
03 Did you have any complaints about your health today?	yes		no		
(complaints=any inconvenience/unpleasant feeling)	☐		☐		
04 Today I experienced the following symptoms	symptom 1		symptom 2		
(symptoms that belong together: in 1 box)					
05 With regard to these symptoms	yes	no	yes	no	
- this symptom is new/unknown to me	☐	☐	☐	☐	
- this symptom lasts longer than 1 year	☐	☐	☐	☐	
- this symptom bothers or irritates me	☐	☐	☐	☐	
- I'm worried about this symptom	☐	☐	☐	☐	
- in my opinion, this symptom is self-limiting	☐	☐	☐	☐	
- I know what caused this symptom	☐	☐	☐	☐	
06 Actions undertaken concerning these symptoms	(mark the boxes that are applicable)				
- didnot do anything	☐		☐		
- talked to others	☐		☐		
- read about it in a book/magazine	☐		☐		
- took it easy (went early to sleep)	☐		☐		
- did relaxation exercises	☐		☐		
- suspended my usual daily activities	☐		☐		
- stayed ill in bed	☐		☐		
- paid more attention to my food	☐		☐		
- didnot take alcoholic drinks	☐		☐		
- used a home remedy	☐		☐		
- used prescribed medication	☐		☐		
- used over-the-counter medication	☐		☐		
- received support from family/friends/neighbours	☐		☐		
- went to the GP today	☐		☐		
- went to another health care provider	☐		☐		
- did something else	☐		☐		

Dankwoord

Het schrijven van een proefschrift is grotendeels een eenzame onderneming. Toch zijn er gedurende het hele traject vele mensen, dichtbij en op afstand, elk met hun eigen kwaliteiten, die het mede mogelijk maken dat het tot een goede afronding komt. Een aantal van deze mensen wil ik met name bedanken.

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diverse artikelen) die een aanzienlijke bijdrage aan dit proefschrift hebben geleverd: Lisette van Suijlekom-Smit (kinderarts in het Sophia KinderZiekenhuis) en Koos van der Velden (projectleider Nationale Studie, NIVEL). Lisette, binnen het kinderteam zijn je adviezen op het gebied van de kindergeneeskunde voor mij erg belangrijk. De tandem die we vormden bij het schrijven van een aantal artikelen is zeer vruchtbaar gebleken. De prettige wijze waarop wij samenwerken hoop ik nog lang voort te kunnen zetten. Koos, als projectleider van de Nationale Studie heb je het mede mogelijk gemaakt dat ik deze data kon analyseren. De samenwerking tussen Huisartsgeneeskunde (lees: ik) en het NIVEL (lees: jij) is door de jaren heen altijd goed gebleven.

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Curriculum Vitae

Marc Bruijnzeels was born on April 19th 1965 in Leidschendam. He graduated from secondary school in 1983 at the Veurs College in Leidschendam. The same year he started to study political science at the Erasmus University Rotterdam. In 1989 he got his degree in political science. In March 1989 he began to work full-time at the Department of General Practice of the same university, initially as a research associate for data-analysis. Since 1993 he has worked on the research project resulting in this thesis.

In December 1995 he split his work into two half time jobs. One job is still at the Department of General Practice. For the other half he has worked at the sector Health Promotion of the Municipal Health Services in Rotterdam, evaluating a project about health education for ethnic minorities in general practice.

He is married to Hèlen van Dongen and they have one daughter, named Laura.