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Is there migration-related inequity in health service utilisation in Germany?

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Abstract

Using 12 waves from the SOEP, this study analyses if there exists inequity in access or in the utilisation of health care services due to lacking language skills or due to lacking information about the health care system (approximated by years since migration) among German first- and second-generation immigrants.

The results indicate that years since migration have a slightly impact on the contact decision, but not on the frequency decision. Hence, missing knowledge about the health care system could create additional access barriers and hence yield inequity in access to health care, but not in utilisation of health care services. Regarding the contact decision, German language skills have no influence for the first-generation immigrants, but for second-generation women. Hence, for this group, there exists inequity in the access to health care due to language skills. Regarding the frequency decision, German language skills seem to play a role for the group of first-immigrant men as well as for men and women of the second-generation: those reporting poor language skills have a significant lower expected number of visits. Hence, there is evidence for inequity in health care utilisation due to lacking language skills.

Keywords: Utilisation of health care, immigrants, SOEP

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I.   Introduction

One of the fundamental goals of the health care system of nearly all OECD countries is to establish "equal access for equal need". As measuring access is methodologically rather difficult, utilisation is often used as a proxy for access.[2] Attention to inequity in health care utilisation has steadily grown in recent years. Most studies examining inequity in health care utilisation have focused on income-related inequity (see, among others, O'Donnell and Propper 1991; Wagstaff et al. 1991; van Doorslaer and Wagstaff 1997; Hamilton et al. 1997; Gerdtham 1997; Gerdtham and Trivedi 2000; van Doorslaer et al. 1992, 2000, 2004; Wagstaff and van Doorslaer 2000a). However, equity should be guaranteed not only independent of income, but also independent of others factors like ethnicity, gender, education, place of residence, and so on. So far, only little attention has been paid to inequity regarding the immigrant population of a country. Additionally, only little is known about the utilisation behaviour of immigrants.

Hence, the purpose of this paper is to provide a detailed analysis of the factors determining utilisation of health care services in the immigrant population in Germany, and to consider whether "equal utilisation for equal need" has been achieved in the German health care system.

The selection of possible determinants of health care utilisation relies on the behavioural model of Ronald M. Andersen. According to the "Andersen model", the main factors determining health care utilisation can be categorised into three groups: predisposing characteristics, enabling factors, and need. Analysing the utilisation behaviour of immigrants it is necessary to control not only for factors such as health status, age, education, marital status, and so on, but also for factors like language ability or years since migration.

The data used are drawn from twelve waves of the German Socio-Economic Panel (SOEP). This offers not only the possibility to study cross-sections (as in most studies on immigrant or ethnic inequity in health care utilisation), but also to provide longitudinal evidence.

Analysing utilisation behaviour, hence, the number of doctor visits or nights in hospital in a given time, requires the application of count data regression methods. As the decision to contact a physician at all and the actual number of visits are the result of two separate decision-making processes, a hurdle model can be estimated which distinguishes between contact and frequency decision. Count data models are a rather widespread approach in cross-

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[2] For a detailed discussion of the terms access and utilisation see chapter III.

section analysis, but there are only very few studies using panel count data methods[3], what shall be done in this paper. The usage of panel methods offers the possibility to take time-constant individual-specific unobserved heterogeneity into account. This allows, for instance, for the control of different behavioural attitudes, health beliefs, preferences or risk aversion as well as genetic frailty, which are all likely to influence the utilisation of health care services.

The paper contributes to the existing literature in several ways. In particular, it is the first paper, which provides an empirical analysis of utilisation behaviour of immigrants in Germany. Additionally, to the best of my knowledge, it is the first study which applies a panel hurdle model to the context of immigrant utilisation.

The outline of the paper is as follows. In chapter II the Andersen behavioural model of utilisation of health care services is described. Chapter III provides a discussion about the principles of equity in health care. Chapter IV discusses count data models. In chapter V the data basis and the variables are described. In chapter VI the empirical findings are discussed and chapter VII concludes.

II.   Andersen model of health service use

Health care utilisation depends on a broad array of different factors. Ronald M. Andersen proposed in the late 1960s the so-called "Behavioural Model of Health Services Use", which provides a possibility to structure and categorise these different factors. Andersen initially aimed at developing a model which helps to understand why families use health services as well as to define and measure equitable access to health care by providing a broad array of determinants of health service utilisation (see Andersen 1968; 1995).[4] Today, it has become a standard model in the international utilisation research.

Since the first presentation of the Andersen model, it has been modified, revised and extended several times – by Andersen himself as well as by others (see, among others, Andersen and Newman 1973; Aday and Andersen 1974). The model can therefore be characterised as "heuristic", as it is open for new variables and extensions (see Andersen and Schwarze 2003: 21).

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[3] Notable exceptions are Schellhorn (2002), Riphahn (2003), Van Ourti (2004), and Bago d'Uva (2005).
[4] The relationship between access, utilisation, and equity is outlined in the next chapter.

The following presents a rather short outline of the Andersen model. It focuses especially on the possible extensions regarding the utilisation behaviour of immigrants. A detailed description of the included variables is presented in the empirical part of the paper (see chapter V).

Figure 1: The behavioural model of Andersen

Source: Own compilation according to Andersen 1995
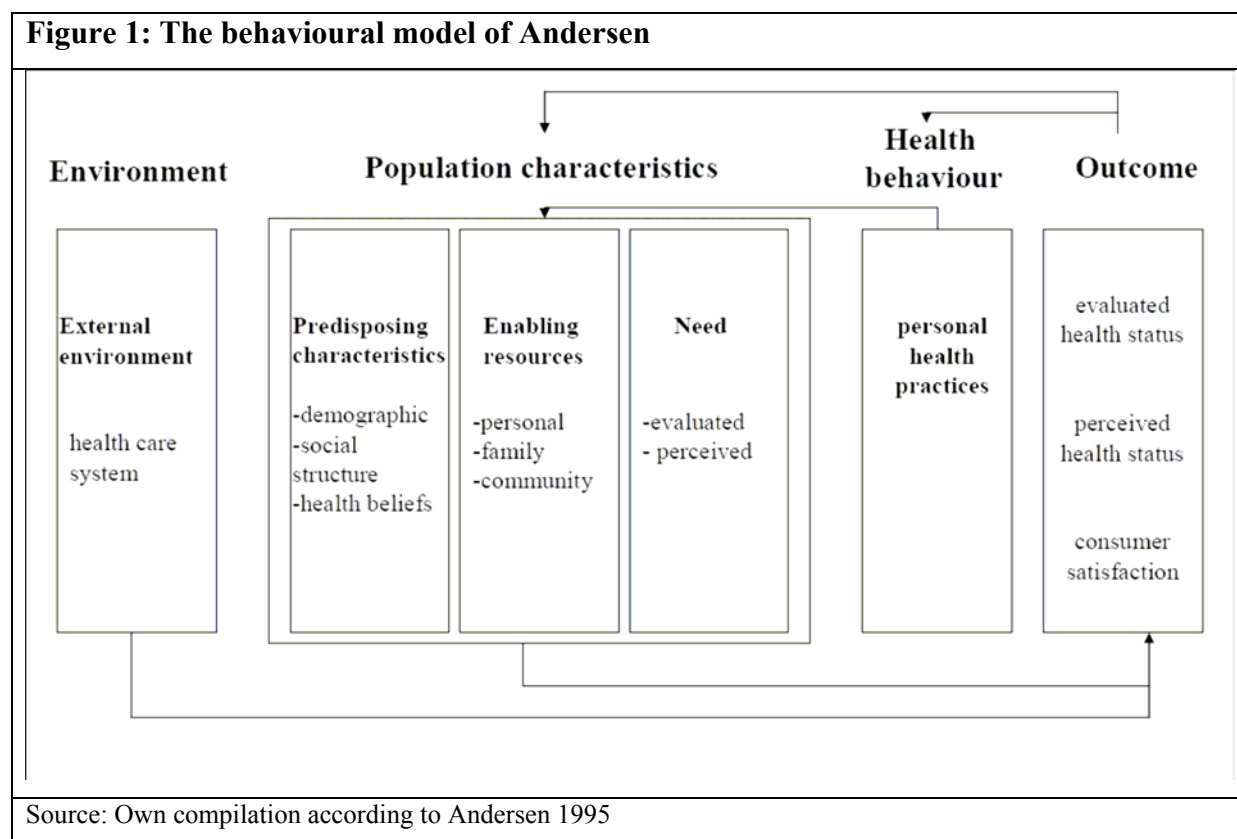
Population characteristics

The core of the Andersen model lies in the categorisation of the so-called population characteristics into three groups: *predisposing* characteristics, *enabling* factors, and *need*:

> "the model suggests an explanatory process or causal ordering where the predisposing factors might be exogenous (especially the demographic or social structure), some enabling resources are necessary but not sufficient conditions for use, and some need must be defined for use to actually take place" (Andersen 1995: 1f.).

Predisposing characteristics

Predisposing characteristics include all factors that influence utilisation in an indirect way. They describe the "propensity" of individuals to use health care services (Aday and Andersen 1974). Predisposing characteristics can be categorised into demographic variables, social structure, and health beliefs, as well as factors like genetic disposition and psychological factors.

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Demographic variables such as age and sex represent "biological imperatives" suggesting the likelihood that people will need health services (see Hulka and Wheat 1985: 446f.). Even though age and sex can hardly be separated from physical circumstances, which influence utilisation, it is also confirmed that age and sex can influence utilisation in various ways related to social dimensions (see Thode and Bergmann 2004).

Social structure covers all determinants related to

> "the status of a person in the community, his or her ability to cope with presenting problems and commanding resources to deal with these problems, and how healthy or unhealthy the physical environment is likely to be"
> (Andersen 1995: 2).

Measures include usually variables such as education, social status, occupational status, housing conditions, and social networks. Regarding the immigrant population of a country, also variables like race, ethnicity, or country of origin should be included.

Health beliefs encompass attitudes, values, and knowledge that people have about health and health care services. They influence an individual's perception of need and therefore the individual's decision to seek health care. "Health beliefs are not considered to be a direct reason for using services but do result in differences in inclination toward use of health services" (Andersen and Newman 1973: 109). First empirical approaches in the US have found that personal beliefs and social networks account for 42% of the variance in the decisions to seek health care, whereby morbidity explained only 12% (see Vickery and Lynch 1995: 553). In the literature it is assumed that with an increasing standard of health service supply for the whole population, subjective indicators are gaining weight (see Andersen and Schwarze 2003: 14f.). Regarding the immigrant population it can be assumed that differences in health beliefs due to cultural and religious influences play a major role in the immigrants' help seeking behaviour and can be seen as a key explanation for differences in access (utilisation) by ethnic populations (see Szczepura 2005:144).

The identification of health beliefs is rather difficult due to their subjective character. In addition, health beliefs are very closely related to other factors, which hampers the assessment of their influence (see Andersen and Schwarze 2003: 14).

Enabling resources

Enabling resources are the necessary conditions, which *enable* utilisation. They are divided into community resources and personal or family related resources. First of all, community resources – hence the availability of health care services – are necessary conditions precedent for utilisation to take place. Second, individuals must have the means and know-how to get to the services available. Hence, personal or family related resources include the income and

insurance situation of the individual or the family. Again, regarding the immigrant population, there might be special problems related to a lack of specific knowledge about the health care system of the host country. Additionally, language skills could be seen as enabling resources, and hence, if immigrants face language difficulties, this can hamper their utilisation.

Need

It can be differentiated between the need a person perceives (***perceived need***), and an objective need (***evaluated need***). Whereas perceived need is more associated with patient-induced utilisation, evaluated need is more associated to supplier-induced utilisation (see Thode and Bergmann 2004). Most empirical studies can only include perceived need as most of the surveys do not include objective health measures.

Differences in need are often seen the most important factors explaining utilisation. As Hulka and Wheat note, "need must be accounted for in any serious attempt to explain utilisation" (Hulka and Wheat 1985: 445). However, need can only explain part of the variance in the level and distribution of medical services. And this part is – according to experts – surprisingly small (see Breyer 1984: 14 as cited in: Andersen and Schwarze 2003: 10).

Environment / health care system

The resources and organisational structure of health care systems can be seen as important external determinants of health care utilisation. These factors are especially important in cross-country studies or in longitudinal studies to assess the effect of health care reforms.[5] As this study relates only to Germany, this category is neglected. To account for possible effects of health care reforms, time dummies are included in the empirical analysis.

Health behaviour

Personal health practices (such as smoking, dietary habits, or sports) are also seen as important factors influencing the utilisation behaviour. So far, there exists no clear evidence on how they influence help care seeking behaviour as theories are unambiguous. Additionally, only little is known about the health behaviour of immigrants and about the interaction between health behaviour and help seeking behaviour in the immigrant population.

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[5] The health care system as a determinant was included in the model in the 1970s (see Andersen 1995).

Outcome

The inclusion of outcome is often seen as one of the most important extensions. This dynamic component assumes that utilisation can influence outcomes, such as subjective and objective health status measures as well as consumer satisfaction.[6] Hence, health status is not only a factor influencing the use of medical services, but also an outcome of this use. Outcomes in turn influence population characteristics and health behaviour, hence there is a "feedback loop" (see Andersen 1995). This simultaneity imposes problems in the estimation process, which ought to be controlled by using information on the lagged health status.

III. Principles of equity in health care

Equity focuses on how to distribute resources in a fair and just way. In the field of health care it is usually recognized to be a very important objective; sometimes it is even seen to take precedence over all other objectives, even efficiency (see Wagstaff and van Doorslaer 2000b). Some authors argue that – in spite of the existence of a vast literature on 'equity in health or health care' – there is only little agreement on the exact meaning of this notion (see Oliver and Mossialos 2004). However, as for example Wagstaff and van Doorslaer (1993) show, there exists a rather broad agreement of policy-makers in several OECD countries about what is meant by equity. Also researchers from quite "different health care systems as Britain and the United States have adopted much the same notion of equity in their analysis" (Wagstaff and van Doorslaer 2000b: 1807), which reflects a rather Marxist or pro-egalitarian view of equity. Hence, there is huge agreement that the distribution of health care should be according to need, and payments according to the ability to pay.

The great deal of literature on equity and its relation to the theories of social justice cannot be replicated here. For an overview on the philosophical background see, among others, Gillon 1986, Pereira 1993, Williams1993, and the references therein.

The following gives a short summary on four different principles of equity, which are often discussed: equal expenditure for health care per capita, equal health outcomes, equal access to health care for those in equal need, and equal utilisation of those in equal need. At least some of these definitions seem to conflict with each other, for example utilisation according to need implies a commitment to inequality regarding, for example, expenditure.

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[6] Consumer satisfaction was included in the 1980s and health status outcome measures in the 1990s (see Andersen 1995).

The first two objectives are due to their shortcomings hardly used. The most common objection against the definition of *equality of expenditure per capita* is that it takes need not into account (see Culyer and Wagstaff 1992). The problem with the principle of *equality of health outcome* (measured for example by mortality, morbidity, or quality adjusted life years) is that health outcomes may depend on many other factors than health care. Additionally, as Oliver and Mossialos (2004) note, health outcomes are also determined by self-chosen lifestyles. Hence, achieving equality of health outcomes "would require too many restrictions on the ways in which people may choose to live their lives" (Oliver and Mossialos 2004: 656). Nevertheless, policies aiming at reducing the existent unequal health outcomes are seen as a desirable goal. This requires additionally to health care, a fiscal and social policy which addresses for example income inequality, housing conditions, education, and nutrition.[7]

In the literature, the principles of "equal access for equal need" and "equal utilisation for equal need" are most commonly discussed and most commonly analysed in empirical studies. These two concepts are also referred to as "horizontal equity", which induces that equals are treated equally.[8]

The terms access and utilisation are often used interchangeable.[9] Without doubt, these two concepts are very closely related (especially in their empirical application); but nevertheless, one should at least try to distinguish these two terms on a theoretical basis, which is tried to be done in the following.

First of all, one important question related to both of the principles is "how to measure need"? The concept of need is far away from being unambiguous (see, for example, Culyer 1995). In the economics literature, need is often identified with ill-health, hence suggesting a positive correlation between being ill and being in need for health care services (see, among others, Le Grand 1978, O'Donnell and Propper 1991, van Doorslaer et al. 1993). However, this is a very simplistic illustration and as Culyer and Wagstaff (1992: 2) note:

> "A difficulty with such a definition is that it is hard to see why someone who is sick can sensibly be said to need health care regardless of the latter's ability to improve the person' health" (ibid: 2).

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[7] For an overview on equity in health see, for example, Williams and Cookson (2000).

[8] In contrast, vertical equity implies that unequal people are treated differently, hence those with unequal needs have unequal access to health care or individuals with different abilities-to-pay make unequal contributions to the financing of health care. Empirical literature focuses mainly on the question of horizontal equity, usually in terms of access or utilisation. The question of vertical equity is usually not addressed – as it imposes quite a lot of problems in the empirical application; a notable exception is Sutton (2002).

[9] The term utilisation is in empirical studies not only often used as equivalent to access, but also as equivalent to demand. Whereas there exists a lot of research of "the demand for medical care" (see Grossman 1972; Breyer 1984), utilisation is seen as an empirical-descriptive concept, for which no theory exists (see Andersen and Schwarze 2003: 4).

Hence, it has to be discussed if need is related to an individual's level of illness or his capacity to benefit from treatment. The latter is often pronounced by health economists, the former more by physicians. However, this neglects possible different inputs, leading to the extended concept of need as the minimum amount of resources required to exhaust the capacity to benefit.

Another question is related to the extent to which non-clinical contributions to need, such as social circumstances, should be considered.

Additionally, the measurement of the state of health poses problems to empirical studies. Due to data limitedness, most empirical studies rely on self-reported morbidity. This is often criticised for being a rather crude measure, and for possible systematic variations in reporting styles among different socio-economic or ethnic groups (see, for example, Groot 2000 or Lindeboom and van Doorslaer 2004).

Finally, all health care utilisation regarding preventive care poses problems in empirical studies as preventive care utilisation can often not be distinguished from curative care.

As Goddard and Smith (1998, 2001) note, most of the empirical work pays only scarce attention to the concept of need. They highlight six assumptions, of which one is usually made by empirical studies:

- o "Levels of need are the same in each group being studied, meaning that no explicit consideration of need is necessary.
- o Levels of need are assessed on the basic of a crude measure, such as self-reported morbidity, thereby assuming that there are no systematic variations between groups in the way that the associated question is interpreted or answered.
- o Levels of need are assessed on the basis of a bio-medical measure of health status, therefore assuming that there is no systematic variation in the way that such measurements are taken, and that unmeasured factors (such as social circumstances) are not relevant to need.
- o Levels of need are indicated by the characteristics of the area in which individuals live, rather than their own circumstances. This approach leads to potential problems of interpretation, as an effect observed at the area level may not obtain at the individual level (and vice versa).
- o Levels of need are indicated by the results of some other study, leading to the potential for circularity in argument if that study itself is based on some measure of utilisation (Goddard and Smith 1998: 15; Goddard and Smith 2001: 1150f.).
- o Need is considered to be a "latent" variable which cannot be measured directly but is represented by a set of proxy socio-economic measures, perhaps inferred from statistical analysis of utilisation of the whole sample under scrutiny" (Goddard and Smith 2001: 1151).

Each of these alternatives can potentially yield misinterpretation. Nevertheless, for an empirical analysis, a concept of need is required. In this study, and by default of a better concept of need, self-reported health is used as a proxy for need. This corresponds to the perceived need in the Andersen model.

Access to health care is a complex concept for which no uniform definition exists. Access is often referred to the availability or the adequate supply of health services. As Rogers et al. (1999) put it: "Optimal access means providing the right service at the right time in the right place" (ibid: 866). That means access is concerned with the opportunity to obtain health care when it is wanted or needed. Mooney (1983) as well as Le Grand (1982a) suggested from a health economic perspective that equality of access is achieved if all individuals face the same money and time costs in obtaining care. This approach has been criticised – also by Le Grand (1991a) himself – that it is unsatisfactory to say that if two people face the same time and money costs, they are said to have the same access *irrespective of their income* (see Le Grand 1991a).

Pechansky and Thomas (1981) extended the concept of access in considering personal, financial, and organisational barriers to service utilisation (see Pechansky and Thomas 1981). Personal factors include the patients' perception of their needs as well as their attitudes and health beliefs, which can be influenced by social factors. As stated above, health beliefs and the perception of need are both largely influenced by cultural and religious factors. If the health care system does not account for this by supplying a kind of "cultural sensibility" it might be that immigrants face additional access barriers. Additionally, immigrants may be confronted with access barriers due to missing knowledge about the health care system as well as due to lacking language skills.

Financial barriers can arise in the presence of out-of-pocket payments. But even in a health care system in which medical care at the point of utilisation is free, individuals may experience financial barriers, for example due to travelling costs or opportunity costs due to time lost from work.

Organisational barriers can result, for example, from long waiting lists or from the unavailability of doctors (see Pechansky and Thomas 1981).

Regarding the immigrant population it can be assumed that especially the personal barriers might play an important and special role, and should hence be investigated further.

The important question "how to measure access" still remains. As Aday and Andersen (1974) note in their early contribution: "It is perhaps most meaningful to consider access in terms of whether those who need care get into the system" (ibid: 218). Hence, in this view, the term access can describe either the potential or the actual entry of an individual to the health care

system. 'Having access' denotes a potential to utilise a service if required, whereas 'gaining access' refers to the initiation into the process of utilising a service; thus 'realised access'.

As Mooney (1983) notes, there has been much confusion from these two distinct uses of the term access. He argues – to avoid further confusion – to regard access as only a question of supply. He highlights that

> "It is important to stress that equality of access is about equal opportunity: the question of whether or not the opportunity is exercised is not relevant to equity defined in terms of access" (ibid: 182).

Hence, what we expect from a health care system from a normative point of view are equal opportunities: individuals in equal need should have equal opportunities, thus equal access, to seek health care. However, this concept of access is rather difficult to implement in empirical studies. Unfortunately, what can be observed is only "gaining access", hence utilisation, (see also Goddard and Smith 2001: 1151). Therefore, in this analysis "equal utilisation for equal need" is investigated as utilisation is observable. Taking "equal utilisation for equal need" as the goal which has to be achieved, one has to deal with the drawback that one cannot allow for individual preferences (or different levels of risk aversion), which may lead – in the presents of equal access – to unequal utilisation. That means unequal utilisation which results solely from individual preferences are in this approach characterised as inequity.

Figure 2: Barriers to access in health care utilisation
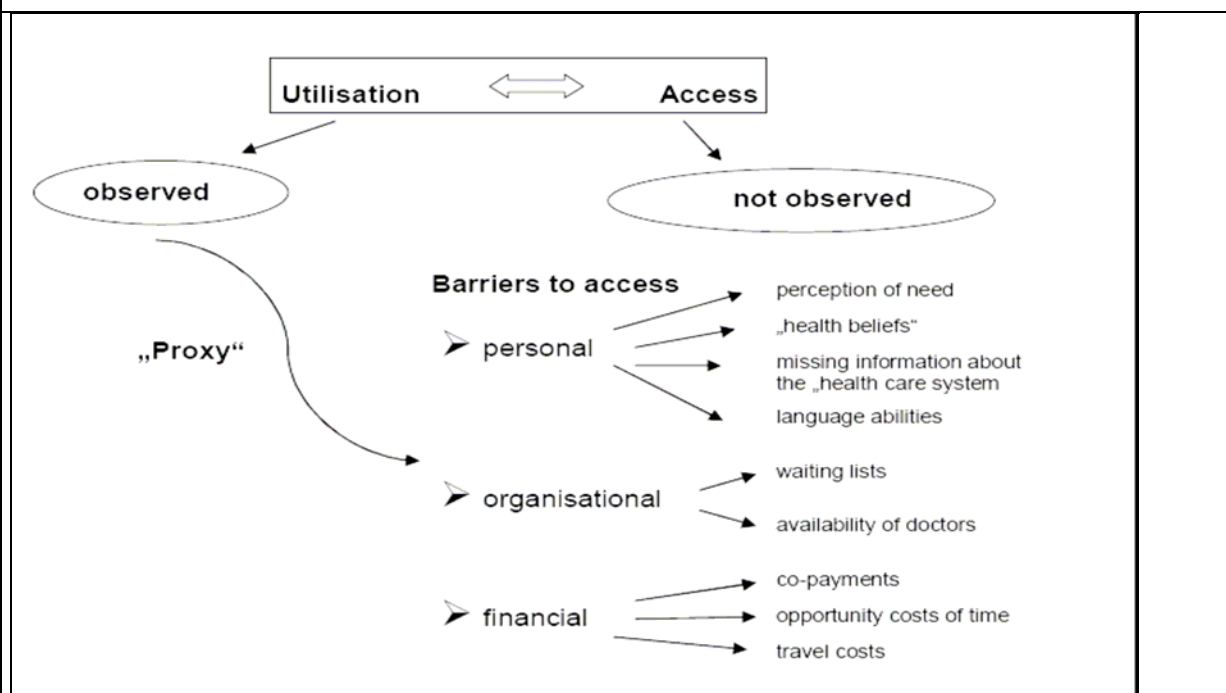
Source: Own compilation

In accordance with the literature, utilisation – especially the first step of the hurdle model, the contact decision, is thereby seen as a proxy for access (see figure 2). It has to be decided from a normative point of view, which variables ought to measure inequity (see the next paragraph).

How to measure "equal utilisation for equal need"?

An often used measure of utilisation of primary care is the number of contacts with general practitioners or specialists. For inpatient care, the number of hospital stays or the number of nights in hospital are mainly used. In this study, the number of doctor visits is analysed. Unfortunately it is not possible to distinguish between general practitioner visits and specialist visits. Analysing the number of doctor visits, utilisation is only measured quantitative; nothing can be said about the quality of treatment. However, the quality of treatment may vary between different population groups.[10] This might be a problem in the immigrant group if a good treatment depends on the relationship between the doctor and the patient, and if this relationship is distorted due to language or cultural barriers, or due to discrimination.

Additionally, if alternative health therapies are not considered, the results can wrongly indicate underutilisation (see Goddard and Smith 2001: 1152).

Broadly spoken, it can be distinguished between three different approaches to measure horizontal (in)equity.

In the first approach use /need ratios for different (income or socio-economic) groups are constructed. That means the amount of health services used by one group is compared to the amount of need this group displays, usually adjusted for the age and gender structure.[11] This approach is sometimes called *Le Grand approach* as Le Grand (1978) was the first who used this method for analysing the distribution of public health care expenditure in relation to need for different socio-economic groups (see Le Grand 1978).

For example, Smaje and Le Grand (1997) used this approach to examining the extent to which the National Health Service (NHS) provides equal treatment (proxied by utilisation of general practitioner, outpatient and inpatient services) for equal need for different ethnic groups (Indian, Pakistani, Bangladeshi, Chinese, Caribbean, African, mixed/none, White, no answer).

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[10] As Goddard and Smith (1998: 15) remark, even the quantity of utilisation may be wrongly measured, if, for example, a contact takes place only for administrative requirement, such as getting a sick note.

[11] Le Grand (1978) himself did not adjust for the age and gender structure in his earlier works. He noted that his results "may derive simply from differences in the age and sex composition of the groups" (Le Grand 1982: 26).

They found – with exception of the Chinese population - no gross pattern of inequity in the use of health care services.

The advantage of this approach lies according to Smaje and Le Grand (1997) in its simplicity and relative easy interpretation. However, this methodology was criticised, among others, by Collins and Klein (1980), O'Donnell and Propper (1991: 3ff.), and Wagstaff et al. (1991), because it does not distinguish between individuals reporting illness and those receiving care, and thus assuming that only those reporting illness consume care. This could yield – for a group with no ill members – an infinite use / need ratio even though the average utilisation is constant across all groups (see O'Donnell and Propper 1991: 4).[12]

The second approach introduces *concentration curves and concentration indices* to measure inequality in the utilisation of health care. There can be distinguished two different schemes: direct standardisation-based indices and indirect standardisation-based indices. As these approaches are mainly used to study income-related inequity, there are not outlined here. For a detailed description see, among others, van Doorslaer et al. 1992; van Doorslaer et al. 1997; van Doorslaer et al. 2000; Wagstaff et al. 1991.[13]

In the third approach *multivariate regression analysis* is used to study the influence of a broad array of possible factors on the utilisation of health care services. These factors can be chosen relying on the behavioural model of R. Andersen, which is outlined in the next chapter.

Multivariate regression analysis is said to offer more scope than the other approaches for examining the influence of a variety of possible explanatory variables (see Smaje and Le Grand 1997: 9). However, one cannot quantify the existing inequity (see Wagstaff et al. 1991: 187).

The underlying idea is to investigate whether need (and demographic variables) are the principal determinants of health care utilisation (see Andersen 1968), which should be the case in an equitable health care system. Hence, a value judgement is needed on which components should explain utilisation in an equitable health care system. For example, if income or ethnicity are seen as factors which should not influence the utilisation of health care in an equitable health care system, then equity will not be achieved if income and ethnic

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[12] For a detailed criticism by means of a simple model see Wagstaff et al. 1991. Le Grand (1991b) responds to this critic.

[13] These approaches can also be seen as an extension to Le Grand's approach. They have been proposed and extensively used in the publication of the so-called ECuity Project of the OECD. A list of publications of the ECuity project can also be found at: http://www2.eur.nl/bmg/ecuity/publications.htm.

variables are significant independent predictors of utilisation, especially in the second step of the hurdle model (frequency decision).

Regarding the immigrant population it is assumed from a normative point of view, that if language skills and years since migration – used as a proxy for know-how of the health care system – show to be independent predictors of utilisation, then there is inequity towards the migrant population in Germany. If country of origin, that means the variable signifying ethnic origin, is an independent predictor of utilisation, then there might be inequity in utilisation, but the differences could also be due to behavioural aspects, and thus due to differences in preferences and risk aversion.

Regarding the access of health care it is – following Abasolo et al. (2001) – possible to define variables from a theoretical point of view as 'access variables'. These are according to the Andersen model mainly the 'enabling variables'. If these variables are significant predictors of utilisation – especially in the contact decision, there is inequity in access to health care.

Taking the variables representing potential access barriers for the immigrant population as discussed above, the hypotheses are again, that there exists inequity in access if language skills and years since migration are independent predictors of utilisation.

Table 1 summarises the hypotheses regarding inequity in utilisation and access of the immigrant population.

Table 1: Variables indicating inequity in access to health care and utilisation

	inequity in access	inequity in utilisation
Contact decision		
language skills	Yes	
years since migration	Yes	
Frequency decision		
language skills		Yes
years since migration		Yes

Source: Own compilation

IV. Count Data models

In many empirical studies of health service utilisation the variable which is mainly ought to be explained is a count variable, for example, the number of physician visits (sometimes detailed by type of physician), number of hospital stays or nights in hospital, or the number of drug

prescriptions. Counts are discrete variables that can only take non-negative integer values, which makes the application of count data models appropriate.

Estimates of the utilisation of health care services are known to depend heavily on the empirical specification used in the analysis (see Deb and Holmes 2000: 475). This highlights the importance to be cautious with the interpretation of estimation results and the choice of the empirical methods.

A standard benchmark model for count data is the **Poisson regression model** (PRM). The events being counted can be seen as the outcomes of n independent Bernoulli trials in a given period. It can be shown that the probability distribution of the number of occurrences in n trials approaches the Poisson distribution with expected value µ as n goes to infinity. To obtain a regression model, each observation is allowed to have a different value of µ, dependent on a set of independent variables x. Hence, the intensity parameter μ_i is specified as a function of observed x_i's.

To ensure a positive µ, this is conveniently done by specifying µ as a log-linear function of the explanatory variables x_i, and we obtain the following conditional probability distribution:

$$f(y_i) = \frac{\exp(-\exp(x'_i \beta))\exp(y_i x'_i \beta)}{y_i!}, \qquad y_i = 0, 1, 2,\ldots \qquad (1)$$

where x is a vector of K explanatory variables including a constant and ß denotes the corresponding coefficient vector.

It is then:

$$E(y_i|x_i) = V(y_i|x_i) = \exp(x'_i\beta) = \mu(x_i;\beta)$$

which is called the exponential mean function.

The equality of mean and variance – the so-called *equidispersion* – is a main characteristic of the Poisson distribution. If equidispersion does not hold it can be due to either *overdispersion* (variance is greater than the mean) or *underdispersion* (variance is smaller than the mean). This *equidispersion assumption* is usually taken as one of the major shortcomings of the PRM (see Greene 2003: 744). Violation of equidispersion will – as long as the conditional mean is correctly specified – not lead to biased parameter estimates, but it will cause the estimated

standard errors to be biased (in the case of overdispersion downwards, in the case of underdispersion upwards), and thus rule out inference.[14]

Overdispersion can be caused by at least one of the following three problems:

First, due to the deterministic relationship $\mu(x_i;\beta) = \exp(x'_i\beta)$ it is not possible in the PRM to allow for *unobservable individual heterogeneity*. One of the consequences of unobserved heterogeneity is overdispersion (see Skrondal and Rabe-Hesketh 2004: 10).

Second, many data sets used for count data modelling are characterised by a large proportion of zero users. However, as μ increases, the probability of a zero count decreases. Hence, the PRM will mostly predict much fewer zeros than there are in the data. This problem is called the "*excess zero*" or "*zero inflation*" problem (see Winkelmann 2000).

Third, another critical assumption of the PRM lies in the postulated *independence of the events over time*. That means, the PRM is only correctly specified if the probability of an occurrence in t does not depend on the occurrence in t-1. That means in the case at hand that a doctor visit in t should not have any influence on subsequent doctor visits. This might be an unrealistic assumption if an illness spell leads to several doctor visits which are not independent from one another. Hence, if events do not occur randomly over time, the application of PRM renders inappropriate.

An alternative to the PRM is the **negative binomial (Negbin) model**[15], which builds upon the *negative binomial distribution*. This is a more flexible distribution than the Poisson, because it allows a more flexible modelling of the variance. It is seen as the standard parametric model to account for overdispersion (see Cameron and Trivedi 1998: 71). However, the Negbin model is also not able to account for the large proportion of zero users usual in health utilisation data sets and leads to poor fits (see Gurmu 1997). Additionally, the Negbin model as well as the PRM assume that there is only one underlying process that generates the zeros and positive observations. This assumption has been shown to be too restrictive in the case of health care utilisation (see Jones et al. 2007: 286).

To overcome the "excess zero" and dispersion problems, Lambert (1992) introduces the **zero-inflated Poisson** (ZIP) and the **zero-inflated negative binomial models** (ZINB). These models allow the zeros to be generated by two distinct processes. The classical example is the

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[14] Cameron and Trivedi (1998) provide approaches to use the PRM in spite of overdispersion by adjusting standard error estimates.

[15] The Negbin model is not outlined here. For a detailed description see, for example, Cameron and Trivedi (1998).

number of fishes caught in a given lake. Some of the "zeros" result from fishing and not catching; but some also result from not fishing at all. Hence, the underlying assumption is that the population is characterised by two regimes: one group where the members have always zero counts and one group where the members have zero or positive counts.

In the case of health care utilisation, Deb and Trivedi (1997) remark that

> "In the zero-inflated negative binomial model there is a sharp and unrealistic distinction between the healthy population with zero demand and the ill population…" (ibid: 319).

Also Jiménez-Martin et al. (2002) state that the zero-inflated models are

> „not reasonable since we know that a patient decides to contact a physician just when he makes a visit. Therefore, the count for those that decide to visit a physician in the first stage is always at least one" (ibid: 305).

The so far described one-step" models or single equation models take a rather traditional consumer theory approach (Grossman 1972; Muurinen 1982), where the demand for health care services is seen as primarily patient determined (see Deb and Trivedi 1997: 313). However, as proposed by Zweifel 1982, the decision to contact a physician at all and the actual number of visits are the result of two separate decision-making processes. This principal-agent approach is quite often highlighted in the literature: the idea behind is that in a first step, it is the patient who decides to visit a doctor (contact decision), whereas it is the physician who determines the intensity of the treatment (frequency decision) (see, among others, Manning et al. 1987: 109; Pohlmeier and Ulrich 1995: 340; Gerdtham 1997: 308). It is thereby assumed that the (individual's) decision to contact a physician is generated separately from the (physician's) decision on successive utilisation of health services.

Hence, so-called **hurdle models**, which distinguish between the contact and the frequency decision, have often been discussed to analyse health service utilisation. It has been demonstrated – for instance by Grootendorst (1995), Pohlmeier and Ulrich (1995), or Andersen and Schwarze (1997) that it might be a better option to estimate two-part models instead of one-part models if the dependent variable is characterised by a large proportion of zeroes and of the dependent variable results from two separate decision-making processes.

> "The idea underlying the hurdle formulations is that a binomial probability model governs the binary outcome of whether a count variate has a zero or a positive realization. If the realization is positive, the "hurdle" is crossed, and the conditional distribution of the positives is governed by a truncated-at-zero count data model" (Mullahy 1986: 345)

As the two parts are assumed to be independent; it is possible to estimate the two parts of the hurdle model separately.

The log-likelihood of the hurdle model is given by:

$$LogL = \sum_{y=0} \log[1 - P_1(y > 0 \mid x)] + \sum_{y>0} \{\log[P_1(y > 0 \mid x)] + \log[P_2(y \mid x, y > 0)]\}$$

$$= \left\{\sum_{y=0} \log[1 - P_1(y > 0 \mid x)] + \sum_{y>0} \log[P_1(y > 0 \mid x)]\right\} + \left\{\sum_{y>0} \log[P_2(y \mid x, y > 0)]\right\}$$

$$= LogL_1 + LogL_2$$

Hence, for the participation decision, a binary model is defined. The underlying distribution is usually either logit, probit, Poisson, or Negbin. For the second decision a truncated-at-zero count data model is defined, whereby the underlying distribution is commonly either Poisson or Negbin.

The independent variables can be different for each of the two processes, or they can be the same, but may be interpreted differently depending on the stage of the decision-making process. For instance, the variable 'physician density' represents at the first stage an availability effect, whereas at the second stage it may reflect competition among physicians, and thus supplier-induced demand (see Pohlmeier / Ulrich 1995: 344).

Mullahy (1986), who has first proposed the hurdle model for count data, used the Poisson distribution as the underlying distribution for both processes.

Pohlmeier and Ulrich (1995) criticise that this approach it not able to take unobserved heterogeneity into account. They argue that this is necessary "since supply side effects are rarely well captured in household data at the micro level" (Pohlmeier / Ulrich 1995: 344). Hence, they suppose to use the Negbin distribution for both stages of the model instead of the Poisson distribution. According to Pohlmeier and Ulrich this specification allows for explicit testing of distributional assumptions (for example, against Poisson), and for the equality of the two parts of the decision-making process (see Jones et al. 2007: 291).

A common criticism of the hurdle model is the sharp distinction between users and non-users, which is usually not tenable in the case of typical survey data sets, because medical consultations are measured per period of time and not per illness episode (see for example Gerdtham and Trivedi 2000; Deb and Trivedi 2002: 602). Hence, Gerdtham and Trivedi (2000) question the possibility to make a direct link between the hurdle and the principal-agent framework.

In this context one can also discuss the "optimal" period under consideration. Pohlmeier and Ulrich (1995) note that on the one hand, a longer observation period reduces the probability of confusing contact and frequency decisions due to a belonging to an illness episode of the preceding period. However, on the other hand, longer time periods increase the probability to observe multiple illness spells, and thus multiple first contacts (see ibid: 350).

To overcome the sharp distinction between users and non-users, Deb and Holmes (2000) and Deb and Trivedi (1997, 2002) propose the use of **finite mixture / latent class (LC) models** as an alternative to hurdle models[16], whereby it is discriminated between frequent and less frequent users. According to Deb and Trivedi (1997) there are a number of advantages of this approach. First, it provides a "natural representation of heterogeneity", because each latent class can be seen as a "type" of individual and additionally, the choice of the functional density form can accommodate heterogeneity within each component. Second, as the finite mixture model is semi-parametric, the underlying distribution for the mixing variable does not need to be specified. Third, as shown by Heckman and Singer (1984), finite mixture models provide good numerical approximations of the estimates even if the underlying mixing distribution is continuous. Fourth, it is also possible to estimate finite mixture models if the marginal density has no closed form (see Deb and Trivedi 1997: 318).[17] Additionally, the latent classes are assumed to be based on a person's long-term health status, which is a latent variable and usually not observable (see Cameron and Trivedi 1998).

Although Jiménez-Martin et al. (2002: 306) list the same advantages of finite mixture models, they also mention some disadvantages. First, they mention that there are only driven by statistical reasoning, whereas the hurdle model can be seen as a natural extension of the principal-agent model. In contrast, Deb and Trivedi (1997) see this as an advantage of the finite mixture model, because „it does not rely for its justification on a principal-agent type formulation" (ibid: 314). Second, according to Jiménez-Martin et al. (2002: 306) the finite mixture model is sometimes difficult to estimate, because the mixing distribution has to be estimated jointly with the rest of the model parameters, which can yield over-parameterisation. Finally, they add that misspecification of the density is as possible as in the hurdle model.

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[16] From a statistical point of view, the two-part model is also a finite mixture, because it combines zeroes from binomial density with positives from a zero-truncated density. However, the hurdle model is more restrictive than the finite mixture model (see Deb and Trivedi 1997).

[17] For parametric count data models the choice of a continuous mixing density can be restrictive when the conditional kernel and mixing densities are not from conjugate families, because then the marginal density has no closed form (see Deb and Trivedi 1997: 318).

The hurdle model and the latent class model are closely related; however they are not nested. Therefore, it is a priori not clear, which model will empirically perform better. Hence, there exist a growing number of studies comparing the performance of the hurdle model and the latent class models (see, among others, Deb and Trivedi 1997, Jiménez-Martin et al. 2002, Santos-Silva and Windmeijer 2001, Van Ourti 2004; Winkelmann 2004). For example, Winkelmann (2004), who compares a range of models, including the Hurdle negative binomial, the Hurdle probit-Poisson-log-normal, and several finite mixture models, finds that his proposed Hurdle probit-Poisson-log-normal model is preferred overall by statistical model selection criteria (for example, log-likelihood, Schwartz Information Criterion, or Vuong's test). Hence, he concludes that the results of Deb and Trivedi (2002) can only be "interpreted as evidence against the particular hurdle parameterization, but not against hurdle models in general" (ibid: 467).[18]

In this paper the hurdle approach is used to study health care utilisation, because of the theoretical link with the principa-agent approach which is of importance in this paper. Additionally, the panel structure of the data is exploited to account for unobservable individual specific heterogeneity and hence, for the first stage a random-effects probit model is estimated and for the second stage a truncated-at-zero negative binomial model is estimated.

V.   Description of the data and variables

Data source

The data used are drawn from the German Socio-Economic Panel (SOEP).[19] The SOEP is a representative longitudinal survey of currently about 12,000 randomly selected private households. Since its start in 1984[20], each household member above 16 years is asked questions on a yearly basis on a broad range of socio-economic indicators covering 'population and demography', 'education, training and qualification', 'earnings and income',

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[18] Bago d'Uva (2005) proposes a combination of the hurdle and the finite mixture model. In this model – as in the finite mixture model – the individuals are considered to belong to latent classes, and additionally – as in the hurdle model – a two stage decision process is allowed, given the latent classes.

[19] For more detailed information see www.diw.de/soep and Haisken-DeNew and Frick 2005 and references therein. The SOEP data are available as a "scientific use" file (see Wagner et al. 1993).

[20] The SOEP started in 1984 with approximately 6,000 households (Sample A and B). In 1990 – after the German reunification – the SOEP was expanded to the territory of the former German Democratic Republic by about 2,200 households (Sample C) (see Haisken-DeNew and Frick 2005, SOEP Group 2001).

'health', 'basic orientation', as well as questions on 'satisfaction with life and with certain aspects of life'. Additionally, the head of the household is asked to fill in a household related questionnaire covering household income, housing, and questions on children in the household up to 16. An additional immigrants' questionnaire contains questions on pre-immigration experiences, measures of integration as well as information about remigration intentions.

One of the most important features of the SOEP is the over-sampling of immigrants. Sample B, which started in 1984 with approximately 1,300 households, covered those households whose head was either from Italy, Greece, Spain, Yugoslavia, or Turkey, that means Sample B covered the so-called "guest workers". In 1994/95 Sample D was started, which consists of households in which at least one household member had moved from abroad to West Germany after 1984; therefore especially immigrants from Eastern Europe are included, and thus Sample D covers to a broad extent the so-called "Aussiedler".[21]

To define who enters the analysis as a migrant information on the country of origin as well as information on the nationality is necessary. In this study, three different groups are distinguished: (i) native Germans (who are born in Germany and have German nationality), (ii1+ii2) first-generation immigrants (who are born abroad irrespective of their nationality), and (iii) second-generation foreign immigrants (who are born in Germany, but have non-German nationality). This distinction means that in this analysis ethnic Germans (who have German nationality but are born abroad) belong to the group of the first-generation immigrants (ii1).

Table 2: Nationality or country of origin: who is a migrant?

nationality	country of origin		Total
	Germany	**abroad**	
German	165,777 **(i)** (86.15)	6,946 **(ii1)**(3,61)	172,723(89.73)
Non-German	3,567 **(iii)**(1.85)	16,193 **(ii2)**(8,41)	19,760 (10.27)
Total	169,344(87.98)	23,139(12.02)	192,483(100.00)

Source: Own computation, SOEP waves 1994-2005

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[21] The term "Aussiedler" is used for ethnic Germans, who moved back to Germany after the fall of the iron curtain. They usually lived in Eastern European countries before.

Dependent Variable

In the SOEP there are two questions relating to the utilisation of health services: one relating to inpatient and one to outpatient services. In this study it is concentrated on doctor visits. Unfortunately, only in five waves (1984-1987 and 1994) has been asked separately for the use of general practitioners and specialists. Hence, the general question is used, which has been asked in the other waves:

"Have you gone to a doctor within the last three months? If yes, please state how often".

This is a rather gross measure of utilisation and can therefore be criticised. A better alternative would be specific measures related to a particular condition, the type of service or practitioner, or − as mentioned above − should be linked to an illness episode (see Andersen 1995: 4). Nevertheless, the number of doctor visits is an often used measure and can serve to provide a first idea about utilisation behaviour.

The dependent variable is highly skewed to zero. The variance exceeds in both cases the mean, which means there is evidence for overdispersion. Table 3 gives an overview of the number of doctor visits for natives, first-generation immigrants, and the second-generation for men and women, respectively. For all groups, women show higher utilisation rates than men. Second-generation men show the lowest mean of the number of doctor visits (1.29), and native women the highest (3.15).

Table 3: Doctor visits: descriptive analysis

Number of doctor visits	Natives		First-generation immigrants		Second-generation	
	men	women	men	women	men	women
0	37.09	23.41	41.17	29.18	52.64	34.76
1-2	32.61	34.78	29.84	32.68	30.69	31.28
3-6	22.52	30.62	19.82	27.92	13.97	25.50
7-10	4.40	6.40	4.82	5.75	1.98	5.20
>10	3.38	4.79	4.34	4.49	0.72	3.26
Mean	2.36	3.15	2.46	2.94	1.29	2.54
Std.Dev	4.21	4.61	4.80	4.73	3.13	4.17
N	79,130	86,647	11,793	11,345	1,818	1,749

Share of total observations in percent
Source: Own computation, SOEP 1994-2005

Independent variables

The inclusion of the independent variables is guided by the behavioural model of Andersen (see chapter II) and the following explanatory variables are included: a dummy variable for *sex* (taking the value one for males); *age* and *age^2*; dummy variables for the *country of origin;* a dummy variable for *German nationality*; three dummy variables for the *marital status* (i.e. one dummy for being married, one for being separated, one for being widowed with being single acting as reference group); a dummy for having children under the age of 15; *years of education*; *occupational status* (i.e. dummy variables covering the following possibilities: 'non-working', 'jobless', 'training', 'self-employed', 'pensioner, or 'public servant' (with 'working' acting as reference group); *equivalence income,* which is defined as household post-government income divided by the square root of the number of household members; four dummy variables for *self-rated health* ("good", "fair", "poor", or "very poor" with "very good" acting as reference group); a dummy variable indicating if the individual has been officially registered as having a reduced capacity for work or *being severely disabled*; four dummy variables for *German language skills*[22] ("good", "fair", "poor", or "very poor" with "very good" acting as reference group); and *years since migration*.

Health behaviour (smoking, body mass index, sports activities) cannot be included in the analysis as these variables have only been asked in three waves up to now.

Descriptive characteristics of the sample

Table 4 presents descriptive characteristics of the sample. In the native group, there are slightly more women than men (52% to 48%), in the group of the first and second generation immigrants this relation is reverse. The natives are on average older than the immigrants with an average age of 46.1 for men and 47.5 years for women. The first generation male immigrants are on average 44.6 and the female immigrants 43.2 years. The second generation immigrants are with an average age of 25.7 for men and 26.5 for women about 20 years younger than the natives. Regarding the marital status, the first-generation immigrants are the group with the highest proportion of married individuals with around 80%, compared to around 60% for the natives and between 26% and 37% for the second generation. The low proportion of marriages in the second generation can be explained by there lower average age. The immigrants are on average slightly less educated than the natives in terms of years of education: whereas natives have about 12 years of education, male immigrants have on average 10.5, female immigrants 10.2 and the second-generation 10.7. It is remarkable that in

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[22] These are constructed from a self-assessed question: "In your opinion, how well do you speak German?".

the second generation there is no difference between men and women in terms of years of education. In all groups, men rate their health on average better than do women. In the second generation, 80% of men and 71% of women rate their health as very good or good. This very high proportion in comparison with natives (52% of men and 47% of women) and immigrants (54% for men and 48% for women) can – at least partly – be explained by the younger average age of the second generation. Remarkable is further the very high proportion of the second generation evaluating their German language skills as very good or good (97% of men and 94% of women). In the first-generation (only) 62% of the men and 57% of the women rate their language skills as very good or good.

Table 4: Descriptive characteristics of the sample

Variable	Natives		first-generation immigrants		second-generation	
	men	**women**	**men**	**women**	**men**	**women**
Sex	0.48	0.52	0.51	0.49	0.51	0.49
Age	46.1	47.5	44.6	43.2	25.7	26.5
	(16.5)	(17.6)	(14.3)	(14.0)	(7.1)	(8.9)
Marital status						
married	0.64	0.59	0.81	0.79	0.26	0.37
separated	0.08	0.10	0.06	0.08	0.03	0.06
widowed	0.03	0.11	0.01	0.05	0.00	0.01
children	0.27	0.28	0.44	0.45	0.35	0.41
years of education	12.1	11.6	10.5	10.2	10.7	10.7
	(2.6)	(2.3)	(2.4)	(2.6)	(2.2)	(2.2)
occupational status						
non-working / jobless	0.08	0.21	0.15	0.40	0.13	0.30
pensioner	0.21	0.25	0.15	0.12	0.01	0.01
public servant	0.06	0.03	0.00	0.00	0.00	0.00
training	0.07	0.06	0.05	0.04	0.29	0.25
self-employed	0.08	0.04	0.05	0.02	0.05	0.02
Income	20233.1	18688.8	16016.2	15471.4	17039.0	15604.8
	(11060.7)	(10655.9)	(7898.1)	(7974.8)	(7454.8)	(7352.1)
Self-rated health						
very good	0.09	0.08	0.12	0.08	0.30	0.21
good	0.43	0.39	0.42	0.40	0.50	0.50
fair	0.33	0.34	0.28	0.31	0.16	0.21
poor	0.11	0.15	0.14	0.16	0.04	0.06
very poor	0.03	0.04	0.04	0.04	0.01	0.02
Disability	0.14	0.11	0.11	0.06	0.02	0.03
German nationality			0.28	0.32		
Country of origin						
Turkey			0.29	0.26		
Greek			0.07	0.07		
Italy			0.13	0.10		
Spain			0.04	0.03		
Former Yugoslavia			0.08	0.07		
Other EU-countries			0.05	0.05		
Eastern Europe			0.31	0.38		
Other countries			0.03	0.04		
German language skills						
very good			0.23	0.23	0.64	0.71
good			0.39	0.34	0.33	0.23
fair			0.28	0.27	0.03	0.04
poor			0.10	0.14	0.00	0.01
very poor			0.01	0.02	0.00	0.01
years since migration			21.0	18.9		
			(10.6)	(10.2)		
# Observations	79,130	86,647	11,794	11,345	1,818	1,749

Source: Own computation, SOEP, wave 1994-2005

VI.   Empirical findings and discussion

The results of the first part of the hurdle model are presented in table 5. Column two and three refer to the natives, column four and five to the first-generation immigrants and column six and seven to the second-generation. The estimation is conducted for men and women separately to allow for a possible different influence of certain independent variables on health care utilisation of men and women, respectively. Overall, the results are in line with the existing literature on health care utilisation.

The interpretation is restricted to a qualitative approach, with a positive sign indicating a higher probability of visiting the doctor, and a negative sign indicating a decreasing probability.

The effect of *age* on the probability to have at least one doctor visits is convex, and – with the exception of the second generation – highly significant. *Married* individuals (with the exception of second-generation men, where there is no significant influence) show a higher probability of at least one doctor visit in comparison to singles. The influence of children on health utilisation is significantly negative (again with the exception of the second-generation and first-generation women). In literature, there exists no consistent explanation for the influence of *years of education.* Whereas more educated individuals have a better recognition of need and a better recognition of the benefits of preventive care, they are also said to be more able to cure trivia on their own. The results show a significant positive influence of years of education on health utilisation. Exceptions are again the second-generation men, where the influence is negative, but not significant. The influence of the *occupational status* seems to be ambiguous. The only variable which has for all individuals a significant and unambiguous influence is being self-employed, which lowers the probability of a doctor visit compared to employees. Being public servant highers the probability of a doctor visits, yet, the influence is only significant for male natives. Being a pensioner or non-working has for natives a significant positive influence, for the first- and second generation the influence is ambiguous. *Income* is only for male natives and second-generation women significant. The influence is converse: whereas income has a positive influence on the probability of a doctor visit within male natives, it has a negative influence within the group of female second-generation immigrants. As expected, *self-rated health* has for all groups a significant influence: rating the state of health worse than very good highers the probability of a doctor visit. For the first-generation immigrant group having German nationality lowers the probability of a doctor visit; this effect is only significant for women. Interestingly, the *country of origin* seems to have no influence on the contact decision. The only exception are

Greek women, who have a significantly higher probability to contact a doctor. *German language skills* have no influence on the contact decision for the first-generation immigrants. The hypothesis of an existing inequity in the access of health care due to additional access barriers due to lacking language skills is therefore not supported by the data. However, language skills have a strong influence on the contact decision for the second-generation women. In this group having fair, poor or very poor language skills reduces significantly the probability to contact a physician compared to having very good language skills. Hence, for this group, there exists inequity in the access to health care due to language skills. Nevertheless, the question why language skills have such a different influence in these two immigrant groups remains and need to be studied further. *Years since migration* show a slightly significant influence, hence the hypothesis regarding ysm as an access barrier can slightly be supported and there might be inequity in the access to health care regarding ysm.

In Table 6 the estimation results for the zero-truncated Negbin model are presented. As in table 5 column two and three refer to the natives, column four and five to the first-generation immigrants and column six and seven to the second-generation.

The results indicate that – conditional on having at least one doctor visit – German language skills play a role for the frequency of doctor visits for the group of first-immigrant men as well as for men and women of the second-generation: those reporting poor language skills have a significant lower expected number of visits. Hence, there can be inequity in health care utilisation due to lacking language skills. On the one hand, assuming that the proposition of the principal-agent approach holds, and it is the physician who determines to a large part the frequency, it could be that there is a kind of discrimination in the way that the physician is less addicted to reorder a patient with poor language skills. On the other hand, it could be that patient with poorer language skills do not feel comfortable about going to a doctor they rather poorly understand, and thus they will only go in the case of emergency. Years since migration seem to have no influence for the frequency of the doctor visits.

Table 5: Estimation results: first part of the hurdle model: random-effects probit model

Variable	Natives		first-generation immigrants		second-generation	
	men	women	men	women	men	women
Age	-0.04***	-0.03***	-0.05***	-0.02*	-0.01	-0.01
	(0.00)	(0.00)	(0.01)	(0.01)	(0.03)	(0.02)
Age^2	0.05***	0.04***	0.06***	0.02	0.01	0.03
	(0.00)	(0.00)	(0.01)	(0.01)	(0.04)	(0.03)
Marital status						
single	-	-	-	-	-	-
married	0.17***	0.14***	0.19**	0.24**	0.10[a]	0.35[a]***
	(0.03)	(0.03)	(0.07)	(0.09)	(0.11)	(0.11)
separated	0.01	0.02	0.18*	0.22**	-	-
	(0.04)	(0.04)	(0.10)	(0.11)		
widowed	0.02	0.14***	-0.15	0.30**	-	-
	(0.06)	(0.04)	(0.22)	(0.14)		
children	-0.06***	-0.04**	-0.07*	-0.04	-0.09	-0.03
	(0.02)	(0.02)	(0.04)	(0.05)	(0.09)	(0.09)
years of education	0.03***	0.04***	0.02**	0.02*	-0.01	0.05**
	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)
occupational status						
working	-	-	-	-	-	-
non-working	0.12**	0.09***	0.01	0.09*	-0.21	-0.02
	(0.06)	(0.02)	(0.11)	(0.05)	(0.22)	(0.11)
jobless	-0.04	0.03	0.08	0.17**	0.25**	-0.01
	(0.03)	(0.03)	(0.05)	(0.06)	(0.12)	(0.14)
pensioner	0.21***	0.33***	-0.03	0.16*	0.51	-0.16
	(0.03)	(0.03)	(0.08)	(0.09)	(0.80)	(0.67)
public servant	0.17***	0.08	0.46	0.55	-	-
	(0.04)	(0.05)	(0.34)	(0.47)		
training	0.24***	0.07**	0.16*	0.22**	-	-
	(0.03)	(0.03)	(0.08)	(0.09)		
self-employed	-0.26***	-0.21***	-0.49***	-0.21*	-0.67***	-0.70**
	(0.03)	(0.04)	(0.08)	(0.13)	(0.20)	(0.29)
Income	0.03*	-0.00	0.03	0.04	-0.02	-0.17**
	(0.02)	(0.01)	(0.04)	(0.04)	(0.07)	(0.08)
Self-rated health						
very good	-	-	-	-	-	-
good	0.33***	0.34***	0.41***	0.31***	0.09	0.42***
	(0.02)	(0.02)	(0.05)	(0.06)	(0.08)	(0.09)
fair	0.77***	0.76***	0.86***	0.70***	0.56***	0.66***
	(0.02)	(0.02)	(0.06)	(0.06)	(0.11)	(0.12)
poor	1.40***	1.33***	1.40***	1.26***	0.97***	1.44***
	(0.03)	(0.03)	(0.07)	(0.08)	(0.21)	(0.22)
very poor	1.72***	1.69***	1.92***	1.68***	1.31**	1.57***
	(0.06)	(0.06)	(0.13)	(0.14)	(0.63)	(0.44)

Disability	0.48*** (0.03)	0.47*** (0.04)	0.66*** (0.08)	0.64*** (0.12)	0.34 (0.36)	0.63* (0.36)
German nationality			-0.05 (0.06)	-0.29*** (0.06)		
Country of origin						
Other EU-countries			-	-		
Turkey			-0.04 (0.11)	0.11 (0.11)		
Greek			0.16 (0.13)	0.41*** (0.14)		
Italy			-0.07 (0.11)	0.09 (0.13)		
Spain			-0.20 (0.14)	-0.04 (0.17)		
Former Yugoslavia			-0.13 (0.12)	0.02 (0.13)		
Eastern Europe			-0.17 (0.11)	0.01 (0.11)		
Other countries			-0.20 (0.14)	-0.07 (0.14)		
German language skills						
very good			-	-	-	-
good			-0.04 (0.05)	0.00 (0.05)	-	-0.07 (0.10)
fair			-0.01 (0.05)	-0.01 (0.06)	-	-0.50** (0.20)
poor			-0.04 (0.07)	-0.05 (0.08)	-0.09[b] (0.08)	-0.93** (0.43)
very poor			-0.14 (0.20)	-0.06 (0.13)		-1.05** (0.48)
years since migration			0.01* (0.00)	0.01* (0.00)		
Constant	-0.32** (0.16)	0.41** (0.15)	-0.27 (0.43)	-0.40 (0.40)	0.30 (0.77)	0.13 (0.76)
Log-Likelihood	-42816.9	-39487.4	-6555.5	-5882.6	-1169.0	-1016.4
# Observations	79,130	86,647	11,794	11,345	1,818	1,749

Note: [a]: due to very few separated and widowed individuals, a dummy is constructed, indicating one, if married, and zero otherwise

[b]: due to very few individuals reporting very poor or poor language skills, a dummy is constructed, taking the value one if language skills are poor, very poor, fair, or good, and zero otherwise.

Source: SOEP, waves 1994-2005

Table 6: Estimation results: second part of the hurdle model: zero-truncated negative binomial model

Variable	Natives		first-generation immigrants		second-generation	
	men	**women**	**men**	**women**	**men**	**women**
Age	-0.01	0.02***	0.00	-0.01	0.03	-0.00
	(0.00)	(0.00)	(0.02)	(0.01)	(0.04)	(0.03)
Age^2	0.01	0.01***	-0.00	0.01	-0.05	-0.01
	(0.00)	(0.00)	(0.02)	(0.01)	(0.04)	(0.04)
Marital status						
single	-	-	-	-	-	-
married	0.00	0.09***	0.06	0.19**	-0.12^a	0.28**^{a}
	(0.04)	(0.03)	(0.12)	(0.09)	(0.17)	(0.14)
separated	0.03	0.14***	0.01	0.23**	-	-
	(0.05)	(0.03)	(0.16)	(0.11)		
widowed	0.04	0.11***	0.04	0.30**	-	-
	(0.07)	(0.04)	(0.25)	(0.14)		
children	-0.03	-0.08***	-0.08	-0.14***	-0.12	0.08
	(0.03)	(0.02)	(0.07)	(0.05)	(0.15)	(0.15)
years of education	-0.01**	-0.00	-0.02*	-0.01	-0.05	0.02
	(0.00)	(0.00)	(0.01)	(0.01)	(0.04)	(0.02)
occupational status						
working	-	-	-	-	-	-
non-working	0.29***	0.24***	0.22*	0.09*	-0.16	0.18
	(0.05)	(0.02)	(0.12)	(0.05)	(0.30)	(0.12)
jobless	0.08***	0.16***	0.11	0.11*	0.55	0.30**
	(0.03)	(0.03)	(0.10)	(0.06)	(0.42)	(0.14)
pensioner	0.07**	0.20***	0.12	0.07	0.07	0.68
	(0.03)	(0.03)	(0.09)	(0.07)	(0.28)	(0.94)
public servant	0.12***	0.12***	-0.72***	0.77	-	-
	(0.04)	(0.04)	(0.22)	(0.49)		
training	0.07*	-0.06**	0.13	-0.02	-	-
	(0.04)	(0.03)	(0.15)	(0.10)		
self-employed	-0.06	-0.03	-0.03	-0.18	-0.87***	-0.60**
	(0.04)	(0.04)	(0.16)	(0.16)	(0.23)	(0.25)
Income	-0.01	0.01	-0.08	-0.04	0.08	-0.22**
	(0.02)	(0.01)	(0.05)	(0.03)	(0.11)	(0.10)
Self-rated health						
very good	-	-	-	-	-	-
good	0.32***	0.25***	0.20	0.20**	0.45***	0.20
	(0.04)	(0.03)	(0.18)	(0.09)	(0.16)	(0.15)
fair	0.80***	0.74***	0.70***	0.64***	0.75***	0.65***
	(0.04)	(0.03)	(0.18)	(0.10)	(0.18)	(0.15)
poor	1.44***	1.32***	1.35***	1.22***	1.55***	1.06***
	(0.04)	(0.03)	(0.18)	(0.10)	(0.19)	(0.19)
very poor	1.89***	1.70***	1.91***	1.75***	1.41***	1.54***
	(0.05)	(0.04)	(0.19)	(0.12)	(0.42)	(0.25)

Disability	0.34*** (0.03)	0.34*** (0.02)	0.31*** (0.06)	0.41*** (0.06)	0.67*** (0.22)	0.28 (0.23)
German nationality			-0.12 (0.08)	-0.28*** (0.06)		
Country of origin Other EU-countries			-	-		
Turkey			-0.01 (0.13)	-0.04 (0.13)		
Greek			0.14 (0.14)	0.15 (0.13)		
Italy			0.13 (0.15)	-0.10 (0.13)		
Spain			0.17 (0.22)	0.05 (0.16)		
Former Yugoslavia			0.06 (0.14)	-0.02 (0.14)		
Eastern Europe			-0.24* (0.14)	-0.07 (0.13)		
Other countries			-0.20 (0.18)	-0.13 (0.16)		
German language very good			-	-	-	-
good			-0.09 (0.08)	-0.05 (0.06)	-	-0.10 (0.13)
fair			-0.16* (0.09)	-0.08 (0.06)	-0.24[b] (0.27)	-0.41* (0.23)
poor			-0.38*** (0.10)	-0.11 (0.08)		-0.17 (0.23)
very poor			-0.45 (0.30)	-0.00 (0.12)	-1.19*** (0.15)	-0.72* (0.43)
years since migration			-0.00 (0.00)	0.00 (0.00)		
Constant	0.22 (0.21)	0.77*** (0.14)	1.09 (0.68)	1.22*** (0.35)	-0.76 (1.06)	2.49*** (0.90)
Log-Likelihood	-101640.8	-143772.0	-14791.9	-17311.2	-1471.1	-2446.7
# Observations	49,780	66,359	6,937	8,034	861	1,141

Note: [a]: due to very few separated and widowed individuals, a dummy is constructed, indicating one, if married, and zero otherwise

[b]: due to very few individuals reporting very poor or poor language skills, three dummy variables are constructed, one taking the value one if language skills are poor or very poor; one taking the value one if language skills are fair, and one taking the value one if language skills are good or very good, with the latter acting as reference.

Source: SOEP, waves 1994-2005

VII. Conclusion

Using 12 waves from the SOEP, this study analyses if there exists inequity in access or in the utilisation of health care services due to lacking language skills or due to lacking information about the health care system (approximated by years since migration) among German first- and second-generation immigrants.

The results indicate that years since migration have a slightly impact on the contact decision, but not on the frequency decision. Hence, missing knowledge about the health care system could create additional access barriers and hence yield inequity in access to health care, but not in utilisation of health care services. Regarding the contact decision, German language skills have no influence for the first-generation immigrants, but for second-generation women. Hence, for this group, there exists inequity in the access to health care due to language skills. Regarding the frequency decision, German language skills seem to play a role for the group of first-immigrant men as well as for men and women of the second-generation: those reporting poor language skills have a significant lower expected number of visits. Hence, there can be inequity in health care utilisation due to lacking language skills.

The reason why language skills have different influences for men and women, and why there is no influence on the contact decision for first-generation immigrants should be investigated further.

A severe drawback of this study is that it is not possible to account for foreign doctors. In areas where lots of immigrants live, there are usually also doctors from this country, thus speaking the language of their patients. Analysing language as an access barriers, this should be accounted for.

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