Eur Arch Psychiatry Clin Neurosci (1997) 247:87–92

ORIGINAL PAPER

R. Heun · J. Hardt · H. Müller · W. Maier

Selection bias during recruitment of elderly subjects from the general population for psychiatric interviews

Received: 5 September 1996 / Accepted: 20 December 1996

Abstract The aim of the present study was to determine and assess a possible selection bias in an epidemiologic investigation in the elderly. A stratified sample of 1305 probands aged 60–99 years was initially contacted by mail and then by telephone to obtain their consent to participate in a psychiatric interview. A liberal recruitment procedure led to interview participation of only 291 subjects. The proportion of younger, male, and married subjects participating in the study was greater than that of elderly, female, and single or widowed subjects. Subjects without a psychiatric lifetime diagnosis were more cooperative than those with a psychiatric disorder. The latter finding demonstrates the need to determine and assess the selection bias in psychiatric epidemiologic studies in elderly subjects.

Key words Dementia · Depression · DSM-III-R · Recruitment · Selection · Non-respondents

Introduction

Methodologic issues are increasingly gaining in importance in geriatric epidemiology as a result of a growing number of studies reporting at least partially controversial results (Browning and Spilich 1981; Burvill 1990; Brayne 1991). Recruitment procedures may exert a considerable influence on the results and general applicability of health surveys (Siemiatycki 1979), psychologic (Herzog et al. 1983; Nesselroade 1988; Poon et al. 1984), and psychiatric studies (Morgan et al. 1993). It is therefore of particular importance to note that recruitment procedures for these investigations vary significantly in elderly samples (Camp et al. 1989; Neaton et al. 1987; Morgan et al. 1993).

Consent to participate in a study might depend on the expectations of the subjects, and individuals with specific problems may thus be either motivated or deterred from entering the study: In a prospective cohort for the examination of urinary problems Panser et al. (1994) observed an increased recruitment for the group of 60- to 74-year-old males, i.e., individuals who have a higher risk of morbidity (i.e., urinary problems) and possibly more free time for participation in the study. In contrast, Atchley (1969) reported that retired women in self-assessed poor health were more likely to refuse to participate in an interview than those in good health.

The possible influence of the subjects' health status on recruitment is of major significance for epidemiologic studies (Atchley 1969; Christensen et al. 1992). Thompson et al. (1994) reviewed the literature on epidemiologic studies of depression in older adults and reported indications for the underrepresentation of elderly depressed subjects in epidemiologic samples.

Ives et al. (1992) and Norton et al. (1994) proposed that aggressive or persistent recruitment procedures might be more effective in attaining high levels of study participation, thus increasing the general applicability of study results (i.e., effects of health promotion programs or frequencies of psychiatric disorders, respectively). However, legal and ethical considerations are becoming increasingly important in western societies (Morgan et al. 1993). In adherence to current legal and administrative regulations by local authorities we applied liberal recruitment procedures in this epidemiologic study on psychiatric disorders in the elderly population (over 60 years). Prospective participants were under no constraints regarding whether or not to refuse study participation (for details see Methods). This would be a minor problem if study participation was not confounded with psychiatric morbidity.

It was therefore the aim of the present study to assess the influence of demographic variables and psychiatric morbidity on subject selection in the recruitment of elderly subjects for psychiatric interviews.

R. Heun (✉) · J. Hardt · W. Maier
Department of Psychiatry, University of Mainz,
Untere Zahlbacher Strasse 8, D-55131 Mainz, Germany

H. Müller
Department of Psychiatry, University of Bonn,
Sigmund-Freud-Strasse 25, D-53105 Bonn, Germany

Methods

Sample selection and contact procedures

A stratified random sample of 1305 subjects was selected with the support of the local census bureau from the general population aged over 60 years: The sample represented 3.64% of the reference population on 30 November 1993 (n = 35 842, 37.9% male, 54.7% married, 45.2% single, divorced, or widowed). An oversampling of elderly subjects was performed to assess psychiatric disorders in different age strata resulting in the following distribution: 25% of the study subjects were aged 60–69 years, 25% 70–79 years, 25% 80–89 years, and 25% 90–99 years. For a description of the study sample see Table 1. The subjects were consecutively contacted by mail during the year 1994.

Regulations issued by the local Census Bureau and the regional Board of Data Protection (Rheinland-Pfalz, Germany) were adhered to:

1. All initial contacts were made by mail. Subjects from whom no answer was received were contacted again by mail or, after up to three written attempts, called on the telephone (where a telephone number was available, ten times during 4 weeks between 9 a.m. and 7 p.m.). Attempts to contact the subjects in person were not made at any stage of the study.

2. The contact letters included a description of the aims of the study, a description of interview contents and procedures, including the expected duration of the interview (2 h), information that interviews were conducted by medical students, a statement regarding the exclusive use of collected data for scientific purposes, and information that participation was voluntary and could be refused without any consequences.

3. The possibility to refuse further contacts easily without the need for an explanation was provided, and the subjects could simply indicate their refusal by ticking the respective box on the answer sheet.

4. Subjects who refused participation in any stage of the study were not contacted to determine the reasons for their refusal. (However, in five subjects a further contact approach was made due to the late receipt of the written refusal).

The contact letters included several questions and a choice of supplied answers, as well as space for written comments, to obtain in-

Table 1 Description of the study sample by availability of subjects. Deceased subjects and those who had moved out of town are not included (for a description of these subjects see text)

	Group A: immediate interview	Group B: interview after second or third contact	Group C: interview by phone or information from relatives	Group D: living in Mainz, but not available for an interview	Statistical comparison (A, B, C, D indicate comparison groups)
Number	175	116	110	792	
Gender (% female)	53.7	69.8	71.2	73.3	χ^2, A/B/C/D: $df = 3$, $p < 0.001$
Mean age ± SD	78.9 ± 10.6	78.6 ± 10.8	80.2 ± 9.5	81.4 ± 11.0	ANOVA: A/B/C/D: $df = 3$, $P = 0.004$ Scheffe: A/D $p < 0.05$
Marital status (% married)	54.3	43.1	41.4	32.7	χ^2, A/B/C/D: $df = 3$, $p = 0.001$
Answers to first contact letter[a]					
No answer	–	92.2%	80.0%	57.7%	χ^2, B/C/D: $df = 2$, $p < 0.01$
No interest	–	0.9%	0	21.5%	χ^2, B/C/D: $df = 2$, $p < 0.01$
Direct refusal	–	1.7%	0.9%	13.9%	χ^2, B/C/D: $df = 2$, $p < 0.01$
Any psychiatric disorders (ICD-10)	22.3%	36.2%	20.9%[b]	Unknown	χ^2, A/B: $df = 1$, $p = 0.01$; A/B/C: $df = 2$, $p = 0.01$
Dementia	11.7%	22.9%	17.1%[b]	Unknown	χ^2, A/B: $df = 1$, $p = 0.02$; A/B/C: $df = 2$, $p = 0.06$
Depression	6.2%	15.9%	9.4%[b]	Unknown	χ^2, A/B: $df = 1$, $p = 0.02$; A/B/C: $df = 2$, $p = 0.05$
Anxiety disorder	6.2%	2.6%	1.1%[b]	Unknown	χ^2, A/B: $df = 1$, $p = 0.25$; A/B/C: $df = 2$, $p = 0.12$
Other psychiatric disorders	2.9%	6.3%	1.1%[b]	Unknown	χ^2, A/B: $df = 1$, $p = 0.21$; A/B/C: $df = 2$, $p = 0.16$

[a] The responses presented in this table were different in the comparison groups; those answers which did not differentiate the subgroups are shown in Table 2

[b] These diagnoses are based on telephone information from subjects or close relatives. This may be information less sensitive for the detection of psychiatric disorders than direct interviews. Consequently, comparisons including these diagnoses have to be interpreted cautiously

Table 2 Answers to initial letter in 1018 subjects who had to be contacted more than once for an interview (more than one answer was rare but possible)

Answers to first contact letter	*N*	%
No answers	652	64.0[a]
Positive answers		
Interest in interview	11	1.1
Provides phone number	6	0.6
Offers a date for interview	3	0.3
Negative answers from contacted subjects		
Lack of interest in participation	171	16.8[a]
Personal refusal	113	11.1[a]
Current lack of interest	32	3.1
Refusal due to physical problems	31	3.0
Refusal due to high age	30	2.9
Being in good mental health	13	1.3
Travel in the near future	9	0.9
Refusal due to memory problems	6	0.6
Blindness or deafness	5	0.5
Feels too weak for an interview	4	0.4
Lack of time	2	0.2
Unwilling to give personal information	2	0.2
Fear of interviewer	1	0.1
Relatives do not agree to interview	1	0.1
Other explanations for refusal	11	1.1
Refusal without any explanation	19	1.9
Information given by relatives		
Confusion as indicated by relatives	20	2.0
Subject in need of complete assistance	14	1.4

[a] For responses which were significantly different among subgroups ($p < 0.01$) see Table 1

formation regarding possible contacts and reasons for refusal, respectively (for possible answers see Table 2).

Diagnostic interviews

Personal interviews were conducted using the Comprehensive International Diagnostic Interview (CIDI; WHO 1990). This is a structured psychiatric interview for the assessment of affective, schizophrenic, and anxiety disorders designed for use by lay interviewers. Interviewers in the present study were medical students in the sixth year of medical school. In preparation for the interviews they spent 4 weeks on a gerontopsychiatric ward and underwent intensive training in interview modules. The Structured Interview for the Diagnosis of Dementia of Alzheimer-type, Multi-infarct Dementia and Dementias of other Aetiology according to ICD-10 and DSM-III-R was performed to allow comprehensive cognitive evaluation (SIDAM; Zaudig et al. 1991). The Mini-Mental State Examination (MMS; Folstein et al. 1975) is part of the SIDAM. Final diagnoses were made by the consent of two psychiatrists on the basis of all available information (best-estimate procedure; Leckman et al. 1982).

Statistical analysis

Group comparisons were made using χ^2-tests for nominal and ANOVA for metric data (see Table 1). Logistic regression analysis was performed both forward and backward for the whole sample ($n = 1305$). The dependent variable was performance of a personal interview; independent variables were age, gender and marital status (married vs not married) as well as all possible interactions between the three factors (included in the model after the main effects).

Results

Success of and responses to subject recruitment

The 1305 subjects selected from the general population were contacted by mail. Sixty-six subjects had died before the first contact in 1994, and in 46 cases the letters could not be delivered because the subjects had moved to another address. (This information was obtained from the postal service or from relatives who had received the letters.) These 112 deceased and unavailable subjects were older and less frequently married than those in other subgroups (deceased: age 89.1 ± 7.0 years, 72.7% female, 16.7% married; unavailable: age 84.2 ± 9.8 years, 87.0% female, 15.2% married; for comparison of groups see Table 1). A total of 175 subjects consented to an interview after the first approach either by returning the questionnaire indicating an interview date or a phone number, or by calling our office. For a description of this subgroup and the following subsamples see Table 1.

In 1018 living subjects no appointment could be made after the first approach. Information on psychiatric morbidity was obtained for 226 of these subjects: 104 subjects who had not answered the first letter consented to be interviewed after a second approach (in most cases contact was made by phone, in other cases by letter, where no telephone number was available); 12 additional subjects consented to an interview only after a third approach (by mail or by phone; due to the small sample size the latter two subgroups were combined for further analysis); 110 subjects did not wish to be visited and interviewed in person, but gave sufficient information to permit an assessment of psychiatric morbidity; i.e., they were interviewed by telephone to determine symptoms of dementia, depression, and anxiety disorders according to ICD-10 (WHO 1991), or alternatively allowed us to contact other informants (usually caretakers, children, or other family members) for the same purpose.

We were not able to obtain sufficient information on 792 living subjects to allow a psychiatric assessment: 335 subjects answered our first letter indicating that they did not wish to be interviewed; 457 subjects (35.0% of the total sample) could not be contacted, i.e., we received no responses to three definitely delivered letters and ten unsuccessful telephone calls (if applicable).

Table 2 describes the responses to the first contact letter received from 1018 subjects who were contacted more than once (psychiatric diagnoses were not made based on or influenced by this information due to the apparent low validity). The majority of the recorded answers do not allow a conclusion as to whether the subjects responded to the later contact and thus cannot serve as reliable predictors of later participation.

Table 1 includes significantly different responses to the first contact letter made by subjects who did not make an immediate appointment for an interview. Uncooperative subjects answered the first letter more often than subjects who provided personal information at a later time (i.e., after several attempts by personal interviews or by telephone). As expected, the former group frequently provided an immediate reluctant answer (i.e., no interest or refusal for different reasons; for details see Table 1). This finding may be less important than the fact that three of five subjects from this group were willing to be interviewed and one gave personal information on the telephone when contacted, although they had sent a reluctant answer by mail a few days prior to the phone call.

Comparison of demographic parameters and psychiatric morbidity by subjects' availability and compliance

Subjects who consented to an interview were younger, more frequently male, and married than non-participants (see Table 1). Logistic regression analysis revealed that the possibility of agreement to be interviewed diminished with increasing age (relative rate RR = 0.984/additional year, 95% confidence interval CI = 0.97–0.996) and was lower in females (odds ratio OR = 0.78, CI = 0.68–0.90). The effect of marital status did not reach significance in this model [but did in models without the variable gender due to high correlation between marital status and gender (70.4% of the male, but only 21.5% of the female, subjects were married, $\chi^2 = 283$, $df = 1$, $P < 0.001$)]. Due to this high correlation, it remains undecided as to whether gender or marital status is the decisive factor predicting study compliance.

Subjects who were interviewed after the first approach had fewer psychiatric disorders than those who were interviewed after a second or third approach (lifetime diagnosis of a psychiatric disorder: 22.3% vs 36.2%, $\chi^2 = 6.42$, $df = 1$, $P = 0.01$; see Table 1 for details). Of the subjects, the 20.9% who gave personal information on the phone ($n = 34$) or allowed an informant to be questioned ($n = 76$) had a psychiatric disorder (17.1% dementia, 9.4% depression, 1.1% anxiety disorder, and 1.1% other disorders) as determined by this less stringent information procedure. The frequencies of diagnoses recorded for the three groups do not allow a conclusive comparison, i.e., the sensitivity of the family history for dementia and depression is assumed to be approximately half as high as the sensitivity for direct interviews (Heun et al. 1996); a reduced sensitivity for psychiatric disorders may also be assumed for telephone information (Weissman et al. 1986; Paulsen et al. 1988). Consequently, the true rate for dementia and depression may be twice as high, i.e., 34% for dementia and 19% for depression, respectively. On the basis of this likely, but unproven, assumption, the lifetime prevalence for psychiatric disorders in the subjects who provided telephone information or allowed another person to give information on the phone might be as high as in subjects who agreed to be interviewed after several approaches ($\chi^2 = 0.7$, $df = 1$, $P > 0.2$). For the distribution of individual diagnoses see Table 1.

Discussion

Recruitment results

Our recruitment procedure resulted in an interview participation of only 291 of 1193 contacted subjects (24.4%); diagnostic information on 401 (33.6%) subjects was obtained either by personal or telephone interview. Although this is comparable with results reported in a health promotion study for elderly subjects using comparable recruitment methods (21.1%; Ives et al. 1992), it is lower than results obtained in other psychiatric epidemiologic studies (70–91%; see Aderibgbe and Adityanjee 1995). More persistent methods or the use of hospital-based samples may lead to an increase in study participation (Ives et al. 1992; Glasser et al. 1994; Norton et al. 1994), but were not applied in this study due to the described imposed legal and administrative regulations.

Our approach was hampered by the following disadvantages: (a) the issue of epidemiologic research was not easily understood by elderly subjects (some of them with cognitive deficits); (b) the letter could not adequately meet the different individual information needs of all subjects; (c) the description of disadvantages (giving personal information to strangers and spending 2 h answering questions) outweighed the description of the only apparent advantage (supporting science); (d) the possibility of immediate refusal without providing any explanatory information offered the most easy choice requiring a minimum of personal activity and commitment. However, we have no knowledge of other more effective methods which comply with the described government regulations. Direct contacts with non-responders which were not possible in the present study may be assumed to increase the collaboration of elderly subjects (Norton et al. 1994).

A total of 457 subjects could not be reached either by mail or by phone. However, since none of the letters were returned to us by the postal service, we can be reasonably certain that they reached the addressees. A personal telephone number was not available for approximately half of these subjects who may also use telephones registered under the name of other individuals living at the same address. Other subjects may not have been home during the day when we tried to contact them over the 4-week period. For a few subjects information as to name, address, or telephone number might have been incorrect or subject to recent change. Due to limited manpower, we were not able to increase the number of approaches, which may have led to a higher response rate.

Representativeness of interviewed subjects

Study participants represented a selected sample, i.e., participants and refusing subjects were different concerning

demographic variables (i.e., age, gender, and marital status) which are known to affect the prevalence of psychiatric disorders.

The study results are in accordance with Weaver et al. (1975) and Christensen et al. (1992) who reported that subjects participating in their study were younger than non-respondents. In contrast, Wernicke and Reischies (1994) observed comparable recruitment in different age strata of elderly subjects. However, their sample might have been too small to permit the detection of minor group differences.

In accordance with Christensen et al. (1992) we found that males were more likely to participate in the interview than females, whereas Friedman and Wasserman (1978) observed no variation in the response rate by gender in elderly consumers. In agreement with Wietlisbach and Barazzoni (1993), who performed a survey on cardiovascular risk factors, we observed a lower participation rate for unmarried vs married subjects.

The delay in contacting subjects drawn from an official register led to an increased dropout rate for individuals who had changed their address or died in the interim. Members from both groups had a relatively high mean age and lived more frequently without a partner (i.e., were not married) than those from other subsamples. Many subjects who had changed their address might have moved to live with family members, or entered institutions or hospitals (where more intensive or supervised care might be provided). Individuals successfully contacted by letter or telephone were more likely to be able to live alone or with a partner without requiring supervision or intensive care, and thus were preferentially selected for interview. Thus, younger and married individuals were more likely to consent to an interview after the written or telephone contacts than older subjects.

In agreement with results reported by Allgulander (1989), Livingston et al. (1990), Eaton et al. (1992), and Norton et al. (1994) respondents (subjects who volunteered to be interviewed after the first contact) had a lower rate of psychiatric morbidity than initial non-respondents (subjects who had to be contacted two or three times before consenting to an interview), i.e., subjects with dementia or depression were harder to recruit than those without these disorders. Individuals who provided information by phone only or allowed an informant to supply the required information might also have an increased rate of psychiatric disorders. However, this was not apparent from the raw data, but may be assumed since the information obtained by phone from subjects or informants is associated with low sensitivity of approximately 50% compared with the direct interview. A recent comparison of interview and family history information using an identical study procedure also showed a low sensitivity for informant reports (Heun et al. 1996). Furthermore, low sensitivity for telephone interviews has been reported by other researchers (Weissman et al. 1986; Paulsen et al. 1988).

In a previous family study we observed that non-respondent first-degree relatives of control subjects from the general population had a higher rate of psychiatric disorders than relatives consenting to participate in an interview. This observation confirms that healthy relatives are easier to recruit than subjects with psychiatric disorders (Heun et al. 1995).

Conclusions and limitations

The liberal recruitment procedure used in the present study was associated with a significant dropout rate. In addition, the recruitment procedure appeared to be prone to selection bias, resulting in the selection of younger, male, and married subjects for personal interviews. Subjects with a lifetime diagnosis of a psychiatric disorder were less cooperative than other subjects to participate in an interview. This might result in an underestimation of the frequency of psychiatric disorders in the elderly general population. More persistent recruitment might reduce the selection bias, but cannot prevent it completely. Furthermore, the nature and extent of extrapolation of results from cooperative, less cooperative, to the unavailable subjects from the general population, in the present study and also in other studies, may be questioned. Extrapolation is complicated by the fact that different methods had to be applied in making psychiatric diagnoses in different subsamples. Consequently, it remains open to question whether epidemiologic research can be adequately performed under the restrictive conditions imposed on the conducting of this study.

References

Aderibigbe YA, Adityanjee SK (1995) Psychiatric epidemiology in cross-cultural perspective: a review. Eur Arch Psychiatry Clin Neurosci 246:37–46

Allgulander C (1989) Psychoactive drug use in a general population sample, Sweden: correlates with perceived health, psychiatric diagnoses, and mortality in an automated record-linkage study. Am J Public Health 79:1006–1010

American Psychiatric Association (1987) Diagnostic and statistical manual of mental disorders (DSM-III-R), 3rd edn, revised. American Psychiatric Press, Washington DC

Atchley RC (1969) Respondents vs refusers in an interview study of retired women: an analysis of selected characteristics. J Gerontol 24:42–47

Brayne C (1991) The EURODEM collaborative re-analysis of case-control studies of Alzheimer's disease: implications for public health. Int J Epidemiol 20 (Suppl 2):S68–S71

Browning GB, Spilich GJ (1981) Methodological comment. Some important methodological issues in the study of aging and cognition. Exp Aging Res 7:175–187

Burvill PW (1990) The impact of criteria selection on prevalence rates. Psychiatr J Univ Ottawa 15:194–199

Camp CJ, West RL, Poon LW (1989) Recruitment practices for psychological research in gerontology. In: Lawton MP, Herzog AR (eds) Special research methods for gerontology. Baywood, New York, pp 163–189

Christensen KJ, Moye J, Armson RR, Kern TM (1992) Health screening and random recruitment for cognitive aging research. Psychol Aging 7:204–208

Eaton WW, Anthony JC, Tepper S, Dryman A (1992) Psychopathology and attrition in the Epidemiologic Catchment Area Study. Am J Epidemiol 135:1051–1059

Folstein MF, Folstein SE, McHugh PR (1975) "Mini-Mental State". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 12:189–198

Friedman M, Wasserman IM (1978) Characteristics of respondents and non-respondents in a telephone survey study of elderly consumers. Psychol Rep 42:714

Glasser M, Stearns JA, Kemp E de, Hout J van, Hott D (1994) Dementia and depression symptomatology as assessed through screening tests of older patients in an outpatient clinic. Fam Pract 14:261–272

Herzog AR, Rodgers WL, Kulka RA (1983) Interviewing older adults: a comparison of telephone and face-to-face modalities. Public Opin Q 47:405–418

Heun R, Burkart M, Maier W (1995) Selection biases during recruitment of patients and relatives for a family study in the elderly. J Psychiatr Res 29:491–504

Heun R, Hardt J, Burkart M, Maier W (1996) Validity of the family history method in relatives of gerontopsychiatric patients. Psychiatr Res 62:227–238

Ives DG, Kuller LH, Schulz R, Traven ND, Lave JR (1992) Comparison of recruitment strategies and associated disease prevalence for health promotion in rural elderly. Prev Med 21: 582–591

Leckman JF, Sholomskas D, Thompson WD, Belanger A, Weissman MM (1982) Best estimate of lifetime psychiatric diagnosis. Arch Gen Psychiatry 39:879–883

Livingston G, Hawkins A, Graham N, Blizard B, Mann A (1990) The Gospel Oak Study: prevalence rates of dementia, depression and activity limitation among elderly residents in inner London. Psychol Med 20:137–146

Morgan A, Harris M, Boyce P, Wilhelm K (1993) Has social psychiatry met its Waterloo? Methodological and ethical issues in a community study. Aust NZ J Psychiatry 27:411–421

Neaton JD, Grimm RH Jr, Cutler JA, for the MRFIT Research Group (1987) Recruitment of Participants for the Multiple Risk Factor Intervention Trial (MRFIT). Control Clin Trials 8:41S–53S

Nesselroade JR (1988) Sampling and generalizability: adult development and aging research issues examined within the general methodological framework of selection. In: Schaie KW (ed) Methodological issues in aging research. Springer, Berlin Heidelberg New York, pp 13–42

Norton MC, Breitner JCS, Welsh KA, Wyse BW (1994) Characteristics of nonresponders in a community survey of the elderly. J Am Geriatr Soc 42:1252–1256

Panser LA, Chute CG, Girman CJ, Guess HA, Oesterling JE, Lieber MM, Jacobsen SJ (1994) Effect of several recruitment strategies on response rates at baseline in a prospective cohort investigation. Ann Epidemiol 4:321–326

Paulsen AS, Crowe RR, Noyes R, Pfohl B (1988) Reliability of the telephone interview in diagnosing anxiety disorders. Arch Gen Psychiatry 45:62–63

Poon LW, Krauss IK, Bowles NL (1984) On subject selection in cognitive aging research. Exp Aging Res 10:43–49

Siemiatycki J (1979) A comparison of mail, telephone, and home interview strategies for household health surveys. Am J Public Health 69:238–245

Thompson MG, Heller K, Rody CA (1994) Recruitment challenges in studying late-life depression: Do community samples adequately represent depressed older adults? Psychol Aging 9: 121–125

Weaver CN, Holmes SL, Glenn ND (1975) Some characteristics of inaccessible respondents in a telephone survey. J Appl Psychol 60:260–262

Weissman MM, Merikangas KR, John K, Wickramaratne P, Prusoff BA, Kidd KK (1986) Family-genetic studies of psychiatric disorders. Developing technologies. Arch Gen Psychiatry 43: 1104–1116

Wernicke TF, Reischies FM (1994) Prevalence of dementia in old age: clinical diagnoses in subjects aged 95 years and older. Neurology 44:250–253

Wietlisbach V, Barazzoni F (1993) Echantillonnage et analyse de la participation pour la deuxième enquête MONICA (1988–1989) sur les facteurs des risque cardiovasculaires. Schweiz Med Wschr 123:13–20

World Health Organization (1990) Composite International Diagnostic Interview. World Health Organization, Division of Mental Health, Geneva

World Health Organization (1991) Tenth Revision of the International Classification of Diseases. Chapter V (F): Mental and behavioural disorders (including disorders of psychological development). Clinical descriptions and diagnostic guidelines. WHO, Geneva

Zaudig M, Mittelhammer J, Hiller W, Pauls A, Thora C, Morinigo A, Mombour W (1991) SIDAM: a structured interview for the diagnosis of dementia of the Alzheimer type, multi-infarct dementia and dementias of other aetiology according to ICD-10 and DSM-III-R. Psychol Med 21:225–236