

3. Methods

Methodology of the Project- “ Implementation of an early detection system for the prophylaxis of allergic disease in Poland.”

Background and Protocol Requirements

The project Epidemiology of Allergic Disease in Poland constitutes the continuation of the pan-European study European Community Respiratory Health Survey II (ECRHS II). In the preparation of ECAP, the protocol and methodology of the International Study of Asthma and Allergy in Childhood (ISAAC) was also used. The ECAP project encompasses adults 20-44 years old (ECRHS standard) and children 6-7 and 13-14 years old (ISAAC standard) living in the eight largest polish urban centers as well as one rural area. The goal of the study was to survey 22,500 people in order to measure to what level allergy and asthma affects the population. It was decided that 30% of those studied via the questionnaire should undergo further standard evaluative outpatient studies to determine the presence of allergy and asthma.

The project has two basic phases of field research:

- Phase I: Questionnaire (22,500 participants)
- Phase II: Outpatient studies (30% of those who completed the ECAP questionnaire interview)

Basic experimental goals:

- Describe the frequency of allergic disease and the sensitization to the most common allergens. The methodology used is similar to that used around the world. This allows for international comparisons to be made.
- Describe living conditions of the participants, taking into account, among other factors, type of housing and setting, humidity, square footage, ventilation, and contact with animals.
- Describe patients' age, sex, socioeconomic status, and family/genetically inherited risk for allergic disease.
- Describe, on the terrain of one of the studied areas, the role and frequency of parasites in patients with allergic symptoms as compared to immunosuppressed patients.

- Evaluate the availability of specialized care for patients suffering from allergies and the quality of the pharmacological care they receive.
- Formulate straight-forward and economical criteria (standard) compatible with the basic national health care plan for the early detection of allergic disease. This criteria will strive to achieve the highest level sensitivity and specificity and validate the necessity for a referral to an allergist's care.

Areas to be studied

The selection of the areas to be studied was carried out on the basis of ECRHS guidelines, which dictated that the qualifying areas must:

- Have a population of around 150 thousand;
- Be entirely located within the limits of relevant administrative boarders;
- Have up-to-date records, on the basis of which a selection process recruiting people 20-44 years old can be carried out.

Units within single administrative boarders, one of the criteria mentioned above, can be defined as cities under single district law. In Poland there are 65 such units, but part of this number has a population of less than 100,000 people. As a consequence, only the largest conglomerations were used.

In accordance with the methodology of the ECRHS project, the study should take into account only urban communities. In Poland the fraction of people living in rural areas is significantly higher than in most of the countries of Western Europe, to which the ECRHS project was tailored. 39% of the Polish population lives in rural areas. Since part of the ECAP study goal's was to evaluate the usefulness of the ECRHS and ISAAC surveys in rural settings, one rural area was studied.

Urban Study

The optimal method for choosing the urban areas to study, from a practical point of view, would be to use purposive sampling, as that would allow the project to take into account all the key factors. On the basis of our analysis, three additional (with respect to the ECRHS standard) criteria were used in the choosing of the urban areas:

- Geographically separate regions: The definition of what constitutes a separate region must take into account the growth and flowering periods of various plants. This will allow for a

variety of types and amounts of pollens in the air to exist.(Please refer to Figure A1 in the appendix).

- Population (Please refer to Figure A1 in the appendix) : ECRHS requires the use of conglomeration of about 150,000 people. In ECAP only the largest Polish cities were used.
- Level of environmental pollution.

After taking into account all the necessary factors, the following cities were chosen: **Warsaw, Lublin, Białystok, Gdańsk, Poznań, Wrocław, Katowice, Krakow.**

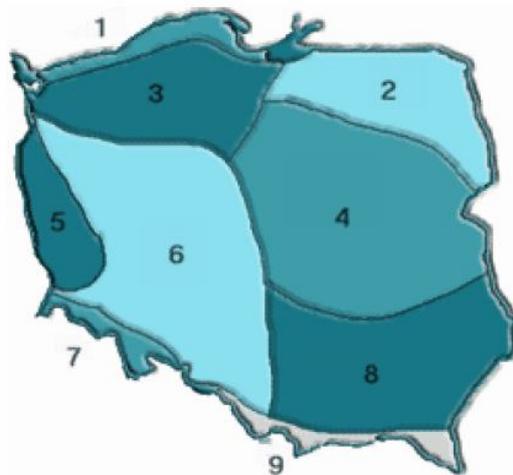


Figure 3.1. The regions of Poland divided according to the growth and flowering periods of vegetation.

Source: Ośrodek Badania Alergenów Środowiskowych

City	Total	Male	Female	Area (km ²)	Population Density pop./km ²	Size Ranking	Density Ranking
P O L S K A	38,180,249	18,478,368	19,701,881				
Warsaw	1,690,821	780,726	910,095	517	3,270	1	1
Łódź	776,297	354,286	422,011	294	2,640	2	3
Kraków	757,957	354,927	403,030	327	2,318	3	6
Wrocław	636,854	298,556	338,298	293	2,174	4	8
Poznań	573,003	266,989	306,014	261	2,195	5	7
Gdańsk	460,524	218,807	241,717	262	1,758	6	13
Szczecin	413,294	196,547	216,747	301	1,373	7	15
Bydgoszcz	369,151	173,343	195,808	174	2,122	8	9
Lublin	355,954	164,456	191,498	148	2,405	9	5
Katowice	321,163	152,055	169,108	165	1,946	10	11
Białystok	291,917	137,213	154,704	94	3,106	11	2
Gdynia	253,651	121,376	132,275	135	1,879	12	12
Częstochowa	248,894	117,445	131,449	160	1,556	13	14
Sosnowiec	229,207	109,237	119,970	91	2,519	14	4
Radom	227,944	109,075	118,869	112	2,035	15	10

Table 3.1. Population of the 15 largest Polish cities, June 30, 2004 (GUS)¹.

Cities used in the study are indicated in blue. This table does not include Zielona Góra, which has a population of slightly less than 120,000.

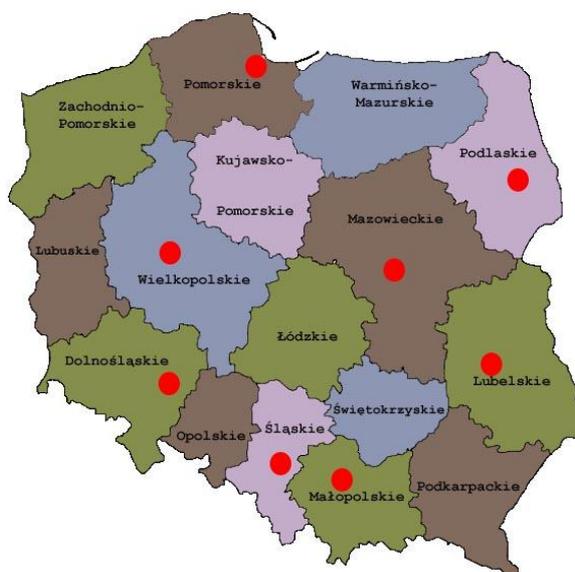


Figure. 3.2. The location of the studied regions on the map of Poland

This choice of urban areas (Figure 3.2) also guaranteed that a variety of types of urban centers would be taken into account in our analyses. Some of the cities will be centers of heavy industry (i.e. Katowice), which will allow (at least partly) for us to estimate the influence of this factor on the manifestation of allergies. The urban areas also differ in the way that they possess different

¹ http://www.stat.gov.pl/dane_spol-gosp/ludnosc/lud_wedlug_plci/30_VI_04/t6.xls

styles of urban planning and different population densities. For example, in Warsaw, almost 3.3 thousand people live per square kilometer, while in Gdańsk, only 1.8 thousand.

Also the purposive sampling of urban areas will allow us to study additional factors. In Wrocław, the study will allow us to evaluate the consequences of the 1997 flood, which created an environment that encouraged the growth and spread of microscopic fungi. (Comment: Mycologists specify that the common term „mold” is incorrect.) Part of the studies will also take place in centers with very old buildings, which will allow for the inclusion of this factor in our analyses.

Warsaw

Warsaw constitutes a very unique study area. Its uniqueness stems from the fact that it is the largest Polish city, having 1.7 million residents. Yet, it is not the number of people residing in Warsaw, but the city's location that is most significant. Theoretically, the most appropriate solution would be to include the entire metro area in our study. However, this method would have a very negative impact on the level of randomization in the sample population that would undergo further outpatient studies. Most likely, persons living on the outskirts of the city would more rarely decide to travel to the medical facility (Banacha Street Hospital). This, in a very obvious fashion, would lead to a sampling bias. This would also, despite using cluster sampling, make the job of the pollsters much harder. These factors were key influences on the decision to limit the area of study in Warsaw to the center city (downtown). Furthermore, this solution allowed for the study of an area where there is the highest number of factors that amplify the manifestation of allergy (i.e. adjuvants). This area is very densely populated, home to a very congested traffic grid, and consists of relatively old buildings.

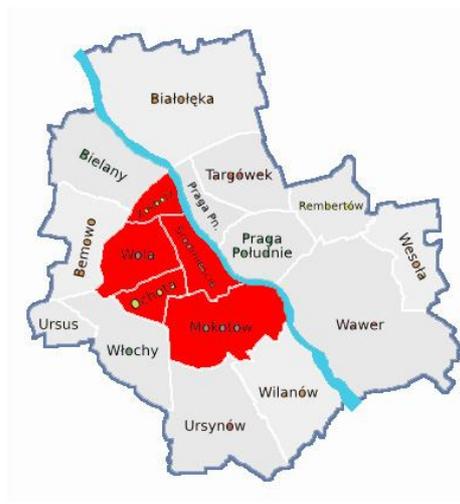


Figure. 3.3. Map of Warsaw with the study areas marked

Source: http://pl.wikipedia.org/wiki/Grafika:Warszawa_podzial_2002.png

The former municipality of Centrum (Figure 3.3), with the exceptions of two more outlying eastern districts (Praga North and Praga South), was included in the study. The western parts of Warsaw were included mostly due to the fact that the medical facility was located in the western Ochota neighborhood. Outside Ochota, the following neighborhoods were included: Mokotów, Śródmieście, Wola, and Żoliborz. All these neighborhoods together form the city center (downtown). Almost 660,000 people live in this area, or about 40% of Warsaw's population. The area of this territory is a little less than 90 km². On the basis of these numbers, the population density can be calculated to be 7,500 people per km² (Table 3.2). This number distinctly distinguishes this study area from the others, where, on average, population density reaches slightly above 2,000 people per km². Concentrating on the city center (downtown) should also homogenize the group being studied. This is a much sought after characteristic from the point of view of conducting comparison studies. We expect that the data collected will be fairly consistent internally within each individual medical center, but differ greatly from medical center to medical center.

Table 3.2. Neighborhoods of Warsaw.

Neighborhood	Population	Area in km2	Pop./km2
Mokotów	231,552	35.4	6,541
Ochota	93,192	9.7	9,607
Śródmieście	136,956	15.6	8,779
Wola	146,328	19.3	7,582
Żoliborz	50,934	8.5	5,992
Bemowo	105,030	25	4,201
Białołęka	64,010	73	877
Bielany	137,270	32.3	4,250
Praga Pd.	187,845	22.4	8,386
Praga Pn.	74,304	11.4	6,518
Rembertów	21,751	19.3	1,127
Targówek	123,232	24.2	5,092
Ursus	44,312	9.4	4,714
Ursynów	137,716	43.8	3,144
Wawer	63,297	79.7	794
Wesoła	18,482	22.6	818
Wilanów	14,032	36.7	382
Włochy	39,405	28.6	1,378
TOTAL	1,689,648	516.9	3,269

Rural area

In accordance to the protocol requirements detailed earlier, the rural area studied does not possess qualities representative of the other areas in the study. The ECRHS protocol, our base protocol, calls for the analysis of exclusively urban populations and these populations will be our

primary focus. However, there is no precedent or requirement to conduct any studies in a rural environment. However, from a scholarly point of view, gathering data from a rural area and comparing it to the urban data should provide much valuable information.

For this reason it was decided that one such area should be taken into account in our study. Similarly to the urban areas, the rural area was chosen using purposive sampling. Two bordering counties were selected within the Lubelski province. Factors favoring the choice of this region were the low level of environmental pollution and its natural farmland character, which separates this region from, for example, the Wielkopolske province.



Figure. 3.4. Map of the Lubelski province

Source: <http://www.gminy.pl>

The counties were chosen based on their location, size, and percentage of residents residing in the countryside. These basic requirements were met exceptionally well by the Zamojski and Krasnostawski counties (Figure 3.4). They are located in the south of the Lubelski province. The former is located near Zamość (but does not include the city of Zamość proper). On the area of 1872 km², live more than 111,000 people, of which 89% reside in an rural area. The latter, Krasnostawski county, is significantly smaller, with an area of 1,138 km². There, live more than 77,000 people, of which 75% reside in a rural area. In total, both counties possess over 188,000 inhabitants on the area of 3000 km² (Figure 3.5). The study will only consider people residing in the countryside, which amounts to about 156,000 people.

An important characteristic of the chosen counties is that they lie in close enough proximity to the city of Lublin to possess the same environmental factors, but far enough away for the direct influences of city life to be very limited.



Figure. 3.5. Zamość and Krasnystawski counties

Source: <http://www.gminy.pl>

Sample selection

a) Sample size

In line with the goals and protocol of our study, 22,500 questionnaires were to be collected by 9 different facilities. This means that each study region should produce about 2,500 completed questionnaires. Specifically, 1,500 questionnaires (13,500 total countrywide) from the adult population (age 20-44) and 1,000 (9,000 total countrywide) from minors (age 6-7 and age 13-14) should be collected. It was taken into account that minors and children do not have all the information about their own health. In such situations a surrogate was used. This was usually the parent (preferable the mother) or a legal guardian. This solution also solved the legal problem related to conducting studies on minors, as the parent/guardian answering the questionnaire could simultaneously give consent for their child to participate in the study.

It was decided that about 30% of the polled participants (both adults and children) would undergo both subjective and objective outpatient evaluations by a physician. These tests would include allergic skin-prick tests, pulmonary function tests, and IgE analyses designed to detect immunoglobulins against dust mite, fungus, and grass pollen antigens. The participants were informed during the process of filling out the questionnaire that they may be chosen to participate in the additional outpatient medical studies. Signing participants up for these studies was done via

telephone at most of the medical centers. Using the telephone numbers provided by the questionnaire, the project headquarters in Warsaw tried to establish contact with the potential participants. During the telephone conversation, the participants were offered a visit at a clinic for a free medical exam focusing on asthma and allergy. This exam would be conducted by a doctor.

To meet protocol requirements, 22,500 people were to be examined. Based on the opinion of medical experts and sociologists, it was assumed that about 25%-40% of those chosen randomly via PESEL number would actually agree to undergo the questionnaire study. It was hypothesized that the low level of participations was due mostly to two factors. The first was the urban setting of the medical facilities. In cities it is harder to get a hold of potential participants at their place of residence and their willingness to participate in any sort of study is markedly lower. The second factor was that the PESEL number is associated exclusively with a person's registered address. A person registered address often differs from their actual place of residence as residents often change their registered address with significant delay. This causes a problem in reaching selected persons under their provided address. In recent years there has been a wave of emigration of people from Poland to other countries in search of better paid work, which has not been reflected in the PESEL registry.

Due to the aforementioned factors, for the safety of being able to fully realize our study, it was decided to draw four times as many PESEL numbers as the amount of people needed to participate in the questionnaire study. In the case of Warsaw, due to the exceptionally strong influence of these factors, five time as many PESEL numbers were drawn.

After the initial drawing for each medical center, the pool of core participants was divided into two groups. The first group (main group) had 2,500 participants. The second (reserve group) contained all the participants not in the first group. In the moment that the main group was exhausted and the needed amount of questionnaire interviews had not been completed, the reserve group was used.

In the case of Białostok there was an additional selection of participants. This was the result of a decision to increase the amount of participants during the course of the study. The number of questionnaire sessions was raised to about 4,000. A group of 5,000 additional potential participants was drawn.

In summary, there were 97,500 PESEL numbers drawn, of which 60% were adults, 20% were children 6-7 years of age, and 20% young adults 13-14 years of age.

b) Recruiting scheme

The areas being studied were chosen purposively (non probabilistic), however the participants in these areas were chosen using random sampling. The recruiting scheme was set up in such a way

that the participants drawn were representative of their area's population. In drawing the sample population, the PESEL system was used. The PESEL number system contains information about each citizen's name, registered address, age, and gender. This system is used by the Department of Registries and the Ministry of Internal Affairs and Administration. These departments recruit people into a number of studies according to customer specifications. Our specifications dictated that the adult group be divided into 10 strata based on age and gender and the children's group be divided into 2 strata (6-7 year olds and 13-14 year olds). Then, within each of these individual groups and strata, a simple random drawing was conducted. Cluster sampling was also required based on street names (in the case of the rural area, names of settlements). Each cluster had to have at least 25 people.

Data concerning the participation of the individual strata was prepared on the basis of information provided by the Regional Data Bank (BDR). As a consequence of the data from the BDR being from the year 2004 (the most up-to-date data available at the moment the recruitment), it was absolutely necessary to update the data to make it current for the years 2006 and 2007. Updating the data depended mostly on the aging of the population by 2-3 years. In this way accurate information was obtained about the individual participation of each population strata. In the case of the children's strata, the age groups were chosen arbitrarily.

The implemented sample was organized by my name. This meant that the pollster had access to the first name, last name, and address of the people who they were to poll via the questionnaire. Often in questionnaire studies, various methods are used (e.g. random route) to raise the level of participation. One method is to recruit replacement participants at the site of study to fill in for those who refused participation or could not be reached. However, these methods are very controversial and the use of such methods is not advisable. Furthermore, the recruiting of participants from outside the PESEL system would equate to a loss of control over the size and proportion of the age strata. The PESEL procedure was also a very important part of pollster quality control.

In an effort to streamline the work of the pollsters cluster sampling was used. The first step was the drawing of street names within the study area. Only then were participants' names actually drawn. This means that the pollsters could operate on a smaller terrain, which would in turn increase their productivity. It was decided that each cluster would have 25 people. In the case of streets with more than 25 residents, clusters were formed in multiples of 25. The drawback to this multi step drawing method is an increased sampling error, as it is introduced in every step.

c) Recruiting participants for the outpatient studies

It was accepted that 30% of those who underwent the questionnaire study would then undergo further outpatient studies at a designated medical facility. At first it was accepted that participants would be chosen in a probabilistic manner using the same MSWiA based system that was used in the drawing for the questionnaire studies. Unfortunately, during the course of our study, it was made clear that the interest in participation in such studies was lower than anticipated, especially in urban areas. As a consequence, it was necessary to ask everyone who took the questionnaire and provided their telephone number and whether they wanted to participate in outpatient studies. Most people, once it was made clear to them how their telephone numbers would be used, gave this information. In 2008, among 5,000 participants studied, only 5% refused to provide their telephone number².

Study realization

The study took advantage of the CAPI (Computer Assisted Personal Interviewing) system loaded on PDA (Personal Digital Assistant) devices. Taking into account the nature of computerized questionnaires, the amount of open-ended questions was limited to those with a numerical answer. At the end of every questionnaire, all the data was sent automatically to headquarters using the GPRS system. Using this system it, the central database was updated daily. This made it possible to have a very high level of control over the progress of the study and the work of the pollsters. Using PDA's made the pollsters' job much easier, as the program automatically sorted and filtered the questions. The details of the IT system are written up in a separate section below.

Pollsters working on the study were recruited from both professional polling firms and universities. The student body of the Department of Health Studies in Warsaw, Białystok, Poznan, Lublin, Katowice, Wrocław, and Gdansk contributed pollsters. In order for the pollsters to be able to accurately and consistently enter the data from the questionnaires, the pollsters underwent additional training in the following subjects: polling, questionnaire contents, and PDA use. This training was done by properly trained personnel.

The pollsters were paid on the basis of the number of questionnaires interviews they completed. In the case that the pollster was not able to reach a participant, the pollster was required to try again. Three such tries had to be done. The pollsters could try at different times, mainly between the hours of 4:00 PM and 9:00 PM, when the probability of someone being home would be greatest. The pollsters were given identification badges, to help prove their identity to the participants.

The average time spent per questionnaire interview was 35 minutes. In the case of healthy people without diagnosed allergy, part of the questionnaire was not even carried out. This shortened the

² Some of these people do not have any telephone access.

length of the interaction to about 20-25 minutes. However if the participant had any sort of breathing or allergy problems, additional questions were asked specific to their ailment. This extended the time of interaction to around one hour.

The questionnaire

As ECAP is part of the pan-European project ECRHS II, it was necessary that the questionnaire be as standardized as possible relative to studies conducted in other countries. Of course, cultural differences had to be taken into account. To study the adult patients, the original ECRHS II questionnaire was used. It was translated into Polish for the purpose of the experiment. Necessary changes were kept to a minimum and mainly had to do with changing open ended questions. Most questions had only two answer choices: YES/NO. The answer choice "I do not know." was not considered. Such situations were marked "lack of response." This solution was necessary in order to keep with the protocol of the ECRHS. In the ECAP study, children 6-7 years old and young adults 13-14 years old were also included. For these groups, there existed a separate questionnaire which was based on the ISAAC study. One of the goals of the study was to be able to compare the results from the adult group to those from the children's and young adults' groups. In this case, the comparing of two independent questionnaires would be incorrect, methodologically speaking. To solve this problem, both questionnaires were combined together and carried out using the same tools and methods in both adults and children. Additional questions were added this combined survey that specifically related to the Polish project. All together, there were about 400 questions, but thanks to the advanced system of filters, each participant only had to answer part of them.

In 2007, a modified questionnaire was used. This questionnaire had an additional 25 questions located at the end of the survey, as to not influence the filling out of the rest of the survey. Thanks to this the methodology of the questionnaire was not disturbed.

Course of the study

The first stage of ECAP field studies was a pilot study performed at the end of May, 2006. This pilot study was performed in the Warsaw-Ochota neighborhood. This study included 150 questionnaire interviews, conducted with participants chosen by the MSWiA using the PESEL system. The obtained results were then compared against a similar pilot study conducted in Świdnica in 2003.

The main part of the ECAP study began in June of 2006 and ended in June of 2008. (Table 3.3). It had 20,449 participants, of which 5,040 underwent further outpatient studies.³ Table 3.4 shows the number of participants in the study. Of the 20,449, 50% were adults. Table 3.5 shows the age details of this group. There were 10% fewer participants in this group than expected. **This discrepancy was due to different levels of implementation in each age group. Interviews with adults were more prone to failure than in both categories of minors. Interviewers were instructed to put greater focus on the interviewing of adults, but these instructions were not applied properly in all facilities. The forcing of the pollsters to adhere to strict 60% / 20% / 20% age group proportions was associated with a significant decrease in their efficiency and increased number of pollsters withdrawing from the study and from cooperation with the Medical University of Warsaw.**

Table 3.3. The realization of the studies in 2006-2008 by location.

Location	2006												2007												2008					
	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6					
Zamość	490	1750													99	19														
Warszawa				1050	546					361	230	58	51	41																
Lublin					296	1167	1029	80																						
Katowice					251	1346	747	187																						
Kraków										627	504	348	104	341	200	70	86													
Gdańsk												183	97	219	251	266	295	135	122	7	79	92	84	42	56					
Białystok																	335	549	373	506	523	512	301	382	237					
Poznań																		98	304	288	163	127	214	109	30					
Wrocław																		168	233	171	290	139	176	120	112					
Total	490	1760	0	1050	1093	2613	1776	247	0	998	734	687	252	601	650	355	716	950	1032	972	1055	870	775	653	435					

Tab. 3.4. Number of completed interviews and outpatient studies by medical facility. (Protocol: 2,500 questionnaire interviews, 30% outpatient studies)

Area	Participants (N=)	% of Target Number Achieved	Outpatient Participants (N=)	% of Target Number Achieved
Zamość	2,358	94%	610	86%
Warszawa	2,339	94%	735	105%
Lublin	2,552	102%	791	103%
Katowice	2,531	101%	445	59%
Kraków	2,281	91%	200	29%
Gdańsk	1,928	77%	682	118%
Białystok	3,718	149%	753	68%
Poznań	1,333	53%	385	96%
Wrocław	1,409	56%	439	104%
Total	20,449		5,040	

³ The database registered a total of 5,282 outpatient surveys, but about 240 of them failed to be matched with their corresponding questionnaire interview based on ID number. Probably the doctor or pollster committed an error in writing down the patients ID number and thus prevented data integration.

Table. 3.5. Age group participation by location

Area	Adults	Young Adults 13-14 y.	Children 6-7 y.
Zamość	50%	27%	23%
Warszawa	50%	25%	25%
Lublin	60%	20%	20%
Katowice	61%	20%	20%
Kraków	48%	26%	26%
Gdańsk	43%	28%	29%
Białystok	46%	28%	27%
Poznań	48%	27%	25%
Wrocław	42%	32%	26%
Total	50%	25%	24%

IT and telecommunication systems.

Summary of system characteristics.

In the ECAP project, an informatics system called “Mobilny Ankieter (Mobile Polster)” was used. This is a system that significantly aids in the optimization of opinion, marketing, and epidemiology studies. The system consists of two main parts, the fixed (office) and mobile part. The fixed part could be accessed via Internet and Intranet using a web browser. The mobile part was based on use of PDA devices running the Pocket PC platform. A schematic of the information systems employed is displayed in Figure 3.6.

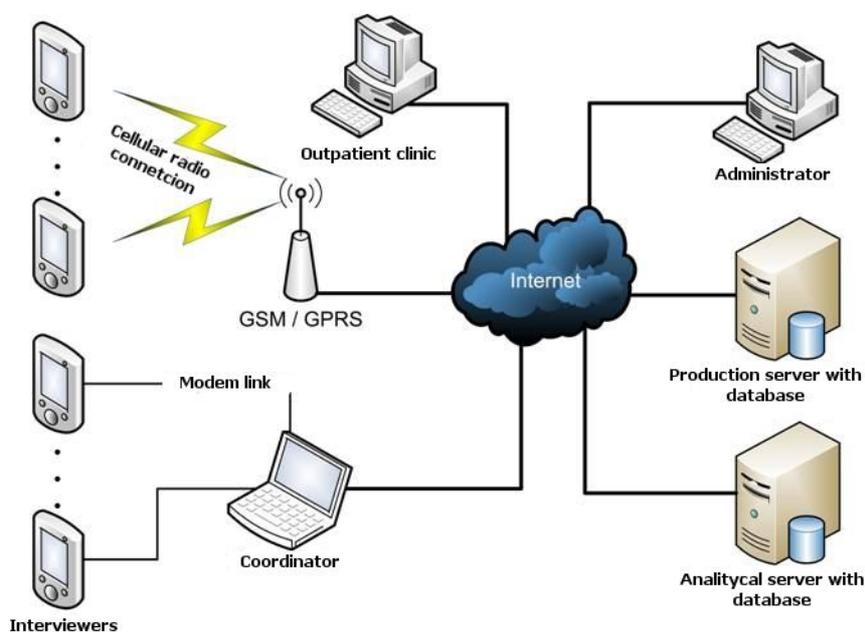


Fig. 3.6. General schematic of the information systems employed in the ECAP project.

The information system was configured in a client-server architecture. The server required continuous access to the Internet, but the client hardware worked on-line as well as off-line.

The client was a PDA equipped with a cellular GSM card capable of wireless data transfer via GPRS or other technology. These devices had a much larger bandwidth than the pollster would ever use. There was no limit on the amount of PDA device clients that could be in circulation and many PDA's could be used simultaneously. The PDA's were equipped with special software that enabled the participant's questionnaire responses to be entered by the pollster. The saved completed questionnaires were sent wirelessly via GSM/GPRS or via a terrain coordinator's computer if there was a problem with the GSM network.

The registering of the responses was done in one of two ways. In facilities that were equipped with a PC computer with a Internet browser and a connection to the Internet, this technology was used. In situations where these requirements were not met, a PDA device was used.

The integration points of the system were two administrative servers. One was the production server, which had a database that could continuously accept data sent by pollsters. The administrator periodically had to carry out activities to allow for continuous system operation. He/she oversaw the smooth operation of the system, periodically prepared system reports, and added new users. Once the data was compiled from four medical facilities, it was transferred to the second server, the analytical server. This solution was adopted to allow for the analysis of partial results during the course of the project and ensure the continuous operation of the production server. Once the data was processed by the production server it was added to the data in the analytical server, forming a complete database.

The most important functions of the informatics system in ECAP:

- Creating the questionnaire form:
 - Assigning questions (nine different kinds) arbitrarily into groups .
 - Configuring the question presentation method of each section as well as configuring the specifics of each question (headings, answer choices, page order). This applies to both PDA and web browser methods.
 - Defining the method/route of progression through the questions, depending on specific previous responses/ groups of responses.
 - Validation of the correctness of form construction.
 - Enabling the real-time monitoring of the generated survey form.
 - User-friendly interface.
- Filling out the constructed questionnaire form using:

- Mobile PDA device with installed software that enables the gathering and registration of data.
- A PC using an Internet browser.
- The mobile clients has the ability to work both on-line and off-line.
- The PC client has the ability to work only on-line.
- Real-time verification of the validity of the responses depending on the type of question.
- Progression from question to question dependent on the previous responses.
- Conducting the study:
 - Defining the data from the sample studied.
 - Monitoring the progress of the study in real-time via preview of registered data.
- Reporting:
 - Questionnaire reports.
 - Analysis and presentation of gathered data.
 - Exporting processed data.
 - Application work statistics.
- Characteristics of the server application:
 - Administration of the information system.
 - The creation of new user accounts at various data access levels and the management of these accounts.
 - The creation, testing, and sharing of new template surveys.
 - The gathering of completed questionnaires via polster (user) using the PDA or Internet browser.
 - Archiving the data in interactive databases.
 - Sharing the gathered data.
 - Creating reports based on the user's needs.

Information exchange in the computer system

A simplified diagram of the information exchange system is shown in Figure 3.7. First, the questionnaire is constructed on the server using the web browser interface. It is possible to add questions of several types. After validation, the questionnaire form is approved and is ready to be downloaded to the mobile clients or the clients using the web browser option.

Subsequently, user accounts are created in the information system for the pollsters. Having an account is absolutely necessary in order to collect data in the electronic system. Every pollster has his/her own user name secured with a password.

Previously set-up and configured PDA's are registered in the system. Every pollster taking part in the study had to register his/her device in the system before starting work. This operation requires a connection to the server. After successful authorization, the pollster could start work. If the PDA did not have the questionnaire template, it could be downloaded from the server.

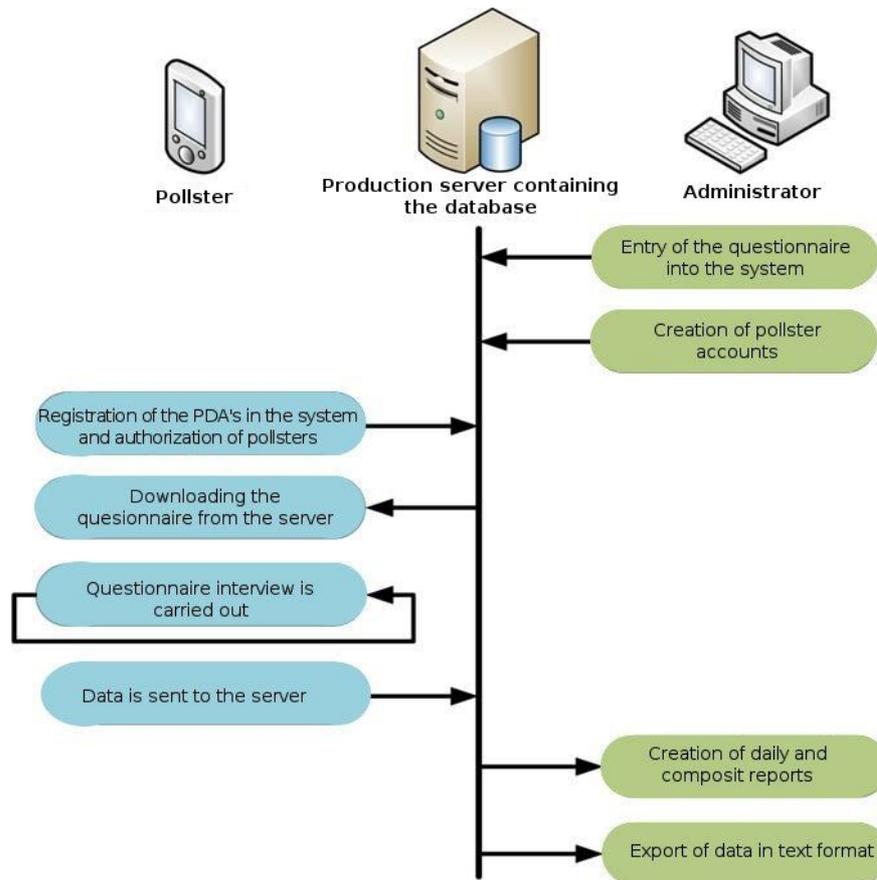


Figure. 3.7. A simplified diagram of the information exchange system.

In the following step, the pollster conducted interviews with the chosen participants. As a consequence of the PDA's being battery powered, the devices needed to be periodically charged. Under intensive polling conditions, daily charging was necessary.

Data gathered during the questionnaire interview (PDA or web browser) were sent to the server. Upon successful upload to the server, the completed questionnaires were deleted from the PDA. The received data were interpreted by an application on the server side. Due to the variability of the databases received form the PDA, the information was saved in many tables that were then incorporated into the main database.

The administrator periodically made reports on the work of the pollsters, which were made available to terrain coordinators. The implementation of daily reports allowed the coordinators to stay abreast on any developments in the study as well as to check the quality of the data.

The administrator, at various set stages of the experiment, exported raw measurement data, which after combining and decoding, were made available. The data was produced in such a way to enable easy import into data processing.

IT resources used in the project

The pollster used two different models of PDA: QTEK 2020 i ETEN M500, which are pictured below in Figure 3.8. The most important parameters of both devices are located in Table 3.6.



Figure. 3.8. The two models of PDA used in the project.: Qtek 2020 (left) i ETEN M500 (right).

A total of 70 PDA devices were used in the project. In 2006, 35 Qtek 2020 devices were used and in 2007 35 more new ETEN M500 devices were incorporated into the experiment. Every device was equipped with a prepaid cellular card in the GSM Plus network. The prepaid account was periodically refilled in order to ensure that the devices had continuous access to the Internet.

Tab. 3.6. Most important parameters of the PDA devices used in the experiment.

	<i>Qtek 2020</i>	<i>E-TEN M500</i>
<i>Standard GSM</i>	900 1800 1900	850 900 1800 1900
<i>Dimensions (L x W x H)</i>	130 x 69 x 19 mm	111.7 x 60.7 x 22 mm
<i>Weight</i>	183 g	170 g
<i>Display</i>	Color / TFT 64K Colors	
	240 x 320 px (3,5'')	240 x 320 px (2,8'')
<i>Standard Battery</i>	Li-Ion 1300 mAh	Li-Ion 1440 mAh
<i>Memory Card</i>	MMC, SD	SD
<i>Operating System</i>	Windows Mobile™ 2003 SE	
<i>Processor</i>	PXA26X	Samsung S3C 2440
<i>Processor Speed</i>	400 MHz	
<i>Other</i>	GPRS, Bluetooth, IrDA, Camera 1.3 Mp	

Every device was configured and equipped with the software necessary to conduct and save questionnaires before it was given to the pollsters. The PDA's were serviced periodically to test general reliability and the functioning of the polling program.

The production server, like the analytical server, was launched in the Warsaw Medical University IT infrastructure and was always active. The servers ran Linux Fedora operating system and PostgreSQL database manager . In addition, a special application for receiving completed questionnaires and loading them into the database was installed. The administrator had control over the system. Access to the administrative functions of the system was made possible via web browser, but it was also possible to access the database directly.

Electronic questionnaire

The pollster lead the questionnaire interview with the participant using a PDA device. If this was the first interview conducted on the device, the pollster had to register it in the system prior to beginning work. Otherwise, the first step in beginning work was logging-in (Figure 3.9). Next the pollster had to choose the appropriate electronic questionnaire module (Figure.3.9). Usually, for all participants, the electronic questionnaire started with the first module. Due to the large amount of questions, the questionnaire was divided into five independent modules. Answers were entered using a touch screen. Each screen displayed one question an several answer choices (Figure. 3.10). In the event that all the answer choices did not fit one one screen, a scrolling option appeared. In the

program, it was possible to return to previously answered questions and change already selected answers.

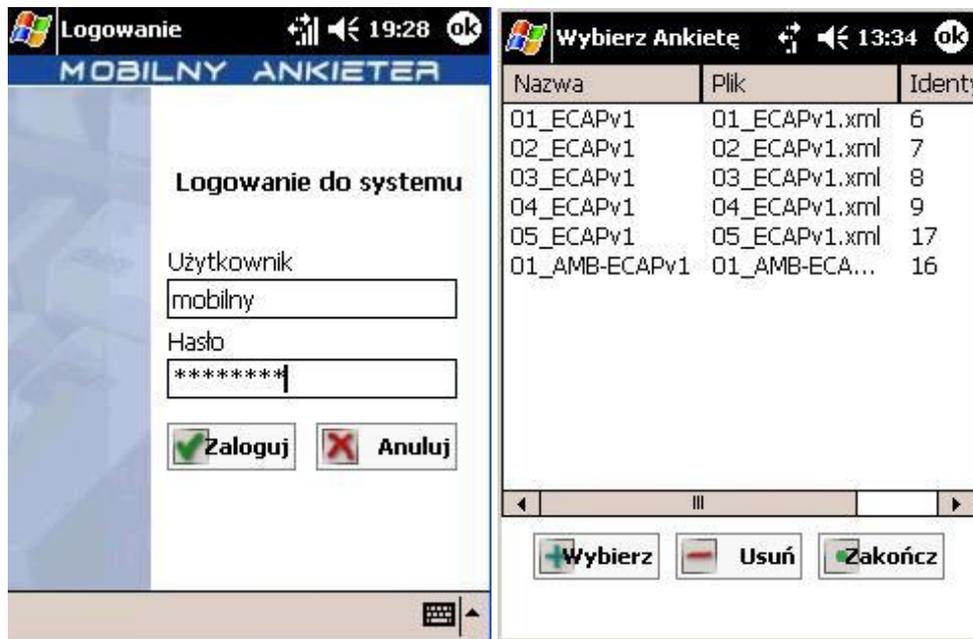


Figure. 3.9. Log in screen at PDA device start-up (left) and module selection screen (right).

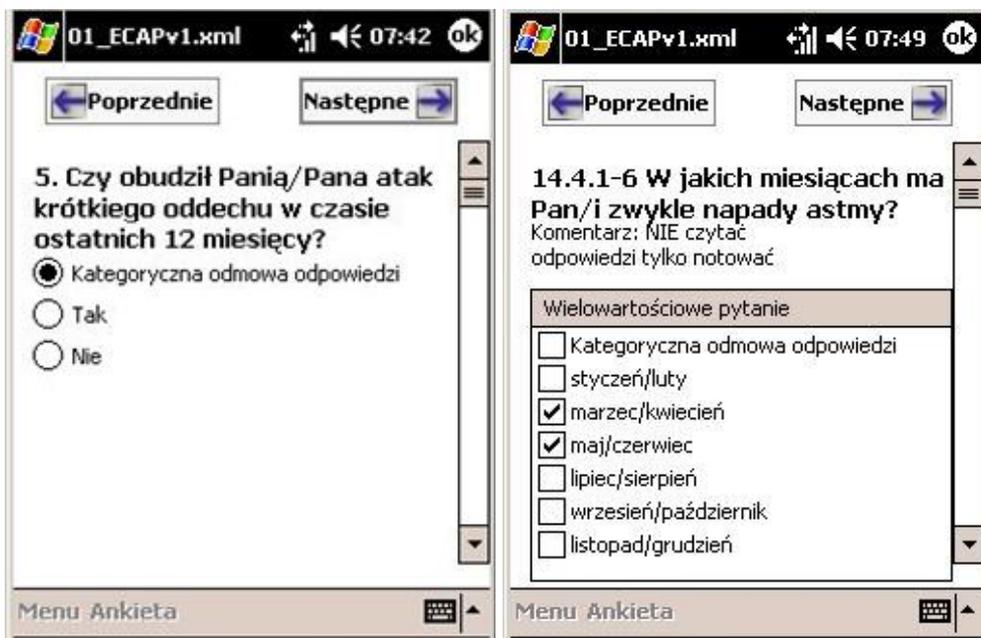


Figure 3.10. Sample screen shot from the questionnaire. Single answer question(left). Multiple-entry question (right).

After each module was completed, the next module was loaded automatically upon confirmation by pollster.

All the completed questionnaires were sent to the server at the pollster's request. When the pollster wanted to send one or more of the completed questionnaires, the application on the PDA would automatically connect to the GPRS network and send the questionnaires one module at a time. Once the transmission was completed, the pollster would receive a message confirming whether the transmission was a success or failure. If the questionnaire was successfully saved on the server's database, it was automatically deleted from the PDA.

IT system security

The IT system was secured on several levels against unauthorized access and data loss. Every pollster and user had his/her own user name that was secured with a password. This user name and password was given to the user before the start of the study and expired after a given amount of time. The transmission between the client and server was done using encryption.

The administrator had access, using his/her user name and password, to the system and database via web browser. A secure encrypted https connection was used in communication between the server application and the web browser.

The sever application and the database were stored on the Medical University of Warsaw IT infrastructure and, thus, fulfilled the highest levels of security to which all university systems are subject (e.g. packet filtering, firewall etc.).

The system automatically backed-up the database to prevent unexpected data loss. A complete back-up of the system was conducted periodically, but never less than once every three months.

Pollsters and the IT system

Every pollster working in the system was clearly and uniquely identified in the system. The pollster's account was set up by the administrator. The following conventions were used when setting up the accounts. Take for instance the hypothetical pollster, Jan Kowalski. His user name would be the eight letter identifier jkowalsk with an eight character password. The pollster was only given access at the end of his/her training. All pollsters participating in the study completed a comprehensive training program on the use of the polling application on the PDA. This included the important functions of logging into the system, conducting the questionnaire on the PDA device, and sending the data to the server. This training also included instructions on what to do in atypical situations.

An instruction manual was made for the pollsters. This manual contained an easy-to-read guide to using the polling application and sending data. It also contained a trouble-shooting section outlining solutions to the most commonly encountered problems the pollsters may experience while polling and using the PDA device.

Additional instructions on servicing procedures were also made available. This made it possible for the field coordinator to quickly reconfigure the device if the situation demanded it (e.g. the devices memory was accidentally wiped out.) The servicing procedures were all written in a step by step fashion and were used successfully on several occasions in the field.

The training materials and user manuals were also prepared in electronic form. They were burned onto CD-ROM and were sent to the field facilities. These materials allowed for the quick and thorough training of additional pollsters, should the situation demand that the effectiveness of a given location be increased.

A telephone technical-support hot-line was set up to provide support to everyone from pollsters to administrators. On more than one occasion, when problems arose in the field, quick telephone intervention allowed for the immediate problem-free continuation of work without the interruption of the questionnaire interview. Practically all problems were solved as they came up.

Reporting project progress

The creation of IT system reports on the progress of the study was one of the most important tasks of the administrator. Within the system there existed two distinct functional types of reports. The first was a daily report and the second was a weekly report. Additionally, special reports could be created if the team demanded them.

The daily report was created every day of the study. The workday of the pollsters was over when they sent in all the days questionnaires and registered them in the system. This was usually at around 11:00 PM. At this time the daily report would be created. Before the report was created the integrity of the questionnaires was checked and errors were corrected. The report was in electronic format (Excel file). The data from the day's progress was displayed in the following tabs:

- *General tab*: Total number of questionnaires collected from a given study area. Total number of additional outpatient exams conducted in a given study area. Number of complete and incomplete questionnaires conducted by pollster.
- *Details tab*: detailed information about each survey carried out by a pollster, such as respondent number, type of survey, time of registration in the system, start time and duration of the survey, completeness of the survey, information on the individual modules completed, and phone number.
- *Service tab*: detailed information about each survey module registered in the system, including module type, registration time, start time, end time, ID of the interviewer, and respondent number.
- *Control tab*: formed to help in the quality control of the pollsters. It contained some cross sectional questions from independent modules.

- *Outpatient studies tab*: information on the outpatient studies in any given facility. This information was organized by doctor, date of registration, start of interview, and information linking the patient with his/her questionnaire interview.

Example: General tab and Details tab in Figure 3.11 and Figure 3.12.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	14 i 15.06.08			Utworzen	16.06.08							Poznań					
2	Gdańsk, Białystok, Wrocław, Poznań											liczba wszystkich pełnych ankiet					1011
3	pollster	m01	m02	m03	m04	m05	pelne	odmowa	obszar								
4	aderez	9	4	4	4	4	4	4	Białystok	Sieć 1		liczba wszystkich ankiet ambulatoryjnych					344
5	askrzypc	14	10	10	10	10	10	1	Białystok	Sieć 1		liczba ankiet amb odpowiadająca pełnym					342
6	bbialosu	9	9	9	9	9	9	0	Białystok	Sieć 1		liczba 'samotnych' ankiet amb					71
7	edobkows	9	9	9	9	9	9	0	Białystok	Sieć 1							
8	kdubrowk	87	12	12	12	12	12	66	Białystok	Sieć 1		Wrocław					
9	wwozniak	19	5	5	5	5	5	8	Białystok	Sieć 1		liczba wszystkich pełnych ankiet					1031
10	bruminsk	17	17	17	17	17	17	0	Gdańsk	Sieć SMGKRC	17	liczba wszystkich ankiet ambulatoryjnych					338
11	adychus	89	6	6	6	6	6	62	Wrocław	Sieć 1		liczba ankiet amb odpowiadająca pełnym					327
12	afugowsk	1	1	1	1	1	1	0	Wrocław	Sieć 2		liczba 'samotnych' ankiet amb					129
13	aoleszko	322	10	10	10	10	10	87	Wrocław	Sieć 1							
14	ebukowsk	4	4	4	4	4	4	0	Wrocław	Sieć 1		Gdańsk					
15	kwiecieln	5	5	5	5	5	5	0	Wrocław	Sieć 1		liczba wszystkich pełnych ankiet					406
16	kpachol	17	7	7	7	7	7	9	Wrocław	Sieć 1		liczba wszystkich ankiet ambulatoryjnych					0
17	swerynsk	198	2	2	2	2	2	106	Wrocław	Sieć 1		liczba ankiet amb odpowiadająca pełnym					0
18												liczba 'samotnych' ankiet amb					0
19												Białystok					
20												liczba wszystkich pełnych ankiet					2510
21												liczba wszystkich ankiet ambulatoryjnych					301
22												liczba ankiet amb odpowiadająca pełnym					292
23												liczba 'samotnych' ankiet amb					244
24																	
25												Warszawa					
26												liczba wszystkich pełnych ankiet					4
27												liczba wszystkich ankiet ambulatoryjnych					0
28												liczba ankiet amb odpowiadająca pełnym					0
29												liczba 'samotnych' ankiet amb					0
30												Kraków					
31												liczba 'samotnych' ankiet amb					214
32												katowice					
33												liczba 'samotnych' ankiet amb					18

Figure. 3.11. An example of a portion of a report with general data about the progress of the study.

A	B	C	D	E	F	G	H	I	J	K	L	
1	pollster	ankieta	registration_date	respondent	numer telefonu	data urodzenia	wyznaczony	przyjal	modul_amb	liczba_modulow	podejscie	m01
2	aderez	13_14	2008-06-13 20:18:01.393699	705474			1994	1	1	0	5	1
3	aderez	13_14	2008-06-13 18:38:01.691856	751311			1995	1	1	0	5	1
4	aderez	13_14	2008-06-13 15:32:01.611972	754511						0	1	1
5	aderez	13_14	2008-06-13 15:18:01.376149	754518			1995	1	1	0	5	1
6	aderez	6_7	2008-06-15 23:44:01.677758	753919						0	1	1
7	aderez	6_7	2008-06-15 23:44:01.693932	754515						0	1	1
8	aderez	6_7	2008-06-13 15:20:01.637308	754519			2001	1	1	0	5	1
9	aderez	dorosly	2008-06-13 20:06:01.56038	705473			1974	1	1	0	5	1
10	aderez	dorosly	2008-06-15 22:42:01.373394	705475						0	1	1
11	aderez	dorosly	2008-06-14 17:58:01.196642	705479			1964	1	1	0	5	1
12	aderez	dorosly	2008-06-14 18:54:02.053588	705482			1963	1	1	0	5	1
13	aderez	dorosly	2008-06-15 22:44:01.516669	751303						0	1	1
14	aderez	dorosly	2008-06-15 14:50:01.713722	751308			1979	1	1	0	5	1
15	aderez	dorosly	2008-06-15 22:44:01.534576	751322						0	1	1
16	aderez	dorosly	2008-06-15 15:28:01.127684	751323			1985	1	1	0	5	1
17	aderez	dorosly	2008-06-13 13:26:01.700023	754509						0	1	1
18	aderez	dorosly	2008-06-13 15:46:01.746001	754514			1965	1	1	0	5	1
19	aderez	dorosly	2008-06-13 17:28:01.464429	754517			1986	1	1	0	5	1
20	aderez	dorosly	2008-06-13 15:40:01.315354	754521			1972	1	1	0	5	1
21	adychus	13_14	2008-06-15 11:24:01.165693	905956						0	1	3
22	adychus	13_14	2008-06-15 11:26:01.284537	905958						0	1	3
23	adychus	13_14	2008-06-15 13:24:01.07757	905965						0	1	3
24	adychus	13_14	2008-06-15 21:22:01.53235	906104						0	1	2
25	adychus	13_14	2008-06-15 21:56:01.774251	906109			1994	1	1	0	5	2
26	adychus	13_14	2008-06-15 21:34:01.387245	906110						0	1	2
27	adychus	13_14	2008-06-15 21:54:01.650289	906118						0	1	2
28	adychus	13_14	2008-06-15 21:42:01.933426	906120						0	1	2
29	adychus	13_14	2008-06-14 11:34:01.524005	906155			1993	0	0	0	5	1

Figure. 3.12. An example of a portion of a report with detailed data from one study.

The coordinator, as well as the field coordinators, received a report in the morning about the previous day. This allowed for the quick action to be taken if, for example, the effectiveness of the study needed to be increased.

The weekly report served as a summary of the preceding week. This weekly/summary report had the same information as the daily report. This information was presented in the same format as the daily report. Along with this information, there were additional tabs (over 25 total) with other relevant data and simple statistics about the implementation of the study. The weekly/summary report allowed for the detailed monitoring of the progress of the study, observing global indicators as well as individual pollster data. The report enabled the detection of any irregularities introduced by the pollsters during their work. The weekly/summary report contained the following information:

- Pollster breakdown, date of execution, and number of completed questionnaires.
- Number of refusals for any given pollster.
- Effectiveness of the pollster's ability to refer participants for outpatient studies.
- Age and sex statistics for any given pollster.
- Detailed technical data about every completed questionnaire.
- Statistics for chosen control questions organized by pollster.
- Statistics on individual questions.

The weekly report was presented to the team on every Monday.

Summary of the use of the IT system in the study

An undoubted advantage of using electronic data collection is its immediate availability in different aggregate forms. These include, reports on research progress, as well as virtually instantaneous sharing of raw data, depending on present needs. Another important advantage is the minimization of pollster error, which could be introduced when using paper format data collection. It deserves mention that the application used on the PDA device was very intuitive and did not cause the pollsters any problems.

Few major hardware (mostly PDA) problems were documented during the project. The major drawback of using the PDA system was the short battery life, which under intense use necessitated the recharging of the battery. During the course of the entire study only three PDA's were permanently damaged. The others were repaired immediately (two devices).

On the server side, all problems were identified and removed during the pilot study. During the study the server was active continuously except on two instances related to power outages. These

events did not cause any major problems on the server or PDA application side. Not a single module was ever lost during transmission from PDA to server.

The main problem that was encountered had to do with sending the questionnaires from the PDA device to the server. Any confusion related to this or problems with the PDA devices themselves were solved immediately via telephone contact with the administrator.

The IT system worked well during the duration of the experiment and the countless minor errors were all resolved as they developed. The electronic data acquisition system proved to be satisfactory in all respects.

Quality control report from the collected data

Available information

In the ECAP project, an electronic data collection system was used. This system was based on the use of PDA devices and wireless transmission. As a result of using this system, not only questionnaire data was gathered, but also technical data about how this data was gathered was gained. The system gathered, among other things, the start and end time of each independent questionnaire module. As a consequence, during the analysis of the data, it was possible to gather the following data:

- Total questionnaire duration
- Module duration
- Break time between modules
- The time when each questionnaire began and finished
- Data on whether the modules were completed in the correct order
- Subsequent questionnaire number for each pollster

Besides the technical data acquired from the IT system, information about the pollster and the person being polled was also available. This information was gathered both from the questionnaire itself and external sources. This data included:

- Pollster login on the basis of which it was possible to determine:
 - First and last name of the pollster;
 - Polling network to which the pollster belonged.
- Identification number of the participant (ID), on the basis of which it was possible to determine:
 - First and last name of the participant;
 - Participant address;
 - Birthday/age (based on PESEL)

- Declared age (based on the questionnaire);
- Number of filtering questions answered (which influenced the duration of the questionnaire);
- Participant telephone number.

The above data was found in many places, which were combined in the process of analysis. This procedure was done using the the statistical packet application SAS. SAS was also used to calculate part of the variables that were not available during data input. Among other factors, it calculated the amount of break time between modules, which could indicate a deliberate manipulation on the part of the pollster,

After the data was combined into a pre-examined database, the data was fed into the statistical packet application SPSS for further analysis.

Basic information

In the period from June 26, 2006 to June 15, 2008, 20.449 comprehensive surveys in 9 centers were collected. The results are summarized in Table 3.7 and the numbers from each month are shown in Figure 3.13. The most surveys were collected in Bialystok (3718) and the least in Poznan (1333). Any discrepancies between the number of completed surveys and the amount that were planned are simply due to the various limitations of carrying out research in an given area in a limited period of time.

Table. 3.7. Completed surveys by location

	N	%
Zamość	2,358	11.5
Warsaw	2,339	11.4
Lublin	2,552	12.5
Katowice	2,531	12.4
Kraków	2,281	11.2
Gdańsk	1,928	9.4
Białystok	3,718	18.2
Poznań	1,333	6.5
Wrocław	1,409	6.9
Total	20,449	100

The study was conducted in a continuous fashion, but the number of completed surveys each month was influenced by external factors. In every location, the logistics had to be worked out anew, paying respect to the local polling networks and academic institutions. In some locations, work started without any major complications (e.g. Białystok). In other locations, starting work required many months of preparation (e.g. Krakow) Furthermore, the lack of continuous funding from the Ministry of Health due to a changing legal environment had an impact on the level and speed of conducting work. This meant stopping work occasionally due to lack of funding. Delays generated by this factor caused the pushing back of start dates in some centers and caused the study to be conducted on a less favorable time schedule. For example, these delays caused the experiment to be conducted preceding holidays or popular vacation periods (e.g. Gdansk). As a result, studies at several locations had to be conducted simultaneously and/or for longer than expected. This meant having more pollsters working simultaneously. These pollsters had to be replaced, often due to other commitments (school, other customers). The large number of pollsters and lack of systematic work made quality control of the gathered data much harder.

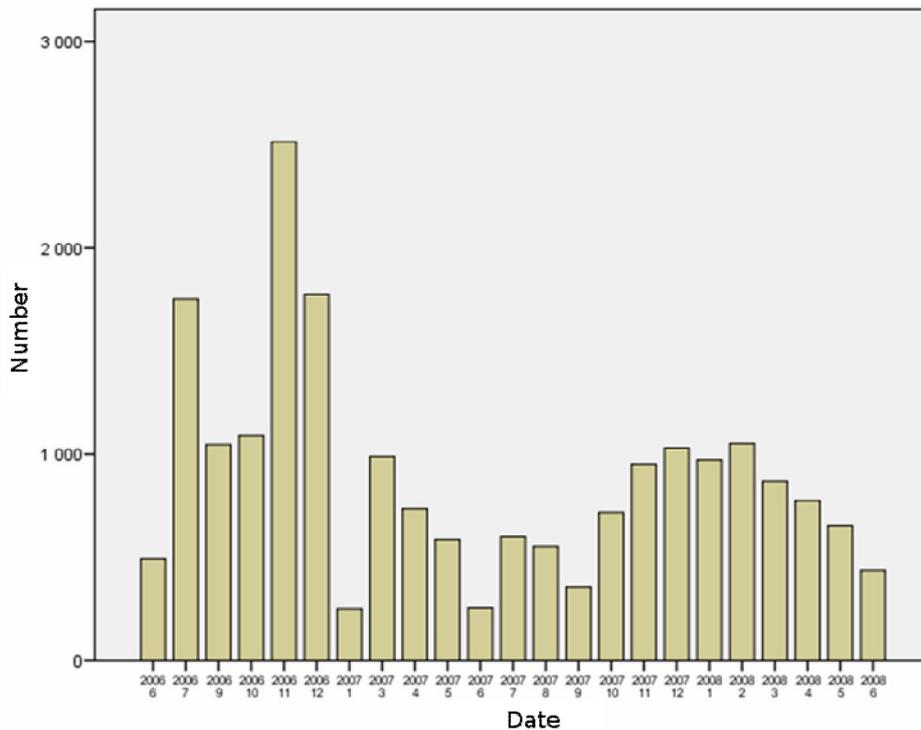


Figure. 3.13 completed questionnaires from June 2006- June 2008

Over 800 people were trained to help carry out this study, of which close to 440 actually participated. Over 100 of these people helped conducted less than 10 questionnaire interviews.

Questionnaire control during the course of the study

In the study, it was particularly important to control the quality of the work by the pollsters. Using an electronic data collection and GPRS transmission system made this task easier because the person responsible for quality control had continuous access to up-to-date information about the pollsters work. Everyday, a report was prepared with pollster statistics from all the individual locations. These reports had information about the number of questionnaires completed, number of refusals, and time at work. Additionally, once a week, a summary report was created with detailed information on how the questionnaire study was progressing.

In the ECAP project, quality control occurred at three stages. The first stage occurred at the level of statistical analysis of the technical parameters for each questionnaire. Every two weeks, on the basis of the weekly report, a report was prepared that contained the technical stats (duration, work hours, use of filtering questions, etc.) of each completed questionnaire during that time period. These analyses were done to find any errors in the the filling out of the questionnaires (e.g. too short of a duration) The age declared by the participant in the questionnaire was also compared to the age provided to us by their PESEL. Anomalies were detected and aggregated for all the various pollsters and, on this basis, indicators were constructed describing the work of each pollster.

Suspicious polls, especially when conducted by pollsters with a high level of irregularities, were verified by phone.

Telephone verification was the second stage of control. Questionnaires were selected at random, with the requirement that at least one questionnaire was chosen from each pollster, for phone verification. All the other data were checked using an electronic system. During phone verifications, the controller contacted the participant using the provided telephone number and asked them 10-12 selected questions from the main questionnaire. Thanks to the electronic transmission of data, the controller knew the answers the participant gave beforehand and could judge whether the new answers were the same. In addition, the attributes of each questionnaire interview were checked, especially those implemented on the PDA. In the case of any serious abnormalities, a control team was sent to conduct a thorough investigation. If a pollster was found in serious violation of protocol, he/she was removed from work and his/her questionnaire data was re-verified and, when justified, removed.

The third stage of control occurred at the level of registering the participant for the outpatient studies at the medical centers. The team in charge of signing people up made contact with about 50-60% of questionnaire participants. In the process of registration, the participant was asked about whether he/she took the survey and the conditions that accompanied this process. In the event that any suspicions were discovered, a person in charge of quality control was contacted.

The construction of the control system guaranteed that every questionnaire in the project was subject to at least one form of control. The system was developed during the course of the project as experience was gathered. With the above applied solutions, it was possible to significantly reduce errors caused by the abuses of dishonest pollsters.

Control of study material

The final stage of preparing the database was the evaluation of the quality of the gathered questionnaires and the removal of any questionnaire that were conducted in a way that did not meet standards. Leaving any low quality data in the database would greatly increase the difficulty of statistical analysis. Any questionnaire that, during the process of telephone verification, was found to be falsified was immediately removed. Furthermore, in some cases, the electronic verification system was able to detect irregularities not found by the telephone verification system. With such detailed and sensitive controls, the number of potential violations found was quite large (especially since 100% of the data was controlled in some fashion). For example, pollsters with a lot of experience in the ECAP study had significantly shorter questionnaire interview times than their inexperienced colleagues. The electronic system would detect these questionnaires as suspicious

due to their short duration time. However, the telephone verification was not able to find any discrepancies or violations of procedure.

Not all surveys could be verified by phone (due to the cost, among other factors), thus it was necessary to implement additional solutions. In the situation where it was not possible to directly verify the quality of each survey due to, for example, the sheer amount of material, an analytical method based on probabilistic models was used. Based on the available information, a risk analysis was conducted calculating the chance that any particular questionnaire was falsified. A certain acceptable level of risk was defined and all questionnaires that had a risk of falsification higher than this level were deleted.

Not every error detected was automatically assumed to be a deliberate falsification on the part of the pollster. Discrepancies between the date of birth provided in the questionnaire and the date provided by the PESEL number could be due to errors in the PESEL database or unintentional error on the part of the pollster or participant. In the entering of the year of birth, the pollster would sometimes accidentally switch the last two digits. Most often the pollsters would add or subtract a year from the date of birth. Another common mistake was to add or subtract 10 years from the date of birth. The variability of the differences in the age of the respondent administered in relation to the actual value are summarized in Table 3.8. Another problem was caused when participants refused to provide their age. In such cases it was impossible to verify age against the PESEL data. Discrepancies in the year of birth occurred in approximately 2.5% of questionnaires. In most cases this was due to interviewer error, and no violations in procedure were found.

Table. 3.8. Difference between age provide in the ECAP questionnaire and the age provided by the PESEL database, regardless on the age of participant.

	N	%
1-5	286	55.2
6-10	79	15.3
>10	71	13.7
No Date	82	15.8
Total	518	100.0

Questionnaire duration

A frequently encountered problem in questionnaire studies is the fact that pollsters fill-out surveys without the participation of the interviewee. In this way, the pollster does not have to bear any of the cost or take the time to make contact to the participant. In the case of ECAP, this sort of

behavior was very limited due to the fact that the pollsters were given only the names of the participant they were to poll but were not given the participant's PESEL number. The chance of guessing a participants age without any sort of contact with them is next to zero.

Another way in which the pollster could try to maximize their profits in a dishonest way was to minimize the questionnaire duration. In this way the pollster could conduct more interviews each day and recruit participants easier. A person is much more likely to agree to participate in a 10 minute survey than in a 30-45 minute survey. To shorten the amount of time per survey, the pollsters could use one of two basic strategies. The first was based on the abuse of the filtering questions, which, if answered a certain way, would reduce the amount of modules needed to be completed. For example, if a participant declared that he/she does not have asthma, questions like, for example, "Has this asthma been recognized by your doctor?" were skipped, shortening the survey. A dishonest pollster could answer "no" even if the participant said the opposite. An extensive network of filtering questions made it possible to decrease the duration of the questionnaire by up to 50%. The second dishonest method for shortening questionnaire time was based on conducting only part of the questionnaire with the participant and completing the the rest independently once outside the participant's house. As the questionnaire had five modules, it sometimes happened that a pollster would try to complete only the first module (about 5-8 min) with the participant, and complete the rest once the pollster was home.

Detecting such dishonest behavior is very complicated. In the case of the telephone interview, the controller may ask whether the questionnaire took place and whether it was on the subject of breathing problems. This may, at this stage of control, indicate that the questionnaire was filled out correctly. However, even asking how long the questionnaire lasted does not guarantee validity because participants may not remember how much time they spent with the pollster. The same goes for asking select questions from the survey because participants could very well change their answer in between the time they took the survey and the time of the control. To minimize the effects of this phenomenon, basic questions were asked like, for example "Do you have a dog?" This kind of approach, however, limits the power of the control because a pollster who has seen a participant's place of residence can gather this type of information sometimes without even asking.

Due to the electronic system of data collection, it was possible to very accurately measure the duration of the interview and the time of day it was conducted. With paper questionnaires, there is usually space where this kind of information can be entered, however its validity again depends on the honesty of the pollster. The situation is completely different with electronic questionnaires as this sort of information is gathered from the PDA's internal clock.

The duration of the questionnaire gave us valuable information about the conditions surrounding the interview (Figure. 3.14). In cases where the interviewer filled-in the questionnaire

independently without the participation of the respondent, the duration was significantly shorter than in a survey undertaken properly. This is due to the absence of the need to read the question and wait for the respondent's reply. In the case of forgery, the interviewer entered the responses very quickly into the PDA, which could be observed in the IT system. Such a survey would last approximately 10 minutes, when a properly implemented interview lasted about 25-35 minutes.

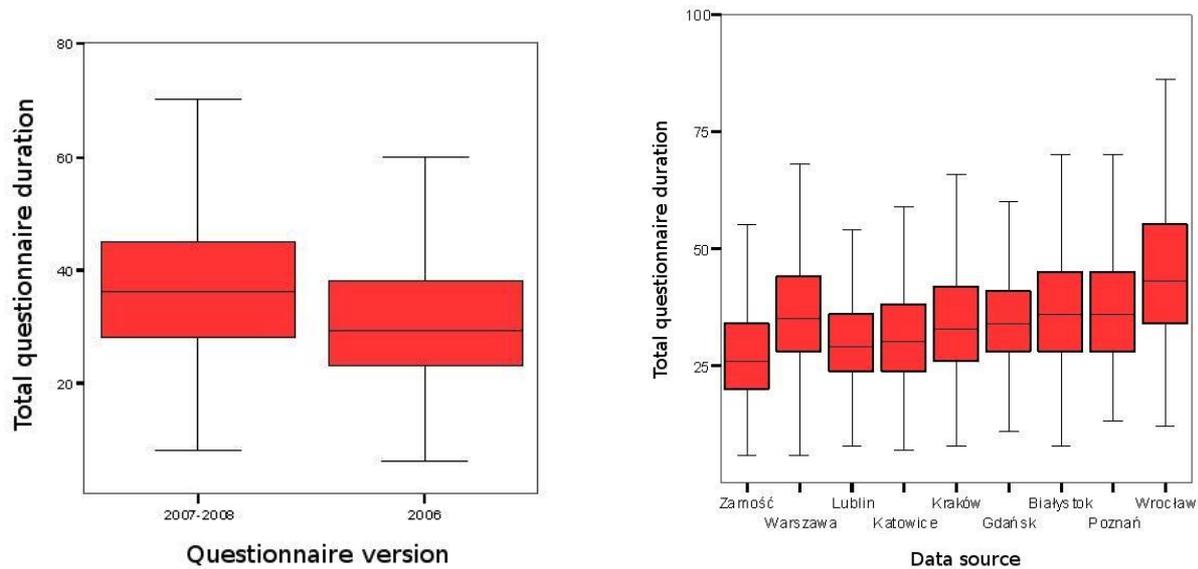


Figure. 3.14. Duration of the questionnaire interview by questionnaire version and by location. The outliers are hidden.

The duration of the interview seems to be an excellent indicator of counterfeiting. However, this parameter has several limitations that should be taken into account. The first is the fact that the survey was expanded in 2007 with several new questions. This resulted in the extending of the execution time by an average of over 6 minutes. Thus, comparing the results of interviewers working on different versions of the survey was not indicated. While the proper implementation of the 2006 survey in less than 18 minutes was theoretically possible, with the 2007-2008 version, it was no longer possible. Variation in the duration of the survey was usually due to the various experience levels of the interviewers. A chart demonstrating this phenomenon for both the 2006 survey and the 2007-2008 survey is shown in Figure 3.15.

Another important factor was the variation between centers. There was a clear difference in the responses given by participants living in different regions of the country, and this was reflected in the duration of the questionnaire interviews. Also the experience of the pollster had an influence on duration. With the increased level of familiarity with the PDA device and the questionnaire itself, the duration time decreased. If a pollster completed one of his/her first questionnaires in 20 minutes,

this indicated fraudulent activity. If it was his/her 50th or 100th questionnaire, 20 minutes was still in the realm of possibility.

Yet another factor influencing the duration of the questionnaire was the participant himself/herself and their way of answering questions. In the case of a participant with no health problems, the length of the questionnaire was shortened due to the fewer number of questions needed to be completed. Furthermore, the attitude and speed at which a participant answered questions as well as their willingness to participate had an important influence on questionnaire duration.

The final factor was manipulations by the pollsters themselves. Professional pollsters know very well the types of controls investigators use to check the honesty of their work. In the case of dishonest pollsters, this knowledge was used to mask their fraudulent activity. For example, two pollsters in Krakow artificially increased questionnaire duration by leaving the last module turned on. In this way the time registered would be closer to that of a properly done questionnaire.

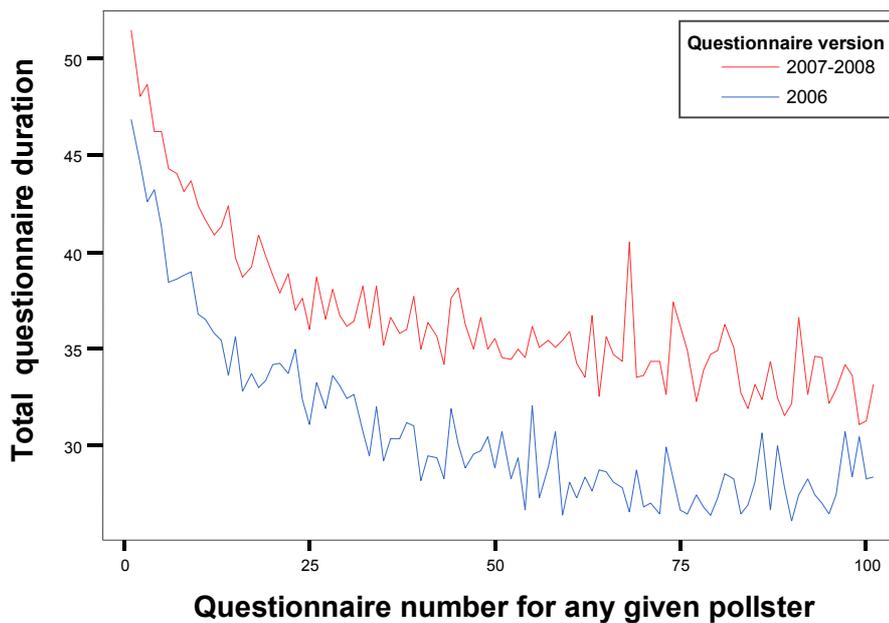


Figure. 3.15. Duration of questionnaire vs. pollster experience.

Part of the solution to the aforementioned problems was to take them into account in the analyses (especially the two versions of the questionnaire and the experience of the pollster). Also, not only the total time of the questionnaire interview was analyzed, but also the four fastest completed modules. The longest module was thrown out before analysis to help protect the data from dishonest manipulations by the pollsters.

Final verification

The purpose of verifying the database is to remove the surveys that were carried out in violation of procedures, which, at a later stage, could cloud results. To achieve this objective it was necessary to develop an algorithm that determined which surveys must be removed. The key was to simultaneously take into account the fact that not every error meant forgery. To take this into account, a point system was developed in which a specific point value was assigned to potential violations. The total number of points was calculated within each survey. If a questionnaire exceeded the set limit, this survey was removed.

In the process of verification the following factors were taken into account:

- Questionnaire duration⁴;
- Duration of the four shortest modules;
- Duration of the longest module⁵;
- The order in which the modules were filled out⁶;
- The time of day in which the pollster worked⁷;
- Correspondence in the dates of birth (PESEL vs questionnaire);

Each of these points could possibly be suspicious even in a properly implemented survey. For example, strange interview hours may simply indicate a bad setting in the PDA's system clock. However, if there were simultaneous violations of the other mentioned elements, the chances of fraud significantly increased. On this basis, the point system was developed. The more points were accumulated, the more likely forgery was committed.

In addition to the questionnaires deemed falsified by the electronic system, all questionnaires that were found to have important inconsistencies during telephone verification were also deleted. Furthermore, in the case that a particular pollster had a unusually high number of falsified questionnaires, all questionnaires conducted by that pollster were deleted.

Based on the data analysis (Table 3.9) 1,350 questionnaires were marked as suspicious. 590 of these were thrown out and deleted based on a particular pollster having consistently suspicious data. 300 falsifications were detected during the telephone interview. Combining these three categories (some surveys were detected as suspicious via more than one method), 1,831 questionnaires, or about 9% were deleted. 639 of these were from Krakow.

⁴ Survey version and experience level of the interviewer was taken into account. If the duration of the survey was suspicious, it was assessed using the irregularity point scale..

⁵ Enabled the detection of artificial lengthening of total interview time.

⁶ Evaluated whether the modules were implemented in chronological order. If they were not, this meant the survey was fraudulent

⁷ Examined whether the interviewer had not worked during hours when it would be impossible to conduct interviews.

Tab. 3.9 Number of falsified questionnaires by location

	Questionnaires	
	Accepted	Rejected
Zamość	2055	303
Warsaw	2281	58
Lublin	2422	130
Katowice	2434	97
Kraków	1642	639
Gdańsk	1837	91
Białystok	3411	307
Poznań	1219	114
Wrocław	1317	92
Total	18618	1831

It is possible that in these 1831 deleted questionnaires, there were some that were not falsified or were conducted with only minor errors. Nevertheless, this risk of accepting such material into our analyses was too large. Therefore, to be safe, this material was removed.

Summary

When working with a group of nearly 400 interviewers who gathered over 20 thousand surveys, one can not guarantee 100% survey quality. Regardless of how perfect of a system of supervision and control one has, one should be aware that a number of surveys were completed in breach of the rules. Therefore, it becomes essential to conducting a final verification of data quality. However, even after the completion of this process, some defective polls will remain undetected in the data set, but their number should be so few that they will not substantially cloud the results of the study.

Outpatient studies

The further outpatient studies were carried out in accordance with the standards set by the ECRHS II study.

Selection of patients

It was decided that 30% of those studied via questionnaire interview would then need to undergo further outpatient studies, meaning 750-800 people per location. 60% of these should be adults, 20% should be young adults 13-14 year of age, and 20% should be children 6-7 years of age.

Patients were invited by telephone using the phone numbers collected by pollsters during the questionnaire interview. Patients were given an appointment at a specific date and time. At first, in

line with our research protocol, a purposeful selection of participants was made, taking into account gender and age group. This sort of recruitment was found not to work, as there were not enough volunteers, especially in the adult category. The protocol was changed in the way that, following the change, everyone who completed the questionnaire was invited to participate in the out studies. Despite this change and the use of practically all the phone numbers provided at each location, the desired amount of patients was not reached in many places. Adding to the trouble was the fact that out of all patients with an appointment, only 40-60% showed for their appointments. This meant that if there were 10 patients with appointments, on average only 4-6 showed up.

In summary, the following factors contributed to a participation bias in the outpatient studies:

- Unwillingness of healthy patients to participate.
- Unwillingness of adults to participate, especially among men 40-44 years of age.
- High interest among parents of children 6-7 years of age.
- High interest among parents of children suffering from some type of allergy.
- A small amount of questionnaires collected translated into a small amount of phone numbers, which then in turn translated to a low amount of patients at the outpatient studies. A slow rate of questionnaire completion extended the amount of time spent at a given location from three months to six or even nine.

Schematic of the outpatient studies:

1. Evaluation by a doctor including:
 - Identifying the patient by ID number.
 - Detecting any contraindications for participation.
 - Signing of agreement for participation (Permission for physical exam and for blood work).
 - Nasoscope exam.
2. Spirometry before and after the administration of Fenoterol.
3. Nasal patency exam (Peak Nasal Inspiratory Flow) before and after the administration of oxymetazoline 0,05%.
4. Skin prick test with the following allergens: hazel, alder, birch, grasses / Grain, Rye, Artemisia, plantain, Alternaria, Cladosporium, and Molds (Alternaria tenuis, Botrytis cinerea, Cladosporium herbarum, Culvularia lunata, Fusarium moniliforme, Helminthosporium), Molds II (Aspergillus fumigatus, Mucor mucedo, Penicillium notatum, Rhizopus nigricans, Serpula lacrymans, Pullularia pullulans), Dermatophagoides pteronyssinus, Dermatophagoides farinae, dog, cat, negative control, histamine.

5. Blood work – 20 ml from adults and 12 ml from children. These samples were used for IgE antibody testing and genetic studies.
6. Parasite exam- only in patients in Warsaw- stool sample containers were given out.
7. Follow up with doctor – diagnosis, complete a medical questionnaire.

Study organization

Patient appointments were made over the phone. On average, every fourth respondent was interested in participating in the outpatient studies. Testing dates and the number of patients admitted at one time depended on how fast surveys were completed and the capacity of the medical center personnel. Usually outpatient studies were done two or three times a week, examining about 40 patients a day (60-80 appointments).

All studies were performed in one visit, which lasted approximately one hour. A large number of studies and the need to see as many patients as possible required the simultaneous work of several personnel. This included the doctor, the nurse performing the skin prick tests, the nurse performing the blood work, and the nurse/specialist performing the spirometry and nasal patency exams. Patients were admitted in such a way that each of these positions could work in parallel.

In each center, one employee served as the local coordinator, who was in direct contact with the head coordinator of outpatient studies at ECAP headquarters. Such a system ensured the fastest possible flow of information on real-time study progress (the setting of deadlines and the number of admissions and appointments), problems in the work of the team, the need to pick up blood and serum samples, and whether the delivery of additional supplies was necessary.

All equipment and materials used in the study originated from headquarters and were transported from there to location.

Training for the outpatient study team

At every location, before work could begin, the research team was trained and familiarized with the standards and protocols of the ECAP study as they related to their particular function. Physicians were trained in the standardized criteria for diagnosis of allergic rhinitis (based on ARIA guidelines), asthma (based on GINA guidelines), COPD, atopic dermatitis, urticaria, etc. They were also trained in how to fill out the outpatient questionnaire and the study participation agreement forms. Nurses were trained in the safety and hygiene guidelines for their particular function e.g. the labeling and storage of blood samples, use of relevant medicines, equipment disinfection standards, and what to do in case of adverse reactions. Persons operating the spirometry equipment, underwent additional training on how to properly use this equipment.

In situations where new employees were hired after work had already begun at a particular location, the training of these employees was the responsibility of the local coordinator. The local coordinator was provided with all the necessary materials to properly train employees.

In summary, during the ECAP study approximately 4,783 patients were examined. 9,566 spirometric tests, 9,566 nasal obstruction tests, and 81,600 skin prick tests were performed. The doctors gave allergy management advice to 4,783 people. About 10,000-12,000 people were given appointments, which required around 50,000 phone calls to be made.

Promotional Activities

In the study Epidemiology of Allergic Diseases in Poland (ECAP), various promotional activities were employed to encourage randomly selected participants to participate in the questionnaire. Due to the nature of the program, it was necessary to inform people who have been chosen to participate in the program of this fact.

In the case of adults (20-44 years) information was addressed directly to those subjects. In the case of younger age groups the information was addressed to the parents of children (age group 13-14, and 6-7 years).

Analysis of the various communication channels that could be used to reach our target population (chosen participants) showed that the following would be the best methods:

- Notification letter
- Media (print, television, radio, Internet)
- Official study website

Information was also distributed by pollsters in the form of leaflets. Those who could not be reached at home the first time were left a leaflet containing basic information about the project, contact information for headquarters, and the time of the planned return visit of the pollster.

Characteristics of the different methods used: boguslaw

Notification letter: This method involved sending a notification letter via conventional mail to the selected participants. Due to the costs of this method, letters were only sent to part of the selected group. The mailing of these letters was planned in such a way that the letters reached the target person prior to the visit by the pollster. It was also a goal to make the time between the letter reaching the target and the visit by the pollster relatively short. To achieve this goal, it was necessary to coordinate activity at both the mailing and polling levels.

The notification letter contained information about the nature and purpose of the research and also included contact information for the central study headquarters.

Media. Media as a channel of communication had an important role in the study. This method of information exchange allowed for the direct communication of information to the select target group as well as other people. These people could then pass this information along to interested parties.

Due to the various media types, this category was divided into two subcategories: country wide and local. Due to the nature of polling work and the fact that the polling was happening in various regions of Poland, both of these subcategories of media needed to be used. Taking into account the quick pace of change during polling, it made sense to use media that was published as often as possible. In the case of press, daily papers were used (both country wide and local). In the case of electronic media, television, radio, and Internet were used. At the beginning of the study, general information was conveyed via countrywide media. Later, more specific information about polling work going on in a given area was conveyed via local media. In this way, the information distributed by the media could have a maximal impact.

Official study website: The official study website was a source of information that was available to the public throughout the course of the experiment. This channel was especially important due to its ability to reach our strategic target groups. The Internet is a very common way for these groups to access information. The website also enabled the posting of a much larger amount of information as well as the contact information for the investigation team (telephone numbers, email addresses, direct contact information for headquarters) The web address of this site was advertised via the other previously mentioned promotional channels. The website also allowed for the posting of information after the polling work was completed.

Promotional activities undertaken

During the course of the study, three press conferences were organized in different locations (Warsaw, Białystok, Krakow). Numerous individual meetings with journalists were also made. Notification letters were sent out to 26 thousand potential participants in all locations except the rural area. A website was created and put online, which was kept current as the experiment went along with progress updates. Pollsters left informative leaflets for chosen participants who were not found to be at home during their first visit.

Effects of promotional activities

As a result of the promotional activities in the ECAP study, during the study, almost 70 different press, television, radio, and Internet promotions were ran, documented, and archived. In 2006, 25 different promotions in the various media types were done. In 2007, 36, and in 2008, 6 additional promotions were done (Table 3.10). With the large variety of information channels used for

promotional purposes, information about the ECAP study should have reached the proper audience with great success. The effect of the notification letter was registered as a positive one by pollsters. They informed us that participants who received such a letter prior to their visit seemed to be easier to get a hold of and more willing to cooperate. The website was a good source of information for people who were seeking more detailed information about the study. Such persons also could contact the study headquarters in order to obtain more information about the study.

Tabela 3.10. List of media and title news about project

Ip.	Media	Title	Date
1.	TVP2 - Panorama	AAA...Psik	9 lipca 2006 r.
2.	Życie Warszawy	Będą wyławiać alergików	17 sierpnia 2006 r.
3.	Życie Warszawy	Ruszają badania alergii w Warszawie	17 sierpnia 2006 r.
4.	Gazeta Wyborcza	Wyłowią warszawskich alergików	28 sierpnia 2006 r.
5.	Życie Warszawy	W poniedziałek ruszają w Warszawie największe w Europie badania	31 sierpnia 2006 r.
6.	Dziennik	Wielki raport o alergii	2 września 2006 r.
7.	Dziennik	Ruszamy na wojnę z kichaniem	4 września 2006 r.
8.	PAP	Badania alergików na ogólnopolską skalę	5 września 2006 r.
9.	Polskie Radio	Sygnaly Dnia - wywiad	5 września 2006 r.
10.	Dziennik Zachodni	Ankieta dla alergików	6 września 2006 r.
11.	Gazeta Wyborcza	W całej Warszawie szukają uczulonych	6 września 2006 r.
12.	Życie Warszawy	Rozpoczęło się wyławianie alergików	6 września 2006 r.
13.	Gazeta Wyborcza	W całej Warszawie szukają uczulonych	6 września 2006 r.
14.	PAP	Badania alergików na masową skalę	7 września 2006 r.
15.	Wirtualna Polska	Badania alergików na masową skalę	7 września 2006 r.
16.	Życie Warszawy	Nie ufają naukowcom, bo boją się oszustów	15 września 2006 r.
17.	TVP2 - Panorama	Akcja "Alergia"	16 września 2006 r.
18.	Przegląd	Cała prawda o alergii Polaków	18 września 2006 r.
19.	Życie Warszawy	Badania alergologiczne	19 września 2006 r.
20.	Gazeta Współczesna	Będą pytać o alergię	3 października 2006 r.
21.	Życie Warszawy	Dłużej będą badać potencjalnych alergików	3 października 2006 r.
22.	Dziennik Wschodni	Co z pańską alergią?	9 października 2006 r.
23.	Gazeta Wyborcza, Lublin	Astma, katar czy zapalenie skóry?	9 października 2006 r.
24.	Gazeta Wyborcza, Stołeczna	Kichają na Warszawę	14 listopada 2006 r.
25.	VOX FM	Wywiad dotyczący badania oraz alergii w programie wieczornym	20 listopada 2006 r.
26.	Rzeczpospolita	Zapytali o katar	8 grudnia 2006 r.
27.	Wirtualna Polska	Co czwarty Polak może cierpieć na alergię	13 marca 2007 r.

28.	Onet.pl	<i>Co czwarty Polak może cierpieć na alergię</i>	13 marca 2007 r.
29.	Dziennik Polski	<i>Poznawanie alergii</i>	14 marca 2007 r.
30.	Gazeta Krakowska	<i>Policzmy alergików</i>	14 marca 2007 r.
31.	Dziennik Zachodni	<i>Liczba dnia</i>	14 marca 2007 r.
32.	Gazeta Wyborcza	<i>Stolica alergików</i>	15 marca 2007 r.
33.	Nasz Dziennik	<i>Powstaje alergiczna mapa Polski</i>	15 marca 2007 r.
34.	Gazeta Wyborcza, Kraków	<i>Alergie pod lupą specjalistów</i>	19 marca 2007 r.
35.	Gazeta Wyborcza	<i>Okulista nie dentysta, nie ma się czego bać</i>	21 marca 2007 r.
36.	Rzeczpospolita	<i>Żyjemy w zbyt sterylnych warunkach</i>	12 kwietnia 2007 r.
37.	Rzeczpospolita	<i>Szybko przybywa Polaków uczulonych na pylenie roślin</i>	12 kwietnia 2007 r.
38.	Dziennik Bałtycki	<i>Ilu tak naprawdę mamy alergików</i>	16 maja 2007 r.
39.	Wirtualna Polska	<i>Tytuł: Cała prawda o alergii Polaków</i>	21 maja 2007 r.
40.	Gazeta Wyborcza, Poznań	<i>Dla Gazety</i>	30 maja 2007 r.
41.	Gazeta Wyborcza	<i>Zbadają polskie alergie</i>	30 maja 2007 r.
42.	Metro	<i>Alergie pod lupę</i>	31 maja 2007 r.
43.	Dziennik Polski	<i>Plaga alergii</i>	6 czerwca 2007 r.
44.	Gazeta Wyborcza	<i>Zbadają polskie alergie</i>	16 czerwca 2007 r.
45.	Echo Miasta Gdańsk	<i>Skąd ta alergia?</i>	5 lipca 2007 r.
46.	Polska.pl	<i>Ruszają badania alergologiczne w Białymstoku</i>	12 października 2007 r.
47.	Współczesna.pl	<i>2,5 tys. białostoczan weźmie udział w badaniach</i>	15 października 2007
48.	Wrotapodlasia.pl	<i>Badania alergologiczne w Białymstoku</i>	15 października 2007
49.	Gazeta Współczesna	<i>Stop alergiom!</i>	15 października 2007 r.
50.	Białystokonline.pl	<i>Badania alergii w Białymstoku</i>	16 października 2007 r.
51.	PAP	<i>Wielkie badanie epidemiologiczne - Polacy a choroby alergiczne</i>	17 października 2007 r.
52.	Polska.pl	<i>Badania alergologiczne - czas na Wrocław</i>	7 listopada 2007 r.
53.	Regional.pl	<i>Czas na Wrocław</i>	9 listopada 2007 r.
54.	Polska Gazeta Wrocławska	<i>We Wrocławiu studenci będą szukać alergików</i>	10-11 listopada 2007 r.
55.	TVP3 - Wiadomości	<i>Leczenie alergików</i>	12 listopada 2007 r.
56.	Gazeta.pl	<i>Ankieterzy zapytają wrocławian o alergie</i>	13 listopada 2007 r.

57.	Gazeta Wyborcza, Wrocław	Ankieterzy zapytają wrocławian o alergię	15 listopada 2007 r.
58.	Metro	Uczuleni na rozwój	16 listopada 2007 r.
59.	Puls Medycyny	Największe w Polsce badanie alergików	16 listopada 2007 r.
60.	Miastowroclaw.pl	Badania alergiczne we Wrocławiu	18 listopada 2007 r.
61.	NaszeMiasto.pl	We Wrocławiu zaczynają szukać alergików	10 listopada 2007r.
62.	Gazeta Wyborcza	Chodzą po domach i pytają o alergię	4 grudnia 2007 r.
63.	Polska - Głos Wielkopolski	Liczą alergików	30 stycznia 2008 r.
64.	Rynek Zdrowia	Oblicze alergicznej Polski	nr 3 marzec 2008 r.
65.	Polska The Times	Wszyscy będziemy alergikami	16 kwietnia 2008 r.
66.	Gazeta Farmaceutyczna	Czas alergii	1 maja 2008 r
67.	EchoMiasta Wrocław	Uwaga na alergię	8 maja 2008 r.
68.	Wprost	Bomba alergiczna	1 czerwca 2008 r.
69.	Przewodnik Katolicki	Pyłki w ataku	22 czerwca 2008 r.
70.	Portal bankier.pl	Raport z badań ECAP: 4 miliony osób w Polsce choruje na astmę	24 października 2008
71.	Portal dziennik.pl	Alergię mają za duże czyszciochy	24 października 2008
72.	Portal gazeta.pl	"Rzeczpospolita": Polacy cierpią na alergię	24 października 2008
73.	Portal newsweek.pl	Polacy narodem alergików	24 października 2008
74.	Portal onet.pl	W Polsce jest najwięcej alergików na świecie	24 października 2008
75.	Portal onet.pl	W Polsce jest najwięcej alergików na świecie	24 października 2008
76.	Portal rmf.fm	Coraz więcej z nas skarży się na alergię	24 października 2008
77.	Portal rynekzdrowia.pl	Naukowcy: Alergiom sprzyja wielkomiejski styl życia	24 października 2008
78.	Portal tvp.pl	Alergie ukrytym wrogiem Polaków	24 października 2008
79.	Rzeczpospolita	Uczulenie nasze powszechne	24 października 2008
80.	Radio Dla Ciebie	Materiał w programie "Przegląd prasy"	24 października 2008
81.	Radio Dla Ciebie	Materiał w programie "Aktualności" g. 20.00	24 października 2008
82.	Radio Dla Ciebie	Materiał w programie "Aktualności" g. 16.00	24 października 2008
83.	Radio EURO	Materiał w programie "Wiadomości"	24 października 2008
84.	Radio Kolor	Materiał w programie "Wiadomości"	24 października 2008
85.	Radio Zet	Materiał w programie "Wiadomości" g. 5.30	24 października 2008

86.	Radio Zet	Materiał w programie "Wiadomości" g. 7.30	24 października 2008
87.	Express Bydgoski	Polska krajem alergików	25 października 2008
88.	Nowości	Polska krajem alergików	25 października 2008
89.	Polska - Dziennik Łódzki	Informacja w dziale "Krótko mówiąc"	25 października 2008
90.	Wprost	Astma autostradowa	26 października 2008
91.	RADIO MARYJA	Materiał w programie "Wiadomości"	26 października 2008
92.	TV TRWAM	Materiał w programie "Informacje Dnia"	26 października 2008
93.	Portal emetro.pl	Pół Polski ma alergię	27 października 2008
94.	Portal interia.pl	Każdy z nas zostanie alergikiem	27 października 2008
95.	Portal onet.pl	Jesteśmy narodem alergików	27 października 2008
96.	Portal onet.pl	Jesteśmy narodem alergików	27 października 2008
97.	Portal studentnews.pl	Polacy cierpią na alergię	27 października 2008
98.	Portal tvn24.pl	I ty będziesz alergikiem	27 października 2008
99.	Portal wp.pl	Niedługo każdy z nas będzie alergikiem	27 października 2008
100.	METRO	Pół Polski ma problem z alergią	27 października 2008
101.	NOWINY	Szkodzi nam życie w sterylnych warunkach	27 października 2008
102.	Polska - Dziennik Łódzki	I ty zostaniesz alergikiem	27 października 2008
103.	Polska - Gazeta Krakowska	Zostaniesz alergikiem	27 października 2008
104.	Polska The Times	Każdy z nas zostanie alergikiem	27 października 2008
105.	TVN 24	Informacje w programie "Przegląd prasy"	27 października 2008
106.	TVP INFO	Materiał w programie "Poranek TVP INFO"	27 października 2008
107.	Portal naukawpolsce.pl	Polacy - narodem alergików	28 października 2008
108.	Portal nursing.com.pl	Alergicy w Polsce - ECAP 2008	28 października 2008
109.	Portal polskatimes.pl	Rany po powodzi	28 października 2008
110.	Portal tf.pl	Polacy - narodem alergików	28 października 2008
111.	SUPER NOWOŚCI	Podkarpackie brudasy nie mają alergii?	28 października 2008
112.	Polska - Gazeta Wrocławska	Rany po powodzi	29 października 2008
113.	Polska - Gazeta Wrocławska	Nie ma klimatu dla alergików	29 października 2008
114.	TVN	Wywiad w programie "Dzień Dobry TVN"	29 października 2008

115.	TVP Wrocław	Materiał w programie "Fakty" g. 8.49	29 października 2008
116.	egospodarka.pl	Wygraj z astmą - nadzieja dla Polaków chorujących na astmę	30 października 2008
117.	Portal gazeta.pl	"Epidemia Astmy i Alergii w Polsce - Konferencja ECAP 2008"	30 października 2008
118.	Portal internetpr.pl	"Wygraj z astmą" - nadzieja dla Polaków chorujących na astmę	30 października 2008
119.	Portal netpr.pl	Nadzieja dla Polaków chorujących na astmę	30 października 2008
120.	Portal netpr.pl	Epidemia Astmy i Alergii w Polsce - Konferencja ECAP 2008	30 października 2008
121.	Puls Medycyny	Alergie dokuczają Polakom	29 października 2008
122.	Angora	Materiał w dziale "Przegląd Tygodnia"	2 listopada 2008
123.	Portal polki.pl	Życie bez alergii	3 listopada 2008
124.	Echo Dnia	Od kichania do duszności	13 listopada 2008
125.	Echo Miasta – Warszawa	Polska krajem alergików	20 listopada 2008
126.	Echo Miasta - Łódź	Polska krajem alergików	20 listopada 2008
127.	mmpoznan.pl	Alergie: śmiertelne zagrożenie	18 lutego 2009
128.	Zdrowie	<i>Choroba XXI wieku - tak mówi się dziś o alergii.</i>	1 marca 2009
129.	Dziennik Bałtycki	Pomorze bije rekordy w alergii	23 kwietnia 2009
130.	Polskie Radio Białystok	Konferencja poświęcona astmie i alergii	6 maja 2009
131.	Kurier Poranny - serwis Zdrowie	Epidemiologia Chorób Alergicznych w Polsce	7 maja 2009
132.	Współczesna	Coraz częściej skarżymy się na...alergie	8 maja 2009
133.	TVP	TVP Poznań - Teleskop	12 maja 2009
134.	Echo Miasta Poznań	Poznań - miastem alergików	18 maja 2009
135.	TVP.info	Polacy - narodem alergików	28 maja 2009
136.	wp.pl	Choroba, która gnębi 4 mln Polaków jest często źle leczona	28 maja 2009
137.	Dziennik Zachodni	Alergię trudno pokonać	28 maja 2009
138.	TVP	TVP Katowice- Aktualności	28 maja 2009
139.	Życie Warszawy - dział Nauka	14 mln Polaków ma alergię	28 maja 2009
140.	Money.pl	14 mln Polaków ma alergię - wynika z badania epidemiologicznego	28 maja 2009
141.	Współczesna - Magazyn	Niech ucieka z miasta ten, kto cierpi z powodu kotów i traw	30 maja 2009
142.	PAP	14 mln Polaków ma alergię - wynika z badania epidemiologicznego	2 czerwca 2009
143.	Dziennik	Stajemy się narodem astmatyków	23 lipca 2009

144.	Gazeta Wyborcza	Polacy to alergicy	25 lipca 2009
145.	Rynek Zdrowia	Astma coraz groźniejsza dla Polaków	24 lipca 2009
146.	nowiny24.pl	Na alergię sterylność nie pomoże	29 lipca 2009
147.	Gazeta Wyborcza - Olsztyn	Polacy to alergicy. Tak jak inni Europejczycy	8 sierpnia 2009
148.	Kurier Poranny - serwis Zdrowie	Polska alergicznym liderem	14 sierpnia 2009
149.	Radio Lublin	Lublinianie cierpią mniej na choroby alergiczne?	10 października 2009
150.	TVP	TVP Kraków - Kronika	14 listopada 2009
151.	kobieta.interia.pl	Polska alergicznym "liderem"	23 października 2009
152.	Radio eR	Polska jeden z najbardziej zalergizowanych krajów świata	24 października 2009
153.	TVP	TVP Lublin - Panorama Lubelska	24 października 2009
154.	Kurier Lubelski	Alergie dają się lublinianom we znaki	26 października 2009
155.	Twój Styl	Katar: Mam cie w nosie!	nr 06 (227) 2009

Refusals

In the questionnaire part of the ECAP study, information was gathered on incomplete questionnaire interviews and their possible causes. Information about the number of polling attempts, whether the pollster was invited into the participants home, and whether the questionnaire was completed was all registered in the IT system. In the case of incomplete surveys, the pollster was obligated to indicate one of eleven possible reasons for the questionnaires failure (Table 3.11). This information is stored in a database independent of the main database.

A total of 69,910 of survey attempts were made during the the course of the study. This number includes all locations and the entire period of polling work. It is important to note that pollsters were given three chances to make contact with each chosen participant. This number also includes tries that ended in a successful questionnaire interview as well as tries that ended in refusal or an incomplete survey (Table 3.12).

A total of 20,455 questionnaire interviews were successfully completed. 28,326 chosen potential participants could not be reached or refused participation. Due to the different causes of the failed questionnaire interview, this group was divided into two subgroups. The first group contained those people who could not be reached by the pollster. The second contained those who directly refused participation in the study. These subdivisions increased the transparency of our data. All the different reasons for refusal and/or incomplete questionnaire interviews are presented by location in the tables below (Table 3.11 and Table 3.12).

Tab. 3.11 Reasons of questionnaire interview failure.

Nm.	Type	Reason for failed questionnaire interview	Registered in analyses as
1.	Reason 1	The pollster could not reach anyone at the designated address.	Lack of participant
2.	Reason 2	Participation refused due to lack of time.	Participant refusal
3.	Reason 3	The participant was TEMPORAILY unavailable at the designated address.	Participant refusal
4.	Reason 4	The participant did not live at the designated address.	Participant refusal
5.	Reason 5	The participant is unavailable at the designated address ((for the duration of the study).	Participant refusal
6.	Reason 6	Refusal to let the pollster into the home, neighborhood, apartment building etc.	Participant refusal
7.	Reason 7	The participant was indisposed, sick, under the influence of drugs or alcohol.	Participant refusal
8.	Reason 8	The participant refused on the basis of the subject of the study.	Participant refusal
9.	Reason 9	The participant refused without giving a reason.	Participant refusal
10.	Reason 10	The pollster could not find the designated address.	Lack of participant
11.	Reason 11	The participant died or moved.	Lack of participant

Tab. 3.12. Data concerning failed questionnaire interviews

Reason for failed questionnaire interview	Study Area										
		Katowice	Zamość	Kraków	Wrocław	Lublin	Gdańsk	Warsaw	Poznań	Białystok	Total
Reason 1	N	1,376	944	805	575	554	734	2,545	251	943	8,727
	%	33.2	44.1	26.8	24.8	25.5	30.8	41.9	17.7	20.2	30.8
Reason 2	N	193	60	91	140	49	72	293	52	116	1,066
	%	4.7	2.8	3.0	6.0	2.3	3.0	4.8	3.7	2.5	3.8
Reason 3	N	202	372	126	212	186	170	496	53	190	2,007
	%	4.9	17.4	4.2	9.1	8.5	7.1	8.2	3.7	4.1	7.1
Reason 4	N	305	142	397	195	182	376	596	283	727	3,203
	%	7.4	6.6	13.2	8.4	8.4	15.8	9.8	19.9	15.6	11.3
Reason 5	N	573	356	353	388	314	287	526	172	746	3,715
	%	13.8	16.6	11.7	16.7	14.4	12	8.7	12.1	16.0	13.1
Reason 6	N	175	19	352	97	211	45	252	85	345	1,581
	%	4.2	0.9	11.7	4.2	9.7	1.9	4.2	6	7.4	5.6
Reason 7	N	48	41	19	24	39	17	31	14	63	296
	%	1.2	1.9	0.6	1.0	1.8	0.7	0.5	1.0	1.4	1.0
Reason 8	N	295	21	110	89	140	96	250	99	245	1,345
	%	7.1	1.0	3.7	3.8	6.4	4.0	4.1	7.0	5.3	4.7
Reason 9	N	797	62	565	498	326	522	883	320	1,016	4,989
	%	19.2	2.9	18.8	21.5	15.0	21.9	14.6	22.5	21.8	17.6
Reason 10	N	37	60	17	9	23	10	37	9	39	241
	%	0.9	2.8	0.6	0.4	1.1	0.4	0.6	0.6	0.8	0.9
Reason 11	N	145	63	173	92	152	54	159	83	235	1,156
	%	3.5	2.9	5.8	4.0	7.0	2.3	2.6	5.8	5.0	4.1
Total	N	4,146	2,140	3,008	2,319	2,176	2,383	6,068	1,421	4,665	28,326
	%	100									

The most common cause for an incomplete questionnaire interview was that the pollster could not reach the participant at the address provided. The rarest cause for failure was that the polster could not find the target address. This data however differs from location to location.

In the group of 28,326 chosen potential participants with whom it was not possible to complete a questionnaire interview, contact with 17,042 could not be established at all. 11,284 directly refused participation. Analysis shows that the total general response rate in the study was 41.9%. However, this rate differers significantly form one region of Poland to another. The response rate was

calculated by comparing the number of participants with whom it was possible to complete a successful questionnaire survey to the number of chosen potential participants with whom a questionnaire interview attempt was made. When the response rate took into account only those people who refused participation, it was calculated to be 64.4%.

Various promotional activities were used to encourage randomly selected participants to participate in the study. With respect to this, various information channels were employed to spread the word about the study. The first urban location where work began was Warsaw. For this reason, the start of polling in Warsaw was announced via country-wide and local media. In the other locations, local media was contacted. Nevertheless, information about the study still appeared in national media. A notification letter was sent out to all participant who lived in urban areas. Due to the nature of the Zamojsć and Krasnystawski counties, news of selection for participation was conveyed via direct contact between the pollster and the potential participant (Table 3.13).

Table 3.13. Data on questionnaire interview implementation, study promotion, and response rate.

		Study Area										Total
		Katowice	Zamość	Kraków	Wrocław	Lublin	Gdańsk	Warsaw	Poznań	Białystok		
Realization of questionnaire interviews	Numer of questionnaires	N	2,531	2,358	2,281	1,409	2,552	1,928	2,345	1,333	3,718	20,455
	Number of participants *	N	6,677	4,498	5,289	3,728	4,728	4,311	8,413	2,754	8,383	48,781
	Lack of participants	N	2,436	1,565	1,745	1,259	1,225	1,461	3,863	798	2,690	17,042
		%	58.8	73.1	58	54.3	56.3	61.3	63.7	56.2	57.7	60.2
	Participant refusal	N	1,710	575	1,263	1,060	951	922	2,205	623	1,975	11,284
		%	41.2	26.9	42	45.7	43.7	38.7	36.3	43.8	42.3	39.8
	Number of polling attempts	N	10,495	4,528	7,155	6,173	6,277	6,428	13,334	3,669	11,851	69,910
Promotional Activity	Notification letter		Yes 2498 letters	No	Yes 2,807 letters	Yes 3,748 letters.	Yes 2,498 letters.	Yes 4,470 letters.	Yes**	Yes 3,750 letters.	Yes 6,296 letters.	
	Media		Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
	Other		No	No	No	No	No	billboards	No	No	No	
Response rate	General response rate ***		37.9%	52.4%	43.1%	37.8%	54.0%	44.7%	27.9%	48.4%	44.4%	41.9%
	Refusal response rate ****		59.7%	80.4%	64.4%	57.1%	72.9%	67.6%	51.5%	68.1%	65.3%	64.4%

* Number of participants - Number of people with whom a questionnaire interview was attempted (number = number of survey participants + lack of participants + participant refusals)

** Mailing was not coordinated centrally

*** General response rate - the ratio of completed interviews to the number of participant

**** Refusal response rate - the ratio of completed interviews to the number of participants minus the number of participant which were not reachable (no participant)

The effect of promotional activities on response rate

During the course of the study, it became necessary to add questions to the survey that would enable us to answer the question of how to best construct our promotional routes. This information could also be used to aid in similar future studies where information will be needed to be conveyed effectively to a target population. Presented below is data from all the centers that participated in the expanded questionnaire (Table 3.14).

When participants were asked whether it was necessary to inform the public about studies such as ECAP, 67.8% of participants from all locations answered “yes”. It was also asked whether a notification letter was a good way to inform potential participants about the study. 71.9% of polled participants answered that a notification letter had a positive influence on their decision to participate in the study (Table 3.14).

Tab. 3.14 Positive impact of promotional activities on willingness to participate in the study

		Study Area					Total
		Kraków	Wrocław	Gdańsk	Poznań	Białystok	
Study information conveyed via media	N	1,642	1,317	1,837	1,218	3,411	9,425
	%	69.4	64.7	84.4	71	57.7	67.8
Study information conveyed via notification letter	N	411	636	416	587	1,972	4,022
	%	73.5	73.1	67.5	52.3	77.9	71.9

In Wrocław, along with the notification letter, additional materials were sent. Participants were divided into three groups. Every group received a notification letter and two of the groups received either a coupon or leaflet. The additional materials informed the participants of the possibility of participating in the outpatient studies. The coupon informed the participant of the costs of these studies and at the same time of the possibility of getting the tests done free of charge if he/she participated in questionnaire study. The leaflet simply contained information about the outpatient studies and informed the potential participant of the possibility that, if they participated in the questionnaire study, they could be chosen to participate in the outpatient study.

Persons who received the notification letter along with the leaflet were least likely to answer “yes” when asked if they received a notification letter. Only 73.2% (n=190) answered yes. 77.6% (n=170) of persons receiving simply the notification letter answered this same question as “yes”. Most frequently, with 85.9% (n=213), persons who received the notification letter along with the coupon answered “yes” to this question. Based on this, it can be said that sending a letter of notification along with the invitation for the outpatient studies in coupon format is most effective. Furthermore, it can be said that sending the notification letter along with the leaflet was less effective than sending the notification letter by itself.