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Challenges in implementing of school-based recruitment for human biomonitoring research

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ABSTRACT

Aims: School-based research involves a multi-level process to ensure recruitment of an adequate and reliable sample. The aim of this study is to present the experience of school recruitment of the DEMOCOPHES study in Cyprus. Moreover, methods and strategies to improve recruitment rates are described.

Methods: The target population of the DEMOCOPHES study were children aged 6–11 years old and their mothers. Cyprus was required to recruit 60 children and their mothers. Random selection of the schools was followed. The information material was provided to the teacher of the selected classes who subsequently distributed it to the children. Personal follow-up contact via telephone call was made with the parents living in rural areas only.

Results: Twenty-one percent eligibility and consent rate for participation were reached. In schools where parents were followed-up by telephone calls, the response rate was significantly higher compared to those not followed-up by reminders (58% *vs* 42%, $p < 0.05$).

Conclusion: Despite the limitations of applicability and representativity, school-based recruitment has been shown to be a feasible and reliable strategy. It is an attractive approach to enrolling young populations into epidemiological studies. Follow-up reminders via telephone calls significantly increased the response rate.

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KEYWORDS

School recruitment; human biomonitoring; recruitment; school

Introduction

Human biomonitoring (HBM) is an important tool for measuring the levels of pollutants or their metabolites in body fluids and tissues. Furthermore, HBM can raise awareness of harmful substances and toxic elements in the public, as well as the policy-makers [1]. DEMOCOPHES (a funded HBM study) was conducted in 17 European countries in order to collect data on the distribution of specific biomarkers and related lifestyle data among defined study populations, which are comparable on a European scale [2,3]. The design of the DEMOCOPHES study allowed two alternative approaches for the recruitment of participants, either via inhabitants' registries or via schools. In Cyprus, the school-based recruitment method was chosen [4]. School-based recruitment is an attractive way of approaching and inviting young populations into epidemiological studies. Schools are often used to recruit participants into research studies because they enable researchers to efficiently reach large numbers of children and their families. Whenever this method of recruitment is selected, necessary steps should be taken to ensure that sufficient numbers of participants are recruited into a study.

However, school-based recruitment is accompanied by the limitation of excluding part of the population. Effective ways of increasing participation level should be considered [5,6].

The aim of this paper is to present the experience and challenges identified during the recruitment phase of the DEMOCOPHES study in Cyprus,

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following the selection of the school-based strategy. Moreover, the wider advantages and disadvantages of a school recruitment strategy are addressed and measures to achieve optimal participation rates are proposed.

Methods

Study design and participants

The cross-sectional survey was designed to include 120 children (6–11 years of age) and their mothers, aged up to 45 years old, in each country. Standardized operating procedures and communication materials were prepared centrally by the COPHES project and were adapted at the national level by each DEMOCOPHES country [2].

In each implementing country, children and mothers were recruited from two different sampling locations; 30 pairs were recruited from an urban area and 30 from a rural area. Industrial sites or hot-spots (i.e., areas next to highways) were excluded. Cyprus was required to include 60 healthy children (children with metabolic disturbances and kidney diseases were excluded) and their mothers in this pilot study. All participants should have sufficient knowledge of the local language and they should had been living at the sampling locations for the last 5 years at least.

Details and rationale for the study design are reported by Becker et al. [7].

Following the detection of eligible schools (according to the exclusion criteria for the participating areas described above) based on population density data from the Statistics Authority and the provision of approval by the National Bioethics Committee and the Ministry of Education, random selection of the participating schools was applied. The principal of each selected school and the parent–teacher association committees were contacted by the leading physician to explain the purpose of the project.

A random number table was used to select the individuals taking part in the study whenever the eligible and consenting population exceeded the required sample size according to the study design since this was a pilot study and there was a limit on the number of participants (60 pairs).

In the selected classes, teachers distributed the information material to the children and informed them to give it to their parents to fill and return the reply card. The information material consisted of an invitation letter accompanied by an information leaflet (one for the parents and a special one for the children). Information on the study and how to participate (or to *not* participate or to withdraw later on if they so wished) including ethical and data-protection aspects were included in the material. A reply card to express participation or non-participation interest and a description of further steps of the survey was also provided.

If the reply card was returned with a positive reply, the researchers then used a "responders' questionnaire" to approve eligibility (age of the mother, language knowledge, and health status of the child) and include the family in a candidate list. A "non-responders questionnaire" was also filled for those who did not return the card to evaluate potential selection bias [7]. Potential bias was evaluated by examining the non-responders demographic characteristics. There was no significant difference in the demographic characteristics of the non-responders versus the responders.

In an attempt to increase the participation rate of the study, the researchers gave a talk at each school to groups of parents, as well as to each school class.

Finally, follow-up telephone calls were conducted with the parents from rural areas at 1, 2, and 3 weeks post distribution of the information material. This was performed with a purpose to investigate potential differences in participation rates between the two different approaches.

The flowchart from invitation to final selection is presented in detail in Figure 1.

Data Analysis

Statistical analysis was performed according to a centrally-developed standardized procedure developed by the COPHES project [3]. This procedure included a codebook with predefined variable

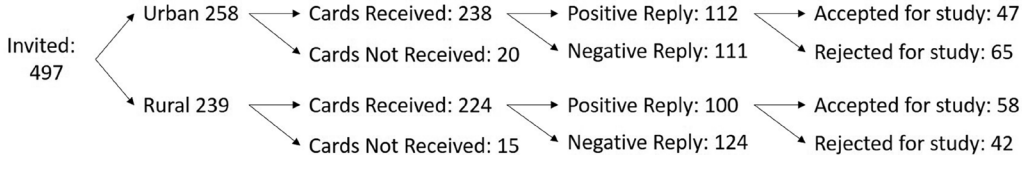

Figure 1. Flowchart from invitation to final selection.

names, unities, formats, and coding rules, instructions on constructing a standardized national database and on analyzing the data to calculate the response rates, non-responder analysis, description of the study population, and analysis of the assessed biomarkers. Cyprus, like all DEMOCOPHES countries, developed its respective national database according to detailed instructions provided in a centrally-developed codebook, guidelines for quality control, and relevant training. Data cleaning was performed using the program R and the quality-assured national database was analyzed using SPSS and then was merged with the European database. Descriptive analyses were performed in order to obtain the percentages of response rates. We performed Chi-square test to compare differences in the response rates before and after telephone invitation. Statistical and descriptive analyses were performed using the statistical software SPSS.

Results

In terms of validation of the recruitment process, the school-based approach employed in the case of Cyprus exceeded the preset goal of 60 participants nation-wide, with a final eligible and consenting population of 103 individuals (20.72% of all families contacted, a surplus of 72% on the recruitment target). In schools (rural area) where parents were followed-up by telephone calls, the response rate was significantly higher compared to those who were not (58% *vs* 42%, *p*-value = 0.028). The final number of 103 eligible participants who responded positively out of 497 initially invited (20.72%) is one of the highest among the 17 countries participating in the DEMOCOPHES study.

Discussion

High return rates can be achieved with multiple reminders, especially via telephone contact, as has been clearly demonstrated in our study, and in other studies also [8–11].

School-based recruitment is an effective method to use in a research program, although it also poses an array of challenges. Convincing schools to participate is a difficult task. Overload school curriculum, concerns about losing valuable class time, staff reluctance to participate and have the responsibility for a research project, and participation in another research project are the main obstacles.

During a school inner-city asthma study, the authors highlighted that convincing the schools to participate in the study was a very difficult procedure. In addition, they emphasized the need to repeat this procedure when a new school was integrated into the study [12]. The complexity of the school approach is similarly described well by a research program in the United States that explored the challenges demonstrated by the study and concluded that in order to plan a school study, all levels of the organization must be included [13].

The engagement of the entire system is needed for a successful school recruitment strategy: starting from the Ministry of Education and Culture approval to the approval and engagement of school principals and school staff and finally, the engagement of children and parents. According to another study, the school approach is an effective way to recruit children, even though a common adverse scenario is the non-participation of entire units (e.g., whole schools or classes), which may result in selective drop out [5].

Under the light of our experience, recruiting participants from schools into research projects is a time-consuming process. In order to make contact with the schools, approval must be granted from Ministry of Education, which usually entails a relatively long application process. The applicant is required to submit among other documents the following:

- Details of the main partners, organizers, and main researchers of the project
- The aim and the research question of the study
- Description of the methodology of the study, research tools, and recruitment strategy
- Description of procedures which should be followed in case of complaints or concerns from the participants.

Once permission to commence the research project is granted, written agreement to participate must be obtained from each school principal.

There are also many factors which deter schools from participating in research studies, including an already overloaded curriculum, participation in other research projects, and teachers' reluctance to get involved in project activities.

Parental consent prior to commencing research involving school children is mandatory. Obtaining parental consent poses additional challenges in school recruitment strategies because the researcher must ensure that the information reaches the parent and is presented in a user-friendly format in order to encourage the return of consent forms.

The early involvement and active participation of pupils, teachers, and parents in briefing sessions prior to the study onset help develop a positive environment and a supportive multidisciplinary collaboration that will enhance pupil inclusion into the study. Moreover, school-based recruitment also generates additional opportunities for benefiting in parallel with different public health interventions. These include the development of informative seminars on environmental health issues for pupils, parents, and teachers, as well as effective communication of individual and overall results through relevant events, carefully organized in the school setting and tailored to the specific participants' concerns and consultation needs.

Individual lifestyle factors also play a major role in the successful recruitment of individuals into a study. People often lead busy lives; they may have other priorities, may be skeptical of studies involving biological sampling and personal data collection, or could simply be uninterested. Furthermore, children may be nervous or peer-pressured against participation.

How to increase participation rate in school-based recruitment strategies

Measures to increase the participation rate are crucial in every epidemiological study [14]. DEMOCOPHES countries showed a preference for school-based recruitment [1,15]. The measures that lead to a higher participation rate in school recruitment studies in Cyprus are described below:

A. Measures for parents and students

1. Active interaction via face-to-face meetings between researchers and pupils is highly recommended [8]. Pupils interested in participating are more likely to convince their parents to consent. For this reason, researchers visited the schools and presented the project to the pupils. Moreover, they stayed with the pupils during recess to discuss any concerns that might have arisen during the presentation.
2. A small reward or gift can be offered to participants as an additional incentive to enter the study although some researchers have questioned the ethics behind this practice [16–18]. Group incentives (such as going out to watch a movie) could be more effective than individual ones [19].
3. Parents should be informed about the project prior to the request for consent. Communication material should be concise and written in simple language for lay people. Moreover, information about the project can be included in the school newsletter [20]. Personal contact with the parents at school in small groups is advisable. It provides an opportunity for parents to ask questions and it has been proved by Stein et al. [20] to increase the rate of return of consent forms from 53.2% to 89.8%. In our project, parents in rural areas were also contacted via telephone calls to explain the study and participation requirements, which was shown to be very effective. However, some ethics committees or schools may not approve requests to access the contact details of the parents for this purpose.
4. Consent forms are usually distributed to parents via pupils. Pokorny et al. [21] suggested that combining the delivery of consent forms with school request for a parent signature on school reports increases the return rate. This approach increased the participation rate from 55% to 81% in their study.

B. Measures for school staff

1. The timing of recruitment is an important consideration [22]. A sufficiently long preparation (minimum 3 months) is necessary. Recruitment should ideally occur at the beginning of the school year because students and teachers are not overloaded with their academic activities such as examinations. Associating study recruitment activities with school activities and the curriculum should be pursued. For example, it would have been ideal to incorporate the project in one of the modules of the curriculum (i.e., biology, chemistry, etc).
2. Approval of a new curriculum or program must fit into the school's existing plans. The study should ideally present the school with the opportunity for educational and networking actions.
3. The research team must know the management structure of the school district and follow the appropriate decision-making policy steps. Consent from the school principal is mandatory. The support from the school principal will be influential in the parents' decision to allow their children to participate [23]. Endorsement of the study by the school principal through a signed letter to parents is an

important element to recruit participants [20]. Moreover, the school principal can encourage the active participation of the school faculty.

4. The research team should show respect and follow the procedures of the school authorities. For example, each school or school district may have a research review committee that must approve the school's involvement. Teachers and other staff often feel negativity toward researchers who do not respect the educational management system.
5. Involve as many people (teachers, student council members, and other individuals) as possible in each school. The experience gained from this study showed that the endorsement of the program by high-level administrators will not be as effective as an endorsement by the individuals who will actually implement the project. The endorsement of the project by the school faculty will increase the participation of the students.
6. School staff should work closely with researchers to tailor all recruitment materials sent home to parents, including information packs and consent forms.
7. Detailed presentations should be given to all teachers who will work for the project in order to increase their understanding of the program.
8. The researchers should ensure that they prepare adequately in order to present themselves as competent, trustworthy, and experienced scientists. They can present testimonials, if available, from others who have worked with them in previous projects.
9. The benefits for the school and the families should be clearly delineated.
10. The expectations, timelines, and responsibilities for both the schools and the researchers should be communicated in advance.

C. General measures

1. The teachers, school principals, parents, and pupils should be actively involved in the development of recruitment plans from the initial planning phase, even before the application to the ethics committee takes place [24]. They should work closely with researchers to tailor all recruitment materials and voice their opinion on how to best engage the pupils and parents.
2. The consent form should not be very long. Many ethics committees require lengthy consent forms, often written using difficult legal terms. This may deter parents from reading or considering the form. An accurate, simply written short consent form can raise participation rates in school-based studies [25,26]. Belzer et al. [27] suggest adding an option on the consent form for parents to request an explanatory phone call prior to consenting. Working closely with the school partners to optimize the consent form and follow-up procedures is of utmost importance [28]. In many instances, school partners are not invited to recruitment planning meetings until problems arise, which is a mistake. School staff should be engaged as early as possible [29].
3. Reminders are important. The most commonly used method to follow-up parents is by distributing reminder notes to them via classroom teachers. Some other researchers may choose to send postal reminders to parents directly to their home addresses. The need for improved communication is also emphasized in other studies based on school recruitment plans [12,30]. We found that following-up parents via telephone call was most effective.
4. Communication activities proved extremely important in enhancing the participation rate. Small countries, such as Cyprus, appear to have a strong advantage regarding communication plans, which is attributable to shorter communication lines at all levels and during all phases of the study (recruitment, sampling, and communication of personal results). They can also be more effective in accomplishing widespread publicity by involving high-level officials, as well as TV/Radio/Press/electronic media coverage [4].
5. A dedicated research team to monitor and coordinate the recruitment process should be in place. Recruitment should not be left up to the teacher to manage. Leaky et al. [4] showed that this practice could lead to poor response rate because teachers may fail to distribute the consent forms or provide incorrect instructions or misplace the returned consent cards.
6. This study shows that strategies to contact the parents directly (telephone call reminders in our case) result in a higher return rate of consent forms compared to less interactive methods, such as postcard reminders. Sometimes,

ethics committees and school authorities do not allow access to parents' personal records, in that case, sending reminders via telephone calls is not possible. One way to overcome this obstacle is to follow a passive consent procedure, where parents are advised to notify the school only if they do not wish to be approached by researchers [18].

Limitations

The inhabitants' registry strategy sets the whole population of a given area as potentially eligible for participation, whereas in a school-based recruitment strategy, part of the population is inevitably excluded, such as children attending private schools or following home-schooling. This may cause bias and decrease the representativity of the study.

Implications for Practice

School-based recruitment is an alternative strategy for recruitment of school-aged children and their parents. Successful recruitment at the school level begins by ensuring the active participation of teachers in the project. They are the ones who encourage children to take part but also raise the awareness and motivate the parents to return the consent forms, agreeing to participate. Communicating the significance of the project is of equal importance and should be conveyed directly to the parents. For this reason, the researchers should organize relevant events at school, where the purpose and the procedure of the project should be explained to both pupils and parents using appropriate language. The school recruitment program in our study was shown to be a successful educational experience for everybody involved (parents, pupils, teachers, and school personnel) and raised the awareness of harmful substances and toxic elements.

Finally, follow-up reminders through personal telephone communication with the parents significantly increase the response rate.

Ethical approval

Ethical approval for the study was obtained from the Cyprus Bioethics Committee and permission to conduct the study was attained from the Ministry of Health. The participation in the study was voluntary and occurred after obtaining written informed consent by the parent(s) or guardians.

Conflict of interest

Nothing to declare.

References

[1] Exley K, Cano N, Aerts D, Biot P, Casteleyn L, Kolossa-Gehring M, et al. Communication in a human biomonitoring study: focus group work, public engagement and lessons learnt in 17 European countries. Environ Res 2015; 141:31–41.

[2] Casteleyn L, Dumez B, Becker K, Kolossa-Gehring M, Den Hond E, Schoeters G, et al. A pilot study on the feasibility of European harmonized human biomonitoring: Strategies towards a common approach, challenges and opportunities. Environ Res 2015; 141:3–14.

[3] Den Hond E, Govarts E, Willems H, Smolders R, Casteleyn L, Kolossa-Gehring M, et al. First steps toward harmonized human biomonitoring in Europe: demonstration project to perform human biomonitoring on a European scale. Environ Health Perspect 2015; 123(3):255–63.

[4] Leaky TLK, Glanz K. Written parental consent and the use of incentives in a youth smoking prevention trial: a case study from project SPLASH. Am J Eval 2004; 4(25):509–23.

[5] Post A, Galanti MR, Gilliam H. School and family participation in a longitudinal study of tobacco use: some methodological notes. Eur J Public Health 2003; 13(1):75–6.

[6] Wolfenden L, Kypri K, Freund M, Hodder R. Obtaining active parental consent for school-based research: a guide for researchers. Aust N Z J Public Health 2009; 33(3):270–5.

[7] Becker K, Seiwert M, Casteleyn L, Joas R, Joas A, Biot P, et al. A systematic approach for designing a HBM pilot study for Europe. Int J Hyg Environ Health 2014; 217(2–3):312–22.

[8] Elder JP, Shuler L, Moe SG, Grieser M, Pratt C, Cameron S, et al. Recruiting a diverse group of middle school girls into the trial of activity for adolescent girls. J Sch Health 2008; 78(10):523–31.

[9] Dent CW, Galaif J, Sussman S, Stacy A, Burton D, Flay BR. Demographic, psychosocial and behavioral differences in samples of actively and passively consented adolescents. Addict Behav 1993; 18(1):51–6.

[10] Ladin L EK, Pardun CJ, Brown JD. Accessing adolescents: a school recruited, home-based approach to conducting media and health research. J Early Adolesc 2004; 24:144–58.

[11] Fletcher AC, Hunter AG. Strategies for obtaining parental consent to participate in research. Fam Relat 2003; 52:216–21.

[12] Phipatanakul W, Bailey A, Hoffman EB, Sheehan WJ, Lane JP, Baxi S, et al. The school inner-city asthma study: design, methods, and lessons learned. J Asthma 2011; 48(10):1007–14.

[13] Geller AC, Oliveria SA, Bishop M, Buckminster M, Brooks KR, Halpern AC. Study of health outcomes in school children: key challenges and lessons learned from the Framingham Schools' Natural History of Nevi Study. J School Health 2007; 77(6):312–8.
[14] Dumez B, Van Damme K, Casteleyn L. Research on the socio-ethical impact of biomarker use and the communication processes in ECNIS NoE and NewGeneris IP. Int J Hyg Environ Health 2007; 210(3–4):263–5.
[15] Fiddicke U, Becker K, Schwedler G, Seiwert M, Joas R, Joas A, et al. Lessons learnt on recruitment and fieldwork from a pilot. European human biomonitoring survey. Environ Res 2015; 141:15–23.
[16] Tishler CL, Bartholomae S. The recruitment of normal healthy volunteers: a review of the literature on the use of financial incentives. J Clin Pharmacol 2002; 42(4):365–75.
[17] Unti LM, Coyle KK, Woodruff BA, Boyer-Chuanroong L. Incentives and motivators in school-based hepatitis B vaccination programs. J Sch Health 1997; 67(7):265–8.
[18] McMorris BJ, Clements J, Evans-Whipp T, Gangnes D, Bond L, Toumbourou JW, et al. A comparison of methods to obtain active parental consent for an international student survey. Eval Rev 2004; 28(1):64–83.
[19] Ji P, Flay BR, Dubois DL, Brechling V, Day J, Cantillon D. Consent form return rates for third-grade urban elementary students. Am J Health Behav 2006; 30(5):467–74.
[20] Stein BD, Jaycox LH, Langley A, Kataoka SH, Wilkins WS, Wong M. Active parental consent for a school-based community violence screening: comparing distribution methods. J Sch Health 2007; 77(3):116–20.
[21] Pokorny SB, Jason LA, Schoeny ME, Townsend SM, Curie CJ. Do participation rates change when active consent procedures replace passive consent. Eval Rev 2001; 25(5):567–80.
[22] Lytle LA, Johnson CC, Bachman K, Wambsgans K, Perry CL, Stone EJ, et al. Successful recruitment strategies for school-based health promotion: experiences from CATCH. J School Health 1994; 64(10):405–9.
[23] Ji PY, Pokorny SB, Jason LA. Factors influencing middle and high schools' active parental consent return rates. Eval Rev 2004; 28(6):578–91.
[24] De las Nueces D, Hacker K, DiGirolamo A, Hicks LS. A systematic review of community-based participatory research to enhance clinical trials in racial and ethnic minority groups. Health Serv Res 2012; 47(3 Pt 2):1363–86.
[25] Harrington KF, Binkley D, Reynolds KD, Duvall RC, Copeland JR, Franklin F, et al. Recruitment issues in school-based research: lessons learned from the High 5 Alabama Project. J School Health 1997; 67(10):415–21.
[26] Foe G, Larson EL. Reading level and comprehension of research consent forms: an integrative review. J Empir Res Hum Res Ethics 2016; 11(1):31–46.
[27] Belzer EG Jr, McIntyre L, Simpson C, Officer S, Stadey N. A method to increase informed consent in school health research. J School Health 1993; 63(7):316–7.
[28] Schoeppe S, Oliver M, Badland HM, Burke M, Duncan MJ. Recruitment and retention of children in behavioral health risk factor studies: REACH strategies. Int J Behav Med 2014; 21(5):794–803.
[29] Smith LH, Petosa RL. Effective practices to improve recruitment, retention, and partnerships in school-based studies. J Pediatr Health Care 2016; 30(5):495–8.
[30] Kimmel CA, Collman GW, Fields N, Eskenazi B. Lessons learned for the National Children's Study from the National Institute of Environmental Health Sciences/U.S. Environmental Protection Agency Centers for Children's Environmental Health and Disease Prevention Research. Environ Health Perspect 2005; 113(10):1414–8.