

ORIGINAL ARTICLE

A Web-based survey among adults aged 40–54 years was time effective and yielded stable response patterns

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Abstract

Objective: We want to present information about response patterns obtained by Web-based survey in a large-scale epidemiological study.

Study Design and Setting: Within the RAPS (Risk Adapted Prevention Strategies for colorectal cancer [CRC]) study, we invited 160,000 randomly selected persons aged 40–54 years in three large German cities from 2015 to 2016 to complete a Web-based questionnaire on CRC risk factors and screening (97 items, average time for completion 15 minutes). Invitation letters and up to two reminder letters were sent to each individual.

Results: A total of 21.4% of women and 18.0% of men completed the questionnaire. Overall cumulative response rates were 7.5%, 14.3%, and 19.6% after the initial invitation letter, and the first and second reminder, respectively, with prevalence of and associations of key epidemiological parameters (such as family history of cancer, previous colonoscopy, etc.) being remarkably stable across waves of responses. For example, the sex and age distribution of the sample did not change with additional answers gained from additional letters.

Conclusion: Web-based questionnaires are feasible, cost-effective, and time effective in the setting of large-scale epidemiological studies. Although response patterns were remarkably stable over several rounds of reminders with substantially increasing cumulative response rates, future research should address possibilities to further enhance response rates. © 2018 Elsevier Inc. All rights reserved.

Keywords: Response rates; Web-based survey; Epidemiology; Large-scale study; Online questionnaire; Colorectal cancer

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What is new?**Key findings**

- Online questionnaires are an efficient tool for obtaining information in large-scale epidemiological studies.
- Reminder letters are worthwhile and may strongly increase cumulative response rates.
- Response rates varied by geographic location, sex, and age.
- Online questionnaires help speed up post-data-obtainment procedures such as data cleansing with built-in plausibility checks and lead to quicker provision of data for analysis.

What this adds to what was known?

- Online questionnaires do not only work when used as follow-up questionnaires but also when applied with initial contact.
- Repeat reminder letters substantially increased absolute response numbers while being cost-efficient.

What is the implication and what should change now?

- Epidemiological researchers should consider implementing online questionnaires as tools for data collection in studies investigating young to middle-aged populations at average risk.
- At least one reminder should be sent to increase overall response rate.

1. Introduction

Epidemiological studies need large number of participants and reasonable response rates. In population-based studies, initial contacts and first responses have traditionally most commonly been made by written letters or phone. In the Internet era, these media are more and more replaced by online communication, but Web-based surveys have not yet been widely used in large-scale epidemiological studies [1].

Generally, online questionnaires seem to have a number of advantages compared to paper-based alternatives. For example, they have previously been found to be returned quicker than postal questionnaires [2,3]. Another advantage of Web-based questionnaires compared to paper-based surveys is the possibility for researchers to immediately adjust questions if necessary without having to discard already printed copies. Furthermore, preliminary results can normally be easily obtained [4]. Although online questionnaires were thought to yield more measurement error than traditional data collection [4,5], more recent research indicates that the contrary seems to be true [1]. A further advantage is that built-in plausibility checks may immediately alert participants of

missing or inconsistent or implausible responses, which may increase data quality and completeness and substantially reduce the load of time-consuming contacts with participants and data cleaning. Importantly, there is evidence that individuals responding to Web-based surveys are comparable to those responding to traditional modes of data collection regarding a large variety of important characteristics (e.g., age, gender, income, education, and health status) [6–8].

Yet very little is known about response rates and response patterns that may be achieved with this approach in times of almost complete Internet coverage. Here, we report on response rates and response patterns and their relationship to observed prevalences and associations in a Web-based survey on family history (FH) of colorectal cancer (CRC) and related factors relevant to CRC screening for which 160,000 men and women aged 40–54 years in three large German cities were invited.

2. Methods

This survey was part I of the RAPS (*Risk Adapted Prevention Strategies for CRC*) study, a multiphase multicenter study conducted in the framework of the German Cancer Consortium. The full description of the RAPS study has been published elsewhere [9]. Briefly, in part I of this study, we aimed for recruiting 30,000 men and women aged 40–54 years in the catchment areas of three German study centers located in the cities of Dresden, Munich, and Stuttgart (approximately 540,000, 1,450,000, and 620,000 inhabitants, respectively). One of the cities, Dresden, is located in the Eastern part of Germany, the other two cities are located in the Western part of Germany. Potential participants were randomly selected from population registries of the three cities (Table 1). With an anticipated response rate of 25%, the initial plan was to select and contact 120,000 participants (40,000 per center). However, because of lower-than-expected response rates, the number of invited persons was later increased to 60,000 in Munich and Stuttgart.

Personal invitation letters were sent through regular mail between June 2015 and December 2016. Participants were invited to take part in a Web-based survey focusing on FH of CRC and related factors relevant to CRC screening. They were informed that those with a history of CRC in a first-degree relative will be invited for individual consultation in our study centers in part II of the study, but participation in the survey was encouraged independent of a FH. All participants (independent of FH of CRC) received a Web-based feedback on their individual CRC risk factors immediately after completion of the questionnaire. Access to the Web-based survey via computer or smartphone was facilitated using a personal access code, as was the online declaration of informed consent. The invitation letters included a QR code, which could be scanned and which directed to the online questionnaire. Respondents were identified via the personal access code, therefore an

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