Non-melanoma skin cancer (NMSC) is the most common cancer worldwide (1). With a large proportion of the adult German population currently at risk, it is estimated, that the prevalence of NMSC will double by 2030 (2). Main risk factor for NMSC is solar ultraviolet (UV) radiation (3), which has led to the classification of NMSC as an occupational disease for outdoor workers in some countries (4). Naturally, sun protection during outdoor work and leisure is the main target of many interventions conducted at individual, organizational and community levels (5). Typically, these campaigns place messages via television, radio, billboards and print media with the aim of promoting sun-protective behaviour (6). They usually target general or recreational sun behaviours among the general population, or among children and adolescents, which means they are difficult to implement in adult high-risk occupational groups with their specific tasks (6–8). Previous studies in occupational professions have focused mainly on seasonal or permanent, predominantly male, workers, who are often employed by the recreation industry (9, 10).

In Germany, farmers and agricultural workers are at very high risk of NMSC (11), but, to date, effective prevention measures for this occupational group have received limited attention. The aim of this study was therefore to explore to what extent the placement of sun protection messages in different profession-specific special interest magazines could effectively reach male and female farmers and other agricultural workers in Germany.

**METHODS**

The study consisted of a national and regional approach placing general information on NMSC and associated sun-protective behaviour in print media. This placement of information was combined with an invitation to visit a study website for further information, as well as to participate in a brief online survey. Eleven questions based on previous studies (11) addressed risk and protective behaviour during work.

At the national level, the information was placed in the free member magazine of the German farmers’ compulsory health and accident insurance. The magazine is published 4 times a year, contains up-to-date information on a range of topics, including healthcare, and has a circulation of 1.35 million across Germany. Publication was on 2 June 2017 (Table S1).

At the regional level, analogous to the national level, the same information was published in the Bavarian Agricultural Journal on 15 September 2017. This special-interest journal is Germany’s highest-circulation subscription agricultural journal, with a circulation of approximately 100,000 copies reaching 85% of all Bavarian farms (12). The weekly magazine provides agricultural professions with the latest news on all aspects of agricultural life, including finance, health and agricultural market prices, thereby ensuring a large and continued readership.

In both cases, the responses and engagement of the target audiences were assessed based on the number of website visits during the 1-month period following publication of the printed campaigns. In addition, the total time spent on the website and completion of the online questionnaires were assessed. Usage statistics and audience characteristics (age, sex, location) were tracked through Google Analytics dashboards. The same descriptive analysis was performed for comparison over a 1-month control period, 2 months after the Bavarian approach.

**RESULTS**

During the month after national publication, a total of 128 individuals (46.1% women) of all age groups (>18 years) visited the website for mean 1 min 2 s. Interestingly, website visitors were located in 10 of 16 German Federal States, with no visitors from Eastern Germany (Fig. S1).
The majority of visitors used desktop computers (59.4%), none completed the online questionnaire (Table I).

Following the Bavarian publication, there were 12 website visitors (41.7% women) from 7 out of 96 districts in Bavaria (Fig. S2). Mean time spent on the website was 1 min 49 s using desktop computers (58.3%) or tablets (41.7%) (Table I). Three visitors completed the questionnaire.

In the control period without preceding publication, one visitor was registered on the website, but no connection was found with the campaign (Table I).

**DISCUSSION**

A printed awareness and information campaign on NMSC and its prevention was distributed among 1.45 million agricultural households across Germany. The target audience was invited to visit the campaign website for further information and to participate in a brief online survey. Only 140 individuals visited the website during the observation period. This does not exclude that other farmers did not receive any educational benefit from the print campaign. However, the website response rate (0.01%) revealed a failure to reach a meaningful proportion of the target population, making it impossible to assess the impact of the campaign on sun-protective behaviour.

Possible explanations for this failure are manifold (8) and include that printed messages might were overlooked and that the factual messages may have been inappropriate for farmers, or a combination of these features.

The postal-based approach was designed to reach all agricultural households in Germany, but combining it with a link to a website may have been a major cause of the very low response rate. Readers might have not wanted to spend extra time by visiting the study website. Previous studies have shown that postal-based campaigns are the most economical option, usually having higher response rates compared with other media campaigns (8,13).

An important limitation of this study is its exploratory nature. We know that the print media were delivered to the target households, but we do not have any information on how many people read or even saw the message. Furthermore, limited internet access and/or experience, especially in older age groups, could have led to an underestimation of the real interest among the target group. However, visitors from all age groups visited the website. In Germany, 95% of farmers use the internet and 75% of them go online every day, which is one of the highest rates worldwide for agricultural professions (14).

In summary, the approach of placing messages in print media combined with an internet-based assessment of response does not appear to be appropriate for reaching agricultural populations in Germany. Future studies on NMSC prevention among outdoor workers should invest in exploring how these high-risk occupational groups might be reached more effectively (15). Finding the best possible access route to these groups could be the key to lowering the burden of NMSC among farmers and other outdoor workers.

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**REFERENCES**