Social disparities by nationality and migration background in cancer screening in Switzerland

Study protocol for a PhD thesis

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Overarching goal

To describe social disparities in cancer screening by nationality and migration background in Switzerland.

Background

According to the 2021 report published by the Swiss Federal Statistical Office, cancer is the second most common cause of death, and the main cause of premature mortality in Switzerland [1]. Each year, about 40,000 new cases are diagnosed in Switzerland [1] and more than one in five persons develops a cancer before the age of 70 [2] . Four types of cancer are responsible for half of the new cases, that is, lung, colorectal cancer, breast, and prostate cancer [1].

According to WHO, 30 to 50% of cancers are primarily preventable [3] notably through the improvement of health behaviours (smoking, alcohol intake, diet, and physical activity) [4]. Access to and uptake of preventive care services, such as cancer screening, is the other pillar of cancer prevention. Cancer screening plays an important role by enabling early detection and timely treatment. According to the Swiss Cancer League and the U.S. Preventive Services Task Force (USPSTF), screening is recommended for breast cancer in women aged 50 and older, cervical cancer in women aged 21 to 70, and colorectal cancer in adults aged 50 to 74 [5]. For adults aged 76 to 85, colorectal cancer is selectively recommended, under an individualised risk-based discussion with the patient [6]. Prostate cancer screening with PSA (Prostate-Specific Antigen) is not routinely recommended but may be considered for men aged 55 to 69 after informed discussion. Lung cancer screening with low-dose CT is advised for adults aged 55 to 74 with a significant smoking history. Skin cancer screening is not routinely recommended but may be appropriate for high-risk individuals [7]. In Switzerland, primary care physicians also refer to the EviPrev program [7] which is based on USPSTF and provides detailed, evidence-based screening guidelines and supports personalized, risk-based prevention strategies.

In 1994, Switzerland adopted a new national health insurance law ("LAMal") which included reimbursement for preventive services, notably several cancer screenings [8].

Cervical cancer screening is reimbursed every three years for women aged 18 to 75 [9]. Modality of reimbursement for other cancer screenings depends on the type of screening and the canton. Colorectal cancer screening is covered in cantons with organized programs, with 90% of costs reimbursed and a 10% co-payment, regardless of the deductible [10]. Mammography screening is similarly reimbursed in cantons with a screening program for women aged 50 to 69 [11]. Prostate and lung cancer screenings are not part of organized programs and are only reimbursed when medically indicated [12].

Social disparities in cancer screening have been well documented in Switzerland. For instance, low-income residents have consistently shown lower colorectal cancer screening uptake compared to high-income residents, and this disparity has persisted over time [13,14]. Similar patterns have been found in cervical cancer screening uptake, where both educational and income disparities have been observed [15] and have remained stable between 1992 and 2012 [14,16,17]. Screening programmes and welfare policies could reduce disparities in access to cancer screening [16,18,19]. In Switzerland, social disparities related to nationality and migration background have received little attention to date. One 2008 study examined the uptake of breast cancer screening among women not born in Switzerland and showed differences between Italian, Spanish, former Yugoslavian, and Portuguese women and the native population [20]. While informative, this study is now dated, and we are not aware of recent studies that systematically describe cancer screening uptake by nationality and migration background. Although some studies have described the nationality or birthplace as factors associated with cancer screening uptake, typically distinguishing between Swiss and non-Swiss individuals [14,15,21,22], they did not aim to describe in-depth the social disparities across different nationalities and migration backgrounds, across socio-economic positions, and across different cancer screening uptakes.

People with a migration background are more often disadvantaged in terms of access to preventive healthcare, including cancer screening [20,24]. In most high-income countries, immigrant women have a lower uptake of breast cancer prevention services compared to the native population and frequently start their cancer treatment at a later stage of the disease [20]. While extensive research has been conducted on migrants and cancer screening, the definition of "migrant" remains unclear in many studies,

failing, surprisingly, to account for the heterogeneity within migrant populations [23]. Migrants represent groups with highly diverse backgrounds (e.g., country of birth, nationality, 1st and 2nd generation, seasonal workers, students) [24]. Further research synthesis is therefore needed to identify and address screening barriers [24] when taking into account the heterogeneity of migrant background.

Specific aims

This PhD thesis has 3 aims:

Aim 1: To review evidence on cancer screening uptake among migration populations (native vs first generation) and the associated factors (barriers and facilitators).

Aim 2: To examine the social disparities in cancer screening among populations with different nationalities in Switzerland.

Aim 3: To examine the social disparities in cancer screening among populations with different migration backgrounds in Switzerland.

Methods of aim 1

We will conduct an umbrella review of reviews having assessed cancer screening uptake and associated factors among migrant populations, synthesizing evidence from existing reviews to provide a comprehensive overview of the research topic. We will define clear research questions and objectives using the PECO framework [25]. Data extraction will be performed systematically, and the methodological quality of included reviews will be assessed using established tools. Findings will be synthesized considering the consistency and quality of the evidence, with results reported in a clear and structured manner. Limitations will be discussed, and implications for practice and future research will be highlighted [26]. The included reviews will be assessed using the CEBM tool to critically appraise and synthesize the best available evidence from multiple reviews and provide robust data [27].

All types of reviews will be eligible, that is, narrative reviews, scoping reviews, and systematic reviews, with or without meta-analyses [28]. The literature search will be conducted using the PubMed and Google Scholar databases [26]. Data extraction will be carried out based on the characteristics of migrant populations. Information on the proportion of cancer screening uptake will be extracted by world region, by cancer type, and, when available, by the screening method used.

The associated factors (barriers and facilitators) will be organized using the PROGRESS-Plus framework [29] and the Ecological Model of Urie Bronfenbrenner [30]. Sunburst plots will be used to reflect the hierarchical structure of factors (individual or systemic level) related to barriers and facilitators to screening participation [31]. These two tools will be complementary to identify and consider social determinants. The PROGRESS-Plus framework highlights in its acronym eight disparity factors known to influence health: place of residence, race or ethnicity or culture, occupation, gender or sex, religion, education, socioeconomic position, and social capital, and with additional context- specific factors (Plus). A narrative synthesis of the findings will be conducted, with a focus on the differences between migrant backgrounds.

Methods of aims 2 and 3

Study design, target population, and study population

We will conduct a population-based study to analyse cancer screening uptake and social disparities among populations with different nationalities and migration backgrounds (non-Swiss nationality, born outside Switzerland, first and second generation). The target population will be adult residents of Switzerland. The study population will consist of participants of the Swiss Health Interview Survey (SHIS), a nationally representative cross-sectional survey conducted every 5 years since 1992 [32] and designed to assess heath and health behaviours of the Swiss population.

The SHIS is conducted by the Swiss Federal Office and surveys all non-institutionalized residents aged 15 years and older living in a household with a telephone number. Refugees, diplomats and people living in nursing homes were excluded from the random sampling. All individuals who were invited received detailed information about

the Swiss Health Survey and retained the right to refuse or withdraw from participation at any time. The selection of respondents followed a two-stage random sampling: households were randomly selected within cantons stratified by three linguistic regions (stratified random sampling) and individuals were randomly selected among the household members. When individuals agreed to participate, respondents completed a questionnaire by computer assisted telephone interviews and received a questionnaire by post that they had to fill in at home. Respondents aged 75 years or older were interviewed by computer assisted personnel interviews. Respondents with poor health status (illness, strong handicap) were interviewed with proxy. The interviews were conducted in German, French, or Italian.

We will analyse data from the 2022 Swiss Health Survey [32]. 21,930 participants contacted by telephone were included (participation rate: 36.2%). The written questionnaire (online or paper) was completed and returned by 19,137 participants.

Description of outcomes

Participants aged 40 and older were asked about colorectal cancer screening (including the faecal occult blood test (FOBT) or colonoscopy). Women aged 20 and above were questioned about breast and cervical cancer screening, while men aged 40 and older were asked about prostate cancer screening. Respondents were asked whether they had undergone a specific test, when they last had that test (colonoscopy: less than 12 months, 1 to less than 5 years, 5 to less than 10 years, or 10+ years; other screenings: less than 12 months, 1 to less than 2 years, 2 to less than 3 years, 3 to less than 5 years, or 5+ years), and the reason for their most recent test.

Men

Prostate cancer screening:

We will define prostate cancer screening uptake for men in the recommended age range who underwent individual screening tests explicitly for preventive purposes. To do this, we will proceed as follows: men aged 40 years and above (40+) were asked, "Have you ever undergone a prostate specific antigen (PSA) test or digital rectal exam for prostate cancer screening?" Participants responding in the affirmative were subsequently asked "When was your last prostate exam?" and "What was the reason for your last prostate exam?". Using the reason of the last prostate exam will allow us

to identify men who underwent the test for preventive purposes. Among men in the age of recommendation, we will subtract the year of a screening test by the year the survey was conducted.

Women

Breast cancer screening: We will define breast cancer screening uptake for women in the recommended age range who underwent individual screening tests explicitly for preventive purposes. For this, we will proceed this way: women 20 years of age and above (20+) were asked "Have you undergone a mammogram?". Participants responding in the affirmative were subsequently asked "When was your last mammogram?" and "What was the reason for your last mammogram?". Using the reason of the last mammogram will allow us to identify women who underwent the test for preventive purposes. Among women in the age of recommendation, we will subtract the year of a screening test by the year the survey was conducted.

Cervical cancer screening: We will define cervical cancer screening uptake as women in the recommended age range who underwent individual screening tests explicitly for preventive purposes. To do this, we will proceed as follows: women aged 20 years and above (20+) were asked, "Have you ever undergone a Pap smear or HPV test"? Participants responding in the affirmative were subsequently asked "When was your last cervical cancer screening?" and "What was the reason for your last cervical cancer screening?". Among women in the age of recommendation, we will subtract the year of a screening test by the year the survey was conducted.

All respondents

Colon cancer screening: We will define colorectal cancer screening uptake as individuals in the recommended age range who underwent individual screening tests explicitly for preventive purposes. To do this, we will proceed as follows: participants aged 40 years and above (40+) were asked, "Have you ever undergone a faecal occult blood test (FOBT) or a colonoscopy for colorectal cancer screening?" Participants responding in the affirmative were subsequently asked "When was your last hemoccult test?" and "What was the reason for your last hemoccult test?". Using the reason of the last hemoccult test will allow us to identify all respondents who underwent the test for

preventive purposes. Among men in the age of recommendation, we will subtract the year of a screening test by the year the survey was conducted.

Description of social disparity predictors

Education level: We will define education level based on the highest level of formal education successfully completed by an individual. Categories include: non-compulsory school, compulsory school, training school, apprenticeship, bachelor/maturity, technical/vocational school, academic high school, or university. Education level will be recoded in three or four categories aligned with the International Standard Classification of Education [25].

Household net income: We will define the total income earned by all members of a household after the deduction of applicable taxes, social security contributions, and other mandatory or voluntary deductions (e.g., insurance premiums, retirement savings).

Employment status: We will define employment status as an individual's current situation in the labour force, specifically whether they are employed, unemployed, or not part of the labour force at a given point in time. Categories will include: employed, independent, student, at home, receiving means-tested benefits, retired, unemployed, working in a family company, or other situation.

Health insurance status: We will define health insurance status as whether an individual or family has health insurance coverage, and if so, the type and extent of that coverage. Categories will include: private, semi-private, or none.

Marital status: We will define marital status according to the respondent's current legal or de facto relationship status: single, married, widowed, divorced, separated or other.

Linguistic regions: We will define linguistic region based on the main language spoken in the municipality where the respondent lives. Categories will include German, French, or Italian.

Description of stratification variables

Nationality: We will define the nationality variable based on three categories: Swiss only (no other nationality), Swiss and other nationality, and non-Swiss, based on respondents' self-reported nationality status. Individuals holding only Swiss nationality will be assigned to the first group, those with dual nationality including Swiss to the second, and individuals without Swiss nationality to the third. For the Non-Swiss, we have decided to organize the answers according to the 22 regions of the world, that is, Western Europe, Southern Europe, Eastern Europe, etc. [33].

Migration background: We will define the migration background based whether the belongs to the 1st generation or to the 2nd generation (non-native). To build this variable, we will need the following variables: Nationality at birth, Nationality and naturalisation, Country of birth, Father's country of birth, and Mother's country of birth. The migration background will be the following 3 categories non-migrant, 1st generation migrant, and 2nd generation migrant.

Statistical analysis

For each outcome, an analytical sample will be built based on age and sex eligibility according to the cancer screening. Participants with self-reported cancer diagnosis will be excluded. Each outcome will be coded (1) if the participant had undergone the screening in his/her life and (2) if the participant had undertaken the screening in the time window corresponding to the recommended time interval.

We will conduct descriptive and association analyses. Descriptive analyses will examine the proportions of screening uptake. Proportions will be weighted to account for the unequal inclusion probabilities due to the random sampling strategy of the SHIS. To find differences by individual characteristics, screening uptake will be cross tabulated with demographic variables (age, sex, linguistic regions), socioeconomic variables (education, income, employment, occupation), family life variables (marital status) and health insurance status variables. Differences will be identified using tests such as Chi-square and other tests depending on the nature of the categorical variable (ordinal, nominal), and t-test for continuous variables. For each outcome, analyses of

differences will be conducted for (1) the overall sample and (2) stratified by nationality (aim 2) and migration background (aim 3).

Associations analyses, or prediction analyses, will examine the association between predictors of interest (demographics, socioeconomic status, family life, etc.) and the outcome, stratified by migration status. Participation to a cancer screening programme will be included in the model. When appropriate, an interaction test will be conducted between the social characteristic and the migration variable. First, each outcome will be analysed separately. For this, prevalence ratios (PR) and 95% confidence intervals (CI) will be estimated using unadjusted and adjusted Poisson regression and robust variance estimators. Collinearity between predictor variables will be examined with variance inflation factor. Second, we will build a sum score of cancer screening adherence separately for women and men, with no screening equal to 0, lifetime screening uptake equal to 1, and up-to-date screening equal to 2. The continuous score will range from 0 to 8 for women and from 0 to 6 for men. Women and men will be analysed separately. Linear regression analysis will be conducted to examine the association between predictors of interest and the score of cancer screening adherence, stratified by migration status. When appropriate, an interaction test will be conducted between the social characteristic and the migration variable.

Sensitivity analyses will be conducted. Depending on the number of missing predictors, sensitivity analyses will be conducted using multiple imputations. Robustness analyses will be conducted using different coding schemes of the socioeconomic predictors (education with three to five levels, income as continuous versus ordinal variable, employment with three to five groups, occupation classes with four versus six levels).

Strengths and limitations

To our knowledge, this will be the first nationwide study examining social disparities in cancer prevention across nationalities and migration backgrounds in Switzerland. It will also serve as a foundation for future research and targeted interventions to reduce disparities in cancer prevention. The study will benefit from a high-quality, nationally representative data source, the SHIS, even if not all populations of migrants (e.g., seasonal workers, migrant students) will be represented [23]. Among the limitations, refugees cannot be studied due to exclusion from the SHIS sampling. Data are self-reported and information bias is possible, notably on the outcomes (mis-classification bias). Causality about the influence of social characteristics on screening uptake cannot be assessed due to the cross-sectional nature of the SHIS design.
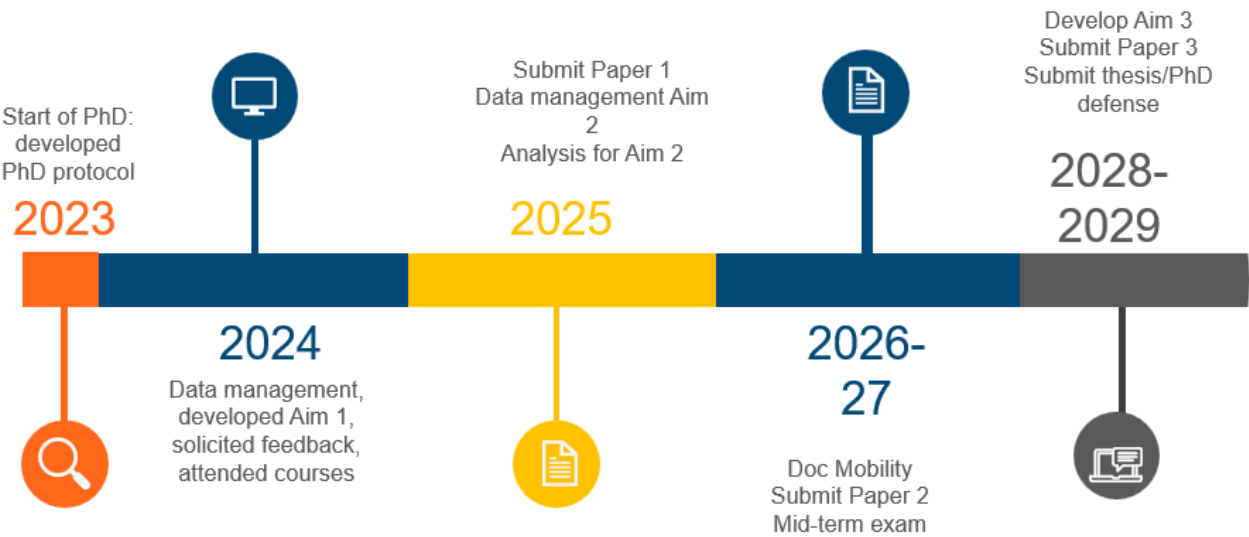
Consequences for public health

In the 1990s, Switzerland experienced a significant rise in immigration, due to increased recruitment of foreign labour and a surge in asylum-related migration. These demographic shifts underscore the growing diversity of the Swiss population and highlight the importance of addressing health disparities within the healthcare system.

While improvements in health insurance coverage and cancer screening rates among migrant populations suggest progress in reducing social disparities in secondary prevention [24], important gaps remain. My work could help by defining better the migration status in cantonal cancer registries and in the SHIS by collecting more information. This lack of detailed data hinders the ability to monitor disparities and design targeted interventions.

More broadly, this thesis will help us gain a better understanding of the social disparities by nationality and migration background in cancer prevention. It will also help assess what could bring inclusive and culturally adapted approaches, such as breast cancer screening programmes tailored to immigrant women, taking into account linguistic, cultural and structural barriers.

Estimated Timeline

Start of PhD:
developed
PhD protocol

2023

2024

Data management,
developed Aim 1,
solicited feedback,
attended courses

Submit Paper 1
Data management Aim
2
Analysis for Aim 2

2025

Submit Paper 1
Data management Aim 2
Analysis for Aim 2

**2026-
27**

Doc Mobility
Submit Paper 2
Mid-term exam

Develop Aim 3
Submit Paper 3
Submit thesis/PhD
defense

**2028-
2029**

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