Cancer by migrant background in Belgium

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English summary

Cancer is a growing health issue worldwide. Although substantial improvements in cancer survival have been made globally in the last decades, the burden of cancer is expected to increase in the future due to population ageing and a growing prevalence of a number of lifestyle-related risk factors for cancer. Especially in northern and western European countries cancer diagnoses and deaths constitute a large part of morbidity and mortality. The enlarging group of people diagnosed with this disease in these countries will diversify due to international migration.

Overall cancer risk and mortality are lower among most migrant groups than European natives, but there is substantial site-specific diversity. Especially for migrants from less-industrialised countries, lower risk and mortality from lifestyle-related cancers contrast with worse infection-related cancer outcomes. The evidence regarding survival shows less consistent outcomes, with few differences between migrant and non-migrant groups.

Although the knowledge about differences in mortality, risk, and survival for a wide range of cancers between migrants and non-migrants in Europe is expanding rapidly, less is known regarding how these differences come about and how they change with time. Overall, research commonly focuses on migrants from traditional countries of labour migration or even outside of the European Union (EU), but EU-migrants make up large portions of migrant populations in current day Europe. Moreover, Belgian evidence on cancer incidence and survival according to population subgroups has been non-existent to date. Nevertheless, Belgium is a high-risk setting for cancer in which a fifth of the population has foreign roots. This thesis therefore aims to analyse site-specific cancer mortality, incidence, and survival during the early 2000s for native Belgian adults as well as those from the largest migrant background groups residing in Belgium. It furthermore wishes to examine determinants for the outcomes observed by breaking down findings into generational status and duration of stay in Belgium,

and by adjusting for socioeconomic position (SEP), demographic traits, and tumour stage at diagnosis. Not only can insight in site-specific diversity in cancer outcomes and how they change over time give clues about the relative role of external versus inherited cancer risks, it also points to areas for policy intervention aimed at equal health opportunities. This dissertation addresses these themes over six chapters: one general introduction, four empirical chapters, and one concluding chapter.

In the first chapter, important contextual information is provided. The chapter gives an overview of the key concepts of this thesis, namely cancer, Belgium's history of immigration, the scientific evidence and theoretical literature about cancer among migrant and native populations, and the approach and data sources used for the empirical work.

The second chapter of this dissertation, the first empirical study, focuses on site-specific cancer mortality using linked 2001 Census and 2001-2011 registry information. The aim of this chapter is twofold: to describe and compare site-specific cancer mortality among native Belgians on the one hand, and French, Dutch, Italian, Turkish, and Moroccan first- and second-generation migrants on the other hand; and to examine the role of SEP and the level of urbanisation of the neighbourhood for the observed discrepancies. Origin- and site-specific variety in cancer mortality are demonstrated, whereby lifestyle-related cancer mortality rates (i.e. lung, colorectal, head and neck, breast) are generally lower among first-generation immigrants from Italy, Turkey, and Morocco compared to native Belgians. This pattern is observed despite the on average lower SEP and higher levels of urbanisation in these migrants' living environments. In contrast, mortality from infection-related cancers such as those of the stomach and liver is usually higher for these groups. Cancer mortality of first-generation French and Dutch migrants also varies from that of Belgian natives for cancers of the lung, liver, and head and neck, with the most pronounced disadvantages among French men. The slightly lower SEP among the latter compared to natives in Belgium explains most of their detrimental outcomes. Convergence to

Belgian native cancer mortality levels among migrant offspring is demonstrated for most cancer sites studied.

The third chapter delves into determinants of cancer mortality for the same migrant background groups that were included in chapter two (French, Dutch, Italian, Turkish, and Moroccan). This time for those living in the urban areas of Antwerp, the Brussels Capital Region, Charleroi, Ghent, and Liège. A multilevel structure is introduced in the linked 2001 Census and updated 2001-2014 Registry data that nest individuals in their neighbourhood of residence. The chapter aims to investigate so-called 'ethnic density' or 'same-origin' effects on tobacco-related cancer mortality among migrants in Belgium using three indicators for same-origin presence with linear and categorical specifications. It furthermore scrutinises how such effects may play out differently for first- versus second-generation migrants and a different SEP. Correlations between ethnic density, individual SEP, and neighbourhood-level deprivation are considered. Within migrant background groups, tobacco-related cancer mortality tends to be lower for individuals living in a neighbourhood with larger presence of the same origin group among men. The opposite is only true among Turkish men. Among Dutch and French men, this protective same-origin effect is attributable to a high concentration of socioeconomic benefits at the individual and neighbourhood level for these origin groups. Product terms reveal that Turkish concentration effects are only detrimental among second-generation Turkish, and that a detrimental effect also appears among second-generation Moroccan men. A more protective effect appears among lower versus highly educated Dutch men. Using various measures with different specifications in the analyses highlights that (not) finding same-origin depends on the indicator chosen, and that for some groups the effects are a matter of high versus low presence rather than linear increases.

Chapter four focuses on breast cancer incidence and survival among native Belgian, French, Dutch, Italian, Turkish, Moroccan, and Sub-Saharan African women by using linked 2001 Census and 2004-2017 cancer registry data. Due to different risk factors

and prognoses, pre- and postmenopausal breast cancer are studied separately. Aside from comparing risk and survival between native Belgian and migrant background women, the chapter also looks at the role played by SEP and reproductive behaviour (parity and age at first childbearing) for incidence, and SEP and stage at diagnosis for survival discrepancies between groups. Breast cancer incidence is lower for migrant versus Belgian women, particularly for Turkish, Moroccan, and Sub-Saharan African women. The differences in risks are more pronounced for postmenopausal than for premenopausal breast cancer, and are strongly affected by lower educational levels, younger ages at childbearing, and having multiple children for Turkish and Moroccan women. Crucially, premenopausal breast cancer risks do not differ from those of Belgians for second-generation migrant women. Breast cancer survival was lower for premenopausal first-generation Moroccan compared to native Belgian patients due to lower educational attainment and later stages at diagnosis. Because lower survival is no longer observed among second-generation Moroccan breast cancer patients, differences in help-seeking behaviour rather than inherited susceptibility to more aggressive breast cancer types can be suspected. Italian first- and second-generation breast cancer patients had higher survival than Belgian patients, which cannot be attributed to socioeconomic traits or tumour stage.

The final empirical study in chapter five also uses the linked Census and cancer registry dataset and focuses on cancer incidence by duration of stay among first-generation migrants. The chapter aims to test the theory of 'migration as a rapid epidemiologic transition' for site-specific cancer incidence. According to this theory, infection-related cancer risks are higher upon migration among migrants from less-industrialised countries, but decrease with duration of stay. Lifestyle-related cancer risks, however, are initially lower, but gradually increase with time. For non-cardia stomach cancer, the theory suggests that the risk of this cancer site is 'pre-programmed' due to exposures in early life, making it less susceptible to change after migration. Colorectal, infection-related (non-cardia stomach cancer, hepatocellular carcinoma, Hodgkin

lymphoma), and separate non-cardia stomach cancer incidence rates were calculated for Belgian natives, and French, Dutch, Italian, Turkish, and Moroccan first-generation migrants by shorter (less than 30 years) and longer duration of stay (as of 30 years) in Belgium to test these assumptions. The theory can be confirmed for Turkish and Moroccan men: these latter groups have higher colorectal cancer incidence rates with longer versus shorter lengths of stay, but the risk remains lower than for Belgians. An initially higher infection-related cancer risk no longer differs from the Belgian risk after 30 years in the country, but non-cardia stomach cancer incidence is persistently higher. Results for Italian men are similar, although their colorectal cancer risk does not differ from that of Belgians. Infection-related cancer incidence is increased compared to natives for French men regardless of length of stay due to higher hepatocellular carcinoma risks (a cancer type with mixed infection- and lifestyle-related aetiology). No clear changes in incidence with length of stay are observed for women, perhaps because different risk transitions occur by gender after migration. SEP and civil status do not contribute to the overall findings.

These four empirical studies together reveal that cancer outcomes by migrant background are characterised by substantial heterogeneity by cancer site, the country of origin, and gender. This heterogeneity seems largely due to different exposures to infectious carcinogens in the country of origin, as well as behavioural differences. The behaviours that underlie discrepancies in site-specific cancer outcomes are furthermore not shaped in a social vacuum, but the findings indicate that they are impacted by lifestyle patterns in the country of origin, gender, SEP, and the environments in which migrants settle. Results furthermore highlight convergence in cancer outcomes for migrant offspring, whereby mortality, incidence, and survival that varied from Belgian levels in the first generation no longer differ for the second generation. Future research should delve further into the behavioural differences that are hypothesised to underlie the outcomes observed in this dissertation, and the potential social capital effects that contribute to them. A cross-country comparative

perspective that looks at outcomes for natives and migrants in the country of origin and destination could also yield additional information about differences in behaviour and cancer outcomes between those two settings and how they change over time.

The study findings also imply that the population in need of cancer prevention and care is growing and diversifying. Although eradicating cancer is an unrealistic goal due to population ageing, decreasing avoidable cancer risks and keeping inequities in cancer outcomes at a minimum are worthy causes. Considering the social embeddedness of cancer risk and survival, policy measures oriented at the individual will not suffice if the goal is to obtain low cancer risks and high survival for all origin groups. Rather, the multi-layered influences on cancer outcomes need to be tackled, implying a combination of policy measures that are implemented at different societal levels to be able to halt the overall high cancer burden in Belgium across population subgroups.

Nederlandse samenvatting

Kanker is wereldwijd een groeiend gezondheidsprobleem. Hoewel de overlevingskansen voor deze ziekte er de laatste decennia aanzienlijk op vooruit zijn gegaan, zal het aantal kankerdiagnoses in de toekomst groeien door een steeds ouder wordende bevolking en risicofactoren verbonden aan onze westerse levensstijl. Vooral in Noord- en West-Europese landen vormen kankerdiagnoses en -sterftegevallen een beduidend aandeel van de algemene morbiditeit en mortaliteit. Door internationale migratie naar deze landen zal de steeds groter wordende groep van mensen die ooit een kankerdiagnose krijgt bovendien meer divers worden.

Kankerrisico's en -sterftecijfers zijn algemeen genomen lager voor migranten dan bevolkingsgroepen zonder migratieherkomst in Noord- en West-Europa, maar deze cijfers worden gekenmerkt door een grote diversiteit naar kankersoort. Vooral voor migranten met herkomst in minder geïndustrialiseerde landen zijn de cijfers heel wat lager voor kankers die in verband gebracht worden met een westerse levensstijl, maar de cijfers voor infectie gerelateerde kankers liggen net hoger voor deze groepen. Wat overlevingskansen betreft heeft onderzoek vooralsnog weinig eenduidige patronen kunnen blootleggen, met slechts kleine verschillen tussen migranten en niet-migranten.

Ondanks deze snel toenemende kennis over verschillen in mortaliteit, risico, en overleving voor een brede waaier aan kankertypes tussen migranten en niet-migranten in Europe, is er minder geweten over hoe deze verschillen ontstaan en hoe ze veranderen doorheen de tijd. Ook heeft onderzoek zich voornamelijk toegespitst op traditionele arbeidsmigranten en migranten met origine buiten de Europese Unie (EU), terwijl Europese migranten een belangrijk aandeel vormen van bevolkingsgroepen met migratieherkomst in hedendaags Europa. Bovendien is er tot op heden geen inzicht in de kankerrisico's en -overlevingskansen van verscheidene bevolkingsgroepen in België. Desalniettemin kent België hoge kankerrisico's en heeft

ongeveer een vijfde van de bevolking buitenlandse origine. Dit proefschrift heeft daarom als doel de kankersterfte, -risico's, en overlevingskansen voor volwassen inwoners van België tijdens de vroege jaren 2000 in kaart te brengen, zowel voor Belgen zonder migratieherkomst als voor de grootste groepen inwoners met migratieherkomst. Het beoogt bovendien determinanten voor de geobserveerde kankercijfers te onderzoeken door de bevindingen op te delen naar migratiegeneratie en verblijfsduur in België, en door te controleren voor socio-economische positie (SEP), demografische kenmerken, en het tumorstadium bij diagnose. Inzichten in de diversiteit in cijfers volgens kankertype en hoe deze veranderen doorheen de tijd kan aanwijzingen geven over de relatieve rol van externe tegenover erfelijke kankerrisico's, maar vestigt ook de aandacht op specifieke domeinen voor beleidsmaatregelen die gelijke gezondheidskansen tot doel hebben. Dit proefschrift behandelt deze thema's in zes hoofdstukken: een algemene inleiding, vier empirische hoofdstukken, en een concluderend hoofdstuk.

In het eerste hoofdstuk wordt belangrijke contextuele informatie gegeven. Het hoofdstuk biedt een overzicht van de sleutelconcepten in dit proefschrift, namelijk: kanker, de Belgische immigratiegeschiedenis, het wetenschappelijke bewijs en de theoretische literatuur over kanker naar migratieherkomst, en de aanpak en gegevensbronnen die gebruikt worden voor de empirische hoofdstukken.

Het tweede hoofdstuk, eveneens de eerste empirische studie, spitst zich toe op kankersterfte voor verschillende kankertypes en maakt gebruikt van gelinkte 2001 Census en 2001-2011 registergegevens. Het doel van dit hoofdstuk is tweeërlei: het beschrijven en vergelijken van site-specifieke kanker bij Belgen en eerste en tweede generatie Franse, Nederlandse, Italiaanse, Turkse, en Marokkaanse migranten enerzijds; en anderzijds het onderzoeken van de rol die gespeeld wordt door SEP en het urbanisatieniveau van de buurt waarin iemand woont voor de geobserveerde verschillen. Het hoofdstuk laat daarbij variatie in sterfte zien volgens kankertype en migratieherkomst, waarbij sterfte aan kankers die in verband staan met een westerse

levensstijl (nl. Long, colorectaal, hoofd en hals, borst) meestal lager is voor eerste generatie migranten uit Italië, Turkije, en Marokko dan voor Belgen. Dit patroon houdt stand ondanks de algemeen lagere SEP en hogere niveaus van urbanisatie in de leefomgeving van deze originegroepen. Daarentegen is sterfte aan infectie gerelateerde kankers, zoals die van de maag en lever, meestal hoger voor diezelfde originegroepen. Kankersterfte voor eerste generatie Franse en Nederlandse migranten verschilt ook van de Belgen voor long-, lever-, en hoofd- en halskanker. De hoogste sterftecijfers observeren we voor Franse mannen, voornamelijk door hun ietwat lagere SEP in vergelijking met Belgen. Voor kinderen van migranten wordt voor de meeste kankertypes die bestudeerd worden niet langer een verschil waargenomen tussen hun kankersterftecijfers en die van de Belgen zonder migratieherkomst.

Het derde hoofdstuk verdiept zich in determinanten van kankersterfte voor dezelfde groepen van migratieherkomst die in het tweede hoofdstuk opgenomen werden (Frans, Nederlands, Italiaans, Turks, en Marokkaans), dit keer in de stedelijke gebieden van Antwerpen, het Brussels Hoofdstedelijk Gewest, Charleroi, Gent, en Luik. Er wordt een gelaagde structuur in de gelinkte 2001 Census en vernieuwde registerdata voor 2001-2014 gebracht, zodat individuen 'genest' zijn in de buurt waarin ze wonen. Het hoofdstuk wil zogenaamde 'etnische dichtheidseffecten' ('ethnic density') of 'zelfde-origine effecten' nagaan op kankersterfte gerelateerd aan roken, gebruikmakend van drie indicatoren die de aanwezigheid van individuen met dezelfde herkomst in de buurt meten. Deze indicatoren worden zowel lineair als categorisch in aanmerking genomen. Het hoofdstuk bekijkt voorts hoe deze zelfde-origine effecten mogelijk anders tot uiting komen voor eerste tegenover tweede generatie migranten, en voor migranten met verschillende SEPs. Correlaties tussen etnische dichtheid, individuele SEP, en deprivatie op het buurtniveau werden eveneens in acht genomen. Binnen groepen van migratieherkomst is tabak-gerelateerde kankersterfte vaak lager voor mannen die in een buurt met meer mensen van dezelfde herkomst wonen. Het omgekeerde is enkel waar voor Turkse mannen.

Voor Nederlandse en Franse mannen ligt het beschermende zelfde-origine effect aan een hoge concentratie van socio-economische voordelen op zowel het individuele als buurtniveau. De resultaten laten ook zien dat het effect van een hogere Turkse aanwezigheid in de buurt enkel voor tweede generatie Turkse mannen samenhangt met een hogere tabak-gerelateerde kankersterfte, en dat ook voor Marokkaanse mannen zo'n nadelig zelfde-origine effect waar te nemen valt in de tweede generatie. Met betrekking tot persoonlijke SEP is het zelfde-origine effect voordeliger voor lager tegenover hoger opgeleide Nederlandse mannen. Door verschillende indicatoren met zowel een lineaire als categorische indeling te gebruiken wordt duidelijk dat het (niet) vinden van een etnisch dichtheidseffect kan afhangen van de gekozen indicator, en dat voor sommige groepen een effect vooral een kwestie is van wonen in een buurt met 'veel' tegenover 'weinig' mensen van dezelfde origine, in plaats van per eenheid toename in aanwezigheid van de originegroep.

Hoofdstuk vier focust op borstkankerincidentie en overlevingskansen bij Belgische, Franse, Nederlandse, Italiaanse, Turkse, Marokkaanse, en Sub-Saharaans Afrikaanse vrouwen door gelinkte 2001 Census en 2004-2017 Kankerregisterdata te gebruiken. Door de verschillende risicofactoren en prognoses voor pre- en postmenopauzale borstkanker, worden deze twee types afzonderlijk bestudeerd. Naast het vergelijken van incidentiecijfers en overlevingskansen van Belgische vrouwen en vrouwen met een migratieherkomst, kijkt dit hoofdstuk ook naar de rol die SEP en reproductief gedrag (het aantal kinderen en de leeftijd bij het krijgen van het eerste kind) spelen voor verschillen in incidentie, en SEP en het stadium bij diagnose voor verschillen in overlevingskansen. Borstkankerincidentie is lager voor vrouwen met een migratieherkomst dan voor Belgische vrouwen, vooral voor Turkse, Marokkaanse, en Sub-Saharaans Afrikaanse vrouwen. Het verschil in incidentie is frappanter voor postmenopauzale dan voor premenopauzale borstkanker, waarbij voor die laatste een lager risico bij Turkse en Marokkaanse vrouwen sterk samenhangt met lagere opleidingsniveaus, jongere leeftijden bij het krijgen van het eerste kind, en het krijgen

van meer kinderen dan Belgische vrouwen. Voor vrouwen van de tweede generatie is er niet langer een verschil in premenopauzale borstkankerrisico's met Belgische vrouwen. Overlevingskansen voor borstkanker zijn lager voor eerste generatie premenopauzale Marokkaanse dan Belgische patiënten door lagere opleidingsniveaus en latere tumorstadia bij diagnose. Omdat de lagere overlevingskansen niet langer zichtbaar zijn bij de tweede generatie lijken verschillen in het consulteren van hulpverleners eerder dan genetische aanleg voor agressievere borstkankers aan de basis te liggen van het overlevingsnadeel in de eerste generatie. Italiaanse borstkankerpatiënten van de eerste en tweede generatie hebben hogere overlevingskansen dan Belgische patiënten, hetgeen niet verklaard kan worden door verschillen in SEP of tumor stadia bij diagnose.

In de laatste studie in hoofdstuk vijf wordt eveneens de gelinkte Census en Kankerregisterdata gebruikt om te kijken naar kankerincidentie naar verblijfsduur bij eerste generatie migranten. Dit hoofdstuk tracht de theorie van 'migratie als een snelle epidemiologische transitie' te testen voor kanker. Volgens deze theorie zijn infectie gerelateerde kankerrisico's en sterftecijfers hoger bij migranten uit minder geïndustrialiseerde landen bij aankomst in een geïndustrialiseerd land van bestemming, maar nemen deze af na een korte verblijfsduur. Levensstijl-gerelateerde kankerrisico's en -sterftecijfers zijn daarentegen oorspronkelijk lager, maar nemen traag toe doorheen de tijd. Voor non-cardia maagkanker suggereert de theorie dan weer dat de risico's voor deze kankersoort 'voorgeprogrammeerd' zijn op jonge leeftijd, waardoor ze minder vatbaar zijn voor veranderingen na migratie. Om deze theoretische assumpties te testen worden incidentiecijfers berekend voor colorectale, infectie gerelateerde (non-cardia maagkanker, hepatocellulair carcinoom, Hodgkin lymfoom), en afzonderlijk non-cardia maagkanker. We doen dit voor Belgische inwoners, alsook eerste generatie Franse, Nederlandse, Italiaanse, Turkse, en Marokkaanse migranten, opgesplitst naar kortere (minder dan 30 jaar) en langere (vanaf 30 jaar) verblijfsduur in België. We kunnen de theorie bevestigen voor Turkse

en Marokkaanse mannen: deze groepen hebben hogere colorectale kankerincidentiecijfers bij langere tegenover kortere verblijfsduur, maar het cijfer blijft wel lager dan voor Belgen. Een initieel hogere infectie gerelateerde kankerincidentie verschilt niet langer van dat van Belgen na 30 jaar in het land, maar non-cardia maagkankerincidentie blijft hoger doorheen de tijd. Resultaten voor Italiaanse mannen zijn gelijkaardig, maar hun colorectale kankerrisico's verschillen niet van die van de Belgen, ongeacht hun verblijfsduur. Voor Franse mannen blijft infectie gerelateerde kankerincidentie hoger dan voor Belgen omdat hun hepatocellulair carcinoom risico hoger is, een kankertype met gemengde infectie- en levensstijl-gerelateerde oorzaken. Er worden geen duidelijke veranderingen in incidentie naar verblijfsduur waargenomen voor vrouwen, mogelijks omdat zij andere gedragsveranderingen doormaken na migratie dan mannen. SEP en burgerlijke staat veranderen deze algemene bevindingen niet.

Deze studies tonen aan dat kanker naar migratieherkomst gekenmerkt wordt door een grote heterogeniteit naar kankertype, land van herkomst, en gender. Vooral een andere blootstelling aan infectie gerelateerde carcinogenen in het origineland en gedragsverschillen lijken aan de grondslag te liggen van deze verscheidenheid in patronen. Het gedrag dat mee de verschillen in kankeruitkomsten bepaalt, wordt bovendien niet gevormd in een sociaal vacuüm: de bevindingen van deze studies geven aan dat ze beïnvloed worden door levensstijlpatronen in het origineland, gender, SEP, en de omgeving waarin migranten zich vestigen in het land van bestemming. De resultaten benadrukken bovendien de convergentie in kankercijfers voor kinderen van migranten, waarbij mortaliteit, incidentie, en overlevingskansen die verschillen van Belgen voor eerste generatie migranten niet langer verschillen voor de tweede generatie. De gesuggereerde gedragsverschillen zijn een belangrijk onderwerp voor toekomstig onderzoek, alsook sociale kapitaal effecten die mogelijk een rol spelen. Ook een vergelijkend perspectief dat naar cijfers voor migranten en niet-migranten in het origine- en bestemmingsland kijkt zou bijkomende duidelijkheid

kunnen scheppen over de verschillen in gedrag en kankeruitkomsten in beide contexten en hoe deze veranderen doorheen de tijd.

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About the author

Wanda Van Hemelrijck was born on June 21st, 1991 in Anderlecht (Brussels), Belgium. In 2009, she started her studies in Sociology at the Vrije Universiteit Brussel (VUB). She obtained her Master's in the summer of 2013 and started a master's in European Public Health at Maastricht University in the fall of the same year. She was awarded the Catharina Pijls Incentive prize for her thesis on targeted breast cancer screening messages for Moroccan migrant women in Brussels in 2014. Wanda went on to work at the Belgian Scientific Institute of Public Health (now 'Sciensano') as a junior researcher working on specific Health Interview Survey analyses and a Eurostat-project aiming to establish an inventory of morbidity statistics for Belgium. She subsequently joined Interface Demography at the VUB's Sociology department as a PhD Researcher in 2015. Wanda collaborated on smaller-scale research projects, such as 'lifestyle and chronic disease among newcomers in Belgium', and the socioeconomic and -demographic differentiation of mortality during the first COVID-19 wave. Her main research focus was the patterning of cancer according to migrant background throughout the 2000s, resulting in this thesis.