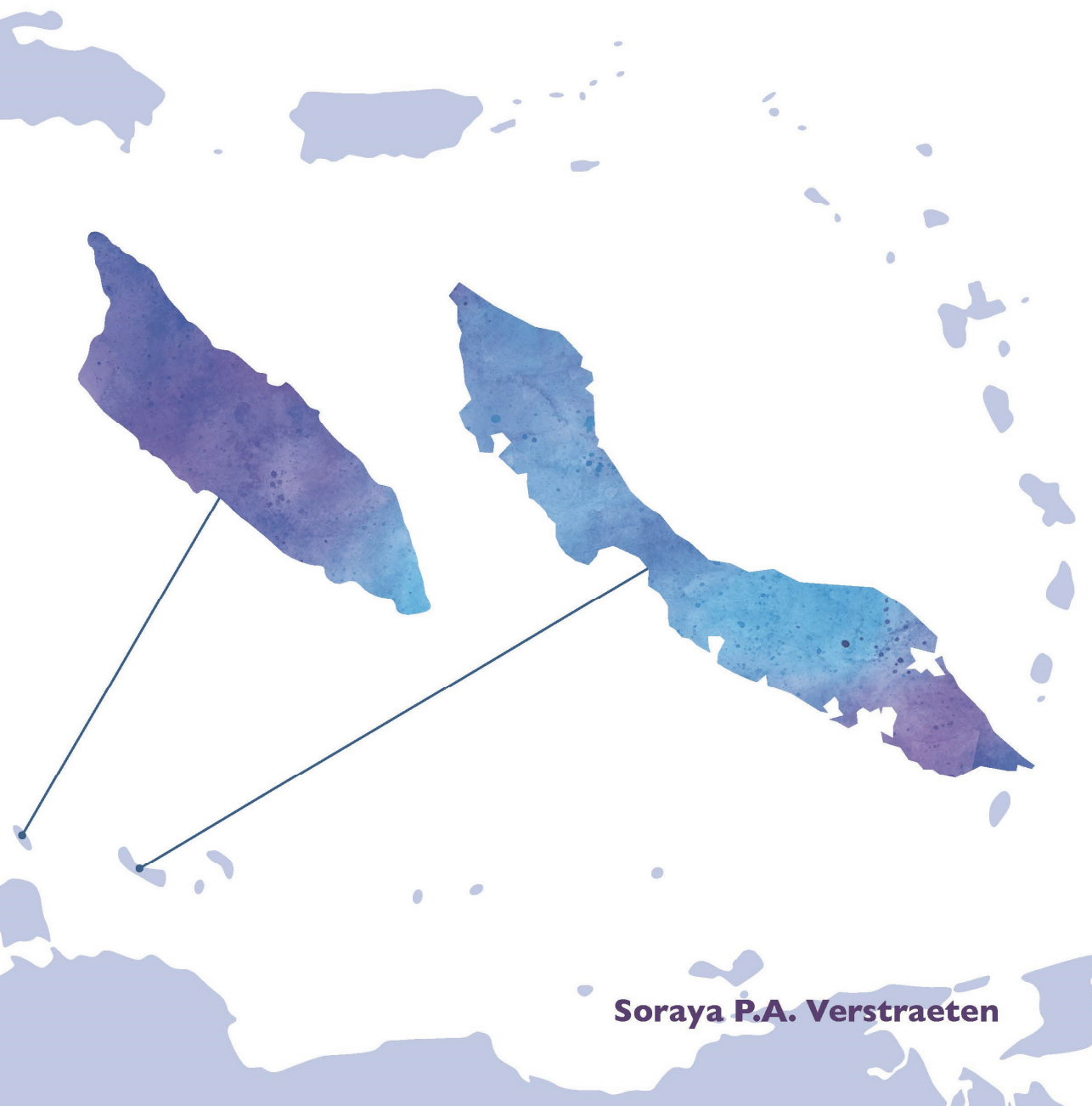


Population Health in the Dutch Caribbean

A comparative study of political context and health policy performance



Soraya P.A. Verstraeten

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Colofon

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Doctoral thesis, Erasmus University Rotterdam, the Netherlands

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Volksgezondheid in de Nederlandse Cariben
Een vergelijkende studie van de politieke context en prestaties van het gezondheidsbeleid

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Prof.dr. A.E. Kunst

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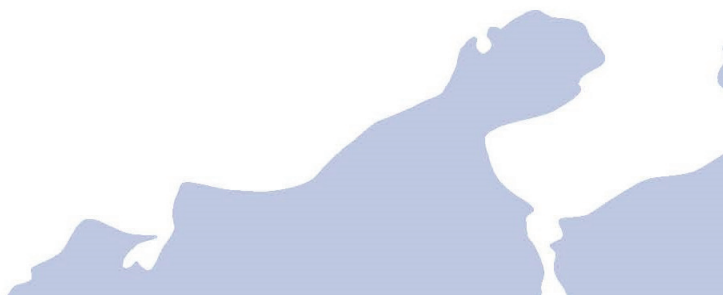
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Chapter I



General introduction



The Netherlands is at the forefront of population health monitoring (1), but not much is known about the health of inhabitants in the Caribbean territories of the Kingdom of the Netherlands. The available information seems to fit Sir Michael Marmot's statement that "all too commonly where health is poorest, health information tends to be poorest" (2). Life expectancies are shorter, and infant and maternal mortality rates are higher, in the two largest Dutch Caribbean islands, Aruba and Curaçao, than in the Netherlands (3,4). Self-reported obesity is twice as prevalent in Curaçao than in the Netherlands, and goes hand-in-hand with increased rates in obesity-related conditions such as diabetes mellitus, hypertension and musculoskeletal disorders (5). Obesity, diabetes mellitus and hypertension are more prevalent among Dutch Caribbean migrants living in the Netherlands as well (6–8). In addition, the risk of mortality from diabetes is three to four times higher among Dutch Caribbean migrants in the Netherlands, compared to the Dutch population (9).

The causes of the poorer health outcomes of the Dutch Caribbean people are largely unknown, but are commonly ascribed to unspecified regional, biological or cultural characteristics. Beyond these general descriptions, however, more specific explanations are necessary to inform policy strategies that are aimed at improving the health of inhabitants in the Dutch Caribbean islands. The urgency for this has not gone unrecognized by the governments of Aruba, Curaçao and St. Maarten, who have aligned their current governing programs to the 2030 UN Sustainable Development Agenda (10–12). As the successful implementation of the proposed policies is fundamentally dependent on the political decision-making process, this thesis aims to provide a better insight in the ways in which political determinants are associated with health outcomes in the Dutch Caribbean.

The Dutch Caribbean

The political context

Apart from several short interruptions, the Dutch Caribbean islands are governed by the Dutch since the seventeenth century. The two largest islands, Aruba and Curaçao, were both territories of the former Netherlands Antilles, the autonomous successor of the Dutch colony Curaçao and its dependencies (in Dutch: *Kolonie Curaçao* and *onderhorigheden*). In addition to these islands, it consisted of the territories of Bonaire, Saba, and St. Eustatius and St. Maarten. Established in 1954, the Netherlands Antilles has since then fragmented into smaller constitutional parts within the Kingdom of the Netherlands. Aruba seceded in 1986 as a constituent country within the Kingdom of the Netherlands, which paved the way for recurring discussions on the constitutional

arrangements of the remaining Dutch Caribbean islands. These discussions culminated in the dissolution of the Netherlands Antilles on 10 October 2010, which was remodeled into two additional constituent countries, Curaçao and St. Maarten, and the integration of Bonaire, St. Eustatius and Saba into the Netherlands as special municipalities (see figure 1).

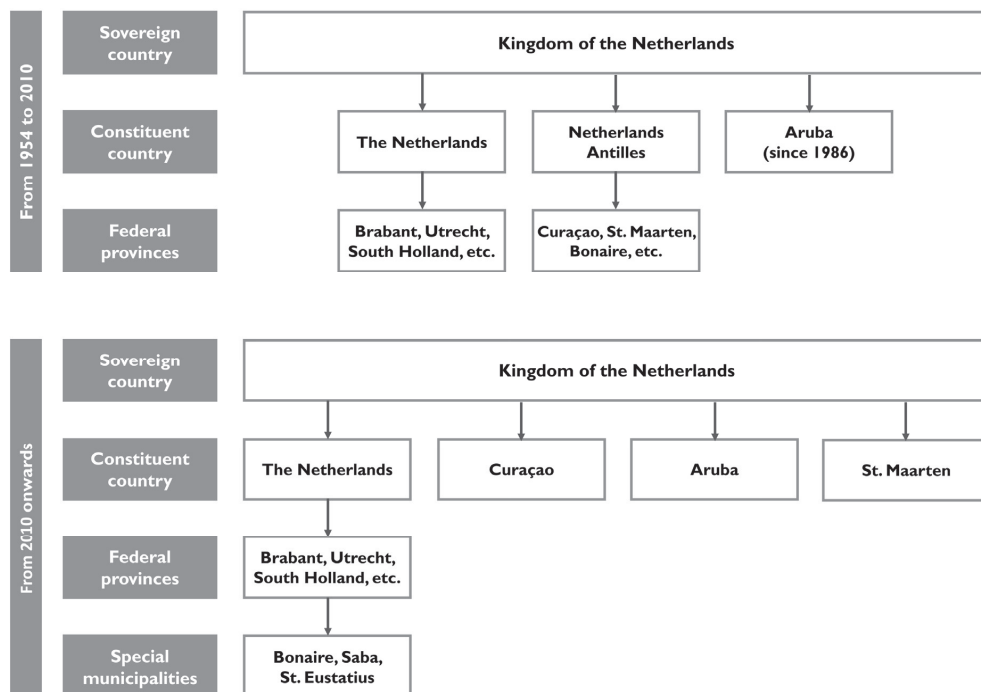


Figure 1 Constitutional organization of the Kingdom of the Netherlands, from 1954-2010 and from 2010 onwards

As health data on the other Dutch Caribbean islands are even scarcer, Aruba and Curaçao are the territories of main focus in this thesis. The islands are located in the southern Caribbean Sea off the north coast of Venezuela and have the largest populations of the Dutch Caribbean territories. Nevertheless, their populations are considered small even within the global family of small island states, with the largest, Curaçao, counting approximately 158.000 inhabitants and Aruba, approximately 104.000 inhabitants in 2015 (3). The islands have their own constitution, legal system and democratically elected government. The island's governments have primary responsibility for the provision of healthcare and public services for their inhabitants, for governing the social, educational and health sector, and for steering and evaluating local policy initiatives. For matters of military defense and foreign policy, the islands are dependent on the Netherlands.

The Kingdom council (in Dutch: Rijkswinsterraad) is the institutionalized guarantor of legal certainty, good governance and human rights in the Kingdom (13), and the four constituent countries participate as equal partners. In practice, the Netherlands has the majority vote in the Kingdom council as it comprises approximately 98% of the Kingdom's population and territory. Recurrent topics of conflict between the governments of the constituent countries in the Kingdom involve the scope of the Council's authority, and on its limits to hold other countries accountable when responsibilities are not met. In addition to these political disputes, the shared history of the transatlantic slave trade, slavery and colonization creates recurring societal tensions to the present-day. Conversely, this shared history also provides the inhabitants of the Dutch Caribbean islands with strong social, economic, cultural and familial ties to the European part of the Kingdom.

The regional context

Health in the Caribbean region

The Caribbean region is more advanced in its epidemiological and demographic transition relative to the African region, Asia and Oceania, based on a higher life expectancy at birth and a lower percentage of deaths due to communicable diseases (14). Because of this, the region is now faced with the growing burden of non-communicable disease among its aging populations. The populations of Caribbean states suffer from high rates of non-communicable disorders (15), worsened by high rates of obesity (16). That this burden has risen to epidemic proportions first became evident in the 2006 report of the Caribbean Commission on Health and Development (17). However, to date, an effective response from regional health organizations and local governments has been lacking (18). Moreover, the region faces the highest mortality rates for interpersonal violence in the world (19). In 2017, almost 5% of all deaths in Latin America and the Caribbean were attributed to homicide (20). Other prominent health challenges the Caribbean states face are HIV/AIDS, mental health disorders and the strengthening of health systems and the public health infrastructure (17).

Recent publications acknowledge that Caribbean states face specific challenges to strengthen their health systems and to take efficient action against avoidable mortality (21,22). For starters, out of 31 Caribbean states, 27 are islands or archipelagoes, of which 10 have populations smaller than 100,000. In addition to small size and geographic remoteness, shared characteristics also include fragile economies, ethnolinguistic diversity, large socio-economic inequalities, emigration of skilled workforce (brain drain), vulnerability to natural disasters, and a history of colonialism. This shows that the governments' capacity to respond to its population needs, as well as global challenges as

economic growth, climate change, and organized crime, cannot be done with the same level of human capital and financial resources that is the norm in larger countries.

Despite these similarities among Caribbean states, the Caribbean is one of the most diverse regions in the world. As diverse as the Caribbean populations are in terms of their ethnic backgrounds, cultural identities and religion, as diverse are their health outcomes. With the exception of Canada, the highest (Martinique, 82), and the lowest (Haiti, 64) life expectancies in the Americas are found in the Caribbean islands (23).

Health in the Dutch Caribbean

A regional comparison of life expectancy data shows that from the 1950s until the 1990s, some of the best population health outcomes in the Caribbean region were found in Aruba and Curaçao. During that period, life expectancy at birth increased from 58.4 years to 73.5 years in Aruba and from 58.8 years to 74.6 years in Curaçao (3). Although curative care remains the primary focus of most Caribbean governments (24), including on Aruba and Curaçao, these stunning advances in longevity may be less the result of medical care services (25,26), and more of improvements in sanitation and nutrition (27), and the implementation of policies that improved social conditions and the physical environment (26).

Since the mid-1990s, however, Aruba and Curaçao have experienced a slowdown, and for several years even a decrease, in life expectancy growth relative to other Caribbean states (3). As a result, the islands dropped in their rank of the Caribbean life expectancy rating between 1960 and 2015, from 3rd place to 9th place for Aruba, and from 2nd place to 6th place for Curaçao (out of 21 Caribbean states). So far, there has not been a compelling explanation for this observation. Is there a Caribbean counterpart that performs arguably better? And if so, what are they doing that the Dutch Caribbean islands are not? Since other Caribbean states face similar challenges in improving and protecting the health of their inhabitants as the Dutch Caribbean islands, the ability to understand health inequalities between Caribbean states would not only be of interest to Dutch-Caribbean policy makers, but also has become a key objective of public health actions across the region (24,28).

Social and political determinants and population health

There is a long standing tradition of the idea that political determinants need to be brought into our understanding of health inequalities within, and between, countries. This idea can be traced back to the mid-19th century, when pioneers of public health such as Rudolf Virchow, Friedrich

Engels and Edwin Chadwick identified poverty, ignorance from a lack of educational opportunities and squalid and overcrowded housing as the origins of poor health and recurring epidemics among peasants and manual workers in Europe (29–31). In order to improve the conditions in which the working classes lived and worked, they advocated for the necessity of social reforms. The successful implementation of these reforms, however, meant that decision-makers and -influencers in society needed to agree on the redistribution of resources and on the collective provision of social services, which was only possible through continuous political commitment. It is in this light, that Rudolf Virchow coined his well-known statement: "Medicine is a social science, and politics is nothing else but medicine on a large scale" (29).

Social determinants of health

The viewpoints of Virchow, Engels and Chadwick still hold significant influence in public health today, as evidenced by a rapidly increasing number of empirical studies on the role of politics on population health (32), and a renewed interest in the social determinants of health (33–35). The paradigm of social determinants poses that health cannot be understood from investigating individual-level factors such as biology and health behaviors alone, but needs to be considered in the light of the physical and social environment in which these biological interactions and behaviors take place. The pathways through which individual social determinants influence population health are well understood (36). The unequal distribution of social and economic factors as income, employment, education and housing, for example, produces inequities in health (37). Even the effect of genes on health, except for several well described exceptions, cannot be considered separately from the social context of an individual (38).

One of the most widely used ecological models to conceptualize the complex interactions of social determinants on the health of individuals is the one by Dahlgren and Whitehead (figure 2). The model depicts the influences on an individual's health as a dynamic, multifaceted system that connects upstream determinants as environmental and cultural factors with more proximal ones like education and housing, and eventually to the individual determinants of biology and health behaviors. The model was originally developed to describe the structural drivers of health disparities within countries, but also shows how health may differ between countries as the structural drivers differ between countries as well. For example, the consumption of healthy foods has a strong social patterning in different European countries, but could also explain the variations in health inequalities between these countries (39). By definition, improvements in social determinants mostly lie outside the influence of medical care practitioners and in the arena of political action, policy interventions and public services. This does not refute the importance of

health care services on health outcomes, but rather shows that an important political and social dimension underlies who becomes sick or injured in the first place (40–42) and that therefore, health considerations need to be integrated into policymaking across sectors to improve the health of all communities in a country (43).

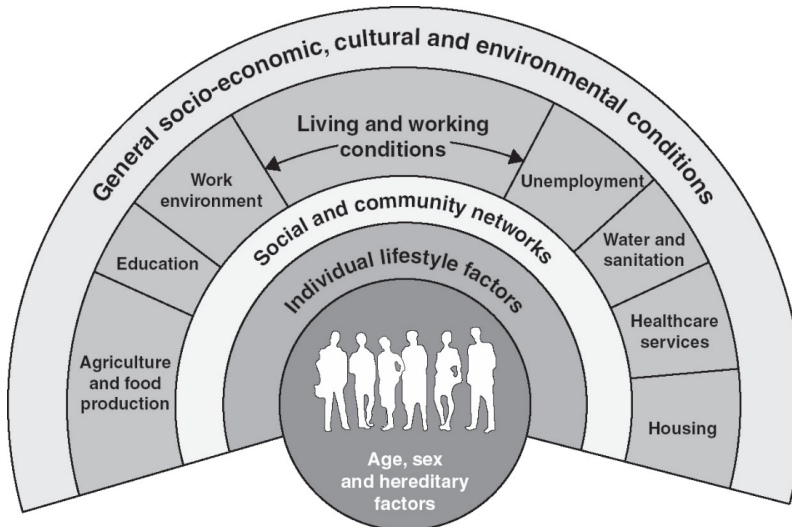


Figure 2 The Dahlgren and Whitehead model of social determinants of health

Political determinants of health

When key objectives have been identified, political decision-making will decide which policy interventions are implemented, what resources will become available, and how different stakeholders are aligned together and agree on common actions to reach a mutual goal. The decisions on prioritization and strategy are preferably based on the best available research evidence, but not enough information may be available for decision-makers to reach more substantiated conclusions. Examples of health policy interventions that have been proven effective in advancing population health efforts are improved access to contraceptives to reduce teenage pregnancies (44), comprehensive bans on the advertisement of tobacco (45) and alcohol (46) to reduce consumption, infrastructural changes to road design to ensure pedestrian safety and speed control (47), the implementation of a sugar tax to reduce the consumption of sweetened beverages (48), breast- and cervix cancer screening for the early detection of cancer (49,50), and the incremental introduction of a wide range of medical interventions to reduce deaths from perinatal causes (51). Other health policies aim to strengthen the healthcare system, for example the implementation of legislation and protocols to ensure the provision and quality standards of healthcare services. Some policy interventions have an indirect beneficial effect on population health through the reduction

of socio-economic inequalities, for example welfare state policies (52,53), and policies that address income inequalities (54,55). What is less clear, however, is whether and why countries vary in their pursuit of policy interventions, and why some governments are more committed to improve the health of their population than others.

The political dimension of population health is obvious during times of crisis, for example in the political back-and-forth on the Affordable Care Act (Obamacare) and in reports of the human death toll and population displacements during wars. In many other cases, however, the relationships between political decisions and health outcomes are less obvious. Yet, political decision-making is at the heart of governmental actions, and inactions, to improve population health (40–42). Whether or not a certain topic makes it to the policy agenda, and what actions will be subsequently taken, is dependent on the political perceptions of the severity of a health problem, the actors who are responsible and the populations who are affected (56). Before discussing the empirical literature of political determinants on population health outcomes, we first define the meaning of the word “politics” as the “practice of the art or science of directing and administrating states” (57). In more concrete terms, politics is concerned with the way that people living in groups make decisions (58).

As political views, systems and ideologies substantially differ between countries, political determinants are most commonly conceptualized in four key features: democracy, welfare state, political tradition, and globalization (32). Democracy reflects the extent of free and fair elections that is allowed by political regimes (59) and is thought to benefit population health through pressures on government accountability and responsiveness (60,61). Many studies have focused on the relation between democratization and health, in particular by looking at the health impact of the transition from an autocratic to a democratic government (62–68), the association of harmonized indexes such as Polity IV (69,70) and political rights (71,72), the years of democratic governance (73,74) and the presence of elections (75,76). While the vast majority of the studies concluded that democracy is good for population health, some have not found any evidence (70,71,77). Welfare state generosity, in terms of relatively high expenditures on health and social services, is favorably associated with population health outcomes in cross-country studies in developed (78–80) and developing countries (81,82). There are indications that (long-term) social democratic (or left-wing) government participation has had a positive impact on some areas of preventive health policy (83,84) and population health outcomes such as life expectancy and infant mortality (53,85,86). Social democratic government has also been related to reduced health inequalities (87) and spatial inequalities of healthcare services (88), but not all studies found a

positive relationship (89). Neoliberal policies, in contrast, were found to widen health inequalities as a result of increased privatization and reduced welfare provisions (90). Moreover, in the traditionalistic political culture in the Southern states of the United States, whose origin is found in plantation-based economies, government is understood as a means to preserve the existing social and economic order (91). To the present day, this political culture is associated with poorer mortality outcomes compared to the moralistic political culture in Northern states, in which the purpose of government is understood as a means to promote the general welfare of the population (92). Globalization, defined by dependency indicators such as trade, foreign investment, and national debt, has been negatively associated with population health (93), although the evidence of this political determinants' effect on health outcomes is least conclusive as studies are dispersed across a diversity of outcomes (32).

Studies on political determinants of health that cover Caribbean states, in contrast, tend to focus on the legacy of colonialism and the current division in political sovereignty status. Currently, 16 of 31 Caribbean states are politically sovereign, while the other states remain politically affiliated to their former colonial administrators the Netherlands, France, the US and the UK. Colonialism is defined as the policy or practice of acquiring political control over another country, occupying it with settlers and exploiting it economically (57). In line with the negative undertone of this definition, common consensus is that Western colonialism did more harm than good. There is empirical evidence, however, that a longer duration of colonial experience is positively related to both economic development and infant mortality (94). The contemporary version of "political affiliation" also seems to make populations living in these territories not worse off: affiliated states consistently outperform their sovereign counterparts in terms of health outcomes (95–97) and economic development (94,96–99).

The previously mentioned evidence on the association of political affiliation with health and economic development is mostly based on cross-sectional data from the 1980s onwards, so after the main events of decolonization, the process in which a colony becomes politically independent. Consequently, they do not shed light on when disparities between currently affiliated and independent states came to be. To answer this question, Bertram used trade data to show that the economic divergence between currently affiliated and sovereign states first became apparent between the 1920's and 1930's and was well established prior to the first wave of decolonization in the 1950's (97). As the petition for independence in the Caribbean was primarily initiated by the local governments of colonized countries and territories (100,101), this suggests that richer

colonies have chosen to remain affiliated to their former colonizers, while poorer colonies have opted for political sovereignty.

Figure 3 illustrates the almost clear-cut division in political sovereignty status for life expectancy and economic development. For each Caribbean state, life expectancy at birth among affiliated (grey triangle) and sovereign states (black square) is plotted against GDP per capita of that state. The graph indicates that states that have remained affiliated to their Western colonizers generally have better population health and higher economic development than states that have gained their independence.

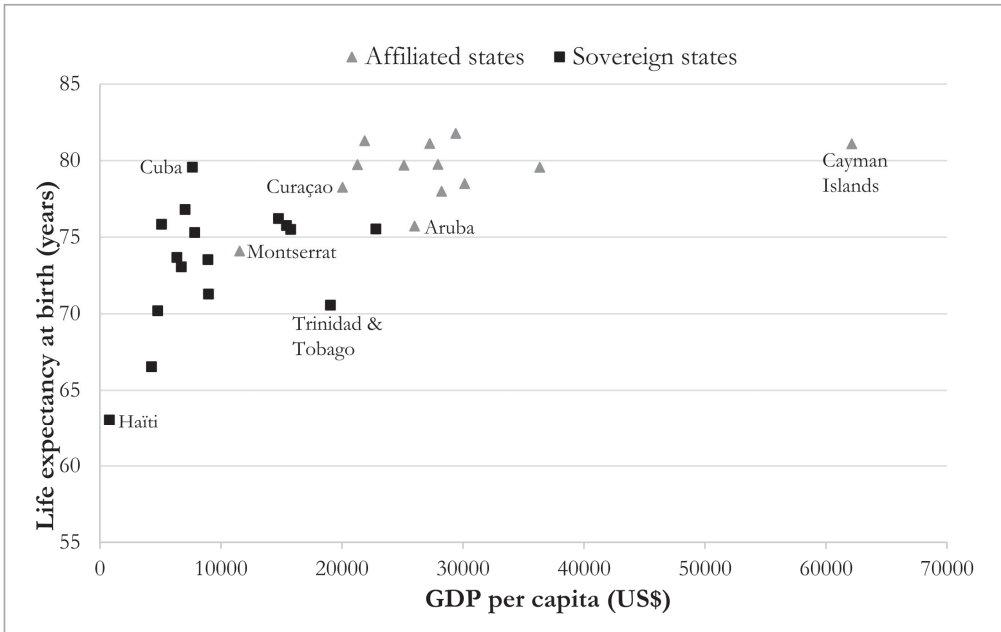


Figure 3 Association between GDP per capita and life expectancy by political sovereignty status, 2015
 Sources: UNdata, <http://data.un.org> and PAHO, PLISA database
<http://www.paho.org/data/index.php/en/>

Given the concave relationship between life expectancy and GDP per capita, it is tempting to conclude that political status had its effect on population health through economic development. The association between the health and wealth of populations has long been established (102), and remains important in the modern age (103). This, however, does not completely explain the inequalities in life expectancies between currently sovereign and affiliated Caribbean states. Some sovereign Caribbean states have been very successful in improving population health despite their low economic development, such as high achiever Cuba. Others, with Trinidad and Tobago being the most remarkable example, perform less well than might be expected based on their GDP per

capita. This observation indicates that variations in determinants other than economic development influence life expectancy development in Caribbean states as well. Whereas the determinants of between-country health inequalities have been rather extensively studied in Europe (see for example (89,104,105)), much less is known about the Caribbean region. The variations in political status and population health in the Caribbean therefore offer interesting opportunities for research on the political determinants of population health, so we can gain deeper insights in why some governments have been more successful than others in improving the health of their people.

This thesis

Shortcomings in the current literature

Despite increased recognition of the importance of political determinants for population health improvements, the current literature has several shortcomings. First, there is a lack of comparative health research among Western countries and their dependencies (also known as overseas countries and territories, OCTs), the constituent countries of the Kingdom of the Netherlands in particular. As we have previously mentioned, the health of Dutch Caribbean people living in the Dutch Caribbean islands and in the Netherlands is poorer than that of the Dutch population. More rigorous studies are needed to identify aspects that may inform health policy strategies to improve the health of the Dutch Caribbean people.

Second, the number of studies on the political determinants of health within the Caribbean region is scarce and typically involves cross-sectional comparisons. Given the fact that decision-making on health occurs on the local level in -nearly- all Caribbean countries and territories, more insights are needed in how political conditions shape population health in Caribbean states, and which mediating pathways are involved. This needs to be better understood to identify factors that hamper and stimulate population health improvements.

Lastly, a fundamental issue in all countries relates to how public funds should be used to invest in population health, and which priorities should be set to achieve better health outcomes. This is particularly important for Caribbean states, considering that their economies are fragile, their human resources are limited and their health challenges require swift actions. Thus far, there are hardly any studies on the impact of the implementation of “best practice” health interventions on population health in the Caribbean region.

Objectives and research questions

This thesis presents the findings of our efforts to understand why health outcomes in the Dutch Caribbean islands are poorer than in the Netherlands and in several other Caribbean states and proposes ways for reducing the between-country inequalities. The main objective of this thesis is to provide a better insight into the health situation of the Dutch Caribbean, and the factors related to this health situation, in particular the role of the political context and health policy performance. This thesis addresses this aim specifically through the following research questions:

- I. What is the health status of the Dutch Caribbean population?
- II. To what extent do differences in population health in the Caribbean reflect differences in political context and health policy performance?

In order to answer these research questions, we have made use of data that are derived from cross-sectional health surveys, mortality registration systems, harmonized international databases, and country reports. We use a quantitative observational approach and apply various statistical methods to empirically examine patterns and trends of health inequalities between the Dutch Caribbean, the Netherlands and other Caribbean territories. Moreover, we assess their association with political conditions, policy implementation and national indicators to point the way to effective public health policies. To address the multidisciplinary aspects of the determinants of populations health, we cover theory from the fields of public health, medicine, political science, organization science, economics, and sociology.

Outline

This thesis is divided in 7 chapters. **Chapter 1** provides a general introduction into the topics addressed in this thesis. It also describes the general aim, the research questions, and introduces the methods used. After the general introduction and in line with the research questions, this thesis is divided in two parts.

The first part consists of **chapter 2 and 3**, and focuses on the differences in population health within the Kingdom of the Netherlands. In **chapter 2**, we compare self-reported health outcomes and behaviors of Dutch Caribbean migrants living in the Netherlands to that of Dutch Caribbean and Dutch non-migrants. The study in **chapter 3** examines the contribution of deaths that are amenable in the presence of timely and effective healthcare to the lower life expectancies in the Dutch Caribbean in comparison to the Netherlands. The second part includes three chapters,

chapter 4, 5, and 6, and focuses on the political context of population health and health policy performance in the Caribbean region. Specifically, in **chapter 4** we investigate how life expectancies in Caribbean states have evolved during the 1950-2014 period and evaluate whether decolonization coincided with changes in life-expectancy, and similar changes in economic development. In **chapter 5**, we assess whether differences in life expectancy trends between Caribbean dependencies and their Western administrators are related to their degree of political independence, and which causes of death contributed to life expectancy developments during the 1980-2014 period. **Chapter 6** depicts a study in which we evaluate the health policy performance of 16 Caribbean states in 11 different policy areas during the 2010-2015 period. We also explore the association of the health policy performance score with national determinants and estimate the potential health gains of “best-practice” health policies. We conclude this thesis with a general discussion in **chapter 7**. Here we present our main findings, address methodical concerns, interpret our results in the context of earlier studies, and propose ways for improving health research and policy in the Dutch Caribbean islands.

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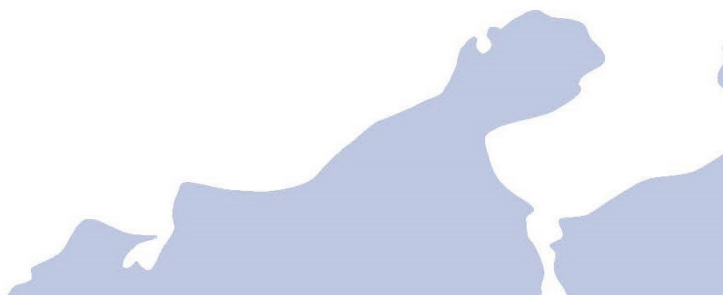
Part I

Population health comparisons within the Kingdom of the Netherlands





Chapter 2





**The health of Antillean
migrants in the Netherlands:
a comparison with the health of
non-migrants in both the
countries of origin and
destination**

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Abstract

Background We examined risk factor and health differences between Antillean migrants in the Netherlands and Antillean and Dutch non-migrants, and related our findings to four commonly used explanations for migrant health disparities.

Methods We used nationally representative data from the 2012 Dutch Public Health Monitor and the 2013 National Health Survey Curaçao. We calculated weighted rates and assessed significance using chi-square. We used logistic regression analyses to compare health behaviors and outcomes between Antillean migrants and the non-migrant populations.

Results Overall, Antillean migrants had poorer physical and mental health than Antillean and Dutch non-migrants. For overweight/obesity and tobacco and alcohol use, Antillean migrants had rates in-between those of the Antillean and Dutch non-migrants. The poor health of Antillean migrants persisted in the second-generation who were born in the Netherlands.

Conclusions Patterns of differences in physical and mental health among the study populations were suggestive of a 'stressful environment' effect. The poorer health of Antillean migrants may be partly determined by host-country specific stressors such as perceived discrimination, spatial concentration in multi-ethnic neighborhoods and reduced social mobility.

Introduction

Migrant health studies in developed countries have primarily focused on the ‘host country’ perspective of the country of destination and commonly describe in what ways migrants’ health differs from the non-migrant population. The literature offers a number of explanations for health disparities between migrants and non-migrants, and a common distinction is made between proposals of theories that take the temporal dimension of migrant health into account (e.g. health transition theory (1), cumulative disadvantage theory (2), and the life course approach (3), and hypotheses that are applied to explain cross-sectional findings.

Many cross-sectional health studies focus on the paradoxical finding that some migrant groups have better health outcomes than their respective non-migrant population, at least initially upon arrival in the host country. The ‘healthy migrant’ effect (or the related ‘Hispanic Paradox’) proposes that migration is selective for younger and healthier individuals (4,5), for example through positive self-selection of healthy individuals or preferential immigrant health policies of the host country (6,7). For most migrant groups, however, chronic health problems are more common than among the non-migrant host populations in developed countries (8–10). Several theories have been proposed to explain these findings. The ‘affluent environment’ effect suggests that migrants’ increased risks for obesity and diabetes is caused by relocation to a more affluent environment and the adoption of sedentary lifestyles with calorie-dense diets (11,12). In contrast, the ‘stressful environment’ effect describes the high incidence of psychiatric disorders and proposes that migrants experience high levels of (psycho)social stress caused by their minority status and socio-economic disadvantage (13,14). The explanation of ‘convergence’ takes into account that migrant health disparities are not static, but change over time (15,16). This hypothesis implies that migrant’s health profiles will eventually, based on length of stay or successive generations, converge towards the host country’s population norm. The direction of convergence can range from more favorable initial levels to the less favorable levels in the host country (upwards convergence), or from less favorable initial levels to the more favorable levels in the host country (downwards convergence) (9).

The commonly proposed theories have advanced our understanding of migrant health disparities, but their actual significance to inform policy development is unclear due to fragmentary and sometimes inconsistent evidence (9). Moreover, a weakness in the migrant health literature is that many studies do not take into account the ways a migrant group’s health status differs from the population in the country of origin. Without this ‘home country’ perspective on migrant health, it is not possible to differentiate whether the disparities between a migrant group and a respective

non-migrant population are the result of biologically or culturally determined differences, or are in fact the result of host country specific circumstances that disproportionately affect migrants more than non-migrant populations. The purpose of our current study was therefore to address this paucity in the migrant health literature and to compare the health of Antillean migrants in the Netherlands with non-migrants in both the countries of origin and destination.

Antillean migrants in the Netherlands represent a unique migrant population. Antilleans from Curaçao and the five other, less populous, Dutch Caribbean islands acquire Dutch nationality at birth, which allows them to freely settle and receive the same social and educational benefits as the non-migrant Dutch in the Netherlands. In fact, the Dutch Caribbean islands from which they originate have been part of the Kingdom of the Netherlands since the 17th century and still have strong (socio-)economic, political and legal ties to its former colonizer today. The Dutch Caribbean islands use Papiamentu, Dutch and English as official languages and their systems of education and healthcare are largely based on those in the Netherlands, albeit of undetermined quality. Nonetheless, Antillean migrants are considered a non-western migrant minority population in the Netherlands, both in political rhetoric and by registration in the Municipal Personal Records Database (GBA). Antilleans are the fourth largest non-Western migrant population in the Netherlands, and although their numbers represent only a small proportion (0.9%) of the Dutch population, they represent 50% of the Antilleans on the Dutch Caribbean islands.

The purpose of our current study was to compare the health status and behaviors of Antillean migrants in the Netherlands with Antillean non-migrants in Curaçao and Dutch non-migrants in the Netherlands and to determine whether health disparities persist in second-generation Antillean migrants who were born in the Netherlands. Then, we relate our findings to the common explanations of migrant health disparities in order to assess which one provides the most plausible explanation for the health outcomes of Antillean migrants relative to Dutch non-migrants.

Methods

Data sources

We used data from two population-based surveys that collected data on background factors, health behaviors and self-reported health among the non-institutionalized population in the Netherlands and in Curaçao. Dutch data were from the 2012 Public Health Monitor and Curaçao data were from the 2013 National Health Survey. We selected comparable questions, cross-standardized categories according to DPHM2012 categories and combined the datasets to ensure comparability.

Both surveys included sample weights to assure that estimates are representative at the national level. Detailed descriptions of the health surveys were published elsewhere and are briefly described below (17,18).

The Dutch Public Health Monitor (DPHM) 2012

The Dutch Public Health Monitor's objective is to provide a comprehensive overview of health status, social and lifestyle factors of the adult population in the Netherlands for regional and national information needs. In 2012, data were collected from 378.195 respondents and included 1.556 Antillean respondents. Migrant background was indicated according to the Municipal Personal Records Database (GBA). The majority of data (97.2%) were collected by 28 Community Health Service departments (GGD's) using digital or written questionnaires during the fall of 2012. Remaining data were collected by Statistics Netherlands using digital or written questionnaires or face-to-face interviews. Sample weights correct for gender, age, marital status, urbanization, household size, ethnicity, income, municipality and GGD-region.

National Health Survey Curaçao (NHSC) 2013

The NHSC's objective is to collect nationally representative data on the health status, health determinants and healthcare use of the adult population in Curaçao. The questionnaire was based on international constructs to ensure validity and improve international comparability. Data collection was organized in collaboration with Statistics Curaçao. Data were collected from 3000 respondents using face-to-face interviews conducted in Papiamentu, Dutch, English or Spanish during January and February 2013. Sample weights correct for gender and age.

Study populations

Antillean non-migrants participated in the NHSC2013 and were born in Curaçao or one of the other Dutch Caribbean islands. Antillean migrants and Dutch non-migrants participated in the DPHM2012. First-generation Antillean migrants were born on the Dutch Caribbean islands. About three-quarters were born and -partly- raised in Curaçao (19). Second-generation Antillean migrants were born in the Netherlands and had at least one Antillean parent. Dutch non-migrants were born in the Netherlands and had parents who were born in the Netherlands as well.

Risk factor and health status variables

Our analysis focused on comparable variables between the surveys. For risk factors, this included overweight (BMI \geq 25), obesity (BMI \geq 30), two indicators for tobacco use -smoker and heavy

smoker (>20 cigarettes/day)-, three indicators for alcohol use -alcohol user, excessive user (>21 (men) or >14 (women) consumptions per week) and heavy user (>5 (men) or >3 (women) consumptions on one day, at least weekly)- and one variable for physical inactivity (0 days during the past 7 days comparable for DPHM2012 respondents only).

For health status, variables included self-reported (very) bad health, morbidity (captured by respondents' reports of stroke, heart infarction, other severe heart disease, cancer, diabetes, migraine and hypertension, with diabetes, migraine and hypertension assessed separately as well), multi-morbidity (two or more of the previously mentioned diseases), and limitations in sight, hearing or mobility).

Psychological distress was assessed with questions from the RAND 36-Item Short Form (NHSC2013) and the Kessler Psychological Distress Scale (DPHM2012). Based on five questions that were comparable across these instruments, we calculated the variable psychological complaints according to the Mental Health Inventory method (20).

Covariates

We adjusted for individual-level sociodemographic characteristics that are known determinants of health during the logistic regression analysis. Demographic characteristics included a continuous variable for age and binary variable for marital status (living together, unmarried, divorced or widowed, with married as reference group). Available for DPHM2012 respondents only, this also included an urbanization variable (moderately urban, not urban, with (very) strongly urban as reference group). This variable is based on the address density of the surrounding area as defined by Statistics Netherlands and retrospectively added to the dataset based on the postal code of the respondent. Socio-economic characteristics included binary variables for educational status (low (ISCED 0-1), intermediate1 (ISCED 2-3), or 2 (ISCED 4), with high education (ISCED 5 and 6) as reference group) and employment (paid work, yes/no).

Statistical analysis

For each gender separately, we computed descriptive statistics with use of the respective DPHM2012 or NHSC2013 sample weights. Significance of differences for categorical variables was tested with chi-square. We estimated odds ratios between study populations with logistic regression, using Antillean migrants as the reference group, with and without adjustment for sociodemographics. Next, intergenerational differences among Antillean migrants were assessed. Considering that the second-generation Antillean migrant group was small and younger, we

combined both genders and included 19- to 65-year olds only to estimate differences between first and second-generation migrants, using the same regression models with the addition of gender. 95% confidence intervals were used to assess significance. Data were analyzed using SPSS-version 20.

Interpretation of the logistic regression results

In order to relate our findings to common explanations of migrant health disparities, we compared patterns of differences between Antillean migrants and non-migrant populations with the differences that one would expect if each of these explanations applied. Although the explanations are not mutually exclusive, the patterns of differences among the study-populations indicate whether certain explanations hold true across multiple health outcomes.

Table 1 summarizes our expectations under each of the explanations. If health problems are less common among Antillean migrants compared to non-migrant populations, the 'healthy migrant' effect would be a plausible explanation. Conversely, since Curaçao has fewer economic resources than the Netherlands, higher prevalence of overweight/obesity and diabetes among Antillean migrants is in accordance with the 'affluent environment' effect. Similarly, higher rates for mental and subjective health related variables are suggestive for the 'stressful environment' effect. We expect that rates of Antillean migrants are in-between rates of the non-migrant populations in the case of 'convergence'. Additionally, Antilleans may have biologically or culturally determined risk, or protective, factors that persist after migration. If so, we expect no significant differences among the Antillean populations, but significant disparities relative to the Dutch non-migrants.

Table 1 Interpretation of odds ratio's (OR) from logistic regression analysis

Results logistic regression analysis			Interpretation
Antillean non-migrants in Curaçao	Antillean migrants in the Netherlands	Dutch non-migrants in the Netherlands	Finding in accordance with:
OR more favorable	1.0	OR more favorable	Stressful or affluent environment ^a
OR more favorable	1.0	OR less favorable	Upwards convergence
OR more favorable	1.0	OR similar	Upwards convergence ^b
OR similar	1.0	OR more favorable	Biological or cultural risk factors of Antilleans that exist after migration
OR similar	1.0	OR less favorable	Biological or cultural protective factors of Antilleans that exist after migration
OR similar	1.0	OR similar	No effect
OR less favorable	1.0	OR more favorable	Downwards convergence
OR less favorable	1.0	OR less favorable	Healthy migrant effect
OR less favorable	1.0	OR similar	Downwards convergence (?) ^{b,c}

^a Depending on health outcome, it may be argued that either the affluent or stressful environment explanation applies.

^b not directly in accordance with given explanation because rates of Antillean migrants in the Netherlands may not reflect the end-point of convergence, but this could be reasoned with additional arguments.

^c May also be in accordance with the healthy migrant effect.

Results

Table 2 presents sociodemographic characteristics of the study populations. For both genders, we found significant differences between Antillean migrants, Antillean non-migrants and Dutch non-migrants for all characteristics. Compared with Antillean non-migrants, Antillean migrants were younger, higher educated, and more likely to be cohabitating and perform paid work. Antillean migrants were also younger than Dutch non-migrants, but less likely to be married, employed, and more likely to live in an urban environment. Antillean migrant women were higher educated than Dutch non-migrants women, whereas Antillean migrant men were lower educated than Dutch non-migrants men. The health characteristics of the study populations are presented in table A1 of the Appendix.

The logistic regression results (figure 1 and Appendix table A2 and A3) showed that health status and risk factors varied substantially between Antillean migrants, Antillean non-migrants and Dutch non-migrants. In the models adjusted for age, marital status, educational level and employment, overall health status of Antillean migrants was unfavorable compared with both non-migrant populations (figure 1). Addition of the urbanization variable did not affect the significance of differences between Antillean migrants and their Dutch counterparts (Appendix table A2 and A3).

Table 2 Sociodemographic characteristics of the given populations, by gender

Men	Antilleans non-migrants (n=907)	Antilleans migrants (n=649)	Dutch non-migrants (n=153.006)
Age in years (range)	48.8 (19-93)	40.1 (19-93)	49.1 (19-107)
Age in categories in n (weighted %)^{a,b}			
19-24 years	53 (11.4)	86 (17.9)	7.449 (9.7)
25-44 years	148 (28.7)	228 (46.6)	27.850 (32.4)
45-65 years	381 (39.8)	195 (27.8)	48.942 (37.1)
65 years and older	325 (20.2)	140 (7.6)	68.765 (20.8)
Education level in n (weighted %)^{a,b}			
Low	207 (18.3)	54 (6.6)	12.490 (5.8)
Intermediate 1	362 (43.5)	209 (31.2)	46.136 (26.2)
Intermediate 2	273 (31.5)	202 (34.9)	45.081 (34.7)
High	65 (6.7)	160 (27.3)	44.804 (33.3)
Missing	0	24	4.495
Marital status in n (weighted %)^{a,b}			
Married/registered partnership	466 (43.9)	220 (29.1)	101.988 (57.3)
Living together	66 (9.1)	83 (19.4)	11.576 (13.6)
Unmarried	258 (38.0)	211 (41.8)	17.526 (21.0)
Divorced	67 (5.7)	79 (7.4)	7.137 (5.0)
Widow(er)	50 (3.3)	16 (2.3)	8.286 (3.1)
Missing	0	40	6.493
Urbanization in n (weighted %)^b			
(Very) strongly urban	-	518 (84.0)	54.307 (42.7)
Moderately urban	-	62 (9.1)	29.472 (21.0)
(very) Little urban	-	69 (6.9)	69.227 (36.3)
Employment in n (weighted %)^{a,b}			
Yes	421 (58.4)	352 (65.7)	73.237 (69.2)
No	486 (41.6)	257 (34.3)	71.432 (30.8)
Missing	0	24	8.337
Women	Antillean non-migrants (n = 1.549)	Antilleans migrants (n = 907)	Dutch non-migrants (n = 182.096)
Age in years (range)	50.1 (19-96)	41.8 (19-92)	50.7 (19-103)
Age in categories in n (weighted %)^{a,b}			
19-24 years	61 (10.0)	151 (15.5)	10.486 (9.1)
25-44 years	327 (28.3)	286 (43.4)	37.629 (30.4)
45-65 years	646 (39.7)	270 (32.3)	56.407 (35.6)
65 years and older	515 (22.0)	200 (8.8)	77.574 (24.9)
Education level in n (weighted %)^{a,b}			
Low	437 (22.3)	68 (5.5)	17.350 (7.0)
Intermediate 1	587 (39.4)	287 (26.4)	70.446 (32.9)
Intermediate 2	414 (30.7)	285 (39.2)	46.957 (31.3)
High	111 (7.6)	222 (28.8)	41.336 (28.7)
Missing	0	45	6.007
Marital status in n (weighted %)^{a,b}			
Married/registered partnership	439 (26.9)	235 (26.9)	101.793 (54.1)
Living together	90 (6.5)	93 (16.9)	15.436 (13.3)
Unmarried	598 (45.2)	350 (40.6)	17.912 (15.2)
Divorced	202 (11.2)	133 (13.2)	11.490 (7.1)
Widow(er)	220 (10.2)	37 (2.3)	27.901 (10.3)
Missing		59	7.564
Urbanization in n (weighted %)^b			
(Very) strongly urban	-	702 (80.4)	66.375 (43.0)
Moderately urban	-	108 (12.8)	34.755 (21.2)
(very) Little urban	-	97 (6.8)	80.966 (35.8)
Employment in n (weighted %)^{a,b}			
Yes	626 (47.0)	420 (58.1)	77.756 (59.2)
No	923 (53.0)	426 (41.9)	89.628 (40.8)
Missing	0	45	14.712

^a Antillean non-migrants are significantly different from Antillean migrants based on the Chi-square test ($p < 0.001$)

^b Dutch non-migrants are significantly different from Antillean migrants based on the Chi-square test ($p < 0.001$)

The poorer health of Antillean migrants relative to the non-migrant populations did not resemble generally worse health behaviors of this group. Overweight/obesity was less (for women) or similarly (for men) common among Antillean migrants than among Antillean non-migrants, but more common than among Dutch non-migrants (figure 1). Antillean migrants' rates for tobacco and alcohol use were in-between the lower rates of Antillean non-migrants and the higher rates of Dutch non-migrants. Physical inactivity was more common among Antillean migrants than among Dutch non-migrants.

Figure 2 shows the results of intergenerational differences among Antillean migrants (see Appendix table A4 for full results). While limitations and hypertension were less prevalent among second than among first-generation Antillean migrants in the adjusted models, other health problems did not differ significantly. Risk factor prevalence among second-generation Antillean migrants converged further to the Dutch population norm.

Discussion

Summary of main findings

Overall, Antillean migrants had poorer physical and mental health status than Antillean and Dutch non-migrants. For overweight/obesity and tobacco and alcohol use Antillean migrants had rates in-between those of Antillean and Dutch non-migrants. The poor health of Antillean migrants persisted in the second-generation who were born in the Netherlands.

Strengths and limitations

Compared with similar studies on migrant health disparities, strengths of our study are that 1. We study Antillean migrants who are Dutch nationals by birth, which allows them to freely settle in the Netherlands and entitles them to the same social and educational benefits non-migrant Dutch receive in the Netherlands, 2. the health of migrants was compared relative to that of non-migrants in both country of origin and destination, and 3. a broad variety of health variables was examined.

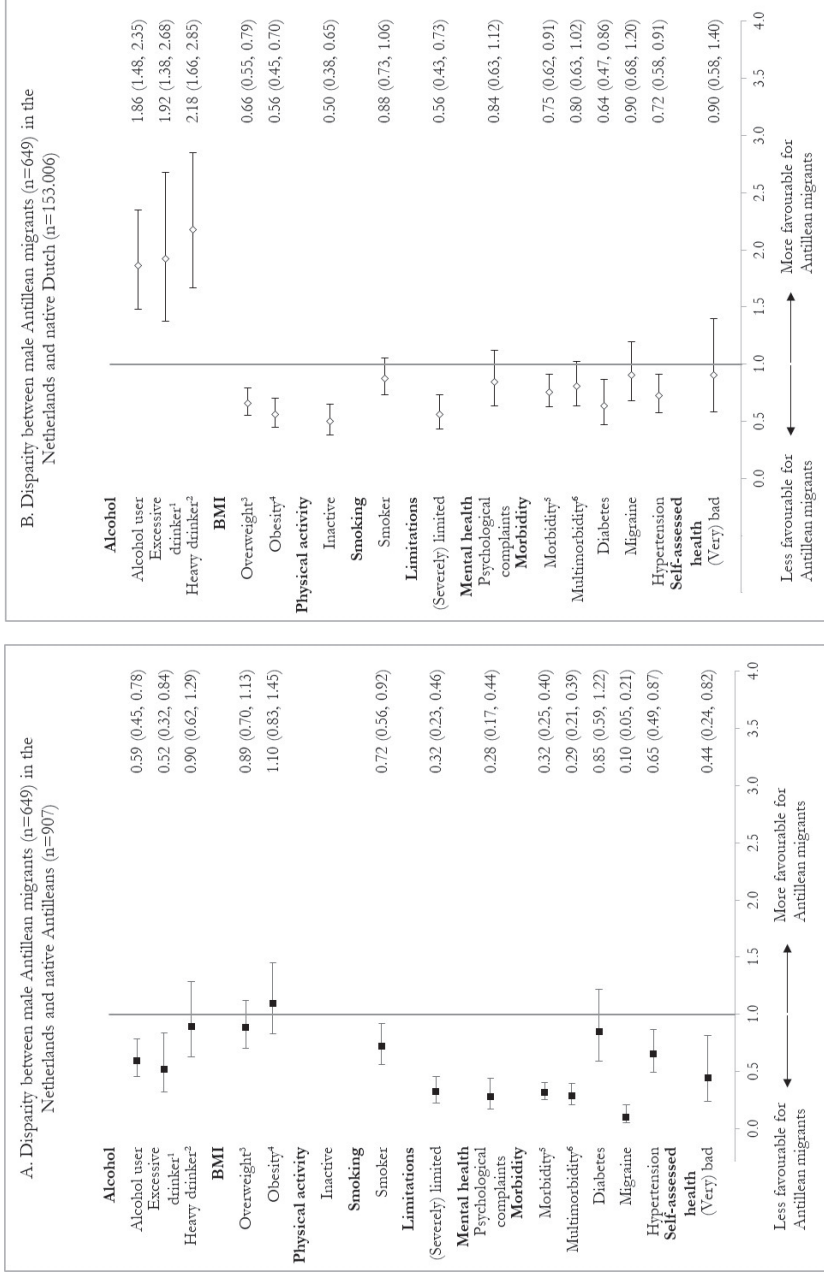


Figure 1 Disparity between Antillean migrants in the Netherlands and the specified study population by gender. Model adjusted for age, marital status, educational level and employment. OR=Odds ratio, BMI=Body Mass Index, ¹>21 (men) or >14 (women) consumptions/week, ²>5 (men) or >3 (women) consumptions on one day/week, ³BMI≥25), ⁴BMI≥30, ⁵Captured by stroke, heart infarction, other severe heart disease, cancer, diabetes, migraine and/or hypertension, one or more, ⁶ Captured by stroke, heart infarction, other severe heart disease, cancer, diabetes, migraine and/or hypertension, two or more.

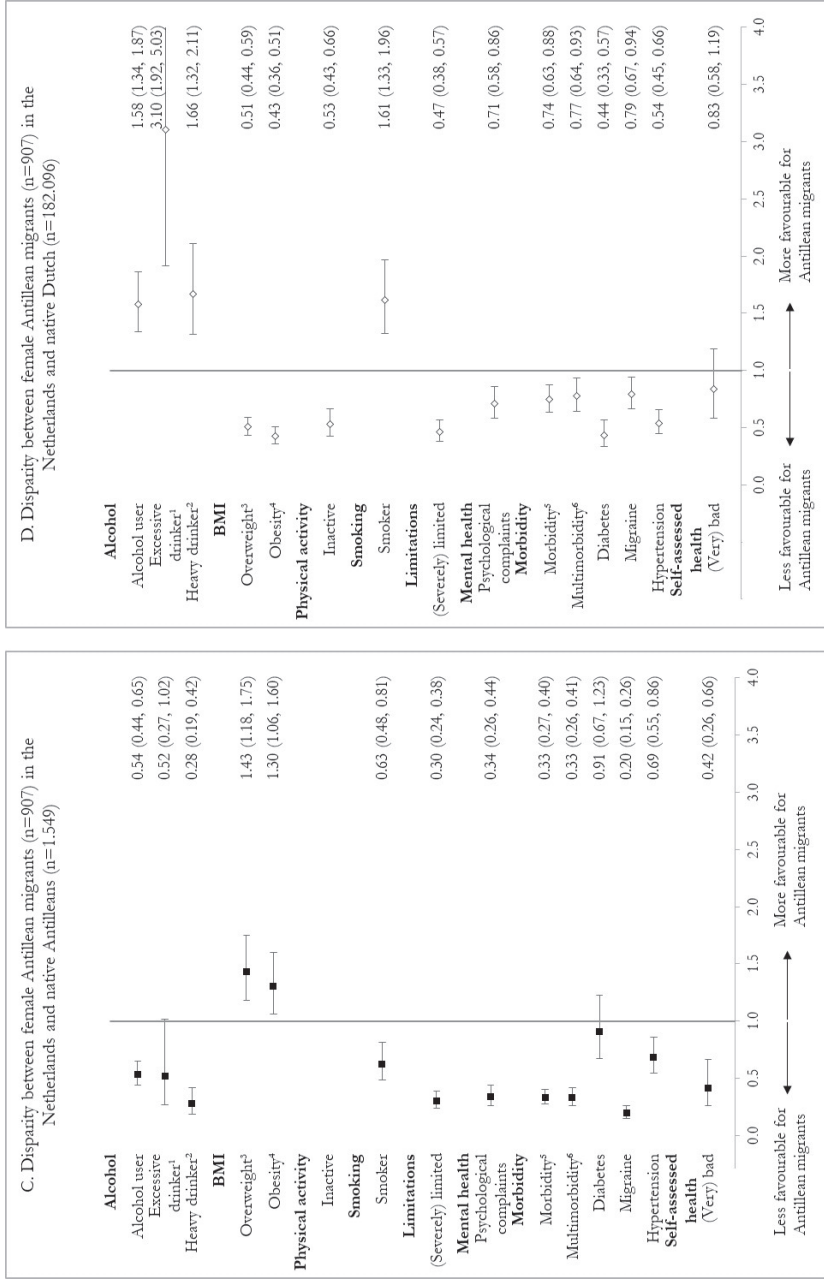


Figure 1 (continued)

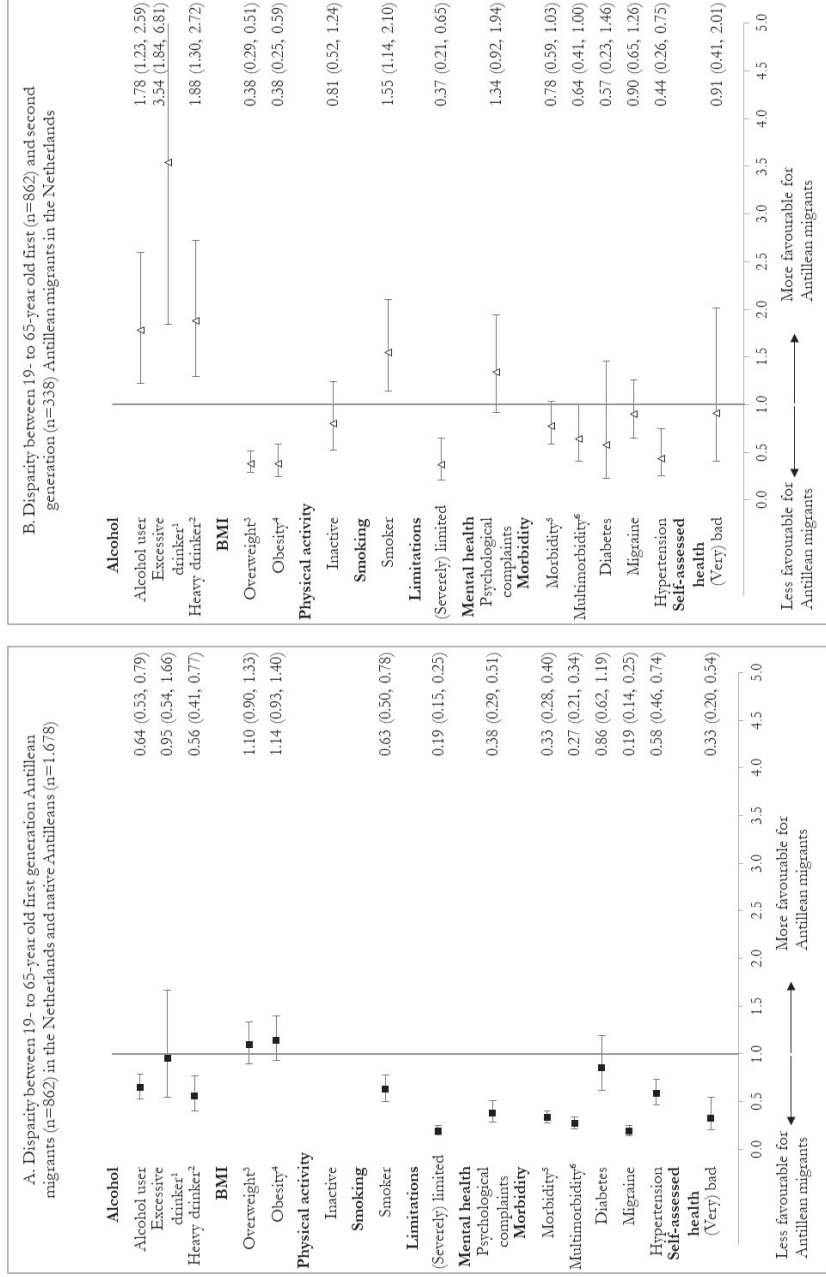


Figure 2 Estimated association between first-generation Antillean migrants in the Netherlands and the specified study population by gender, 19- to 65-year olds. Model adjusted for age, marital status, educational level and employment. OR=Odds ratio, BMI=Body Mass Index, ¹>21 (men) or >14 (women) consumptions/week, ²>5 (men) or >3 (women) consumptions on one day/week, ³BMI≥25), ⁴BMI≥30, ⁵Captured by stroke, heart infarction, other severe heart disease, cancer, diabetes, migraine and/or hypertension, one or more, ⁶Captured by stroke, heart infarction, other severe heart disease, cancer, diabetes, migraine and/or hypertension, two or more.

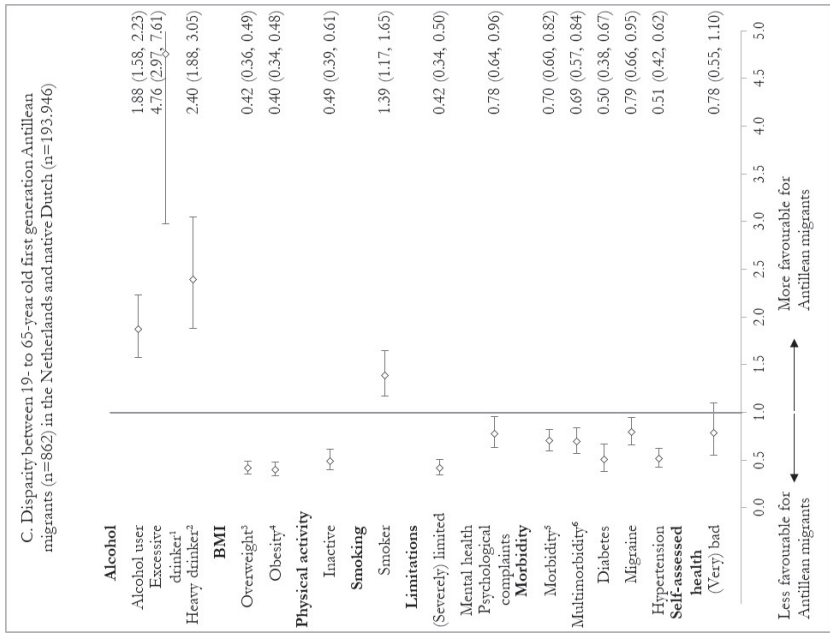


Figure 2 (continued)

Our study's main limitation is that the NHSC2013 (Curaçao) was mainly conducted in Papiamentu using face-to-face interview mode, while the DPHM2012 (the Netherlands) respondents' interviews were mainly in Dutch and self-administered (digital or written). Differences in survey language and administration modes potentially limit comparability between surveys and may have introduced a bias in the prevalence estimates (21,22). The direction and magnitude of the bias may differ per health variable. Since this may sometimes underestimate and other times overestimate the differences we found among the study populations, we find it unlikely that this impacted our overall conclusions.

Another limitation is that lower self-reported morbidity in Antillean non-migrants could reflect underdiagnoses in this population. We, however, consider underdiagnoses unlikely to strongly influence our results because the lower self-reports of disease are consistent with lower self-reports of subjective health problems as limitations, psychological complaints and self-assessed health.

Interpretation

By combining the home and host country perspective on health disparities, our study shows new opportunities for advancing the knowledge on migrant health and to differentiate whether disparities between migrants and non-migrants are the result of biologically or culturally determined differences, or the result of host country specific circumstances. Our study of Antillean migrants in the Netherlands shows that the picture is diverse and depends on the health variable studied.

Our finding that risk factor prevalence among Antillean migrants converge to the Dutch population norm indicates that many Antilleans adopt health behaviors and attitudes of Dutch society. This observation is in line with key-indicators of socio-cultural integration: Antillean migrants frequently spend their free time with Dutch non-migrants and 45% of the marriages among Antillean migrants is with a native Dutch partner (23). While cultural integration into the host culture is generally regarded as the acculturation strategy with the best psychosocial outcomes for migrant populations (24), the integration of a subgroup of Antillean migrants is reminiscent of segmented assimilation. They represent a counterculture that is characterized by gang- and drug-dictated lifestyles (25) that are associated with high drop-out rates (26), imprisonment rates (27), and violent deaths (28).

The patterns of differences between the study populations for health status variables were suggestive of the 'stressful environment' effect, with the exception of diabetes and overweight.

The physical and mental health status was less favorable for Antillean migrant women than for Antillean and Dutch non-migrant women. For Antillean migrant men, this was only observed for limitations, morbidity and hypertension; rates for psychological complaints, migraine and self-assessed health were similar to Dutch non-migrants, yet higher compared with Antillean non-migrants. The results provide evidence against two potential underlying mechanisms of a 'stressful environment' on Antillean migrants' health. First, resettlement in a new country may be a stressful experience that plausibly affects health, but this is unlikely to apply for Antillean migrants: we show that their unfavorable health relative to the Dutch population persists in the second-generation who were born in the Netherlands. Second, increased stress may lead to unhealthy coping behaviors in the form of alcohol and tobacco use, which in turn lead to poorer health outcomes. We tested this assumption by re-running the model for all health variables with the addition of risk factor variables. This additional adjustment of our model did not attenuate the odds ratios of Antillean migrants (Appendix table A5). In other words, our results imply that differences in tobacco and alcohol use, overweight and physical inactivity do not explain differences in health outcomes between the study populations.

Previous literature discusses three host-country specific environmental stressors that disproportionately affect Antillean migrants more than the non-migrant population. First, almost half (43%) of the Antillean migrants in the Netherlands report they have experienced negative or unequal treatment based on their skin-color (29) and Dutch non-migrants and other migrant groups were most negative in their judgement about Antillean migrants compared to other migrant groups (30). Previous studies found that perceived discrimination and internalized racism –the belief that one's ethnic group is inferior caused by ethnic stereotyping- negatively affected physical and mental health outcomes (31). Social stigmatization in Dutch society may therefore explain why Antillean migrants' health outcomes are less favorable compared to both non-migrant populations. In fact, the migrant/ethnic/race variable that is traditionally used to capture cultural and biological variations in health research, in this regard, may be a more accurate in capturing the consequences of social stigmatization

Second, migrants are typically concentrated in urban areas (32). Health problems, such as drug- and alcohol use, violent behavior, nutritional problems and mental health disease, and related social difficulties are more prevalent in urban areas (33). While our results show that Antillean migrants were twice as likely to live in an urban area than Dutch non-migrants (table 2), controlling for the variable urbanization did not affect the overall patterns of significance (Appendix table A2 and A3). This variable does, however, not reflect the spatial concentration of migrants within urban

areas in low socioeconomic, multi-ethnic neighborhoods (34), which creates a disproportionate disadvantage in poor living conditions for migrant populations (35). Inhabitants of multi-ethnic neighborhoods are more likely to report criminal victimization, reduced social cohesion and feelings of unsafety and neighborhood deprivation than inhabitants of predominantly white neighborhoods (30). This independent neighborhood effect may explain why Antillean migrants in our study, as well as other migrants populations in the Netherlands (36), appear more susceptible to hypertension and other stress-related disorders. Additionally, the concentration of migrants in multi-ethnic neighborhoods also reduces interethnic contacts and possibly leads to a more negative mutual perception of migrants and the non-migrant population (34).

Third, migrants in Western countries typically have lower levels of upward social mobility than their non-migrant counterparts (37). This is also noticeable in the Netherlands: educational achievement has been rising in all migrant groups relative to the Dutch non-migrants, but their relative position in terms of unemployment, job insecurity, low income and poor housing has not improved during the 2003-2015 period (23). Thus, at any given level of educational achievement, migrants appear disadvantaged for factors that, directly or indirectly, contribute to good health. This may explain why, despite being relatively better educated than their Dutch non-migrants' counterparts (table 2), Antillean migrant women were more likely to report poor health outcomes. Adjustment for educational status and employment, as we did in our analyses, may not fully control for differences in the socioeconomic circumstances between Antillean migrants and Dutch non-migrants.

The disadvantaged health outcomes of Antillean migrants in the Netherlands are likely the result of complex interactions between their socioeconomic circumstances and their cumulative experiences with environmental stressors during the life course (3). In part, this may also be influenced by biological or cultural risk factors that persist after migration: our results show that rates of diabetes (both genders) and overweight/obesity (men only) were similar in the two Antillean populations. Additionally, vitamin D deficiency is more common among Antillean migrants than among Dutch non-migrants due to an often higher pigmentation of the skin, which may increase their susceptibility for certain physical and mental disorders (38).

Our finding that the poorer physical and mental health status of Antillean migrants is suggestive of the 'stressful environment' effect is in line with previous literature that showed that prevalence rates of schizophrenia in Afro-Caribbean's are much higher in the United Kingdom than in Jamaica, Trinidad and Barbados (39). Considering that the 'host country' perspective results of migrant/ethnic health research are sometimes misinterpreted to validate 'colonial' stereotypes that

potentially expand stigmatization and social differentiation (40), additional studies that take the 'home country' perspective into account may provide a valuable addition to inform policy makers. The paradox may then not be found in the fact that some migrant groups can be considered 'healthy migrants', but that host country stressors still disproportionately affect migrants, and their children, more than the non-migrant populations in some of the most developed countries in the world.

Conclusions

Patterns of differences in physical and mental health among the three study populations were suggestive of a 'stressful environment' effect. The poorer health of Antillean migrants in the Netherlands is unlikely related to poorer health behaviors, but may be partly determined by host-country specific stressors such as perceived discrimination, spatial concentration in multi-ethnic neighborhoods and reduced social mobility. Future studies that take the home country perspective of migrant health into account may provide a valuable addition to inform policy makers.

Acknowledgements

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Appendix

The Appendix for this study is available via this (private) link: www.vic.cw/appendices.

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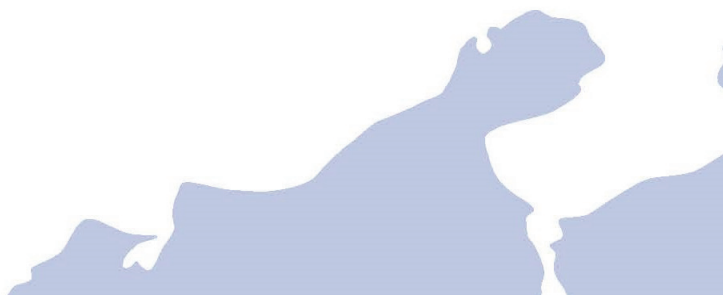
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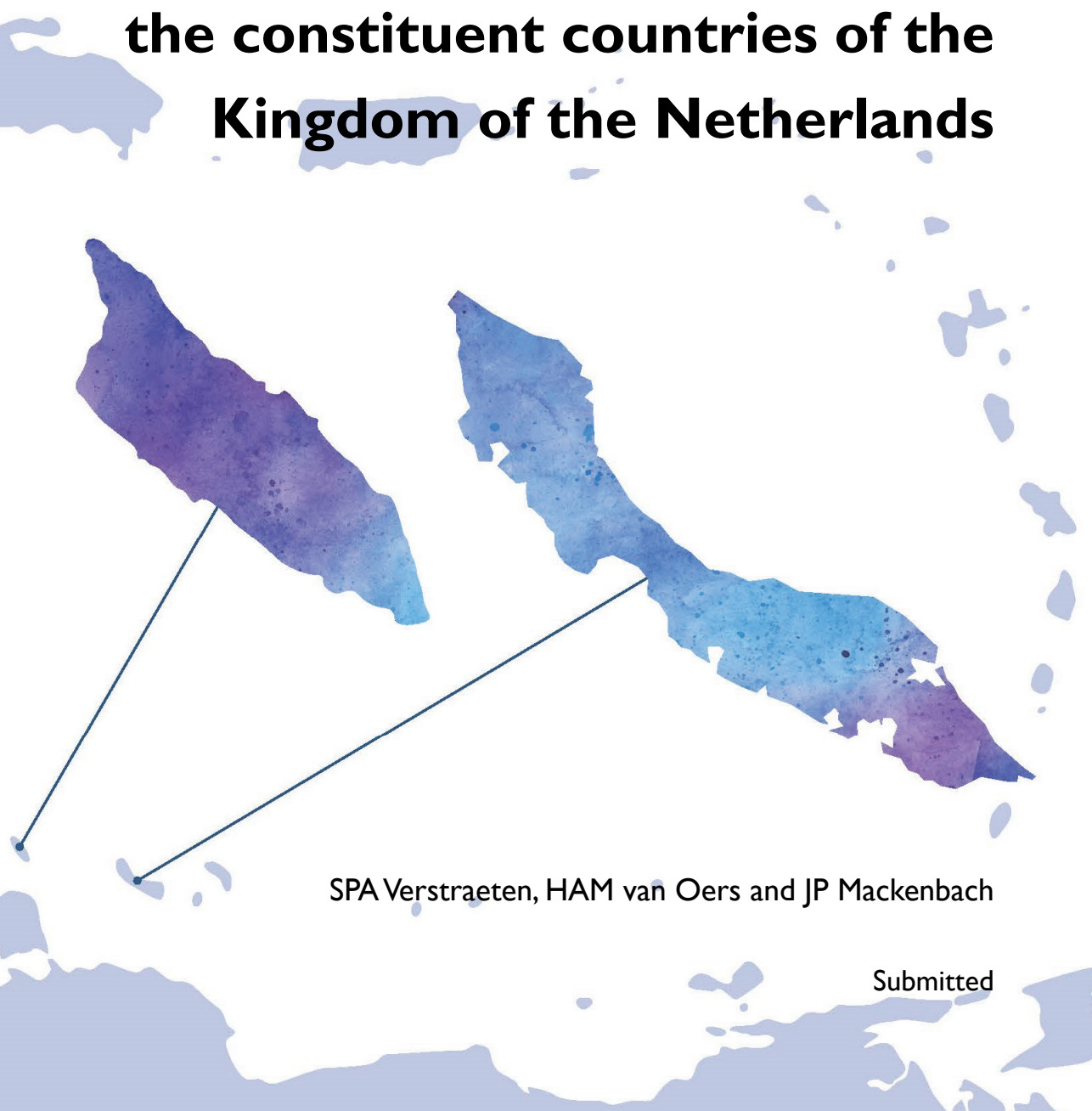
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Chapter 3



Contribution of amenable mortality to life expectancy differences between the constituent countries of the Kingdom of the Netherlands



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Submitted

Abstract

Objectives Despite being part of the same Kingdom, the Dutch Caribbean islands of Aruba and Curaçao have substantially lower life expectancies than the Netherlands. In 2015, life expectancy in Aruba was 6.7 years (men) and 5.4 years (women) shorter than in the Netherlands. In Curaçao, this was 4.8 years and 2.4 years respectively. We examined the contribution of mortality amenable to healthcare to the lower life expectancies in the Dutch Caribbean as compared to the Netherlands.

Methods Analysis of age-standardized death rates and decomposition of life expectancy differences between the Netherlands and the Caribbean islands of Aruba and Curaçao by age and cause of death during the period 1988-2014.

Results We show that amenable mortality makes a substantial contribution to the life expectancy gap with the Netherlands, particularly deaths from ischemic heart disease, cerebrovascular disease, hypertensive disease, breast cancer, perinatal causes and nephritis/nephrosis. If mortality from amenable causes were reduced to similar levels as in the Netherlands, men and women in Aruba would add respectively 1.19 years and 0.72 years to their life expectancies. In Curaçao, this would be 2.06 years and 2.33 years.

Conclusions Our study suggests that improvements in healthcare can help to reduce the gap in life expectancy between the Dutch Caribbean and the Netherlands. In-depth studies investigating care delivery related to these causes-of-death are necessary to identify the specific interventions and resources needed for healthcare strengthening in the Dutch Caribbean.

Introduction

Life expectancies are higher in the Netherlands than in the Dutch Caribbean islands of Aruba and Curaçao (1). In the Netherlands, life expectancy has increased steadily since 1985. Male life expectancy in the Dutch Caribbean was two years lower in 1988, and failed to improve until the late 2000s. This resulted in a substantial gap with the Netherlands of 6.7 years for Aruba and 4.8 years for Curaçao. Trends in female life expectancy, in contrast, moved more or less in parallel to those of the Netherlands. In Aruba, this improvement was slower, thereby deteriorating its relative position from 4.2 years in 1988 to 5.4 years in 2015. The female life expectancy gap somewhat narrowed for Curaçao, from 2.7 years in 1988 to 2.4 years in 2015 (Supplementary Figure A1).

The determinants of these differences in life expectancy development are largely unknown and require more specific explanations to inform policy strategies aimed at improving the health of the Dutch Caribbean populations. Variations in life expectancies between populations are often the result of complex interactions between many factors, e.g. socioeconomic conditions, behavioural and environmental factors, and healthcare. Although the accessibility and quality of healthcare services are not routinely monitored in the Dutch Caribbean, anecdotal evidence suggests that lack of access to good quality healthcare services may play a role. Berend et al. reported on ten dialysis patients in Curaçao who died due to acute aluminium intoxication caused by a defective water distribution pipe (2). Alberts et al. showed that, despite much higher morbidity rates, the low-educated on Curaçao were less likely to have consulted a specialist, and were also less likely to have been hospitalized than the high-educated (3). Besides these studies, several country reports describing aspects of healthcare are available, but their usefulness to inform policy development is limited due to their fragmentary presentation. This lack of information demonstrates that policymakers' needs for relevant and timely information to identify issues, set priorities, support practices and monitor progress in population health are not met in the Dutch Caribbean. Moreover, there has been a lack of transparency in the findings of the islands' healthcare inspectorates, although the recent launch of departmental websites in Aruba (www.iva.aw) and Curaçao (<https://www.inspectiegmn.org/nl/>) have laid a promising foundation for future improvements.

The Dutch Caribbean islands have limited research capacity to routinely monitor aspects of health and healthcare. This study is therefore an initial step to identify healthcare areas whose optimization could contribute to reducing the gap in life expectancy with the Netherlands. The results will enable the local governments to prioritize policy areas for more in-depth investigation, with the ultimate goal of improving health planning. Using the concept of amenable mortality, our

study aims to assess the contribution of healthcare to the lower life expectancies in the Dutch Caribbean. Specifically, we examine trends in mortality amenable to health care during the 1988-2014 period, and estimate the contribution of amenable causes-of-death to the gap in life expectancy between the Dutch Caribbean islands and the Netherlands. Then, we look at national health indicators and country reports to discuss the role of healthcare in our findings on amenable mortality in more detail.

Methods

Data

We obtained mortality data from the World Health Organization (WHO) mortality database or through a request at the Pan American Health Organization (PAHO) for Curaçao (4). Subject to data availability, we included data of the Netherlands for the period 1988-2014, of Aruba for 1999-2014 and of Curaçao for 1988-2007. Data include annual deaths by gender and age in each year, using the tenth revision of the International Classification of Diseases (ICD). ICD-codes are given in Supplementary Table A1 (and followed the classification of amenable deaths used in Nolte & McKee (2004)) (5). Population data by gender and age were extracted from the United Nations (UN) World Population Prospects (WPP) 2017 (1). We depicted data of the Netherlands Antilles (which consisted of five island territories and was dissolved in 2010) and Curaçao (the most populous island territory of the former Netherlands Antilles that accounted for 75% of the population) as a continuous trend, since analyses showed a continuance of mortality trends from the Netherlands Antilles (NA) (1988-2000) to Curaçao (2001-2007). We refer to these territories as NA/Curaçao. Data sources for the comparison of health indicators between the Netherlands, Aruba and NA/Curaçao are listed in the notes of Supplementary Table A4.

Data analyses

We corrected deaths for unclassified age and gender, for deaths attributed to ill-defined causes (R00-R99, non-external deaths only) and for under-registration, as determined by comparing the number of deaths with independent estimates from the WPP 2017 (6). Based on the corrected numbers of deaths, we calculated age-standardized mortality rates per 100,000 population using direct standardization to the World standard population (7). Changes in mortality during the study period were determined with linear regression analysis (using joinpoint software, version 4.2.0., National Cancer Institute Bethesda, MD). We computed life expectancy from abridged life tables

and the age- and cause-specific contributions to life expectancy differences by Arriaga's decomposition method (8).

Results

Figure 1 demonstrates that the differences in amenable and non-amenable mortality between the Netherlands and the Dutch Caribbean islands were substantial. From 1988 through 2014, both amenable and non-amenable mortality has decreased steadily in the Netherlands, more rapidly for men than for women. In Aruba and NA/Curaçao, trends have taken a more fluctuating course due to their small populations, but levels of amenable and non-amenable mortality have been consistently higher than in the Netherlands.

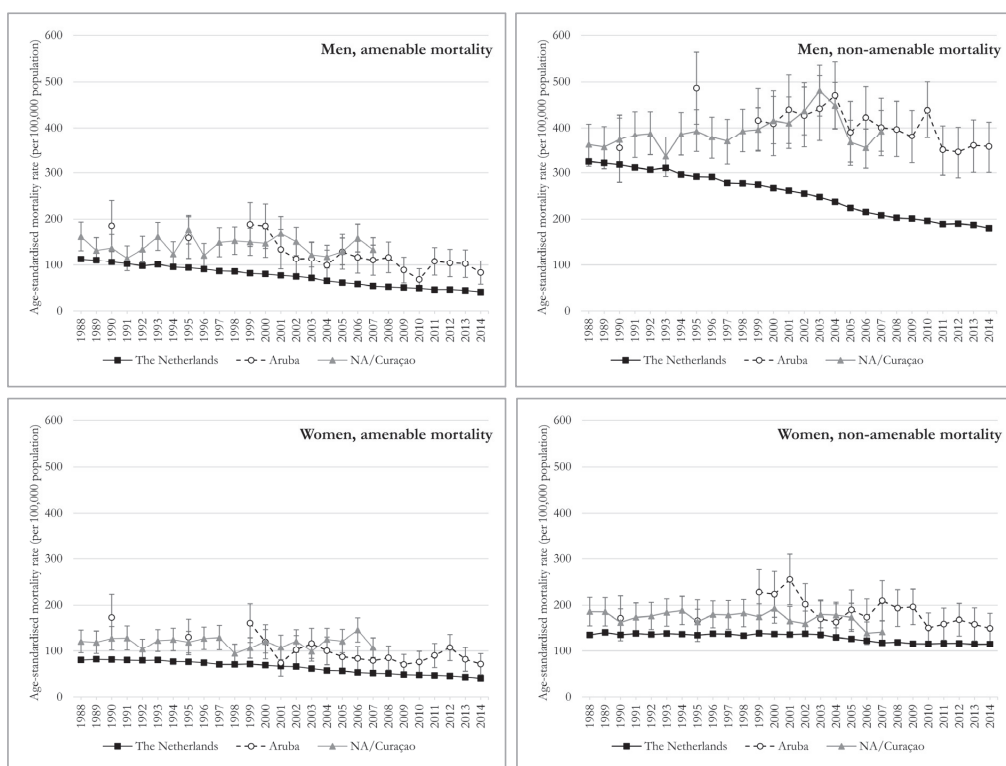


Figure 1 Trends in mortality from amenable and non-amenable causes, men and women, 0-74 year olds, Kingdom of the Netherlands, 1988-2014

According to the results of the regression analysis (Supplementary Table A2), amenable mortality has declined more rapidly than non-amenable mortality in all constituent countries, with the exception of women in NA/Curaçao. Despite the strong fluctuations between 1999 and 2014, the overall trend in amenable mortality in Aruba has been downwards. A comparison of the slopes yielded non-significant results for both genders, i.e. the annual percentage changes were not

statistically significantly different between Aruba and the Netherlands. Consequently, the gap in amenable mortality between Aruba and the Netherlands did not significantly widen or narrow during the study period.

NA/Curaçao experienced a non-significant decline in amenable mortality rates during the 1988-2007 period for both genders. A comparison of the slope with that of the Netherlands yielded significant results for both genders, indicating that the annual percentage changes are different between the Netherlands and NA/Curaçao. In contrast to the Netherlands, the NA/Curaçao population did not experience a decline of amenable mortality during the study period, so that the gap in amenable mortality with the Netherlands widened.

Table 1 shows how much separate amenable causes-of-death contributed to the difference in life expectancy between the Netherlands and the Dutch Caribbean islands during the latest time-period for which data for all three constituent countries are available, i.e. 2005-2007. In Aruba, amenable mortality accounts for 19% (men) and 17% (women) of the total mortality gap with the Netherlands. For NA/Curaçao, this is substantially more with 37% and 75% respectively.

If mortality from amenable circulatory causes (which includes ischemic heart disease, cerebrovascular disease, and hypertensive disease) were reduced to similar levels as in the Netherlands, men and women in Aruba would add respectively 1.02 years and 0.56 years to their life expectancies. In NA/Curaçao, this would be 0.65 years and 0.55 years. Perinatal deaths are an important additional contributing cause-of-death in NA/Curaçao, and are responsible for 0.79 years (men) and 0.90 years (women) of the total mortality gap with the Netherlands. Nephritis/nephrosis is also important, especially for NA/Curaçao. In addition, reduction in breast cancer mortality to the level of the Netherlands would add 0.22 years in Aruba and 0.21 years in NA/Curaçao to female life expectancy.

Table 1 Contribution of causes amenable to healthcare to the differences in life expectancy between the Netherlands and the Dutch Caribbean islands, Kingdom of the Netherlands, 2005-2007

	Men		Women	
	Aruba	NA/Curaçao	Aruba	NA/Curaçao
Difference in life expectancy (years) with the Netherlands due to:				
All causes of death	6.24	5.62	4.12	3.10
Non-amenable causes	5.05	3.57	3.41	0.77
Amenable causes	1.19	2.06	0.72	2.33
% of the difference due to amenable causes	19.1	36.6	17.4	75.1
Amenable causes				
Infectious diseases	0.01	0.01	0.01	0.00
Treatable cancers, among which:	0.05	0.04	0.18	0.35
- Colon and rectum	0.03	0.08	-0.08	0.10
- Breast	--	--	0.22	0.21
- Cervical and uterus	--	--	0.01	0.01
Diabetes	0.00	0.03	0.05	0.08
Ischemic heart disease (50% of deaths)	0.33	0.22	0.12	0.15
Cerebrovascular disease	0.34	0.20	0.32	0.20
Respiratory diseases	0.03	0.07	-0.06	0.06
Digestive diseases	0.00	-0.01	0.01	0.01
Perinatal deaths	0.09	0.79	-0.10	0.90
Other amenable conditions, among which:	0.34	0.40	0.19	0.58
- Hypertensive disease	0.35	0.23	0.12	0.20
- Nephritis and nephrosis	0.03	0.12	0.02	0.21

Discussion

Limitations

Before discussing our results from a substantive perspective we need to take the limitations of our study into account. First, our analyses are constrained by the limited availability of mortality statistics, by the uncertain accuracy and consistency of cause-of-death certification and coding, and by the relatively small populations of the Dutch Caribbean. Preferably, mortality data would have been available for the complete study-period in all constituent countries of the Kingdom of the Netherlands, but this was not the case and is an important fact in itself, illustrating severe shortcomings in health monitoring systems. Data of Aruba and NA/Curaçao also had more inadequacies and were more incomplete than data from the Netherlands (Supplementary Table A3). However, we corrected registered deaths for data inadequacies and incompleteness using PAHO methods, so that the effects of data quality were minimized as much as possible (6). Due to their small populations, the year-to-year fluctuations in mortality rates are relatively large in the

Dutch Caribbean. This made it impossible to run joinpoint analyses for determining trend breaks in the mortality series for the Dutch Caribbean.

Another limitation is that cross-country variation in amenable mortality does not automatically imply that differences in healthcare performance are involved (9). Other factors that are not related to healthcare performance, such as disease incidence, may also play a role in generating higher mortality in the Dutch Caribbean. Disease incidence is also influenced by factors outside of the healthcare system, such as socioeconomic conditions, health behaviours and environmental factors. Many of these factors are less favourable in the Dutch Caribbean islands. For example, income distributions are far more unequal than in the Netherlands and obesity is twice as prevalent in Curaçao than in the Netherlands (Supplementary Table A4). Also, SO₂-emissions recorded in Curaçao are among the highest in the world (10). Observed differences in amenable mortality in cross-country comparisons, however, cannot be solely attributed to differences in disease incidence. In two recent studies, amenable mortality rates were controlled for incidence of underlying conditions, yet substantial cross-country variations remained (11,12). Another argument supporting the view that healthcare performance is involved in the difference in amenable mortality between the Dutch Caribbean islands and the Netherlands is our finding that amenable mortality has decreased faster than non-amenable mortality during the study period, except for females in NA/Curaçao. This suggests that improvements in healthcare were at least partly responsible for the mortality decline in amenable causes (13). This limitation also implies that our results must be interpreted in light of other information on the healthcare system before it is possible to conclude that the variation in amenable mortality rates reflect differences in the effectiveness of healthcare services between Aruba, Curaçao and the Netherlands. Therefore, we will discuss our findings in the light of available information from national health indicators and country reports in the next section.

Interpretation

Deaths from causes that are considered unnecessary in the presence of timely and effective healthcare substantially contribute to the life expectancy variations between the Netherlands and the Caribbean islands of Aruba and NA/Curaçao. In Aruba, amenable deaths comprise 19% (men) and 17% (women) of the total life expectancy difference with the Netherlands. In NA/Curaçao, this is 37% and 75% respectively. The larger relative contribution of amenable deaths in NA/Curaçao is mainly due to its relatively high mortality from perinatal causes and nephritis/nephrosis. As the contribution in years is comparable between men and women in NA/Curaçao, the large gender difference is explained by the relatively large contribution of non-

amenable mortality among males. Non-amenable mortality rates were also higher in the Dutch Caribbean islands than in the Netherlands, especially for men, for whom the gap with the Netherlands has strongly diverged during the study period. A previous study showed that the divergence of mortality from non-amenable causes is largely due to mortality from homicide and transport accidents (14).

All in all, amenable mortality plays a larger role in the life expectancy gap with the Netherlands for NA/Curaçao than for Aruba. Ischemic heart disease, cerebrovascular disease, hypertensive disease (hereafter referred to as circulatory diseases) and breast cancer are the underlying causes-of-death with the largest contribution to life expectancy differences with the Netherlands. In NA/Curaçao, perinatal deaths and nephritis/nephrosis also play a role. Medical interventions that help to prevent deaths from these causes have been comprehensively described elsewhere and we briefly summarize these insights here (15). Increased detection efforts for hypertension, improvements in the treatment of hypertension from the 1950s onwards, and the intensive management of stroke in coronary care units, have significantly reduced the mortality from circulatory diseases. Breast cancer mortality declined after the introduction of population screening programs (mammography) and treatment with tamoxifen, even though the effectiveness of the first intervention remains a topic of dispute (16). Declines in deaths from perinatal causes have been the result of advances in the treatment for specific conditions, such as rhesus immunization and surfactant, and the incremental introduction of a wide range of interventions, such as special baby care units, and local intensive and ventilator care. The key interventions in reducing deaths from nephritis/nephrosis were dialysis and renal transplantation, and graft survival for the latter treatment was further improved after the introduction of cyclosporine in the 1980s.

Accessibility

All healthcare systems in the Kingdom of the Netherlands are built on the principle of solidarity and provide universal healthcare for their residents. In many aspects, the three healthcare systems are comparable. For example, General Practitioners (GP) are the gatekeeper to healthcare; many other health providers are only accessible upon referral by a GP. In practice, however, this seems to work better in the Netherlands than in Curaçao (17). All countries' healthcare systems are also based on the value that everyone should receive the same type and quality of treatment, irrespective of social status, gender and income. While equal access to the system generally has by-and-large been achieved in the Netherlands (18), this was less the case in Curaçao, where greater needs for services were not met by greater consumption (3). Part of the explanation was that waiting times for specialist care in Curaçao were longer for low-income patients (whose insurance payment

model was based on a capitation fee) than for private patients (whose insurance payment model was based on fee-for-service) (19). With the introduction of the basic healthcare insurance system in Curaçao in 2013, these differences in payment models and waiting times have largely disappeared (20). Nevertheless, the results of a recent health survey show that the consumption of specialist care was still not associated with self-reported morbidity (21). As access is commonly defined as the use of healthcare by individuals with a need for care (22), this shows that access to healthcare services is currently inadequate in Curaçao. On the one hand, this implies under treatment of those who need medical services the most. On the other hand, this may also suggest that overtreatment is common in Curaçao. Indeed, the consumption of primary health services is much higher than in the Netherlands: more people had visited their general practitioner and had used prescription medication, and twice as many drug prescriptions per inhabitant were recorded (Supplementary Table A4). Unnecessary or inappropriate medical interventions are the largest contributor of excess healthcare costs and an important cause of patient harm (23). We found no comparable information on the accessibility and consumption of healthcare services for Aruba.

Quality of care

Universal healthcare does not automatically translate in lower amenable mortality, because this is also dependent on the quality of the services (11). The legal framework that regulates the quality of healthcare services clearly lags behind in the Dutch Caribbean. Thirteen years after the introduction of the Individual Healthcare Professions Act (the so-called BIG-wet) in the Netherlands, which regulates the qualification of healthcare professionals wanting to practice in the healthcare sector, a similar law was proclaimed by the Curaçao parliament (2010). The provisions that stimulate quality standards of health providers and protects patients against unskilful and careless behaviours have, however, not yet been implemented. Legislation that regulates the quality of healthcare providers is not foreseen in Curaçao in the near future. Aruba proclaimed a similar law as the BIG-wet, the AruBIG, in 2014. In the same year, Aruba also introduced legislation that regulates the quality of healthcare providers. The provisions that these regulations bring in force are currently implemented by Aruba's healthcare inspectorate.

Our results show that circulatory diseases, breast cancer, perinatal deaths and nephritis/nephrosis (the last two causes solely in NA/Curaçao) contribute to the lower life expectancies in the Dutch Caribbean islands as compared to the Netherlands. There are several indications that patients with these disorders and their underlying risk factors do not receive adequate curative and preventive care in the Dutch Caribbean. During a health examination survey in Curaçao, blood pressure control was 32% among respondents that were previously diagnosed with hypertension by a

medical professional (21). While data from the Netherlands were not directly comparable because of different study methods, control of hypertension appears substantially higher among Dutch men (53%) and women (61%) with hypertension in Amsterdam (24). Among diagnosed diabetics in Curaçao, 35% had a normal blood glucose level (21), whereas 67% of diabetic men and 47% of diabetic women in Amsterdam had HbA1c levels on target, which suggests that blood glucose control is also less favourable in Curaçao (25). This demonstrates that the prevalence of uncontrolled hypertension and diabetes, and subsequently the proportion of people that are at risk for related complications such as nephritis/nephrosis, is relatively high in Curaçao. Information on hypertension or blood glucose control in Aruba was not available.

Moreover, in order to prevent complications, it is recommended that patients with diabetes have a regular eye and foot examination (Dutch College of General Practitioners (NHG) guidelines). In 2017, 67% of diabetics in Curaçao had undergone a clinical eye examination in the past 2 years, and 29% had undergone a clinical foot-examination, a drop of 9% and 7% respectively compared to 2013 (21). A severe complication of untreated diabetes is kidney disease. As another indication that the detection and/or treatment of hypertension and diabetes is inadequate in Curaçao, the proportion of dialysis patients was four times higher than in the Netherlands in 2014 (Supplementary Table A4). Concerns about an alarmingly high number of complications related to diabetes were confirmed in Aruba as well (26). Further investigation should ascertain whether the differences in nephritis/nephrosis mortality between the Dutch Caribbean islands is due to an increased effectiveness of chronic disease care in Aruba that prevents the severe complications from hypertension and diabetes, or is for example the result of different practices in the diagnosis and treatment of renal failure.

A national breast screening program was introduced in the Netherlands in 1989. In NA/Curaçao, a similar program was initiated by a private foundation in 2010, and only received financial support from the local government in 2017. A national breast screening program was introduced in Aruba in 2016. In 2017, breast cancer screening rates in Curaçao were lower than in the Netherlands, which may partially explain the higher mortality-to-incidence ratios on the island. Information on breast cancer screening rates were not available for Aruba. No information on the effectiveness of breast cancer treatment in the Dutch Caribbean was available, as cancer survival rates are not published by the local hospitals.

Curaçao also struggles with providing sufficient coverage in other areas of preventive care. For cervix and colorectal cancer, relatively low screening rates and high mortality-to-incidence ratios were recorded (Supplementary Table A4), which suggests room for further improvements in the

diagnosis and/or treatment of these diseases. The association of GP's in Curaçao recommends an annual seasonal flu vaccination for every person at risk, but only 6% of the target population had received one during the 2016 season (21). Moreover, the procedures necessary to quickly detect and respond to infectious disease outbreaks are non-existent in Curaçao (27), and childhood immunization coverage is below 95% (Supplementary Table A4). This is especially concerning in light of the resurgence of vector-borne and vaccine-preventable outbreaks in infectious diseases in the neighbouring country Venezuela (28,29). It is unclear whether the high coverage recorded in Aruba indeed reflects higher population immunization rates, as the reported estimates preceding the introduction of the child monitoring system from Curaçao also consistently depicted an overly optimistic immunization coverage of >95%.

Perinatal deaths stem from healthcare-related causes such as the inappropriate management of complications during pregnancy and delivery, and may be reduced by up to 30% through the implementation of recommendations from quality-of-care audits (30). During the study period, perinatal mortality was consistently higher in NA/Curaçao than in the other constituent countries of the Kingdom of the Netherlands. Curaçao also recorded a maternal mortality rate that was three times higher than in Aruba (Supplementary Table A4). This suggests that the effectiveness of mother-and-child care is unsatisfactory in Curaçao. An important reason for Curaçao's poorer outcomes could be the fragmented organization of perinatal care services, with midwives providing services in the maternity clinic, and gynaecologists in the main hospital located several kilometres away. In Aruba, in contrast, midwives and gynaecologists work closely together in the main hospital. Further investigation should determine whether the low perinatal mortality in Aruba reflects lower incidences of underlying risk factors, better care during the antenatal period and during delivery, and/or a registration artefact, for example from the exclusion of stillbirths.

All in all, the information on healthcare in the Dutch Caribbean suggests that the excess amenable mortality from circulatory diseases, breast cancer, perinatal deaths and nephritis/nephrosis in the Dutch Caribbean, at least partly, reflects differences in the effectiveness of healthcare services between the Dutch Caribbean and the Netherlands. As we mentioned in the introduction, this study is an initial step to identify healthcare areas whose optimization could substantially contribute to reducing the gap in life expectancy with the Netherlands. Although our cross-country comparison identifies areas where improvements are possible and necessary, they do not allow us to specify which improvements are needed. More in-depth studies investigating care delivery related to these amenable causes-of-death are therefore necessary, for example by linking these findings to healthcare processes during consultations with policymakers, physicians and other

relevant health professionals. These efforts are expected to identify the specific interventions and resources needed to reduce the mortality from these amenable causes in the Dutch Caribbean, with the ultimate goal of improving health planning. During further investigations, the small scale of the Dutch Caribbean islands should be taken into account. The volume of certain complex specialist interventions, for example, may be too low to guarantee quality of care, which increases the risks of mortality from the underlying conditions. To illustrate, surgeons in the Netherlands commonly offer services in a specific area of specialization, while most surgeons in Aruba and NA/Curaçao offer general services. Also, medical treatment abroad may be necessary because not all medical specializations are available on the islands, which is likely to increase the waiting time to start treatment for certain procedures. Nevertheless, every healthcare system, big or small, needs to be optimized to provide the best care that the available resources can buy.

Conclusion

Our study suggests that improvements in the healthcare processes related to several amenable causes-of-death can help to reduce the gap in life expectancy between the Dutch Caribbean and the Netherlands. In-depth studies investigating care delivery related to these causes-of-death are necessary to identify the specific interventions and resources needed for healthcare strengthening in the Dutch Caribbean, with the ultimate goal of improving health planning.

Appendix

The Appendix for this study is available via this (private) link: www.vic.cw/appendices.

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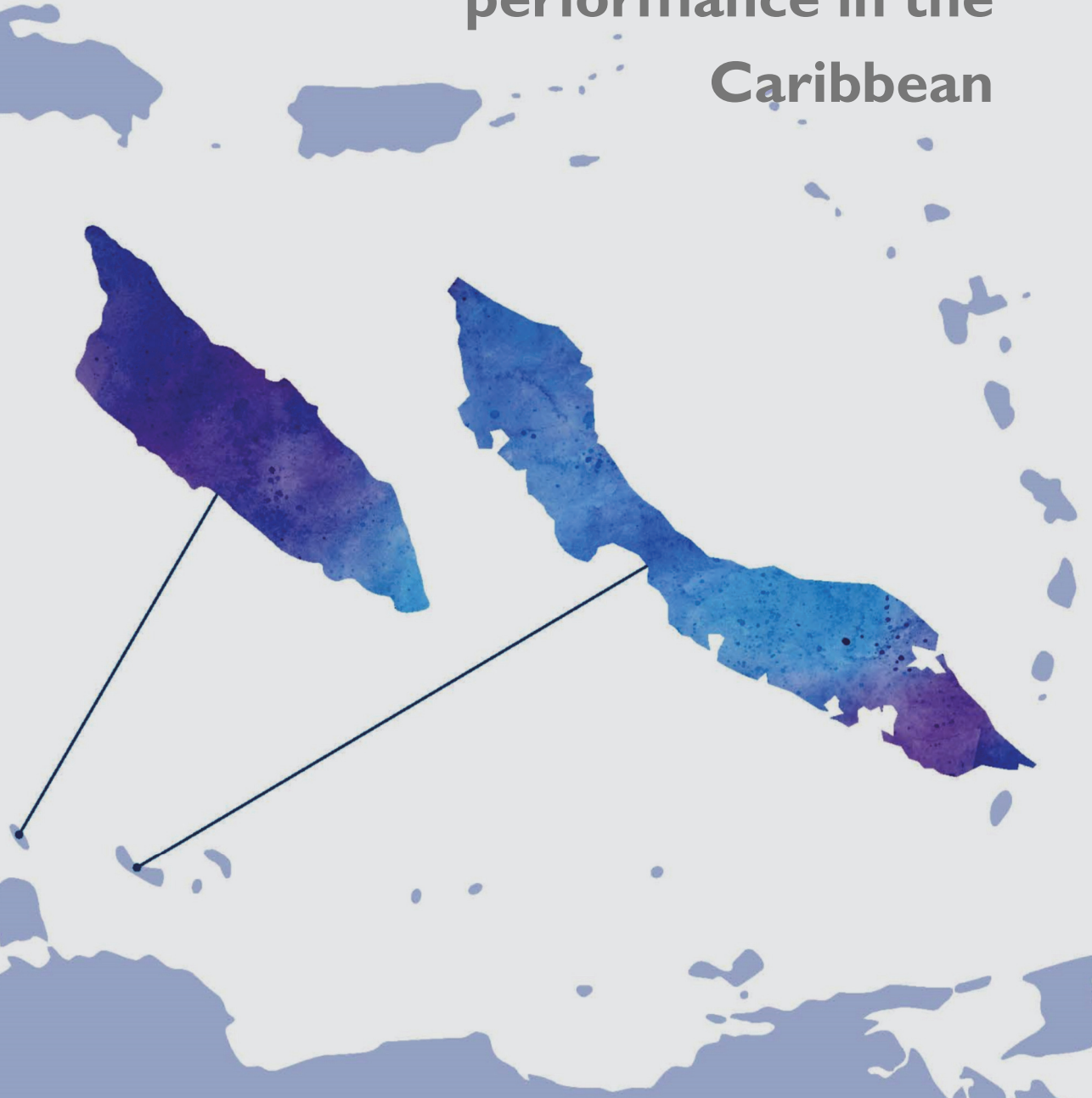
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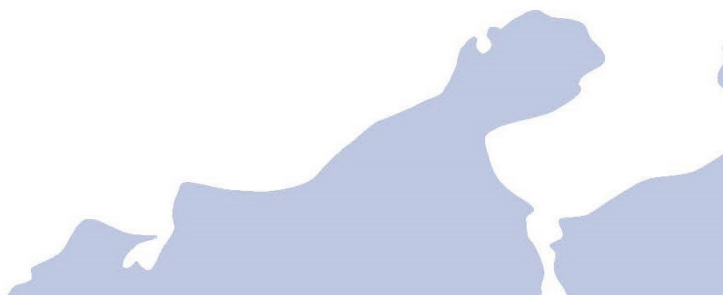
Part II

The political context of health and health policy performance in the Caribbean

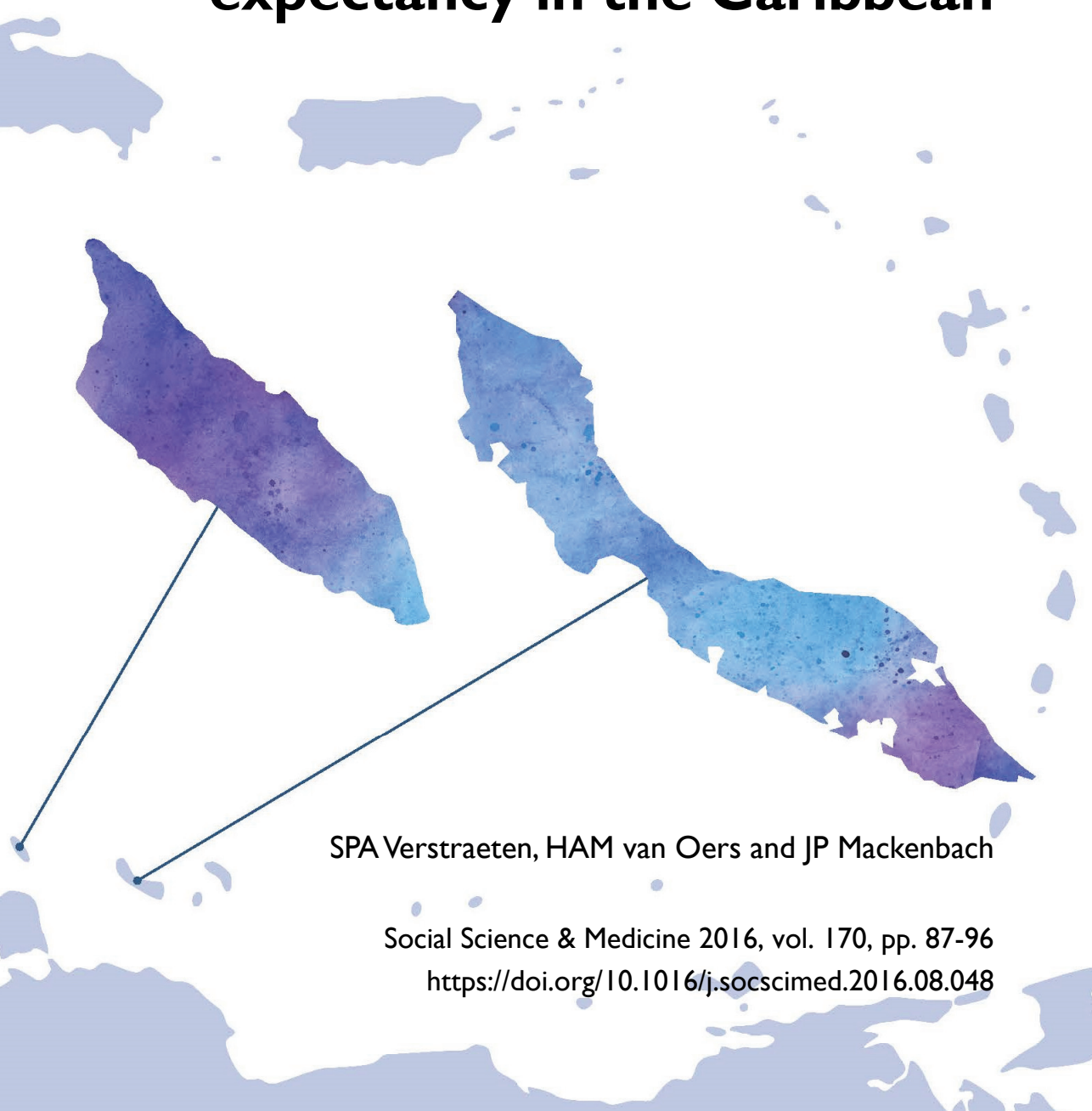




Chapter 4



Decolonization and life expectancy in the Caribbean



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Abstract

Introduction Decolonization has brought political independence to half the Caribbean states in the last half of the 20th century, while the other states remain affiliated. Previous studies suggested a beneficial impact of affiliated status on population health, which may be mediated by more favorable economic development. We assessed how disparities in life expectancy between currently sovereign and affiliated states developed over time, whether decolonization coincided with changes in life expectancy, and whether decolonization coincided with similar changes in GDP per capita.

Methods Time-series data on life expectancy and related variables, GDP per capita and political status were collected from harmonized databases. We quantified variations in life expectancy by current political status during the 1950-2010 period. We assessed whether decolonization coincided with life expectancy trend changes by: 1. calculating the annual changes before and after independence, and 2. evaluating trend breaks in a predefined period during decolonization using joinpoint analyses. Similar analyses were undertaken for GDP per capita.

Results Life expectancy in currently sovereign Caribbean states was already lower than in affiliated states before political independence. Overall, decolonization coincided with reductions in life expectancy growth, but not with reductions in economic growth, and changes in life expectancy growth in the decade after independence did not correspond with changes in economic performance. The widening of the life expectancy gap between currently sovereign and affiliated states accelerated in the 1990's and continues to increase.

Conclusions Despite considerable life expectancy gains in all Caribbean states, life expectancy in currently sovereign states increasingly lags behind that of states which remained affiliated. Our results indicate that changing economic conditions were not the main determinant of the unfavorable trends in life expectancy during and after decolonization. Circumstantial evidence points to the weakening of bureaucracies during decolonization underlying the uneven life expectancy developments of currently affiliated and sovereign states.

Introduction

Decolonization has brought political independence to half the Caribbean states in the last half of the 20th century, while the other states remain affiliated to their former imperial countries. A recent study demonstrated that since 1965, life expectancy growth has been remarkably more uneven among Caribbean states than in the rest of the Americas (1). As a consequence, the Caribbean currently has the lowest life expectancies and highest between-country disparities of the Americas.

Historical evidence reveals that a multitude of factors has contributed to the global rise in life expectancy, including medical and public health interventions, rising levels of education, economic development and income redistribution, and improving social conditions. Many of these factors are influenced by political decision-making, and empirical evidence of the impact of politics (defined as the process of making decisions applying to all members of a population) on population health is growing rapidly (2–4). Politics may directly shape the conditions for life expectancy improvement through policies related to primary and secondary prevention programs, road traffic safety, food, water and air safety, health promotion campaigns, and health care delivery, or indirectly through policies related to education, social and economic development (5,6) and policies that address income inequalities (7).

Decolonization - the process in which a colony becomes politically independent - is one important political event that can plausibly affect population health. Economic analyses that exploit current differences in political status have found that affiliated status is consistently associated with better economic conditions and better health outcomes (8,9). These studies remain inconclusive, however, on the onset of health disparities between currently sovereign and affiliated states, and studies that directly investigate the impact of decolonization on population health remain scarce. While improved health outcomes were reported in several former colonies after political independence (10–12), population health in many former colonies remains relatively poor to the present day.

Decolonization may affect life expectancy development in several ways. First, decolonization can lead to lower economic growth relative to other independent countries (13), for example through discouraging private investments (14). Given the strong dependency of life expectancy growth on economic conditions (15), even in the modern age (16), this may affect life expectancy developments during decolonization. If this were the case, we expect that life expectancy growth during decolonization mirrors a state's economic growth. Second, decolonization can be accompanied by civil unrest and violent eruptions. Short-term effects on life expectancy growth

include an increase in the number of violent deaths, the displacement of civilians, the disruption of health services and economic activities, and the reallocation of government resources from public services to military expenditures (17). The effects of civil unrest on population health persist long-term and result in additional health challenges, for example through increases in infectious and other preventable diseases (18) and mental health problems (17). Third, political decisions during decolonization can lead to the weakening of (colonial) bureaucracies and, consequently, a state's administrative capacity (19). In the absence of strong bureaucracies, the government's capacity to solve problems, to provide necessary resources and to implement effective policy initiatives is challenged in areas that contribute to population health, such as health care, education and social welfare. Political decisions during decolonization were also found to influence the termination of beneficial medical reforms (20) and to incite health professional migration to Western countries (21).

The purpose of this paper is to explore the development of population health -indicated by life expectancy at birth- and the potential role of changing economic conditions -indicated by GDP per capita- during decolonization in the Caribbean region in the last half of the 20st century. Specifically, we aim to 1) quantify variations in life expectancy development by political status during the 1950-2010 period, 2) assess whether decolonization coincided with changes in life expectancy growth, and 3) assess whether decolonization coincided with similar changes in GDP per capita.

Methods

Data

We selected datasets that were most comprehensive in terms of study period and number of included Caribbean states based on searches in harmonized databases. The source of life expectancy at birth data is the World Population Prospects 2012 dataset of the United Nations (UN), which included states with 90,000 inhabitants or more. We collected life expectancy data in single calendar years (interpolated from 5-year estimates), by gender, from 1950 to 2009 (22). In order to provide explanatory clues and to confirm our findings, we selected three variables from the same dataset that are related to life expectancy: crude death rate (per 1,000 population, by gender), under-5 mortality and infant mortality (both per 1,000 live births). The source of GDP per capita data is the Bulmer-Thomas dataset (in US\$, 2000 prices), which includes annual time series on 28 Caribbean states, from 1960 to 2008 (23).

Definition and selection of Caribbean states and their political status

The Pan American Health Organization's (PAHO) definition of the Caribbean includes 30 states: 27 island states and 3 continental states in South America: French Guiana, Suriname and Guyana. Continental Belize in Central America was added to this selection because of its strong historical and economic ties to the Caribbean and its membership to the Caribbean Community and Common Market (CARICOM). Life expectancy data of 21 states were available in the UN dataset.

Information on political status, including the year of independence where relevant, was collected from the United Nations (<http://www.un.org/en/decolonization/nonselgov.shtml#s>) and verified with other sources, such as national websites. We included sovereign states -loosely defined as populations in defined territories that are represented by one government and have full control of their (inter)national affairs by international law- that gained political independence during the period for which life expectancy data were available. This excludes Haiti, the Dominican Republic and Cuba. Table 1 presents a factual overview of the political status of the 18 states included in this analysis during the 1950-2010 period.

The number of independent Caribbean states grew from three in 1960 to sixteen in 1983 during three consecutive waves of decolonization. The majority of these states were former British colonies and all are currently member of the Commonwealth of Nations, an a-political intergovernmental organization with the purpose of collaborating on shared objectives. Surinam is the only former Dutch colony that gained political independence. All currently sovereign states are sovereign under international law and UN member states.

Within the same time period other imperial countries with presence in the Caribbean, the Netherlands, France and the United States (U.S.), established new political entities for their colonies. The U.S. Virgin Islands is an unincorporated territory with limited political power and citizenship rights. Aruba, Curaçao and Puerto Rico, have gained more autonomy and are self-governing with respect to internal affairs. The three French colonies, French Guiana, Guadeloupe and Martinique, became French departments in 1947. Its citizens have full citizenship rights and the states are considered an integral part of the French Republic. All currently affiliated states have strong political, legal and (socio)-economic ties to their former imperial power.

Table 1 Change in political status of Caribbean states included in this analysis, 1950–2010

	Ca. 1950	Ca. 1955	Ca. 1960	Ca. 1965	Ca. 1970	Ca. 1975	Ca. 1980	Ca. 1985	Ca. 1990	Ca. 1995	Ca. 2000	Ca. 2005	Ca. 2010
Currently sovereign states													
Antigua and Barbuda ^a	UK	UK	UK	UK	UK	UK	UK	Indep '81	Indep	Indep	Indep	Indep	Indep
Bahamas ^a	UK	UK	UK	UK	UK	Indep '73	Indep	Indep	Indep	Indep	Indep	Indep	Indep
Barbados ^a	UK	UK	UK	UK	Indep '66	Indep	Indep	Indep	Indep	Indep	Indep	Indep	Indep
Belize ^{a,b}	UK	UK	UK	UK	UK	UK '73	UK	Indep '81	Indep	Indep	Indep	Indep	Indep
Grenada ^a	UK	UK	UK	UK	UK	Indep '74	Indep	Indep	Indep	Indep	Indep	Indep	Indep
Guyana ^a	UK	UK	UK	UK	Indep '66	Indep	Indep	Indep	Indep	Indep	Indep	Indep	Indep
Jamaica ^a	UK	UK	UK	UK	Indep '62	Indep	Indep	Indep	Indep	Indep	Indep	Indep	Indep
St. Lucia ^a	UK	UK	UK	UK	UK	UK	Indep '79	Indep	Indep	Indep	Indep	Indep	Indep
St. Vincent & the Grenadines ^a	UK	UK	UK	UK	UK	UK	Indep '79	Indep	Indep	Indep	Indep	Indep	Indep
Suriname	Nether-lands	CCKN '54	CCKN	CCKN	CCKN	Indep '75	Indep	Indep	Indep	Indep	Indep	Indep	Indep
Trinidad & Tobago ^a	UK	UK	Indep '62	Indep	Indep	Indep	Indep	Indep	Indep	Indep	Indep	Indep	Indep
Currently affiliated states													
Aruba	Nether-lands	NA '54	NA	NA	NA	NA	NA	NA	CCKN '86	CCKN	CCKN	CCKN	CCKN
Curaçao	Nether-lands	NA '54	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	CCKN' ¹⁰
French Guiana	France	France	France	France	France	France	France	France	France	France	France	France	France
Guadeloupe ^c	France	France	France	France	France	France	France	France	France	France	France	France	France
Martinique	France	France	France	France	France	France	France	France	France	France	France	France	France
Puerto Rico	US	US	US	US	US	US	US	US	US	US	US	US	US
U.S. Virgin Islands	US	US	US	US	US	US	US	US	US	US	US	US	US

Notes: ^a Independent state within the Commonwealth of Nations, ^b Name was changed from British Honduras to Belize in 1973, ^c Life expectancy data includes Saint-Barthélemy and Saint-Martin (French part).

Abbreviations: CCKN: Constituent country within Kingdom of the Netherlands (year), Indep: Independent state (year), NA: Netherlands Antilles, a constituent country within Kingdom of the Netherlands, UK: colony of the British Empire, US: unincorporated territory of the United States.

Quantitative analysis

To conclude whether decolonization coincides with a changes in population health or GDP per capita, two quantitative approaches were applied that together would offer consistent evidence when consensus in outcomes was found. The analyses were applied to all available variables, for each currently sovereign state.

Growth developments before and after independence

Absolute and relative annual growth was calculated in the ten-year period before and after the year of independence. Measured in years or US\$, the absolute growth is the arithmetic difference between life expectancy and GDP per capita respectively at the year of independence and ten years before or after independence. Relative annual growth was calculated as the median annual percentage of growth during the ten years before and after independence. Statistical significance of differences in life expectancy growth before and after independence was assessed with the one-sided Wilcoxon Signed-rank test. Strength of the association in life expectancy growth before and after independence was tested with the Spearman's Rank Correlation Coefficient (ρ).

Joinpoint analysis

Trend changes during the period for which time-series data were available were determined with joinpoint regression software (version 4.2.0., National Cancer Institute Bethesda, MD). For this analysis, a minimum number of 0 and a maximum number of 3 joinpoints were supplied and homoscedasticity was assumed. In order to narrow the time period within which a trend change in mortality and economic conditions could be expected as a result of the transition to independence, we chose a 6-year period; the year of independence, 1-year before and 4-years after.

The results of the joinpoint analysis were analyzed in line of previous research (24):

Count of matches: Measured in total number of matches, it counts the number of joinpoints occurring in the predefined period of 1-year before and 4-years after the year of independence. When more than half of the states show a match during this period, this was considered evidence consistent with a change in mortality and economic conditions coinciding with decolonization.

Likelihood test: Under the assumption that joinpoints occur randomly during the 60-year (for health variables) or 48-year (for GDP per capita) study period, the theoretical probability of a match in a predefined period of 1-year before and 4-years after the year of independence was calculated. From this theoretical probability the expected number of matches was derived. The

expected number of matches was compared with the observed number of matches using Fisher's exact test. When the number of observed matches was significantly higher than expected, this was considered evidence consistent with a change in mortality and economic conditions coinciding with decolonization.

Since the selection of the predefined 6-year time period (year of independence, 1-year before and 4-years after) is somewhat arbitrary, we also calculated the number of matches occurring in 6-year time periods set earlier or later around the year of independence. We found that the overall conclusions of the joinpoint analysis did not change when the 6-year time period was set later (i.e., year of independence and 5 years after). However, when the 6-year time period was set earlier (beginning 2, 3 or 4 years before independence), the results of Fisher's exact test became non-significant, indicating that the number of matches found in the joinpoint analysis was no longer significantly higher than would be the case by pure chance alone (Appendix table A1). This shows that our conclusions are sensitive to the time period chosen for the analysis, but as we consider it unlikely that sudden life expectancy changes occurring before decolonization are causally related to decolonization, we consider our findings sufficiently robust.

Results

Secular trends in life expectancy in Caribbean states, 1950-2010

Table 2 shows that life expectancy has risen steadily in currently sovereign states, but not as fast as in currently affiliated states. In 1950, Caribbean states that would become independent in the decades thereafter already lagged behind by 2.9 years (men) and 1.9 years (women), as compared with the median life expectancy in currently affiliated states. When the eleven former colonies became politically independent between 1962 and 1981, overall life expectancy remained relatively low (more for women than for men), but stable during the entire period. In the 1990's, there was a period of stagnation that affected currently sovereign states more than affiliated states. As a consequence, the gap between currently sovereign and affiliated states increased further from 1990 to 2009 with an additional 1.1 years for men and 2.0 years for women. By 2009, male life expectancy in currently sovereign states lagged behind by four years as compared with currently affiliated states, making it similar to the level of life expectancy in currently affiliated states in 1984. Female life expectancy in currently sovereign states was seven years lower in 2009, making it comparable to the level observed in affiliated states in 1983.

To explore life expectancy developments in individual sovereign states, we compared their life expectancy development with the median of currently affiliated states. Figure 1 illustrates when trend changes in male life expectancy occurred before, during and after independence during the three waves of decolonization. In 1950, male life expectancy was higher in Trinidad & Tobago and the Bahamas compared with the median of currently affiliated states. The onset of divergence from the currently affiliated states showed much variety among states. In Jamaica and Trinidad & Tobago, the first two states that gained independence in 1962, an abrupt negative trend change coincided with the transition to independence. In Guyana, the Bahamas, Grenada and Surinam, the gap with affiliated states was already present before political independence. The decades after independence witnessed an increased widening of the gap caused by a (further) stagnation of life expectancy growth or, in the case of Belize and Jamaica, a decrease in life expectancy. At the end of the study period life expectancy was lower in all currently sovereign states, ranging from -1.38 years in Antigua & Barbuda to -11.21 years in Guyana. Only three states were able to improve their relative position during independence as compared with the currently affiliated states: Barbados, Antigua & Barbuda and St. Lucia.

Female life expectancy developments in currently sovereign states are similar, yet more pronounced (Appendix figure A1). Female life expectancy was higher in Antigua & Barbuda, the Bahamas and Guyana in 1950, compared with the median of the currently affiliated states. In 2009, however, life expectancy was lower in all currently sovereign states, including Antigua & Barbuda, the Bahamas and Guyana. Differences with the affiliated states ranged from -4.38 years in Antigua & Barbuda to -13.68 years in Guyana. None of the currently sovereign states was able to improve their relative position to the currently affiliated states during independence. In other words, despite a small convergence observed in the 1980's, female life expectancy in all currently sovereign states increasingly lagged behind.

Table 2 Life expectancy in the Caribbean states from 1950 to 2010, by gender and current political status

Current political status	# of states	Life expectancy (in years)																			
		1950-1954	1955-1959	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009								
Men																					
Sovereign	11	54.5	57.0	59.5	61.6	63.4	64.3	65.9	67.3	68.0	67.5	68.4	69.6								
<i>Q1-Q3</i>		54.2-56.2	55.8-58.8	58.2-60.8	60.5-62.7	61.9-63.8	63.6-65.2	64.6-66.6	65.3-67.9	65.9-68.7	66.1-68.9	66.5-69.9	67.8-71.2								
Affiliated	7	57.4	60.5	62.2	63.9	65.6	67.4	69.3	70.4	71.1	71.3	72.3	73.8								
<i>Q1-Q3</i>		52.6-58.7	55.9-62.6	59.0-64.7	61.8-66.2	64.2-67.5	66.3-69.0	68.0-70.4	69.7-70.9	70.4-71.5	71.2-72.9	71.7-74.5	72.5-75.7								
Difference (years)		2.9	3.5	2.7	2.3	2.3	3.1	3.4	3.2	3.1	3.8	3.9	4.2								
Women																					
Sovereign	11	58.4	60.8	62.6	65.5	67.8	69.6	71.1	72.5	73.1	73.1	73.8	74.8								
<i>Q1-Q3</i>		57.3-59.8	60.0-62.4	62.4-65.2	64.7-66.9	66.9-68.4	68.3-70.5	69.8-72.2	70.7-73.2	71.2-73.5	72.0-74.1	72.8-75.2	73.4-76.5								
Affiliated	7	60.3	64.2	66.8	69.2	71.7	73.8	75.2	76.2	77.9	79.4	80.7	81.7								
<i>Q1-Q3</i>		56.6-61.6	59.6-65.3	62.9-68.0	66.7-69.9	69.2-72.2	71.5-74.3	73.9-75.9	75.9-77.4	76.8-78.5	77.6-80.0	78.7-81.2	79.6-82.3								
Difference (years)		1.9	3.4	4.2	3.6	3.9	4.2	4.0	3.8	4.9	6.3	6.9	6.9								

Data refer to the same selection of states during the study-period, namely the currently 11 sovereign or 7 affiliated states

Abbreviations: Q1=first quartile, Q3=third quartile

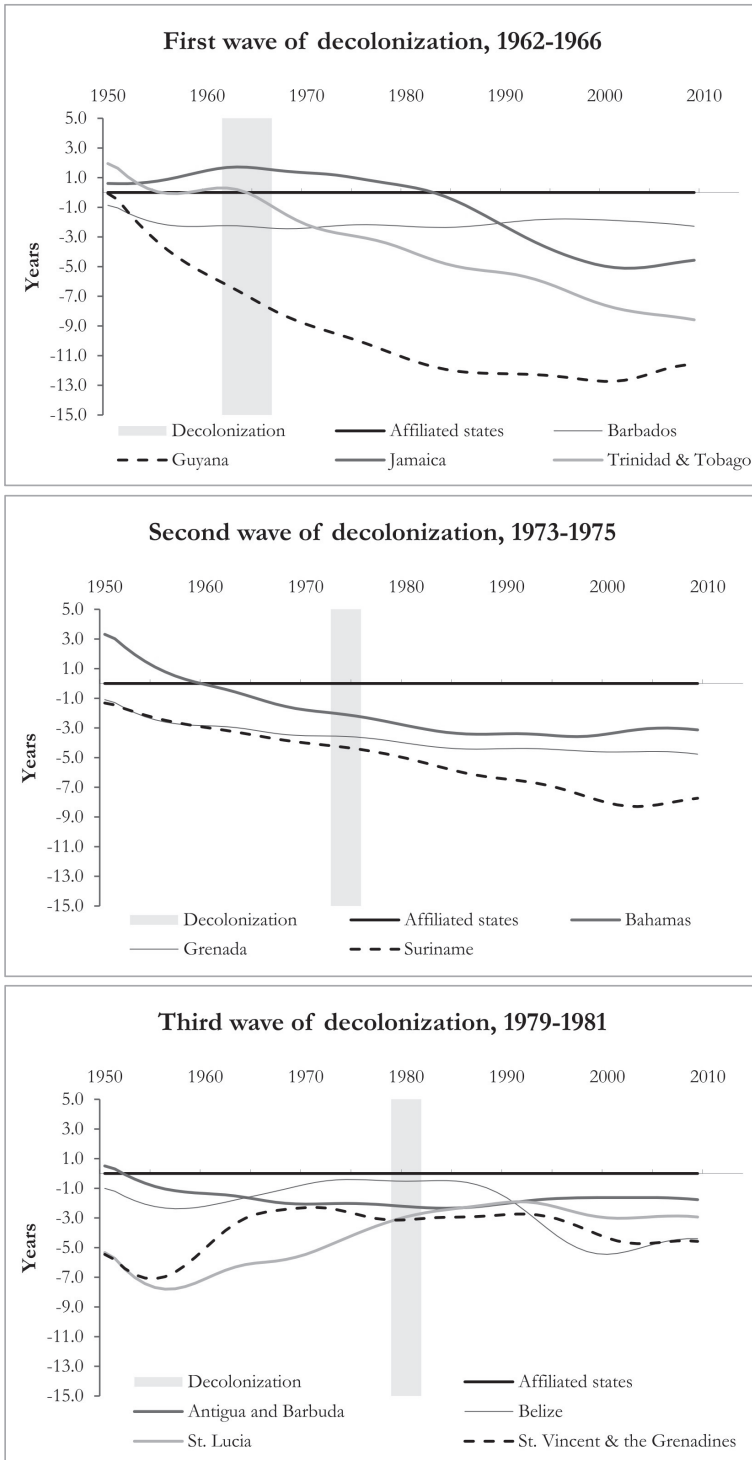


Figure 1 Differences in life expectancy between currently sovereign and affiliated states 1950-2010, men

Quantitative analysis of life expectancy developments during decolonization

The observation that life expectancies between currently sovereign and affiliated states increasingly diverged after independence in sovereign states is confirmed in the quantitative analyses. Appendix table A2 shows the results of the first quantitative approach. Life expectancy growth was smaller in the decade after than in the decade before independence for both genders, except in St. Vincent & the Grenadines and Guyana. This corresponded with a decreased decline in crude death rate, which was -1.5 for men and -1.6 for women before independence, but lowered to -0.5 for men and -0.7 for women after independence and became positive in Antigua & Barbuda (Appendix table A3 and A4). Only in St. Vincent & the Grenadines, the male crude death rate dropped faster after independence, corresponding with an increased growth of male life expectancy. The changes in mortality rates were not the same for all ages across currently sovereign states. The relative annual growth for infant and under-5 mortality remained similar in five states after their independence (Appendix table A5 and A6). The relative annual growth rate for infant mortality was, in contrast to under-5 mortality, not significantly different before and after independence when all states were considered.

Considering the currently sovereign states individually, differences in life expectancy growth were most dramatic in Belize and Trinidad & Tobago, where growth in the decade after independence declined with approximately 80 per cent for men and 70 per cent for women. In Belize, despite its favorable starting position at the time of independence, male and female life expectancy started to decrease in the mid 1980's. In Surinam, a strongly negative development in infant mortality was seen. Relative annual growth was -2.1% before independence, but came to a complete halt in the following decade (Appendix table A6).

Table 3 summarizes the results of the second quantitative approach, showing the estimated calendar years in which a joinpoint (of potentially three) occurred that was closest to the year of independence, and whether or not this can be considered a match. A match was defined as the occurrence of a joinpoint that indicated a negative trend change during the predefined 6-year time period. A match was found in six of eleven states that became sovereign during the study period: for both genders in Guyana, Jamaica and Trinidad & Tobago, for men only in Surinam and for women only in Belize and St. Lucia. A corresponding match indicating a negative development in crude death rate was found for Guyana, Jamaica and Trinidad & Tobago, for infant mortality in Surinam and Trinidad & Tobago and for under-5 mortality in Jamaica, St. Lucia and Trinidad & Tobago (Appendix table A7). Only in Belize the negative trend change in female life expectancy could not be confirmed with corresponding trend changes in the three mortality variables. Table

4 shows the results of the likelihood test, in which we determined whether the number of matches found was significantly higher than would be the case by pure chance. The test indicates that the assumption of random distribution can be rejected.

Table 3 Results joinpoint analysis and count of matches

	Year of Indep	Gender	Year of closest joinpoint (95% CI)	Change in APC ^a	Closest trend change (years)	Match (1 year before, 4 years after indep)
Antigua & Barbuda	1981	M	1988 (1984-1993)	-0.1	7	No
		F	1975 (1971-1979)	-0.1	-6	No
Bahamas	1973	M	1978 (1974-1982)	-0.1	5	No
		F	1966 (1963-1968)	-0.3	-7	No
Barbados	1966	M	1962 (1959-1964)	-0.3	-4	No
		F	1962 (1959-1965)	-0.2	-4	No
Belize	1981	M	1987 (1985-1988)	-0.9	6	No
		F	1985 (1984-1987)	-0.6	4	Yes
Grenada	1974	M	1980 (1978-1984)	-0.1	6	No
		F	1969 (1966-1973)	-0.2	-5	No
Guyana	1966	M	1969 (1959-1984)	<-0.1	3	Yes
		F	1968 (1965-1970)	-0.1	2	Yes
Jamaica	1962	M	1962 (1960-1964)	-0.9	0	Yes
		F	1961 (1960-1963)	-0.9	-1	Yes
St. Lucia	1979	M	1984 (1982-1985)	-0.7	5	No
		F	1982 (1981-1984)	-0.8	3	Yes
St. Vincent & the Grenadines	1979	M	1989 (1986-1992)	-0.3	10	No
		F	1987 (1985-1990)	-0.4	8	No
Suriname	1975	M	1979 (1976-1982)	-0.3	4	Yes
		F	1984 (1983-1986)	-0.4	9	No
Trinidad & Tobago	1962	M	1963 (1962-1964)	-0.6	1	Yes
		F	1962 (1961-1982)	-0.9	0	Yes

^aAPC is the Annual Percentage Change in the years before or after a joinpoint occurred. Depicted is the difference in APC before and after the joinpoint closest to year of independence occurred. The negative number therefore indicates decreased life expectancy growth.

Table 4 Results likelihood test

Length of observation period	60 years
Length of period expected effect	6 years
Theoretical probability of a match	0.10
Maximum number of matches (both genders)	22
Expected number of matches	2
Observed number of matches	9
Observed probability of a match	0.41
<i>P</i> -value Fisher's exact test (one-sided)	0.017

Under the assumption that joinpoints occur randomly during the 60-year study-period, the theoretical probability of a joinpoint occurring in the predefined period of 1-year before and 4-years after the year of independence is 0.10. Of 22 possible matches (11 states, 2 genders), the expected number of matches is 2. The observed number of matches was significantly higher than would be the case by chance.

The role of economic development during decolonization

Similar analyses were undertaken for GDP per capita (in US\$, 2000 prices) to explore changing economic conditions during decolonization. In 1960, Caribbean states that would become independent in the decades thereafter already lagged behind by US\$2,735 as compared with the median GDP per capita in currently affiliated states, making the GDP per capita three times higher in affiliated states. After decolonization between 1962 and 1981, GDP per capita continued to diverge due to stagnation of economic growth or, in the case of the Bahamas, a decline in absolute GDP per capita. This totaled a US\$11,750 or 256% difference in GDP per capita in the period 2005-2008 (Appendix table A8).

While the median GDP per capita in currently sovereign states was lower compared with the affiliated states during the whole study period, the relative annual growth was not significantly lower after independence (4.5% vs. 3.5%) (Appendix table A9). In addition, the results of the count of matches and likelihood test were non-significant (Appendix table A10 and A11). Considering the currently sovereign states separately, a decline in economic growth was apparent in seven of eleven Caribbean states in the decade after independence. This decline was especially pronounced in the high-income state of the Bahamas, where growth of GDP per capita and life expectancy both steeply declined during the transition to independence. In contrast to the life expectancy decline, decline in GDP per capita did not coincide with decolonization (Appendix table A10) but started 4 years before the year of independence. In Antigua & Barbuda, Guyana and Jamaica, GDP per capita more than doubled in the decade after independence while these countries experienced a stagnation of life expectancy growth.

Discussion

Summary of main findings

Life expectancy in currently sovereign Caribbean states was already lower than in affiliated states before political independence. Overall, decolonization coincided with reductions in life expectancy growth, but not with reductions in economic growth, and changes in life expectancy growth in the decade after independence did not correspond with changes in economic performance. The widening of the life expectancy gap between currently sovereign and affiliated states accelerated in the 1990's and continues to increase.

Strengths and limitations

The main strength of this study is that the time period for which life expectancy data were available encompasses the complete period of Caribbean decolonization in the last half of the 20th century. This enabled us to evaluate trend changes before, during and after independence.

One limitation of our study is that the World Population Prospects data, which are widely used, are of uncertain validity. The Appendix includes a description of the methodology used by the UN to derive life expectancy data for each Caribbean state. Estimates obtained by the direct method are considered more reliable than those obtained by the indirect method. For the 18 Caribbean states included in our analysis, life expectancy estimates of 11 states were based on the direct method (Appendix table A12). This implies that our conclusions are likely to be robust. Another limitation is that annual life expectancy data were based on interpolation from 5-year estimates. Since interpolation smooths year-to-year fluctuations, we may have missed less pronounced changes in annual life expectancy coinciding with decolonization.

GDP per capita data were subject to data availability; the first available data year was 1960. We therefore calculated economic growth in the pre-independence decade based on three years only for Jamaica and Trinidad & Tobago and seven years for Barbados and Guyana. Our conclusions are, however, likely not sensitive to the exact 10-year period changes in these states; our results show that, relative to the currently affiliated states, their GDP per capita trends were already unfavorable before decolonization (figure A2). Moreover, we accounted for the observation period in the likelihood analysis.

Our results do not necessarily imply a causal effect; states that became independent may be different from states that remained affiliated in other respects than the event of decolonization

alone. A previous study found that identity of (former) colonizer and duration of colonization were important determinants for contemporary outcomes in GDP per capita and infant mortality, possibly through the establishment of more (or less) inclusive institutions (25). Ten of eleven currently sovereign states we assessed are former British colonies, but data of states that remained affiliated to the United Kingdom (UK) were not available for comparative analysis. Given the methods we used, we were also unable to include duration of colonization in our analyses. We consider identity of (former) colonizer and duration of colonization, however, unlikely to be responsible for contemporary life expectancy disparities between currently sovereign and affiliated states. First, more recent life expectancies in UK-affiliated states from the PAHO-database resemble those of affiliated states in our analysis (Pan American Health Organization). Second, decolonization also coincided with reductions in life expectancy growth in the former Dutch colony Surinam. Third, Caribbean states in our analysis were at least 250 years under imperial rule, so any differences in length of colonization are unlikely to affect our results.

It should also be noted that caution of interpretation is needed to generalize our results to other former colonies. Our results may be specific for small island states, since they share characteristics that pose particular development challenges, such as their small size, their remoteness and their narrow resource base (26).

Interpretation

To the best of our knowledge, our study is the first to explore the development of population health and the potential role of changing economic conditions during decolonization in the Caribbean region. To discuss possible explanations of our results in more detail, we will differentiate between a before independence, during decolonization and after independence period.

Surely, decolonization is unlikely to be the cause of the lower life expectancies and GDP per capita in currently sovereign states before independence. On the contrary, this finding suggests that Caribbean states with lower development indicators were more likely to become sovereign, as already noted by Bertram (27). Empirical studies support the idea that economic factors played an important role in the widespread decolonization events in the 20th century. Imperial countries were increasingly willing to give up their colonial 'assets' when it became more lucrative to trade than to occupy (28,29). Other studies emphasize the rise of the international free market economy under United States hegemony (30,31), even as other factors, such as catalytic effects of previous decolonization (32), play significant roles. As life expectancy development is known to strongly

depend on economic conditions (15), this may explain the lower life expectancies in currently sovereign states before independence.

External pressures from imperial countries are, however, unlikely to be the main cause of Caribbean decolonization after WWII. The petition for independence was primarily initiated by local governments, who also largely set the timing and pace to independence (33,34). Perhaps more importantly, as McElroy and Mahoney concluded in their study on the reluctance of currently affiliated populations to petition for independence, affiliated states: “remain unwilling to trade the visible security, affluence and standard of living of affiliation for the less tangible but more costly rewards of autonomy” (35).

So, what caused the reductions in life expectancy growth that coincided with decolonization? Our results suggest that generally worsening economic conditions are unlikely to be the main determinant. In three states, Antigua & Barbuda, Guyana and Jamaica, declines in life expectancy growth occurred while GDP per capita more than doubled in the decade after independence. Caribbean decolonization in the last half of the 20st century was also not accompanied by major social disruptions, with the exception of Belize. Belize’s independence provoked Guatemala’s renewal of its long-standing claim to the entire territory (https://en.wikipedia.org/wiki/History_of_Belize#Decolonization_and_the_border_dispute_with_Guatemala), which has likely contributed to the observed reductions in life expectancy growth in Belize after independence (Appendix table A2), but such disruptions have not occurred anywhere else. Furthermore, we show that life expectancy developments during decolonization did not correspond with similar trend changes in infant mortality. This suggests that quality of mother and child care was relatively stable during decolonization, although experiences of individual states varied greatly (Appendix table A5).

Descriptions on how political decisions affected healthcare and (colonial) bureaucracies during decolonization in the Caribbean states are absent in the scientific literature. Nonetheless, circumstantial evidence points to the weakening of bureaucracies underlying the uneven life expectancy developments of currently affiliated and sovereign states. First, weakened bureaucracies during decolonization gave way to the institutionalization of corruption, defined as the use of state resources for private gain (19). The corruption of governmental officials and the police force is involved in the trafficking of drugs in the Caribbean (36). Drug trafficking and related crimes produced a fast escalation in murder rates in sovereign Caribbean states (37), while the Caribbean was considered relatively safe in the 1960’s and 1970’s (38).

Political corruption has also been linked to reduced economic output, educational output and social equalities in sovereign Caribbean states (36). These factors, in combination with higher rates of crime and gun-related violence, would influence the living conditions after independence and lead to higher stress and uncertainty experienced among the population. This is consistent with the rise of emigration between 1965 and 2000 and resulted in net population losses in several currently sovereign states (39). On average, 70% of the migrants were tertiary educated, as indicated by the popularly used term 'brain drain' (40). This large-scale emigration may have also directly influenced life expectancy growth of the relatively small populations in currently sovereign states, considering that higher educated people have higher life expectancies. Increased stress and uncertainty after decolonization may have also led to higher suicide rates and unhealthy coping behavior, as previously seen during the political transition of post-communist countries (41,42).

Second, weakened bureaucracies challenge the governments' capacity to influence areas that contribute to population health. Contemporary reports indicate that the capacity of sovereign Caribbean governments to generate health information to evaluate population health and the quality of healthcare remains challenged (43,44). Moreover, while sovereign states adopted a resolution to address the non-communicable diseases crisis in 2002 (45), more than a decade later effective responses were not implemented (46). Finally, where bureaucracies are weak, it is the poor population that suffers the most (47). Poverty in the Caribbean disproportionately affects women more than men due to lower earnings, poorer working conditions, increased risks of sexual and physical violence and the burden of caring for a single-parent family (48,49). This may explain why our results show that declines in life expectancy growth in currently sovereign states were more pronounced for females than for males relative to the currently affiliated states (table 2).

Importantly, the explanation of the effect of decolonization on life expectancy in currently sovereign states through weakened bureaucracies does not imply that currently affiliated states do not experience high levels of corruption and challenges in their capacity to improve population health. Rather, continuous political affiliation may create more favourable political conditions for Caribbean states to implement policies that are, directly or indirectly, beneficial for population health, for example through the involvement of metropolitan countries' law enforcement and justice departments to address drug trafficking and gun-related violence in affiliated states (37).

In the decades after decolonization, our results clearly imply that life expectancies followed different trajectories across Caribbean states with differing political status, most notably that the widening of the life expectancy gap between sovereign and affiliated states accelerated in the 1990's and continues to increase. These widening disparities are likely related to the Latin American debt

crisis and related factors which, as our results suggest, impacted sovereign states more than affiliated states (figure A2). Weakened bureaucracies may not only have made currently sovereign states more susceptible to the effects of this crisis on their economies (36), but may also have aggravated its impact on life expectancy development, for example through increased crime rates and the discontinuation of programs beneficial to population health.

To date, the ongoing development problems in many former colonies remain mired in controversy. On the one hand, postcolonial critics debate the Western view of development, and argue that rich countries' commitment to improve living conditions in former colonies too often ignores the dependency of these countries on international markets, and does not fundamentally address the disparities in political and economic power that were present under colonialism (50–53). On the other hand, the neoliberal view adopted by many economists attributes the ongoing problems in the Caribbean to local failures such as inadequate spending on social development (54), persistence of high income inequalities (49), and corruption (36). A detailed discussion of both view-points is beyond the scope of this paper, but it is apparent that these beliefs influence contemporary debates on development in many former colonies.

By no means does our study intend to imply that a return to colonial status is preferred based on the higher development indicators of currently affiliated Caribbean states. The impact of decolonization, however, merits analysis for the sake of explaining the long-term effects of the transition to independence on contemporary health outcomes. Further studies could shed light on the institutions, policies and other events that contributed to the uneven life expectancy developments in the Caribbean. Additional research on the counterfactual experience of Cuba seems particularly interesting, since it is the sole sovereign state that has seen major advances in population health during the decades after the revolution (55,56), despite having comparable economic development to other sovereign Caribbean states (57).

Implications and general conclusion

Despite considerable life expectancy gains in all Caribbean states, life expectancy in currently sovereign states increasingly lags behind that of states which remained affiliated. Our results indicate that changing economic conditions and violent eruptions were not the main determinant of the unfavorable trends in life expectancy during and after decolonization. Circumstantial evidence points to the weakening of bureaucracies during decolonization underlying the uneven life expectancy developments of currently affiliated and sovereign states.

Since the state is the main unit of political decision-making, continuous political affiliation may create more favourable political conditions for Caribbean states to implement policies that are, directly or indirectly, beneficial for population health. Further studies could shed light on the institutions, policies and other events that contributed to the uneven life expectancy developments in the Caribbean.

Appendix

The Appendix for this study is available via this (private) link: www.vic.cw/appendices.

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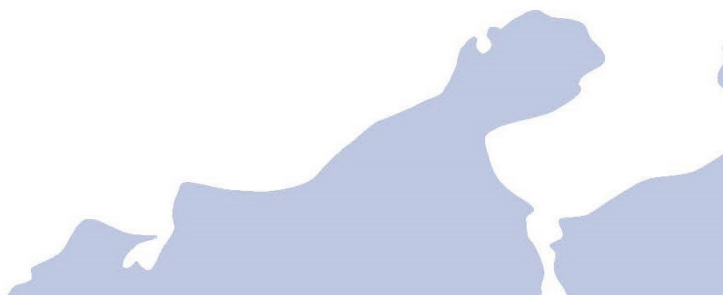
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Chapter 5



Differences in life expectancy between four Western countries and their Caribbean dependencies, 1980-2014



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Abstract

Background In the Caribbean, life expectancy in politically independent territories has increasingly diverged from that of territories that remained affiliated to their former colonizers. Because these affiliated territories differ in degree of political independence, they are not all governed in the same way. We assessed whether differences in life expectancy trends between Caribbean dependencies and their Western administrators were related to their degree of political independence, and which causes of death contributed to divergence or convergence in life expectancy.

Methods Analysis of age-standardized death rates and decomposition of life expectancy differences between France, the Netherlands, the UK, the USA and their Caribbean dependencies by age and cause-of-death during the period 1980-2014.

Results Life expectancy differences between Western countries and their dependencies have generally increased for men and narrowed for women, but trends have been much more favorable in the French- than in the Dutch-administered territories. The strongest contributions to widening gaps in life expectancy between Western countries and their dependencies were from mortality from cardiovascular diseases (ischemic heart disease) and external causes (homicide and traffic accidents).

Conclusion Dependencies with a stronger political affiliation to a Western country experienced more favorable life expectancy developments than dependencies that had more autonomy during the 1980-2014 period. The underlying mortality differences with Western countries are largely comparable among Caribbean territories but differ in magnitude, most notably for cardiovascular disease and external causes. This suggests that increases in a territory's political autonomy impairs the diffusion of new knowledge and techniques, and/or reduces government's effectiveness in implementing policies.

Introduction

Since the 1960s, when many Caribbean island territories gained independence, life expectancy trends in the Caribbean have diverged. As a consequence, the Caribbean region currently has the lowest life expectancies and largest between-country disparities in life expectancy of the Americas (1). Previous studies observed large differences in life expectancy development between dependent and independent Caribbean territories (2–4), which may be the result of two self-reinforcing mechanisms. On the one hand, the weakening of bureaucracies after decolonization challenge a governments' capacity to influence areas that contribute to population health (5). On the other hand, affiliation to some of the most advanced countries in the world (France, the Netherlands, the United Kingdom (UK) and the United States of America (USA)) likely promotes a process of policy diffusion that is, directly or indirectly, beneficial for population health (6). In other words, an absence of the disadvantages of sovereignty, and the presence of the advantages of a strong political, cultural, and (socio)economic relationship with a prosperous country, probably results in the relatively high life expectancies in affiliated territories. We will refer to “affiliated territories” and “dependencies” as neutral terms to describe the political status of Caribbean territories without sovereignty under international law, as indicated by their non-membership of the United Nations (<http://www.un.org/en/member-states/index.html>).

Life expectancies, however, vary greatly between Caribbean dependencies (7). Possibly underlying these differences is a gradient in autonomy caused by the way Western countries govern their dependencies, which varies considerably and also translates into a variety of governance structures on the area of public health. At one end of the autonomy-dependency spectrum, we find Guadeloupe and Martinique. These French departments are considered an integral part of the French Republic. Health system governance on the islands is implemented with oversight from the Ministry of Health in metropolitan France, since 2010 by the ‘Agence Régionale de Santé’ (ARS). Next are the small island territories of the UK: Anguilla, British Virgin Islands, Cayman Islands, Montserrat and Turks & Caicos. All islands have their own constitution, legal system and a democratically elected Government (with the exception of Turks & Caicos during the 2009-2012 period). While the island governments are considered to have primary responsibility for the provision of healthcare and public health interventions to their populations, the UK government leads with overall policy through the Department of Health, the Department for International Development and the Health Protection Agency. They pro-actively support the islands to manage their health sector, to work with regional organizations, to prepare for emergencies and to fulfil international responsibilities such as the International Health Regulations (8). Succeeding these

islands are Puerto Rico and the US Virgin Islands, two unincorporated territories of the USA. Whereas Puerto Rico is a self-governing territory based on its commonwealth status, the US Virgin Islands is considered not. Health governance, however, is similarly organized and provided by the local Departments of Health that lead all efforts related to health on the islands. At the other end of the spectrum, we find the constituent countries of the Kingdom of the Netherlands: Aruba, the Netherlands Antilles (which consisted of five island territories and was dissolved in 2010) and Curaçao (the most populous island territory of the former Netherlands Antilles). Similar to the UK islands, the Dutch territories have their own constitutions, legal systems and a democratically elected Government. In contrast to the UK islands, however, the Dutch islands govern their own health sectors and steer their own health policy initiatives.

In this paper, we will assess whether Caribbean dependencies with a greater degree of political independence have less favourable life expectancy trends, as measured by the development over time of the gap in life expectancy with their Western administrators. In order to obtain insight in the factors underlying convergence or divergence of life expectancy we will also determine the contribution of specific age-groups and causes of death to gaps in life expectancy.

Methods

Data

We selected all Caribbean dependencies for which mortality and population data were available during the 1980-2014 period. This excluded one territory of France and four territories of the Netherlands. We obtained mortality data from the World Health Organization (WHO) mortality database (9) or through a request at the Pan American Health Organization (PAHO) for Curaçao. Data include annual deaths by gender and age in each year, using the ninth or tenth revisions of the International Classification of Diseases (ICD). ICD-codes are given in Appendix Table A1. Demographic data by gender and age were extracted from the United Nations (UN) World Population Prospects (WPP) 2017(10) or, for islands with 2015 populations smaller than 60 000, from the US Census Bureau (11). In preliminary analyses we noticed that records concerning certain causes of death were missing in the datasets for Aruba prior to 1995. This involved the E-codes indicating external causes, for which most sub-causes registered an implausible count of zero. We continued analyses as normal and took these omissions into account during the interpretation of the results.

Data analyses

We totalled mortality and population data over 5-year periods to reduce sensitivity to small number fluctuations. For the same reason, we combined all deaths in the five dependencies of the UK. The actual number of data years included per 5-year period varies due to data availability. We corrected deaths for unclassified age and gender, for deaths attributed to ill-defined causes (R00-R99, non-external deaths only) and for under-registration (as determined by comparing the number of deaths with independent estimates from the WPP 2017 and the US Census Bureau) (12). Based on the corrected numbers of mortality, we calculated age-standardized mortality rates per 100 000 population using direct standardization to the World standard population (13). We computed life expectancy from abridged life tables and the age- and cause-specific contributions to life expectancy differences by Arriaga's decomposition method (14) and calculated 95% confidence limits using Monte Carlo simulations (15).

Results

As figure 1 shows, life expectancy in France, the UK, the USA and the Netherlands has increased steadily since the early 1980s. Life expectancy in their Caribbean dependencies has also increased, but in a less regular pattern. In all Caribbean dependencies, the relative position in male life expectancy with respect to their Western administrators deteriorated. In contrast, the gap in female life expectancy that existed in the early 1980s has improved in all dependencies but Aruba (Appendix table A2). In the Caribbean dependencies of France and the UK, life expectancy has moved more or less in parallel with that in their administering countries, and as a result gaps in life expectancy were relatively small or non-existent in the early 2010s. For the UK islands this meant that they lost their initial advantage in male life expectancy relative to the UK. Trends in life expectancy were less favorable in the Caribbean dependencies of the Netherlands and the USA. In Aruba and the Netherlands Antilles, male life expectancy decreased and female life expectancy stagnated during the 1990s, which resulted in a substantial gap in life expectancy with the Netherlands in the early 2010s. A smaller gap in male life expectancy has opened up between Puerto Rico and the USA. Similar to the trends in the Dutch islands, however, male life expectancy decreased in the US Virgin Islands which resulted in a gap of almost 5 years with the USA in the early 2010s. Remarkably, due to faster increases over the study-period, female life expectancy in Puerto Rico and US Virgin Islands is now higher or comparable, respectively, than that in the USA.

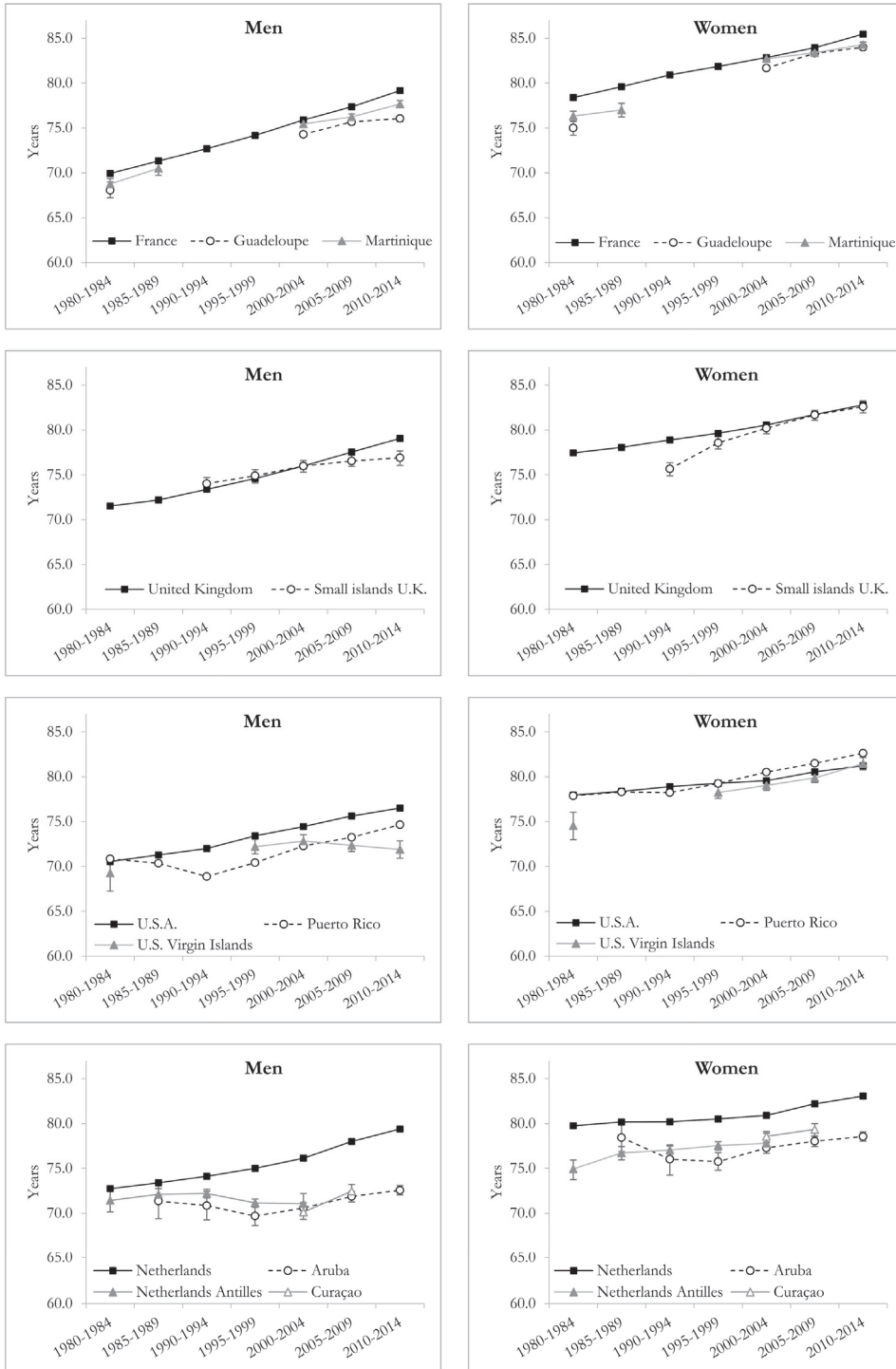


Figure 1 Life expectancy at birth in Western countries and their Caribbean dependencies, 1980-2014

The differences in male life expectancy between Caribbean dependencies and their administrating countries have been decomposed by age and cause-of-death after combining the populations and deaths of the dependencies of each Western country, both for the earliest and the latest available time period. In the top of figure 2, we again see that life expectancy differences have generally increased for men: the difference between the top and bottom column is always negative. The magnitude of this increase differs greatly between Caribbean dependencies (France: 1.0 years, UK: 2.8 years, US: 2.2 years, the Netherlands: 4.4 years). When considering age-specific contributions to life expectancy differences, we observe similarities in the direction of the changes during the study period. In all Caribbean dependencies, infant mortality trends have been more favorable than in their Western administrator. For young and elderly men, the opposite is true and the gap between Western countries and dependencies has become larger. In all dependencies except the French, mortality trends among middle-aged men have been unfavorable compared to their Western administrators.

When considering cause-specific contributions to male life expectancy differences, we see that the strongest contributions are from diverging trends in cardiovascular diseases and external causes (Appendix table A3). The cardiovascular mortality gap has increased in all Caribbean dependencies except the French, with the greatest increases seen in the Dutch territories. Within this category this is mainly caused by ischemic heart diseases, whose initial advantage in the dependencies almost completely disappears during the study period. Next in magnitude are changes in external causes, whose contribution to life expectancy differences with Western countries increased in all dependencies, but again most strongly in the Dutch territories. The leading causes in this category are transport accidents and homicide. Additional causes that had a smaller contribution to the increasing gap in male life expectancy are neoplasms (prostate and lung cancer), diabetes and infections (HIV/AIDS).

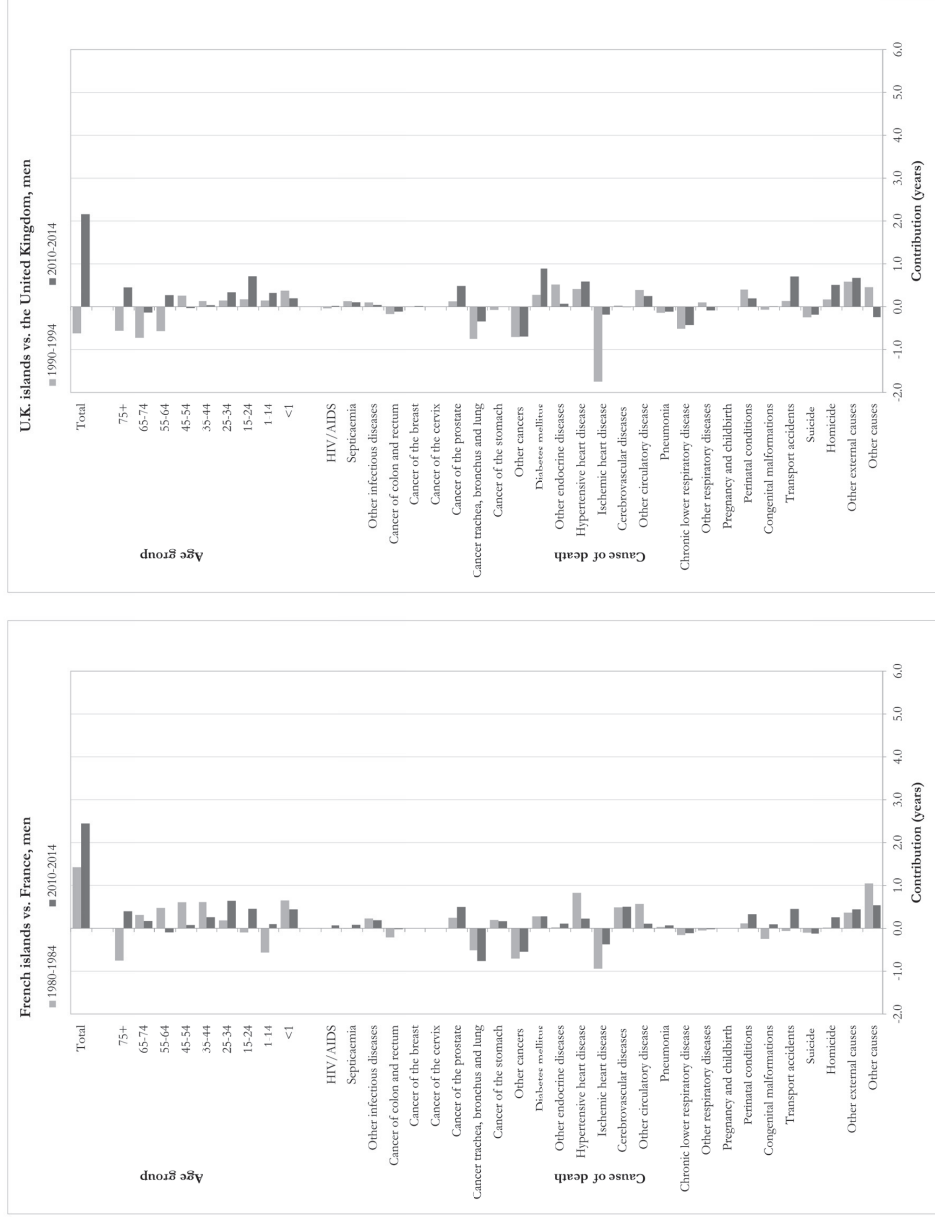


Figure 2 Contribution to life expectancy difference between Western countries and their Caribbean dependencies, earliest vs. latest available time period, men

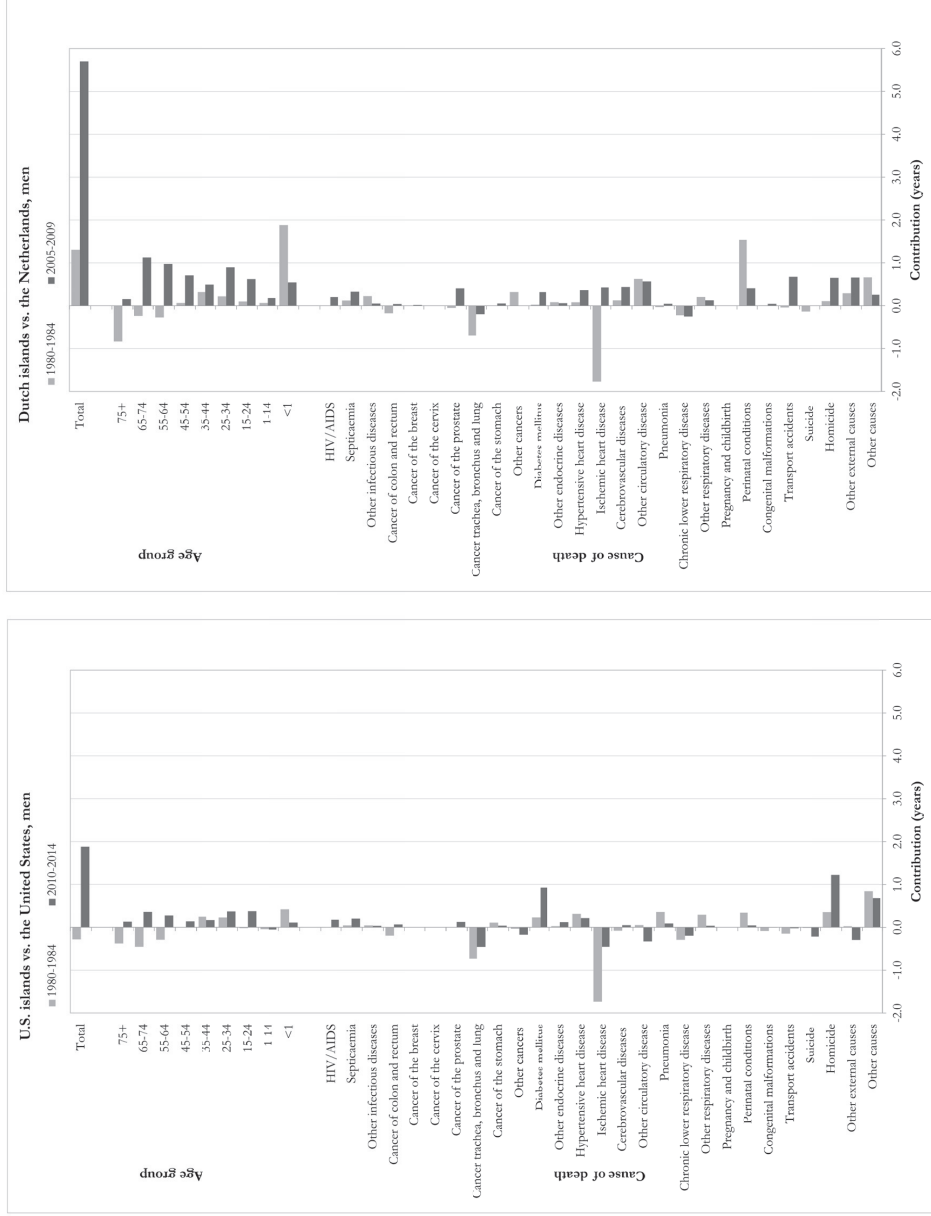


Figure 2 (Continued)

Differences in female life expectancy between Western countries and their dependencies decreased over the study period (Appendix figure A1), but the magnitude of these gains are relatively modest (France: -1.2 years, UK: -3.0 years, US: -1.5 years, the Netherlands: -1.6 years). Relative to developments in Western administrators, trends in cardiovascular mortality have been more favorable in all dependencies except the Dutch. For external mortality, the gap between Western countries and their dependencies remained similar to the beginning of the study period, but increased in the Dutch territories. Additionally, the impact of mortality from diabetes increased in all dependencies except the French islands. These contributions are, however, small relative to those that occurred in favor of female life expectancy convergence between Caribbean dependencies and Western administrators.

Finally, we look at trends in age-standardized mortality from cardiovascular diseases and external causes. As figure 3 shows, male mortality from cardiovascular diseases decreased steadily in Western countries since the early 1980s. In the dependencies of France, the UK and the USA, cardiovascular mortality trends largely followed those of their Western administrator. In stark contrast, cardiovascular mortality has poorly improved in the Dutch dependencies. For women, trends in cardiovascular mortality are similar (Appendix figure A2). Male mortality trends from external causes show large differences between the Western countries and their dependencies (figure 3). In the Netherlands Antilles/Curaçao, Puerto Rico, and the US Virgin Islands, this was due to dramatic increases in homicide mortality during the study period. Transport accidents are the main contributor to external mortality in Guadeloupe, Martinique, Aruba and the UK islands, and an important additional contributor to external mortality in the Netherlands Antilles/Curaçao (Appendix table A4). Differences in female mortality from external causes between Western countries and their dependencies are relatively small (Appendix figure A2).

Discussion

Limitations

This analysis is subject to several limitations. The most obvious relates to the availability and quality of mortality data in Caribbean territories. Ideally, all data years would be available for all dependencies, but this was not the case. To make best use of the available data, we pooled the data in 5-year periods, but may consequently have missed less pronounced trend changes. We corrected registered deaths for data inadequacies and incompleteness using PAHO methods (12). Compared to Western countries, mortality data of Caribbean dependencies had more inadequacies and were

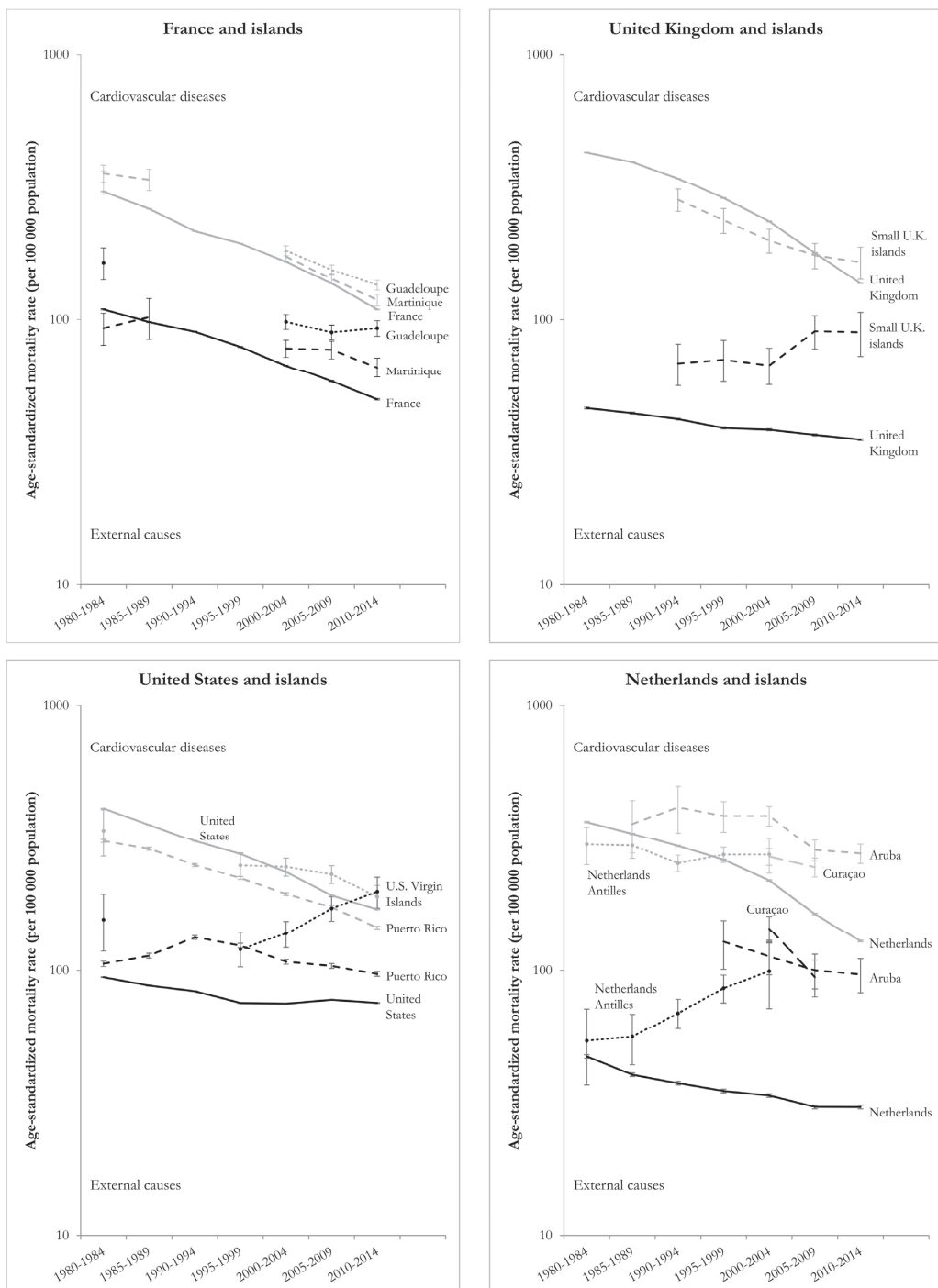


Figure 3 Trends in age-standardized mortality rates from cardiovascular diseases and external causes in Western countries and their Caribbean dependencies, 1980-2014, men

more incomplete, except in Puerto Rico and the US Virgin Islands (Appendix table A5). With the PAHO corrections we have minimized the effects of data quality issues as much as possible.

The corrections, however, assumed that misclassified and missing deaths from the vital statistics followed the same distribution as recorded deaths and did not differ by age, gender and cause-of-death. These assumptions were, however, not met in the mortality registration of Aruba prior to 1995, in which several external causes were omitted. Although this has led to an underestimation of the total mortality and external causes in particular, we judge it unlikely that our conclusions are mainly attributable to this registration bias, as the results during this period are generally consistent with the years after 1995.

Another limitation is that many Caribbean territories have experienced population losses caused by large-scale emigration (16). This may plausibly have effected mortality patterns, because migrants are often well-educated and young (17). The assumption that population declines have influenced life expectancy trends was tested in an additional analysis (Appendix table A6). We found that the largest fluctuations in population size occurred in Aruba, Curaçao and the UK islands. In Curaçao the population mainly declined in the 1980-2014 period, while in Aruba and the UK islands it mainly increased. Since unfavorable life expectancy trends were found in both Aruba and Curaçao, we have no indication that population declines have influenced life expectancy developments in these territories.

Interpretation

Our findings suggest that the way that Western countries govern their dependencies has strongly influenced life expectancy trends during the 1980-2014 period. Life expectancy developments in Caribbean dependencies that had relatively low levels of autonomy, Martinique, Guadeloupe and the UK islands, ran relatively in parallel with that in their administrator countries. In contrast, the US territories with more autonomy, Puerto Rico and the US Virgin Islands, experienced declines in male, and developments more similar to the US in female life expectancy. The constituent countries of the Kingdom of the Netherlands, Aruba and the Netherlands Antilles/Curaçao, experienced declines in male and stagnation in female life expectancy. This shows that territories with a stronger political affiliation experienced more favourable life expectancy developments.

Our conceptual model focuses on two macro-level explanations of health disparities between affiliated and more autonomous Caribbean states: stronger political affiliation increases a government's capacity to influence determinants of population health (i.e., the ability to implement

and enforce policies) and facilitates diffusion of the knowledge and tools necessary to implement effective policies. We see these ‘upstream’ factors as defining the context in which ‘downstream’ determinants of population health develop, such as medical practice, prevention campaigns, and the health behaviours of individuals, which more directly impact risks of mortality.

Decomposition of male life expectancy differences between Western countries and their dependencies point to the important contribution of mortality from cardiovascular diseases and external causes. The underlying patterns of trend changes relative to their Western administrators are similar among Caribbean states and possibly reflect common region-specific drivers, such as a high prevalence of obesity and other non-communicable disease risk factors (18) and a strong presence of the international drug trade and weapon trafficking (19) that involves corrupt governmental officials (20). We also find, however, that Caribbean dependencies differ in the magnitude of trend changes, again with more favourable trends in the French than in the Dutch administered territories.

Unlike other islands, Dutch dependencies did not experience substantial improvements in cardiovascular mortality, which is in line with the high levels of uncontrolled hypertension that were measured during a recent health survey in Curaçao (21). This suggests that the third epidemiological transition, characterized by progressive declines in cardiovascular mortality (22), is delayed in the Dutch dependencies. In the Netherlands, cardiovascular mortality has gradually declined since its peak in the late 1950s for women and early 1970s for men (23). This suggests that the Dutch Caribbean populations have not fully taken advantage of advancements in prevention and treatment of cardiovascular diseases and their underlying causes.

The contribution of external causes to life expectancy differences between Western countries and dependencies has also increased, most strongly in Dutch (both genders) and US (men only) territories. In the Netherlands Antilles/Curaçao, Puerto Rico, and US Virgin Islands, this divergence was due to sharp rises in homicide, which gave these territories the dubious distinction of being among those with the highest homicide rates in the world (24). Transport accidents are the main contributor to external cause mortality in Aruba and an important additional contributor to external cause mortality in the Netherlands Antilles/Curaçao. Just like after decolonization (5,25), increases in a dependency’s autonomy may weaken bureaucracies and subsequently challenge its government’s capacity to address organized crime and to implement and enforce traffic regulations.

The less favourable trends for men than for women suggest that men are more sensitive to the negative effects of political sovereignty. While we have no specific data to shed light on this intriguing finding, we note that the life expectancy declines in former USSR countries after the economic and political shocks caused by the fall of communism were also largely limited to men (26). Somehow, men seem to respond differently to unfavourable social or economic conditions than women, with a greater tendency to engage in potentially lethal behaviour. In the case of the Caribbean, economic shocks are likely to be of less importance for the explanation of our findings. While life expectancy trends have been least favorable in the Dutch and US territories, we did not find an indication of reduced economic growth in these territories relative to those of France and the UK (Appendix table A7).

As far as we are aware, our study is the first attempt to explore the role of political conditions on life expectancy developments in Caribbean dependencies. We recognize that the current political status of these dependencies is in many aspects comparable to the colonial era, and could in fact be seen as a continuance of the asymmetrical power relationship with a former colonizer, as is regularly echoed in political rhetoric (27,28). Contemporary literature points to the benefits of late colonialism largely outweighing its disadvantages (29–32), while also demonstrating that Caribbean people in Western countries experience negative treatment based on their skin color (33,34), and are disproportionately disadvantaged for factors that contribute to their health (35,36). Considering the duality of these cultural dynamics, with sustainable development on one side, and social stigmatization on the other, it may then not be too surprising that the populations of many former colonies are hesitant to allow more “Western” influences in their internal affairs, yet currently struggle to move forward as well.

Appendix

The Appendix for this study is available via this (private) link: www.vic.cw/appendices.

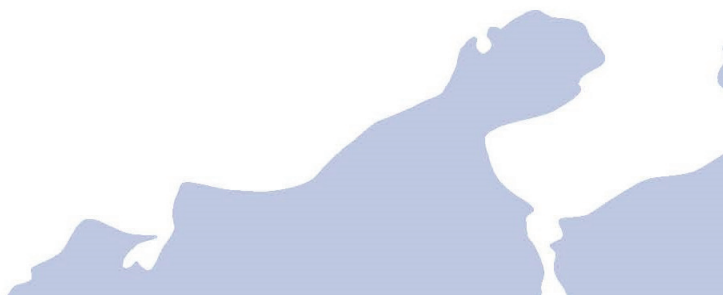
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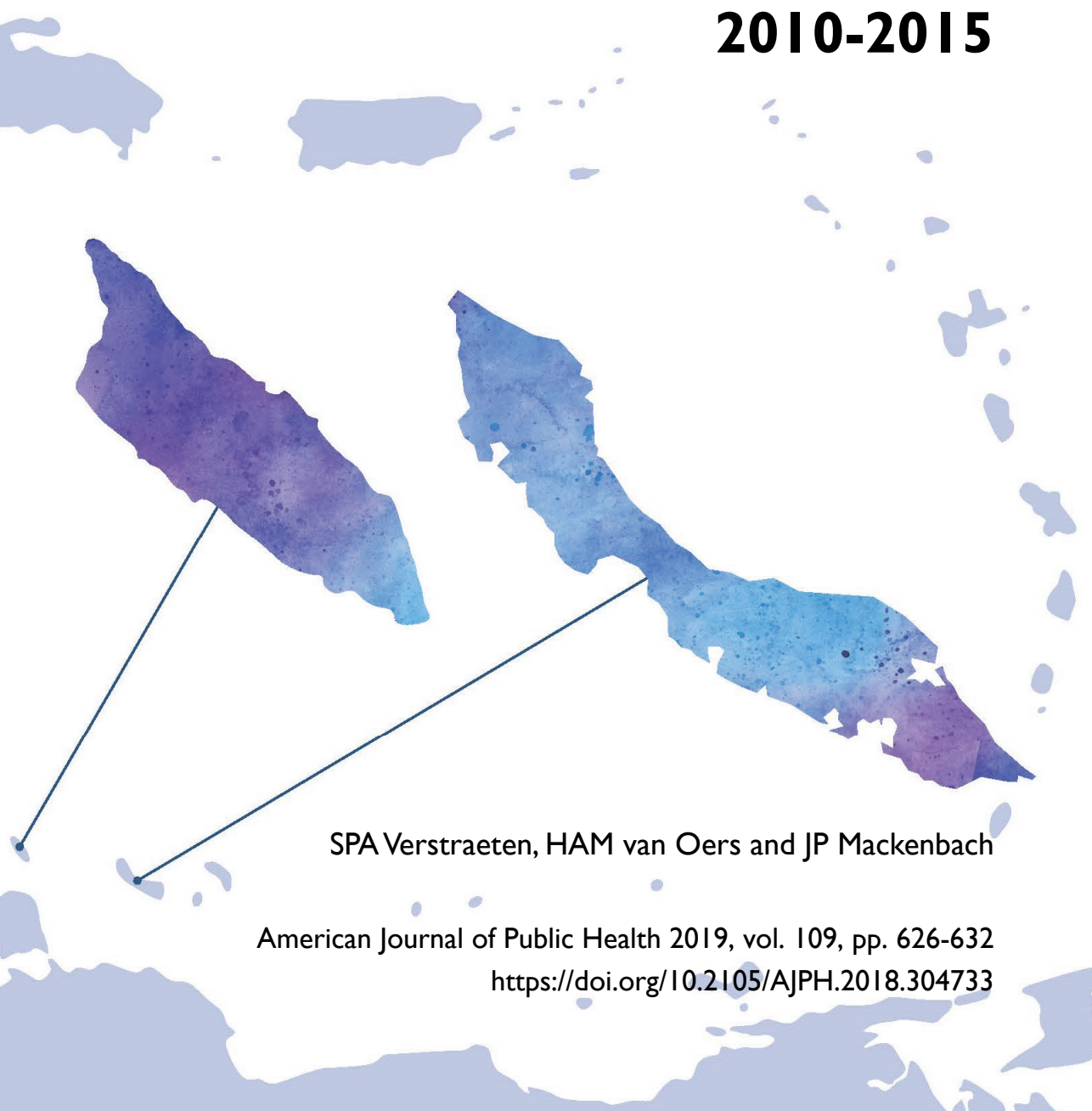
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Chapter 6



Health policy performance in 16 Caribbean states, 2010-2015



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Abstract

Objectives To determine whether Caribbean states vary in health policy performance in 11 different areas; to explore the association with sociodemographic, economical, and governance determinants; and to estimate the potential health gains of “best-practice” health policies.

Methods We selected 50 indicators that included data on mortality (latest available, 2010–2015), intermediate outcomes, and policy implementation to calculate a state’s health policy performance score. We related this score to country characteristics and calculated the potential number of avoidable deaths if the age-specific mortality rates of best-performer Martinique applied in all states.

Results We found large differences in health policy performance among Caribbean states. Martinique, Cuba, and Guadeloupe had the highest performance scores, and Guyana, Belize, and Suriname the lowest. Political affiliation, religious fractionalization, corruption, national income, and population density were associated with health policy performance. If the mortality rates of Martinique applied to all Caribbean states, an overall mortality reduction of 12% would be achieved.

Conclusions Differences in health outcomes between Caribbean states are partly attributable to variations in health policy implementation. Our results suggest that many deaths can be prevented if Caribbean governments adopt best-practice policies.

Introduction

Substantial evidence shows that the implementation of effective health policies leads to declines in mortality from causes that are amenable to policy interventions. For example, implementation of alcohol control policies has effectively reduced alcohol-related mortality in many populations (1). Maternal and neonatal mortality rates have declined through policies aiming at safer pregnancy and childbirth (2). Cervical and breast cancer mortality rates declined after the introduction of cancer screening programs (3,4).

In the Caribbean, however, a decade after local governments acknowledged the severity of the region's health crisis and committed to address their populations' needs, effective health policies were still not implemented (5). Caribbean states also vary greatly in population health outcomes, for example in life expectancy (6), cervical cancer morbidity and mortality (7), adolescent health (8), and homicide rates (9). In this article, we combined data on health policy implementation with data on health outcomes to create a comprehensive picture of health policy performance in all Caribbean states with available data.

Our purpose was to inform policy strategies aimed at improving population health in the Caribbean by carrying out a broad cross-country comparison of health policy performance and by identifying Caribbean states that perform better or worse than others. Our study covers 11 policy areas related to the regional health objectives of the Pan American Health Organization (PAHO): 1. "HIV/AIDS", 2. "Communicable disease", 3. "Cancer screening", 4. "Tobacco", 5. "Fertility, pregnancy and childbirth", 6. "Child health", 7. "Diabetes", 8. "Hypertension", 9. "Alcohol", 10. "Road safety", and 11. "Violence". We also explored the demographic, economical, health system, political, governance and cultural determinants of variations in health policy performance within the Caribbean region. Finally, we calculated the potential health gains if all Caribbean states would implement best-practice health policies.

Materials and methods

Data

We defined the Caribbean by PAHO's definition and included Belize because of its strong historical and economic ties to the Caribbean. The source of mortality data was the World Health Organization's (WHO) mortality database (10). A detailed description of the calculation of the mortality rates is given in the Appendix. In short, considering that many Caribbean states have small populations, we included up to 5 years of the most recent data during the 2010-2015 period

for each Caribbean state. We then systematically assessed whether the mortality data of each state was suitable for inclusion in our analysis, using three criteria: 1. the total number of deaths was 500 or more, 2. causes of death were registered for at least 70% of deaths in the vital registration, and 3. quality assessment of the cause-of-death data according to WHO's ANACoD program was found sufficient (11). We judged mortality data of 16 Caribbean states suitable for inclusion. Data sources for policy implementation and intermediate outcome indicators are listed in the notes of table A3 (Appendix). Data sources for national determinants are listed in the notes of table 1.

Methods

We followed the methods of Mackenbach and McKee, which are briefly described below (12,13). For each of the 16 Caribbean states, we searched data on policy implementation and intermediate outcome indicators. We aimed to include at least one indicator on policy implementation, one indicator on intermediate health outcomes and one indicator on final health outcomes for each policy area. Policy implementation indicators measure the degree to which a policy is successfully implemented, e.g. the “alcohol policy sum score” depicts the extensiveness with which recommendations on effective alcohol policies are implemented. Intermediate outcome indicators measure health risks that are directly influenced by policy implementation, e.g. total alcohol consumption among drinkers. Final outcome indicators measure the deaths that could have been avoided by public health interventions, e.g. mortality from alcohol-related causes. Preferably, measurements of indicator(s) on policy implementation and intermediate outcomes preceded measurement of indicator(s) on final outcomes with at least 5 years. Due to limited data availability, this was not possible for all policy areas (Appendix table A3). We included up to 50 indicators per country, and were able to cover all 11 policy areas for each country.

As a basis for the calculation of our health policy performance score, we first evaluated whether policy implementation had likely impacted the level of related health outcomes using correlation analysis. Next, we calculated a performance summary score per state by assessing whether a state fell in the lower, intermediate or upper tertile of the Caribbean distribution of each indicator, followed by subtracting, for each country, the percentage of scores in the upper tertile from the percentage of scores in the lower tertile. For example, of the 48 indicators that were included for Cuba, 33 indicators (68.8%) fell in the upper tertile and 8 indicators (16.7%) fell in the lower tertile of the Caribbean distribution. Cuba's summary score was therefore $68.8\% - 16.7\% = 52.1\%$ (Appendix table A4). To explore determinants of health policy performance, we related the summary score to country characteristics using correlation analysis. We attempted to only include

data that preceded the policy indicators for at least 5 years, but this was not always possible due to limited data availability (Table 1).

Finally, for each of the selected causes of death, we calculated the annual average number of deaths and the Potential Years of Life Lost (PYLL). The PYLL was calculated by taking the difference between the age of death and age 75. This is a conservative estimate; life expectancy at birth exceeds 75 years in many Caribbean states. We used the age-specific mortality rates of the state with the highest summary score, Martinique, to estimate potential health gains per policy area by calculating the number of deaths that would have occurred if the age-specific mortality rates of Martinique would have applied, and by subtracting that number from the observed number of deaths.

Results

Calculation health policy performance summary score

For all health indicators, considerable differences were found between Caribbean states (Appendix Table A3). Correlations between indicators for policy implementation, intermediate and final health outcomes were largely in accordance with what one would expect if policy implementation induces changes in intermediate outcomes, and if changes in intermediate outcomes induce changes in final outcomes (Appendix Figure A1). For example, HIV/AIDS mortality varied from 1.6 to 45.2 deaths per 100,000 population in a pattern that was consistent with coverage of antiretroviral therapy (figure A1a). A high score for the International Health Regulations' core capacity "Surveillance" was negatively associated with communicable disease mortality in children (figure A1b) and was also weakly but negatively associated with communicable disease mortality in adults). This suggests that higher communicable disease mortality could indeed be a consequence of a state's substandard ability to monitor infectious disease. The two Caribbean countries with a cancer policy sum score of 0 because they did not have national policy and action plan in place and did not provide free cancer-screening programs, Belize and St. Vincent & the Grenadines, also have relatively high cervix cancer mortality (figure A1c). In Cuba and Guadeloupe (nearly) all deliveries are attended by trained personnel, and the perinatal mortality rates (figure A1d) are accordingly low. The indicator "deliveries attended by trained personnel" also weakly correlates with low maternal mortality and, while not directly related, low levels of teenage pregnancies. Alcohol consumption is relatively low in Cuba and the Bahamas, which are both countries with a high number of policy interventions to limit alcohol use (figure A1e). The

more effective a state was in the enforcement of speed laws, the lower the rates of male road traffic deaths (figure A1f), although this association was weak.

For two policy areas, “tobacco” and “violence”, the policy implementation indicators were not related to the intermediate and final outcomes in the expected way, but in these cases, based on previous studies, we nevertheless think that variation in intermediate and final outcomes do reflect differences in policy implementation (12,14). The number of implemented smoking policies was weakly but positively associated with the smoking prevalence rate, and the latter was not associated with lung cancer mortality. This probably indicates that states were more likely to implement tobacco control measures when smoking prevalence was already high, and that current lung cancer mortality rates reflect smoking prevalence several decades ago. More restrictions in laws and other regulations that civilians face to obtain or own a gun are weakly but negatively associated with a lower number of firearms per 100 population in a territory. However, more restrictive gun policy is not associated with lower male or female homicide mortality, possibly because of differences in the enforcement of civilian gun laws and regulations that are not picked up by this policy implementation indicator.

For three policy areas, “diabetes”, “hypertension” and “child health”, policy implementation indicators were not available. We therefore had to assume that the outcome indicators indeed reflect policy implementation, which is not unreasonable in view of the fact that: 1. diabetes and hypertension screening methods and treatments, as well as dietary salt reduction programs to prevent hypertension, are applied on a large but varying scale in the Caribbean, and 2. child health services are typically distributed through governmental programs. A high prevalence of obesity was associated with raised blood glucose in men but not in women. Raised blood glucose, in turn, was associated with male and female diabetes mortality. Female stroke mortality was higher in Caribbean states where the average systolic blood pressure was also high. Measles vaccination coverage was lower than 90% in Guadeloupe, Jamaica, and Suriname, suggesting that herd immunity was compromised.

Supported by the associations found between indicators of policy implementation, intermediate outcomes and final outcomes, we calculated, for each Caribbean state, a health policy performance summary score that indicates the relative performance of a country for all policy areas together (Appendix Table A4). In descending order, Martinique, Cuba and Guadeloupe have the highest summary scores, and Guyana, Belize and Suriname the lowest (Figure 1).

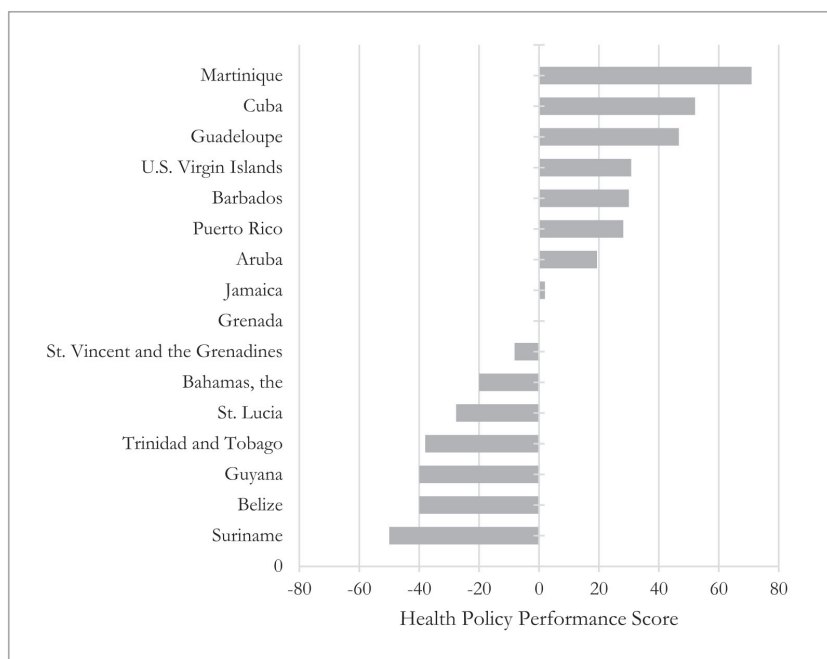


Figure 1 Health Policy Performance Score, by country

Note: For each Caribbean state separately, we calculated the health policy performance summary score by evaluating whether a state fell in the lower, intermediate or upper tertile for a certain indicator, followed by extracting the percentage of scores in the upper tertile from the percentage of scores in the lower tertile. For example, of the 48 indicators that were included for Cuba, 33 indicators (68.8%) fell in the upper tertile and 8 indicators (16.7%) fell in the lower tertile of the Caribbean distribution. Cuba's summary score was therefore $68.8\% - 16.7\% = 52.1\%$.

Associations health policy performance and country characteristics

In univariate regression analyses we then explored which country characteristics are associated with variation in summary scores (table 1). We observed statistically significant associations between higher summary scores and higher population density, higher GDP per capita, a non-sovereign political status, higher control of corruption and lower religious fractionalization. Of the included country characteristics, sovereignty status was most strongly associated to the summary score: it explained 47% of the variation, with higher scores for Caribbean states that have remained politically affiliated to their former colonizer.

The strength of these associations increased when we omitted the best-performing sovereign state Cuba, and we then also found additional significant associations between higher summary scores and a shorter post-independence period, higher government effectiveness, better regulatory quality

Table 1 Association between health policy performance summary score and country characteristics

Indicator	N	r	r ²	P
Demographic characteristics				
Population (in numbers)	16	0.35	0.12	0.18
Population density (in km ²)	16	0.58	0.33	0.02
Economical characteristics				
GDP per capita (current US\$)	15	0.59	0.34	0.02
Health system characteristics				
Total health expenditure as % of the GDP	11	0.21	0.45	0.53
Total expenditure on health per capita at Purchasing Power Parity (NCU per US\$)	11	0.02	<0.01	0.95
General government expenditure on health per capita Purchasing Power Parity (NCU per US\$)	11	0.17	0.03	0.63
General government expenditure on health as % of GDP	11	0.60	0.35	0.05
Governance characteristics				
Current sovereignty status	16	0.66	0.47	<0.01
Years since independence	16	-0.19	0.04	0.48
Government Effectiveness	15	0.44	0.19	0.10
Voice and Accountability	15	-0.25	0.06	0.37
Political Stability and Absence of Violence/Terrorism	15	0.23	0.05	0.42
Regulatory Quality	15	0.28	0.08	0.30
Rule of Law	15	0.30	0.09	0.28
Control of Corruption	15	0.54	0.29	0.04
Cultural characteristics				
Ethnic fractionalization index	11	-0.44	0.20	0.17
Language fractionalization index	16	-0.42	0.17	0.11
Religion fractionalization index	16	-0.64	0.42	<0.01

Data sources:

-Population (in numbers), population density (in km²), GDP per capita (current US\$), 2000, were extracted from the United Nations database (www.data.un.org)

-Total health expenditure as % of the GDP, total expenditure on health per capita at Purchasing Power Parity (NCU per US\$), general government expenditure on health per capita Purchasing Power Parity (NCU per US\$), general government expenditure on health as % of GDP, 2004, were extracted from the WHO Global Health Expenditures database (<http://apps.who.int/nha/database>)

-Current political sovereignty (1=sovereign, 2= affiliated) and years since independence, 2010, were derived from (15).

-Government Effectiveness, Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Regulatory Quality, Rule of Law, Control of Corruption (ranges from -2.5 (weak) to 2.5 (strong) governance performance), 2000, were extracted from the Worldwide Governance Indicators database (<http://info.worldbank.org/governance/wgi/#home>)

-Ethnic fractionalization index, language fractionalization index, religion fractionalization index (ranges from 0 (low) to 1 (high) diversity), 2001, were extracted from (16).

and rule of law and lower ethnic fractionalization (Appendix table A5). We performed a similar analysis on three partial summary scores for policy implementation, intermediate and final outcomes separately, but did not find consistent differences between partial summary scores in their associations with country characteristics, either with (Appendix table A6), or without (results not shown) the inclusion of Cuba.

Calculation potential health gains

Table 2 depicts, per policy area, the number of observed deaths, the PYLL and the number of potentially avoidable deaths if all Caribbean states had the age-standardized mortality rates of the best-performer Martinique. Overall, an annual average of 97,480 men and 82,166 women died in the 16 included Caribbean states. For the selected causes, the largest number of deaths were found for cerebrovascular disease for both genders. The principal cause of lost years of Caribbean men, by far, is homicide/assault. For women, the main cause of lost years is diabetes, closely followed by breast cancer.

If the mortality rates of Martinique applied in the 15 other Caribbean states, 11,492 male and 9,758 female deaths for the included causes of death could have been avoided annually. For men, the largest gains would be attained for lung cancer and cerebrovascular disease. For women, it would be cerebrovascular disease and diabetes. The potential for mortality reduction varies greatly between Caribbean states (figure 2). The largest relative reductions in total mortality are found in Belize, where one-third (32%) of the total number of deaths could potentially be avoided. The largest absolute reduction is observed in the country with the largest population, Cuba. Overall and in the Caribbean as a whole, the total number of deaths could have been reduced by 12% for both men and women.

For alcohol-related diseases among men and accidental injury among women the number of potentially avoidable deaths is negative. This means that for these specific causes the age-specific mortality rates of Martinique are higher than in several other Caribbean states. It shows that while Martinique may have done well in terms of low mortality rates for most causes of death, improvement for these causes is still attainable.

Table 2 Average number of deaths, PYLL and potentially avoidable deaths in Caribbean states (n=16), by gender and policy area, ca. 2013

Health policy area	Related cause(s) of death	Men				Women			
		Deaths	PYLL	Potentially avoidable deaths ¹	% potentially avoidable deaths	Deaths	PYLL	Potentially avoidable deaths ¹	% potentially avoidable deaths
HIV/AIDS	HIV/AIDS	1,392	43,940	1,116	80	758	26,358	593	78
Communicable disease	Communicable disease, excluding HIV/AIDS	1,315	33,407	525	40	796	20,293	143	18
Cancer screening	Malignant neoplasms of the breast	-	-	-	-	2,970	37,374	80	-
	Malignant neoplasm of cervix uteri	-	-	-	-	1,009	17,826	644	64
Tobacco	Malignant neoplasms trachea, bronchus and lung	4,501	35,402	2,582	57	2,440	19,820	1,277	52
Fertility, pregnancy and child birth	Maternal mortality	-	-	-	-	139	6,493	34	24
Child Health	Accidental injury among children aged 0-14	143	9,896	21	14	67	4,723	-52	-
Diabetes	Diabetes mellitus	5,350	41,004	2,374	44	6,571	38,877	2,873	44
Hypertension	Cerebrovascular diseases (stroke)	8,126	47,939	2,548	31	8,481	33,705	3,207	38
Alcohol	Alcohol-related diseases, excluding external causes	2,346	39,003	-97	-	567	7,272	191	34
Road Safety	Road traffic accidents	1,893	62,277	325	17	471	15,972	384	82
Violence	Homicide/assault	2,718	114,243	2,198	81	401	15,693	385	96
	Total	27,783	427,111	11,492	41	24,668	244,406	9,758	40

Abbreviations: AIDS, Acquired Immunodeficiency Syndrome; HIV, Human Immunodeficiency Virus; PYLL, Potential years of life lost

¹ The annual average of potentially avoidable deaths when age-specific mortality rates of best-performer Martinique would have applied.

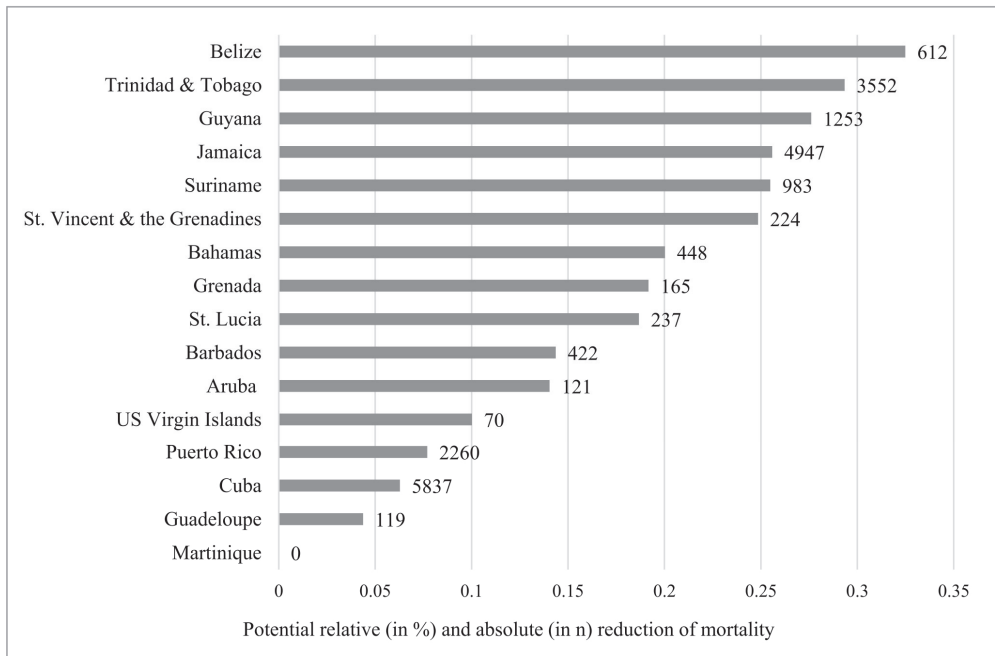


Figure 2 Potential annual reduction in mortality if Martinique's deaths rates applied for the causes of death related to the 11 policy areas.

Discussion

Limitations

The main strength of our study is that it uses the available data from harmonized databases to generate comprehensive evidence on health policy performance in a large number of Caribbean territories. Moreover, we estimate the potential impact of implementation of best-practice policies, which informs national governments about the consequences of continued inaction and should stimulate them to do better. Our study also has several limitations. First, the incompleteness of cause-of-death data in several states, as well as the limited data coverage in terms of number of states and number of health indicators per state may challenge the representativeness and validity of our results. For example, we noticed that fewer data on policy implementation and intermediate outcomes were available for non-sovereign Caribbean states (Appendix table A3). Given these Western countries' long-standing tradition in evidence-based policy making in their continental territories, this is rather surprising. The representativeness of our results for the Caribbean as a whole, and the validity of our health policy performance estimates for the 16 countries included in the analysis, would decidedly be better if data coverage were more complete. Second, our study design does not allow a more rigorous impact evaluation of health policies, for example with

methods proposed by the World Bank (17). The effectiveness of these policies, however, has already been demonstrated (12). Moreover, given the limited research capacity in the Caribbean region thorough impact evaluation studies may not be feasible (18,19), while the current state of population health in many Caribbean states urges immediate action (20). A third limitation is that the small number of states for which data were available needs to be considered in the interpretation of our analyses of significance and other statistical estimates, and challenges unraveling the determinants of variations in health policy performance in the Caribbean. A stepwise multivariate regression analysis with forward selection indicated that population density, ethnic fractionalization, number of years since independence and rule of law explained 99% of the variation in the summary score (Appendix table A7). The small number of states did not allow us to tease out the interrelationships between various country characteristics and a state's summary score.

Interpretation

Mackenbach & McKee's assessment found that variations in population health between European countries are related to differences in health policy implementation (12,13). Our results suggest that this applies to Caribbean states as well. We do recognize, however, that implementation of best-practice health policies only partly explains the variation in population health between states. Better health outcomes can also reflect differences in medical care or more upstream factors, such as income inequalities and levels of education.

So why have some Caribbean states been more successful in their pursuit of effective health policies than others? There were several country characteristics we found to be associated to the health policy performance summary score: sovereignty status, population density, GDP per capita, control of corruption and the religious fractionalization index, with the strongest association for sovereignty status.

The finding that population health is generally poorer in sovereign states than in politically affiliated Caribbean states has been described previously (15,21,22). One of the factors contributing to these differences is that sovereign states underwent decolonization, i.e., the transition from a colony to political independence. Decolonization weakens (colonial) bureaucracies (23), and consequently challenges a state's capacity to obtain the necessary resources to implement policy initiatives (15). In agreement with this, more than a decade after sovereign Caribbean states committed to address their populations' non-communicable disease crisis (24), health policy initiatives were still not implemented (5). Another factor that possibly contributes to

differences in health policy performance between sovereign and affiliated states is that the strong political, legal and (socio-)economic ties between affiliated states and their -richer- administrative countries may make health policy implementation more feasible, for example through the rapid diffusion of tools and knowledge (25). Best-performer Martinique and third-best performer Guadeloupe are both French departments and are considered an integral part of the French Republic since 1946. Their relatively stable political situation, the full French citizenship rights of their people, and a strong level of collaboration with continental France may explain their superior health outcomes. In contrast, Aruba, an autonomous country within the Kingdom of the Netherlands, whose inhabitants do not benefit from the health, educational and social policies that apply to Dutch citizens in the Netherlands, has the lowest summary score of the included politically affiliated states; it performs considerably worse on breast cancer, lung cancer and road traffic mortality, and on teenage pregnancies. Aruba's local government is considered responsible for the initiation, implementation and evaluation of health policies, which may be too ambitious given its small population of approximately 100,000 inhabitants.

Differences in health policy performance between European countries were attributed to differences in available resources ('means') and differences in the willingness to take action ('will'). In other words, while adequate financial resources and functioning institutions must be present to introduce policies, another requirement is that politicians, policy makers and health professionals acknowledge that a problem exists and are willing to take action accordingly (12,13). Besides sovereignty status, a Caribbean state's pursuit of effective health policies was also related to the financial means they have available: 41% of the variation in the summary score was explained by GDP per capita. Nonetheless, some governments are doing more or less than expected based on their economic development. The Bahamas stands out as an underperformer: it has one of the highest GDPs per capita in the Caribbean, yet scores in the upper tertile for only 9 out of 50 indicators. The Bahamas covers 30 inhabited islands and is the least densely populated territories. Low population density was related to poorer health policy performance in our analyses, which may reflect an impaired coverage of (public) health services (26). In comparison, Cuba stands out as an overachiever in comparison with Caribbean states with a similar level of income. Cuba's low economic development and relatively exceptional health outcomes challenge the idea that high economic development is a prerequisite for good population health (27). Moreover, Cuba's counterfactual example also shows that relatively weak scores on governance performance measures such as government effectiveness, voice and accountability, regulatory quality and rule of law do not exclude successful health policy implementation. Arguably, these findings may indicate that the "will" to implement policies is fundamental, and that the "means" required will

then follow. Thus, Cuba's example may illustrate that the link between population health and economic development can to some extent be broken when engaged technocrats, politicians and civic leaders are committed to identifying health problems and thinking through solutions.

In the European context, the "will" to implement effective health policies increases when a population's cultural attitude moves from traditional survival values, emphasizing economic and physical security, towards modern self-expression values, emphasizing rising demands of participation in decision-making in economic and political life (28). For Caribbean states, data on social values is limited. Nevertheless, our results show that where control of corruption was low, health policy performance was low as well (29). Corrupted practices are encouraged in collectivist societies where the focus is on relationships instead of tasks, and where the population accepts that power is distributed unequally (30,31). We also found that health policy performance is lower in states that are more religiously fragmented. Just as ethnic heterogeneity in European countries (13), greater religious pluralism may affect health policy performance by lowering social cohesion between people of different groups. Dominant groups in religiously pluralistic states may be less willing to invest in public goods that benefit the whole population, instead of their group in particular. Another possible explanation is that more religious societies are less inclined to invest in policies that are incompatible with their religious norms, such as policies for HIV/AIDS and reproductive health.

Public Health Implications

Our results suggest that differences in health outcomes between Caribbean states are partly due to variations in the implementation of effective health policies. The calculation of excess deaths compared to best-performer Martinique shows the potential for considerable health gains in the Caribbean: an overall mortality reduction in the Caribbean as a whole of 12%. With these results, we hope to stimulate politicians, policy makers and health professionals around the Caribbean to come into action and to combine their efforts to improve the health and well-being of their populations by implementing best-practice health policies. It is, however, likely that these efforts will remain challenged if the underlying political, economic, and cultural factors are not addressed.

Appendix

The Appendix for this study is available via this (private) link: www.vic.cw/appendices.

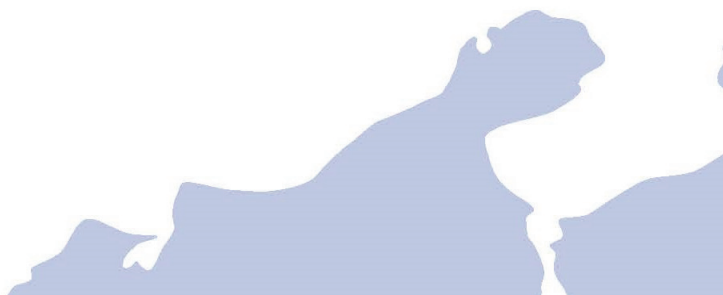
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Chapter 7



General discussion



This thesis aims to provide a better insight into the health situation of the Dutch Caribbean, and the factors related to this health situation, in particular the role of the political context and health policy performance. We have addressed this aim in two research questions. The first research question seeks to describe the health situation in the Dutch Caribbean through a comparison of health status in the Dutch Caribbean, the Netherlands, and other Caribbean states. The second research question investigates the influence of the political context and health policy performance on population health in Caribbean states. Considering that the implementation of health policies is an important outcome of the political decision-making process, we also examine how possible interactions between these two factors influence population health in Caribbean states.

This final chapter summarizes our main findings, and discusses our results in light of their methodological limitations. Moreover, we interpret our main findings in reference to earlier studies, and propose ways for improving health research and reducing between-country disparities within the Kingdom of the Netherlands. We close this chapter with an overall conclusion of this thesis' findings.

Summary of main findings

I. What is the health status of the Dutch Caribbean population?

For the first research question, we sought to explore how the health status of the Dutch Caribbean population compares to the Dutch population, and to the populations in other Caribbean states. Comparative health data from the Dutch Caribbean islands of Bonaire, Saba, and St. Eustatius and St. Maarten were unavailable, making Aruba and Curaçao (the latter being the largest territory of the former Netherlands Antilles (NA)) the islands of main focus. We considered three different health measures: self-reported health indicators, life expectancy and cause-specific mortality rates. Overall, we found that the health status of the Dutch Caribbean population is poorer than that of the Dutch population (**chapter 2 and 3**), and that of populations in Caribbean states that are politically affiliated to France, the United Kingdom (UK), and the United States (US) as well (**chapter 5**).

In **chapter 2**, we made a three-way comparison between the Dutch Caribbean population living in Curaçao, Dutch Caribbean migrants living in the Netherlands, and non-migrants living in the Netherlands. The results of **chapter 2** indicate that, perhaps surprisingly, the Dutch Caribbean population reported better physical and mental health than Dutch Caribbean migrants in the Netherlands during the 2012/2013 period. Health outcomes were poorer for Dutch Caribbean

migrants compared to non-migrants living in the Netherlands as well. These results persisted even when controlling for sociodemographics (age, marital status, education and employment), risk factors (tobacco and alcohol use, overweight and physical activity) and urbanization (in the Netherlands). The exceptions were overweight/obesity and diabetes; prevalence rates for overweight/obesity (men only) and diabetes (both genders) were similar for the Dutch Caribbean populations living in Curaçao and in the Netherlands, and higher than in Dutch non-migrants. For Aruba, no comparative data were available to include in this study.

The study in **chapter 3** demonstrates that levels of amenable mortality, deaths from causes that are considered unnecessary in the presence of timely and effective healthcare, have been consistently higher in Aruba and the NA/Curaçao than in the Netherlands during the 1988-2014 period. If mortality from amenable causes were reduced to similar levels as in the Netherlands, men and women in Aruba would add respectively 1.19 years and 0.72 years to their life expectancies. In Curaçao, this would be 2.06 years and 2.33 years. If mortality from amenable circulatory causes (which includes ischemic heart disease, cerebrovascular disease, and hypertensive disease) were reduced to similar levels as in the Netherlands, men and women in Aruba would add respectively 1.02 years and 0.56 years to their life expectancies. In the NA/Curaçao, this would be 0.65 years and 0.55 years. Perinatal deaths are an important additional contributing cause-of-death in the NA/Curaçao, and are responsible for 0.79 years (men) and 0.90 years (women) of the total mortality gap with the Netherlands. Nephritis/nephrosis is also important for the NA/Curaçao, where it contributes 0.12 years for men and 0.21 years for women. In addition, reduction in breast cancer mortality to the level of the Netherlands would add 0.22 years in Aruba and 0.21 years in the NA/Curaçao to female life expectancy.

The results of **chapter 5** show that Aruba and NA/ Curaçao experienced declines in male and stagnation in female life expectancy, and that life expectancy trends have diverged relative to the Netherlands during the 1980-2014 period. In contrast, life expectancy trends in Caribbean dependencies that had relatively low levels of autonomy, Martinique, Guadeloupe and the UK islands, ran in parallel with those in their administrator countries. Decomposition of life expectancy differences between Western countries and their dependencies point to the important contribution of mortality from cardiovascular diseases and external causes to the excess mortality in the Caribbean states. The magnitude of mortality differences with Western countries, however, differs greatly. Unlike other affiliated states, Dutch dependencies did not experience substantial improvements in cardiovascular mortality during the 1980-2014 period. Also, the NA/Curaçao experienced sharp rises in homicide during the study period, alongside the US territories Puerto

Rico and the US Virgin Islands. In addition, transport accidents are an important additional contributor to higher external cause mortality in NA/Curaçao, and the main contributor to the high external causes mortality in Aruba.

II. To what extent do differences in population health in the Caribbean reflect differences in political context and health policy performance?

For the second research question, we turn to the role of political context and health policy performance as potential factors that influence population health variations between Caribbean states. We considered three determinants for the political context: current political sovereignty status, decolonization and degree of political affiliation. Overall, we found that decolonization has increased the life expectancy gap between currently sovereign and affiliated Caribbean states, and that a strong political affiliation to a Western country is positively related to population health and health policy performance in Caribbean states.

In **chapter 4**, we assessed how disparities in life expectancy between currently sovereign and affiliated Caribbean states have developed over time. We saw that life expectancies in currently sovereign states were already lower than in currently affiliated states before the decolonization events in the last half of the 20th century. Decolonization, the process in which a colony becomes politically independent, coincided with reductions in life expectancy growth in the decade after independence, which did not correspond with similar changes in economic performance. After the decolonization events, the gap in life expectancy between currently sovereign and affiliated states accelerated in the 1990's, and it continues to increase to the present-day.

In **chapter 5**, we investigated whether differences in life expectancy trends between Caribbean dependencies and their Western administrators were related to their degree of political independence. We found that Caribbean states with a strong political affiliation to their Western administrators, Martinique, Guadeloupe, and the UK islands, experienced more favorable life expectancy trends during the 1980-2014 period than Caribbean states with higher levels of autonomy, the US Virgin Islands, Puerto Rico, Aruba and Curaçao. In comparison with the Western administrator, the underlying trends in causes-of-death are similar among Caribbean states and possibly reflect region-specific drivers. The politically affiliated Caribbean states, however, differ greatly in the magnitude of changes in mortality, most notably for cardiovascular diseases and external causes. The least favorable trends are found for affiliated states with a high degree of political autonomy.

In **chapter 6** of this thesis, we determined whether and why 16 Caribbean states vary in health policy performance in 11 different policy areas related to regional health objectives of the Pan American Health Organization (PAHO) during the 2010-2015 period: 1. HIV/AIDS, 2. Communicable disease, 3. Cancer screening, 4. Tobacco, 5. Fertility, pregnancy and childbirth, 6. Child health, 7. Diabetes, 8. Hypertension, 9. Alcohol, 10. Road safety, and 11. Violence. Our findings suggest that variations in population health outcomes between Caribbean states are related to differences in the implementation of effective health policies. In other words, Caribbean states with better health outcomes were more likely to have implemented a comprehensive set of best practice health policies for the 11 policy areas included in this study. Martinique, Cuba and Guadeloupe had the highest health policy performance summary scores, and Guyana, Belize and Suriname had the lowest. Aruba has the lowest health policy performance summary score of five politically affiliated Caribbean states included in this study, indicating that performance in 11 policy areas related to important regional health objectives is suboptimal compared to other politically affiliated Caribbean states. In terms of health outcomes, Aruba performs considerably worse on breast cancer, lung cancer and road traffic mortality, and on teenage pregnancies. The latest available mortality data from Curaçao dated from 2007 and we therefore had to refrain from doing a similar analysis for Curaçao.

Again, we found a strong association with political sovereignty status: Caribbean states that remained politically affiliated to Western countries had generally higher health policy performance summary scores. Health policy performance was also better in states where the population density, GDP per capita, and control of corruption is high, and states that are less religiously fragmented. The small number of states did not allow us to tease out the interrelationships between the various country characteristics and a state's health policy performance summary score. In this analysis, Cuba stands out as an overachiever considering its political independence, its low economic development and its exceptional health outcomes. The potential for mortality reduction from causes that are avoidable through health policy interventions varies greatly between Caribbean states, and is considerable for the Caribbean as a whole: if the mortality rates of Martinique applied in other Caribbean states, an overall mortality reduction of 12% could be obtained.

Methodological considerations

The studies in this thesis used data derived from cross-sectional health surveys, mortality registration systems, harmonized international databases, and country reports to compare population health in the Dutch Caribbean with the Netherlands and with other Caribbean states.

In this section, we will critically discuss data considerations and research designs, and their potential impact on the representativeness and validity of our results.

Descriptive comparative research

A thorough description of the health patterns across territories is a necessary first step towards explaining potential causes for the variations between territories. For the first research question, we therefore focused on comparing the health status of the Dutch Caribbean population in an international context. We concluded that the health status of the Dutch Caribbean population is generally poorer than that of the Dutch population, and that of populations in other politically affiliated Caribbean states as well. We noticed, however, that few data from mortality and cancer registrations, health surveys, infectious disease surveillance and administrative systems were available in all Dutch Caribbean territories. Given the Kingdom's longstanding tradition of evidence-based policy making in the Netherlands, this is rather surprising. For some common health measures, data are not collected or not published on a regular basis, or this has only recently started as in the case of Bonaire, Saba and St. Eustatius. For other health measures, owners seem unwilling or unable to share the data from their organization. This has restricted our current account on the health status in the Dutch Caribbean in two important ways.

First, we were not able to include data from all Dutch Caribbean territories in our studies. As comparative data were not available, Bonaire, Saba, St. Eustatius and St. Maarten were excluded from our analyses. Moreover, in some studies we had to exclude either Aruba or Curaçao, or had to restrict our analysis of trend data. For example, no recent health survey data were available from Aruba for our study in **chapter 2**. In Curaçao, the publication of mortality statistics lags behind, with the latest data from 2007. Our comparison of amenable mortality in **chapter 3** was therefore based on the latest time-period for which data for the Netherlands, Aruba and Curaçao were available, i.e. 2005-2007, which raises obvious questions for present day relevance as rates may have changed over time. Moreover, mortality data from Curaçao were considered too old for the study on health policy performance in **chapter 6**, as its measurement preceded data on the implementation of health policies and on intermediate health outcomes. Although we were able to study the health status of the two largest territories in the Dutch Caribbean, Aruba and Curaçao, the representativeness of our results for the Dutch Caribbean as a whole would decidedly be better if health data coverage were more complete. Recently, health data from Bonaire, Saba, and St. Eustatius have become available. Life expectancy in the three special municipalities of the Netherlands was a year shorter than in the European part of the Netherlands (1), and self-reported rates for obesity and diabetes vary considerably between the islands, but are much higher than in

the Netherlands (2). We therefore have no reason to believe that the health situation on the other Dutch Caribbean islands is much better than that on Aruba and Curaçao.

Second, the majority of our descriptive analyses were based on life expectancy and mortality data. To obtain a more complete picture, we compared self-reported health status and risk-factors between Curaçao and the Netherlands (**chapter 2**), and have complemented our analyses with data from country reports and harmonized databases. Nonetheless, if we had been able to assess health data from sources that shed a broader light on morbidity, such as mental health, infectious disease and cancer incidence, this would have permitted a more complete view of the health situation in the Dutch Caribbean. For example, there are indications that for certain aspects of population health, health outcomes in the Dutch Caribbean are more favorable than in the Netherlands. Self-reports of feelings of sadness/depression and migraine are less common in Curaçao than in the Netherlands, and perhaps relatedly, Curaçaoans less frequently report (problematic) alcohol use (3). Moreover, in line with the lower rates of lung cancer mortality, tobacco use is less prevalent in Curaçao than in the Netherlands as well (3). Regardless of these counterexamples, we find it unlikely that this would affect the robustness of our overall conclusion that population health in the Dutch Caribbean is relatively poor as compared to the Netherlands and other politically affiliated Caribbean states. Measuring the final outcome of life, our comparative (trend) analyses on mortality data give insight into many diseases and external factors that influence population health in Aruba and Curaçao, and a large number of specific cause-of-death rates are higher than in the Netherlands.

Explanatory comparative research

For the second research question, we attempted to explain the potential factors contributing to the health variations between Caribbean states, in particular political context and health policy performance. Our use of observational study designs for explanatory analyses may raise questions on the validity of our results.

First, the use of observational data to determine relationships between population health and potential determinants across territories is not without its concerns. In health research, clinical studies in particular, the gold standard to provide evidence on a causal relationship between exposure and outcome remains the randomized control trial, although this is now slowly changing (4,5). In contrast to experimental studies, in observational studies the exposure to a determinant or intervention is not manipulated by the researcher. In observational studies, it is often impossible to completely eliminate the bias of selective exposure to a determinant of interest and that of

confounding variables (i.e., factors that independently affect exposure and health outcome). The main methodological limitation of our studies is therefore that they are not able to provide strong evidence on cause and effect (6). This is, however, a direct consequence of the nature of the exposure variables we investigated, i.e., the political context and health policy implementation at the national level, which cannot be randomized. While this is an important disadvantage, an important advantage of observational studies is that they give insight into real world conditions, and do not require a reduction of the multifaceted complexity underlying disease, injury and death (7).

Second, the studies in **chapter 4 and 5** indicate that a strong affiliation to a Western country and hence, lower levels of political autonomy, is an important predictor for favorable population health outcomes in the Caribbean. This finding is in accordance with the findings of previous studies we discussed in the introduction (8–10). The association between political sovereignty and population health also fulfills several Bradford Hill criteria for potential causality (11). One, the association is strong: there is almost clear-cut division in political sovereignty status for life expectancy and economic development (see figure 3, **chapter 1**). Two, the temporal relationship between political sovereignty and population health is consistent with what one would expect if changes in political autonomy influenced health: decolonization in the last half on the 20th century preceded worsening of life expectancy growth in currently sovereign Caribbean states (**chapter 4**). Three, we observed a gradient of political dependency and mortality outcomes, reminiscent of a dose-response relationship: life expectancy trends in political affiliated states with lower levels of political autonomy are more favorable than in affiliated states with higher levels of political autonomy (**chapter 5**). Four, the findings from the Caribbean are consistent with observations from the Pacific region: relative to sovereign Pacific states, economic and health outcomes are also more favorable in politically affiliated island states (8,10). Five, plausible explanations are available for the link between political sovereignty and population health based on our studies in **chapter 4 and 5**. On the one hand, a stronger political affiliation can increase a government's capacity to influence areas that contribute to population health, for example through its bureaucracy's ability to implement and enforce effective policies. On the other hand, a strong political, cultural and (socio)economic relationship with a prosperous administrator country will more likely facilitate the diffusion of knowledge, tools and finance necessary to implement effective policies. Population health in the territories of the French islands, for example, benefit from strong collaborations with metropolitan institutes and from the European Union's support for its economic, social and cultural development through structural funds.

The assumption of a causal relationship between political sovereignty and health, however, needs further scrutiny, as there may be other country characteristics that independently affect the magnitude of health variations across Caribbean territories (confounders). One obvious candidate is economic performance. In his analysis of 67 island states, Bertram showed that the gap in economic performance between currently affiliated and sovereign states was well established prior to the first wave of decolonization in the 1950's (10). The petition for independence during the last half of the 20th century was primarily initiated by the local governments of colonized countries and territories in the Caribbean (12,13), which indicates that poorer colonies were more likely to opt for independence. Given the strong association of population health with economic development (14), economic conditions may have plausibly contributed to both current political status and population health outcomes of Caribbean states.

We consider population health, however, unlikely to be dictated solely by economic performance, as we previously mentioned in **chapter 1**. This is perhaps best illustrated by the counterfactual experience of Cuba. With its low economic performance, but exceptionally good health outcomes and health policy performance, Cuba stands out as an overachiever in comparison to Caribbean states with a similar level of income (**chapter 6**). Also notable is that we did not find an indication that economic conditions have influenced mortality developments in **chapter 4 and 5**. In **chapter 4**, we observed that reductions in life expectancy growth in the decade after independence occurred irrespective of changes in economic performance. In **chapter 5**, while life expectancy trends have been least favorable in the Dutch and US territories, we did not find reduced economic growth in these territories relative to France and United Kingdom during the 1980-2014 period. This suggests that population health in the Caribbean is also partly determined by other factors, perhaps the prioritization of health and education on a national level (15). Importantly, Cuba's example illustrates that the dependency of population health on economic performance can to some extent be broken when politicians, policy makers and health professionals are committed to identifying health problems and thinking through solutions (16).

Sovereign states may also differ from states that are politically affiliated in other respects than political sovereignty and economic performance. Current population health reflects the accumulation of complex historical interactions between economic, social and other health-influencing factors, but quantitative data for these historical factors are rarely available. We considered the identity of the former colonizer and the duration of colonization as potential confounders, as they were previously shown to be important predictors for contemporary outcomes of infant mortality and economic performance (17). Although the majority of currently

sovereign states in the Caribbean are former British colonies, we find it unlikely that the identity of the former colonizer and the duration of colonization are responsible for the current health divide between currently sovereign and affiliated Caribbean states. Life expectancies in currently affiliated UK islands are more favorable than currently sovereign, former UK colonies, as well. Moreover, we consider differences in the length of colonization as marginal, as Caribbean states were at least 250 years under colonial rule.

Third, in **chapter 6** we empirically evaluated one of the main outputs of the political decision-making process on health: the implementation of health policies. Our results show that differences in health outcomes between Caribbean states are partly attributable to variations in the implementation of effective health policies. A comparable analysis of 43 European countries reached a similar conclusion (18,19). A major strength of this study was that it was able to assess the potential health gains of best practice policies in a region with low research capacity, which reduces the feasibility for more comprehensive policy impact evaluation studies. The great reliance of this cross-sectional analysis on data of undetermined validity from harmonized databases, however, may affect our findings if health policy performance is also related to the quality and availability of health data. For each Caribbean state, we therefore applied a rigorous procedure to determine whether quality and completeness of death registration data was suitable for inclusion in our analysis. For data on policy implementation and intermediate outcomes, however, we noticed that fewer data were available for Caribbean states that are politically affiliated to Western countries. The main reason for this is that international organizations such as the World Health Organization and the United Nations do not include these territories in their databases. Surely, we would have obtained more reliable estimates of health policy performance if data coverage had been more complete. Nonetheless, we do not expect that this has strongly influenced our health policy performance rating: based on data from available countries, we were able to show that the correlations between indicators for policy implementation, intermediate and final health outcomes are largely in accordance with what one would expect if policy implementation induces changes in intermediate outcomes, and if changes in intermediate outcomes induce changes in final outcomes. Another limitation of this study is the relatively small number of states (16) included in this study, which reduced the statistical power of our analyses, and restricted further explorations of the interrelationships between various country characteristics and a state's health policy performance summary score.

Interpretation of findings

Health status of the Dutch Caribbean population in Aruba and Curaçao

A major strength of the mortality data we analyzed in this thesis is that it allows for cross-territory comparisons to benchmark local health outcomes in an international context. This section compares the mortality rates from causes-of-death that are potentially avoidable through healthcare and/or policy interventions. In other words, the mortality rates reflect premature deaths from selected conditions that are considered either treatable through timely and effective health care (amenable mortality), or preventable by the implementation of effective public health interventions (preventable mortality). Because the degree to which death from certain diseases can be prevented becomes progressively more doubtful at older ages, age limits were set for non-external mortality causes in line with other research (20).

Figure 1 depicts an overview of the avoidable mortality rates in the Dutch Caribbean islands of Aruba and Curaçao, the Netherlands, and the French islands of Guadeloupe and Martinique. We included up to five years of the most recent data during the 2010–2014 period for each Caribbean state, with the exception of Curaçao (2005-2007). For each territory, age-standardized mortality rates per cause-of-death are given. The results indicate that people in Aruba and Curaçao were more likely to die from breast cancer, cervix cancer, ischemic heart disease, cerebrovascular disease, pneumonia, nephrosis/nephritis and transport accidents than in the Netherlands, Guadeloupe and Martinique. In Curaçao, important additional contributors of excess mortality are HIV/AIDS, cancer of the colon and rectum, diabetes, hypertensive heart disease, perinatal deaths and violence. Mortality rates from lung cancer are lower in the Dutch Caribbean than in the Netherlands, possibly because tobacco use is more prevalent in the Netherlands (3).

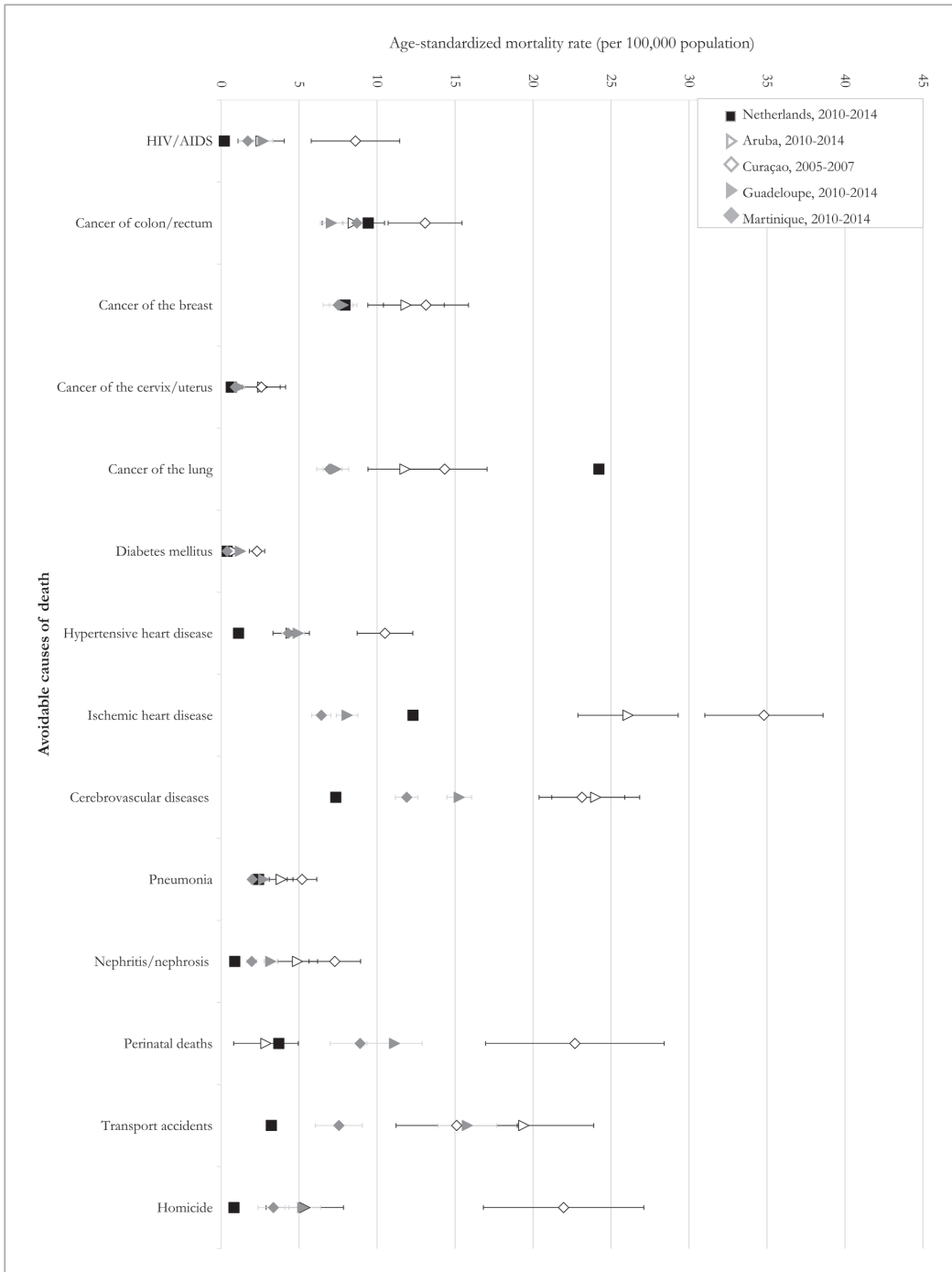


Figure 1 Age-standardized mortality rates for selected avoidable causes of death, latest data available

Avoidable mortality is a function of the underlying disease incidence, access to high quality healthcare, and implementation of effective health policies. Disease incidence is also influenced by factors outside of the health system, such as socioeconomic conditions, health behaviors and environmental factors. Many of these factors are less favorable in Aruba and Curaçao than in the Netherlands, probably because policy responses are still lacking. For example, income distributions are far more unequal, the proportion of people living in poverty is higher, and educational attainment is lower (21,22). So far, there is no firm commitment from the local governments to carry through interventions that would reduce socioeconomic inequalities within their societies, such as policies that encourage asset-building for working families, improve educational outcomes and prevent housing segregation (23). Obesity is twice as prevalent in Curaçao than in the Netherlands, and sport-participation almost twice as low (3). Relatedly, there is a high density of fast food outlets, a scarcity of fresh produce in neighborhood stores and an unsafe infrastructure for walking and cycling in the islands, factors that have been previously shown to be associated to higher risks of obesity (24–26). Also, SO₂-emissions recorded in Curaçao are among the highest in the world (27). In the poor neighborhoods that are affected by the air pollution this has regularly led to serious acute health effects such as coughing, vomiting and headaches (28), and the self-reported prevalence of asthma in these neighborhoods is higher than in other poor neighborhoods as well (29). The efforts and activities taken by the local government to prevent these health effects in the future are, however, not yet sufficiently visible to the public. Although it is difficult to ascertain how much these social determinants of health contribute to the high rates of avoidable mortality in the Dutch Caribbean, observed differences in avoidable mortality in cross-country comparisons, however, cannot be solely attributed to differences in disease incidence (30,31). Therefore, while policies are needed to address the social determinants of disease, an important aspect contributing to the higher rates in avoidable mortality is that governments in the Dutch Caribbean have, so far, not optimally addressed their population's health needs.

There are indications that the higher rates of avoidable mortality reflect that the provision of curative and preventive health services, and health policy performance in general, falls short in Aruba and Curaçao. In the study in **chapter 3**, we already mentioned that the access to healthcare services is inadequate and that the (implementation of) legislation that regulates the quality of healthcare services lags behind. The -often underreported- mortality cause “misadventures during medical care” reflects the number of deaths from injuries caused by an adverse event during medical treatment. Under the assumption that this cause-of-death is not more frequently underreported in the Netherlands than in the Dutch Caribbean, the mortality rate for this cause is still 15 (Curaçao) to 21 (Aruba) times higher in the Dutch Caribbean (own calculations). The access

and quality of healthcare services is likely to vary greatly among health professionals, types of care and healthcare organizations. Nonetheless, the negative experiences of encounters in healthcare that were published in the (social) media reveal that in the eyes of some patients, professional standards are regularly not met by health professionals on the islands. In Curaçao, for example, where over the years several specialists were considered unfit to provide medical care by their colleagues in the St. Elisabeth Hospital, yet could continue their medical practice elsewhere on the island. Evidently, much of the concern on the quality of healthcare services, and the self-regulating capacity of the healthcare system, has developed through these publically discussed events.

Beyond these general features of the health system, the study in **chapter 3** also revealed that there is much room for improvement in the healthcare processes that underlie deaths that are amenable to healthcare, circulatory diseases, breast cancer, perinatal deaths and nephritis/nephrosis (the last two causes solely in NA/Curaçao) specifically. We also discussed that Curaçao struggles with providing sufficient coverage in areas of preventive care, such as cervix cancer, colon cancer and (vaccine-preventable) infectious diseases. Another policy area that stands out is that of sexual health. Teenage pregnancies are relatively high in both Aruba and Curaçao (**chapter 3**), and HIV/AIDS mortality in the latter territory (figure 1), which suggests that increased attention to planning and implementation of effective strategies are required. So far, the causes that contribute to the high mortality for external causes have also received unsatisfactory attention in the health policy priorities set in Aruba and Curaçao. While the economic cost of the many motor vehicle crashes is regularly discussed in the media, traffic safety is generally not considered a public health concern. One viewpoint contributing to this is that traffic accidents are often considered avoidable by becoming a “better” driver, rather than the anticipatable result of a lack of regulation and enforcement in road safety policy. Moreover, the high rates of homicide mortality in Curaçao are among the highest in the world, but have not been declared a public health crisis. Violent deaths mainly affect young men from the lower social classes, a group already characterized by high drop-out rates and youth unemployment (32). Regardless of the victims and perpetrators frequently alleged links to organized crime, however, the toll of trauma affects the well-being and safety of those witnessing the violent events as well.

In the absence of more detailed information on morbidity, the causes-of-death we mentioned above are therefore likely candidates for targeted interventions. The studies in **chapter 3 and 6** of this thesis suggest that considerable health gains could be achieved in Aruba and Curaçao if these causes-of-death would be targeted with best practice policies. To illustrate, the calculation of excess deaths compared with best-performer Martinique estimates the potential for mortality reduction

from the implementation of best-practice policies in 11 policy areas (**chapter 6**). If the mortality rates of Martinique applied in Aruba, an average of 121 deaths could have been avoided annually during the 2011-2014 period, an overall mortality reduction of 14%. The potential for mortality reduction in Curaçao would be 11% of total mortality, equating an average of 122 deaths annually during the 2005-2007 period.

It should be noted that the retrospective character of our studies largely exclude the effects of the current political crisis in Venezuela on population health. The resurgence of vector-borne and vaccine-preventable disease in Venezuela (33,34), the impact of this crisis on the islands' economies, the influx of relatively large numbers of refugees, in addition to the austerity measures implemented to achieve sustainable public financial management, places additional stress on the islands' health systems. Possibly, population health outcomes in Aruba and Curaçao have further deteriorated analogous to the effects of financial crisis in other countries (35,36). In light of the slow pace of improvements that the healthcare systems in Aruba and Curaçao have experienced in the past decade, and the undesirability of allowing the health situation to further deteriorate relative to other Caribbean states, more efforts are needed. The need to do so is best captured in the words of Richard Horton, who states that the "health system is the most visible and tangible expression of a society's concern for the welfare and wellbeing of its citizens".

Health status of the Dutch Caribbean population in the Netherlands

Higher rates of obesity, diabetes and hypertension among the Dutch Caribbean population in the Netherlands relative to the Dutch population have previously been documented (37–40). Where these health outcomes corresponded with the analysis in **chapter 2**, we came to similar conclusions. The study in **chapter 2** goes beyond earlier studies by adding the 'home-country perspective' and by considering a comprehensive set of health outcomes and health behaviors. We expected that the health outcomes and behaviors of Dutch Caribbean population in Curaçao would be poorer than that of the Dutch Caribbean population in the Netherlands. The reason for this is twofold. First, the Netherlands is a country known for its quality healthcare services and its comprehensive implementations of public health interventions. Second, many young adults leave the islands to continue their education and further their careers in the Netherlands, indicated by the popularly used term "brain drain". In agreement with this, we observed that, compared to the Dutch Caribbean population in Curaçao, the Dutch Caribbean population in the Netherlands is younger and more highly educated. Surprisingly, however, we found that Dutch Caribbean migrants living in the Netherlands generally reported poorer physical and mental health than both

Dutch Caribbean non-migrants in Curaçao and Dutch non-migrants in the Netherlands, even when controlling for sociodemographic variables such as age and educational level.

Although poorer health outcomes among the Dutch Caribbean population in the Netherlands have been commonly reported, the explanations for these findings have remained rather speculative. The prevailing explanations typically emphasize the role of individual-level factors and their influence on unhealthier health behaviors. For example, the higher incidence of sexual transmitted infections (STI's) among the Dutch Caribbean population in the Netherlands were believed to reflect an inclination for high-risk sexual behaviors (41), but the evidence base for this relationship was later contested (42). Moreover, excess diabetes mortality among Dutch Caribbean migrants in the Netherlands was previously related to their relocation to a more prosperous country, which was suggested to lead to drastic lifestyle changes, such as declines in physical activity and high-fat, energy-dense diets (43). Such individual-level explanations for poorer health outcomes are not limited to the Netherlands. In Curaçao for example, where traits that reflect a lack of character have at times been proposed by health professionals as an explanation for the relatively high obesity prevalence (44). The logic underlying such individual-level explanations can be problematic: it may essentially lead to the perception of a stereotypical, homogenized migrant/ethnic population (45–48), which is a gross oversimplification of the diversity in ethnicity, religion, language, and socio-economic class in the Dutch Caribbean. In addition, the migration turnover is relatively high in the Dutch Caribbean, illustrated by the fact that 33% of the population in Aruba and 24% of the population in Curaçao were born abroad, mainly in the Netherlands, Colombia, the Dominican Republic and Venezuela (49,50). Although certain cultural characteristics are commonly equated with a population living in a certain territory, the evidence base for this is weak (51).

The results in this thesis provide an alternative explanation for the higher rates of obesity and related conditions, and the higher incidence of STIs, relative to the Dutch population. Prevalence rates for diabetes and overweight/obesity were generally similar for the Dutch Caribbean populations in Curaçao and in the Netherlands (**chapter 2**), and rates of HIV/AIDS mortality were also relatively high in the Dutch Caribbean islands (**chapter 5**). The higher prevalence of obesity and relatedly diabetes, and STIs, among the Dutch Caribbean population in the Netherlands therefore reflect their migration from an area in which the underlying risk factors are more prevalent, partly because the governments have not properly invested in interventions to prevent, detect and treat these conditions (**chapter 3 and 6**). We previously mentioned that in Curaçao, there is a high density of fast food outlets, a scarcity of fresh produce in neighborhood

stores and an unsafe infrastructure for walking and cycling, environmental factors that likely contribute to higher risks of obesity (24–26). In turn, the heightened risk for STIs may reflect that the procedures necessary to quickly detect and respond to infectious disease outbreaks are suboptimal (52), as well as the investments in sexual health prevention.

While the health situation in the home-country of migrants may therefore play a role in shaping certain health outcomes, our study in **chapter 2** concluded that the overall poorer physical and mental health status of Dutch Caribbean migrants in the Netherlands is suggestive of host-country specific stressors. Based on the discussion of recent studies on migrant health in the Netherlands and previous health literature, we proposed three host-country-specific stressors that affect the Dutch Caribbean population more than the Dutch population in the Netherlands: perceived discrimination, spatial concentration in multi-ethnic neighborhoods and reduced social mobility. Experiences of stigmatization are, however, not limited to the Netherlands: racial patterns of deprivation and exclusion stubbornly persists in the Dutch Caribbean as well, where the majority Afro-Curaçaoan population continues to be associated with the lower classes (53).

In contrast to our findings on health outcomes, we found that risk factor prevalence among Dutch Caribbean migrants in the Netherlands converges to the Dutch population norm; rates for tobacco and alcohol use were in-between the lower rates of Dutch Caribbean non-migrants in Curaçao and the higher rates of Dutch non-migrants in the Netherlands. This indicates that many Dutch Caribbean migrants adopt the health behaviors and attitudes of Dutch society, which is line with key indicators of sociocultural integration: Dutch Caribbean migrants frequently spend their free time with Dutch non-migrants and 45% of the marriages among Dutch Caribbean migrants is with a native Dutch partner (54). As an emphasis on individual-level explanations for ethnic health disparities may obscure the impact of host-country-specific factors, we suggest that the ‘home country’ perspective of migrant health may provide a valuable addition to inform policy makers.

The political context of population health in the Dutch Caribbean

This thesis demonstrates a positive effect of a strong political affiliation to a Western country on population health in Caribbean states. The idea that a strong affiliation to a Western country largely outweighs its disadvantages in the modern age should not come as a surprise, as the broad literature of studies from the fields of political sciences, sociology and economics on this topic suggest (8–10,55–59). In the words of McElroy and Mahoney, affiliated states “remain unwilling to trade the visible security, affluence and standard of living of affiliation for the less tangible but more costly

rewards of autonomy”(60). Notwithstanding, the studies in this thesis expand the existing knowledge in two important ways.

First, we observed that life expectancies in currently sovereign states were already lower than in currently affiliated states during the colonial period, that decolonization coincided with a reduction in life expectancy growth, and that the gap in life expectancy between currently sovereign and affiliated states continues to increase to the present day (**chapter 4**). Colonial institutes varied greatly in their promotion of prosperity for the (nonindigenous) public good (inclusive institutes) or for a small elite (extractive institutes), across colonies and over time (57). Kenny describes that political decisions during decolonization can weaken the (colonial) bureaucracies that served their public’s interests through the institutionalization of corruption (61), which consequently may have disrupted a states’ capacity to solve problems, to provide necessary resources and to implement effective policy initiatives in areas that contribute to population health. The continuous involvement of Western countries in currently affiliates states, in contrast, may have plausibly resulted in the co-evolvement of good governance and state capacity alongside their continental territories. “Western” influences have been consequential in state building and state capacity in a multitude of countries, and hence, population health and economic development, probably by increasing “the scope of their policies as the resources at their disposal increased” (55). Over time, these institutional effects have cumulated into divergent development trajectories (62), which underlie the gap in economic performance and population health between politically sovereign and affiliated Caribbean states to the present day.

Second, the comparison of life expectancies and cause-specific mortality rates across politically affiliated states suggests that it is not the division in political sovereignty in itself that dictates the gap between affiliated and sovereign Caribbean states, but rather its reflection of a “gradient of political autonomy” (**chapter 5**). This “gradient of autonomy” also translates into a variety of governance structures on the area of public health: governmental (health) organizations in Caribbean states with a lower degree of autonomy have more and stronger collaborations with metropolitan (health) institutes. In other words, the strong political, cultural, and (socio)economic relationship with a Western country may (eventually) result in the availability of resources (e.g. human capital, financial resources and investments, and technology) that contribute to better population health. For example, health system governance on the French islands, which are considered an integral part of the French Republic, is implemented with oversight from the Ministry of Health in metropolitan France, since 2010 by the “Agence Régionale de Santé” (63). Likewise, Caribbean health organizations in the dependencies of the United Kingdom actively

work together with metropolitan organisations to protect and improve the health of their populations. While the island organizations are responsible for the implementation of policies, the European organizations pro-actively support the islands' governments with the provision of healthcare and the implementation of public health interventions (64).

To illustrate the situation in the Dutch Caribbean further, we will now view health system governance in the Dutch Caribbean context. In contrast to other Western administrators, the Kingdom's administration has entirely decentralized health system governance to the island governments of the constituent countries in line with their persistent demands of complete autonomy over internal affairs. Besides matters of military defense and foreign policy, Dutch administration has therefore been primarily concerned with the achievement of sustainable public financial management in Aruba, Curaçao and St. Maarten in the past decades. This led to the installation of the board of financial supervision (College Financieel Toezicht, CFT) in the islands of the former Netherlands Antilles in 2010, and the board of financial supervision Aruba (CAft) in Aruba in 2015. Collaborative programs in the area of health have mainly focused on aspects of curative care, such as the organization of clinical conferences by the Nashko and the exchange of medical students from Dutch teaching hospitals to the islands. In other cases, Dutch health organizations and consultants have supported projects in the Dutch Caribbean, but these collaborations were typically short-term. In May 2018, however, the four Ministers of Health from the constituent countries of the Kingdom have committed to strengthening their cooperation, among other things, in the areas of infectious diseases, emergency preparation, preventive and curative care, health workforce and health information. In the special municipalities of the Netherlands, Bonaire, Saba and St. Eustatius, governance is steered by the Dutch government since the dissolution of the Netherlands Antilles on 10 October 2010.

Our results indicate that governments in Caribbean states where (health) organizations collaboratively work with their counterparts in the country of their Western administrator are more successful in improving and protecting the health of their population, likely because they have more knowledge, tools and finance to their disposal, and have more effective bureaucracies to turn plans into practice. Conversely, this also indicates that the halfhearted political situation with the Netherlands has contributed to the current health situation in the Dutch Caribbean. In terms of understanding the ambivalent governing style of the Dutch government towards its Dutch Caribbean dependencies, it is important to place the current situation in its historical context.

The accounts of the Dutch civil servant van Kol, who visited the Dutch Caribbean islands in the first decades of the 20th century, suggest that the ambivalent governing style of the Dutch government is not a contemporary phenomenon, but already characterized the Dutch colonial administration of the islands at the time. In 1901, van Kol urgently pleaded the Dutch government to prevent a further decline of living standards in the Dutch colony after years of economic recession (65). In 1919, van Kol concluded that in spite of the progress made, the colonial administrations on the islands had, so far, “not fulfilled their duty with regard to public health” (66). Over the years, when the settlement of oil refineries in Aruba and Curaçao had brought economic growth, the colonial administration became more concerned with the social and economic causes of ill health, as is illustrated by the reports by the Dutch civil servants Verwey and de Gaay Fortman (67,68). As a result of the decolonization efforts, the 1954 Charter (Statuut) for the Kingdom of the Netherlands now defined the relationship between the Netherlands and the then newly established Netherlands Antilles as a voluntary and equal endeavor, in which mutual assistance and cooperation is possible on request, and in which each country is largely autonomous in arranging their own internal affairs (69). While all constituent countries of the Kingdom are obliged to promote the realization of legal certainty, human rights and good governance conform the Charter, the Kingdom council is the ultimate guarantor in all territories of the Kingdom. It did not take long to realize that the Kingdom Council, however, has few means to intervene in the island’s internal affairs and to hold the constituent’s countries’ governments responsible for their (in)actions, yet is obliged to intervene in case of (financial) emergency on the request of the island’s governments. Repeatedly, however, the island’s governments demonstrated that sustaining the degree of autonomy over internal affairs took precedence over strengthening governmental institutes, and hence, improving public services, to the level of the Kingdom (70).

Since the establishment of the Netherlands Antilles, the self-governing governments in the Dutch Caribbean have not succeeded in closing the economic, educational and health gap with the Netherlands, nor have they, as the results in this thesis suggest, addressed their population’s health needs as effectively as other affiliated Caribbean states. On the contrary, the study in **chapter 5** in this thesis indicates that where life expectancy is concerned, the gap with the Netherlands has even diverged in the past decades, in contrast to the more favorable population health outcomes in other politically affiliated counterparts. The better health outcomes in Caribbean states with stronger collaborations with their Western administrator suggests that Dutch Caribbean politicians need to critically consider what degree of autonomy over internal affairs would serve the population’s interest the most. In this light, it should also be noted that succeeding Dutch governments, in turn, have been wittingly or unwittingly involved in endorsing policies that

sustained the asymmetrical power relationships in postcolonial society (71), and that resulted in weakened governmental bureaucracies through corporatization efforts since the 1980s (72).

Although the current political impasse may imply that discussions on the constitutional nature of the Kingdom, and the scope of the authority of the Kingdom Council, are needed, this thesis mostly calls for an increased awareness and determination to address the current health situation in the Dutch Caribbean. In light of the recurring tensions around the shared colonial history between the constituent countries of the Kingdom, we recognize that recommendations of increased “Dutch influence” in the islands’ internal affairs to strengthen governmental bureaucracies and to improve public services may be considered unwelcome by some. Although it is apparent that these ideological dynamics influence the current discussions on the islands’ relationships with the Netherlands, a detailed discussion on this topic is beyond the scope of this thesis on public health. It seems important to note, however, that the paradigm of neocolonialism, a scholarly approach that criticizes Western influences in former colonies as this would increase the gaps between rich and poor countries even further (73–76), predicts the exact opposite of what is currently observed in the Caribbean region. Despite the negative connotation of the term “(neo)colonialism”, this suggests that the judgement of contemporary relationships between the Netherlands and the constituent countries in the Dutch Caribbean needs a more careful consideration, for example based on how these relationships can contribute to the much needed social and economic development in the former Dutch colonies. Under those circumstances, it seems more likely that an agreement on all sides of the political spectrum can be reached, for example on the undesirability of further declines in population health on the Dutch Caribbean islands relative to the Netherlands and to other politically affiliated Caribbean states.

Implications for research and policy

Based on the findings mentioned above, we now turn to a number of suggestions for future research and policy efforts in the Dutch Caribbean. As special municipalities of the Netherlands, health system governance on the islands of the Caribbean Netherlands (Bonaire, Saba and St. Eustatius) is currently implemented with oversight from the Dutch government. In the absence of comparative data, these territories were excluded from our studies. For the same reason, we were unable to include St. Maarten. We will therefore focus our recommendations on Aruba and Curaçao. The constituent countries of the Kingdom of the Netherlands govern their own health sectors and steer their own health policy initiatives. We primarily recommend to invest in filling

the gaps in the monitoring of population health and health services and in expanding the focus of policy initiatives to areas of suboptimal performance.

If our findings on the better population health in Caribbean states that are politically affiliated to France, the UK and the US provide any inspiration, it is that efforts to improve population health in Aruba and Curaçao benefit from strong partnerships with (health) organizations in the Netherlands. The Dutch Caribbean islands have relatively small populations, but the scope and complexity of efforts needed for the adequate monitoring of population health and the effective implementation of policy interventions require the efforts analogous to large countries. For example, in the research efforts that are needed to regularly analyze data for a comprehensive set of national health indicators from a variety of sources, such as health surveys and population-based registers, the size of the population of interest is of marginal importance once data collection measures are routinely implemented. Moreover, the extend of work required for the development, implementation and evaluation of effective policy interventions for each specific policy area, for instance the implementation of legislation and protocols to ensure quality standards of healthcare services, is vast regardless of the size of the target population. Thus, the successful implementation of the following recommendations will become more feasible in collaboration with larger (health) organizations that are experienced in (health) research and policy implementation.

Implications for research in the Dutch Caribbean

Besides restricting our description of the health situation in the Dutch Caribbean, the gaps in national health data availability in the Dutch Caribbean islands also illustrate that its current application to meet the needs for relevant and timely information of local decision-makers (e.g. politicians, physicians, health professionals, public health officers, and policy makers) to point out issues, set priorities, support practices and monitor progress to reach certain targets in the Dutch Caribbean is limited. More efforts in the monitoring of population health and healthcare services in the Dutch Caribbean are therefore needed.

We recommend to establish a platform for health researchers in the Dutch Caribbean with as primary aim to publish four-yearly population health reports that support the policy making process at the strategic level. A shared health data platform was previously proposed during consultations between the four Ministries of Health from the constituent countries of the Kingdom in May 2018 (vierlandenoverleg), but thus far has not materialized. The population health reports provide a broad analysis of the situation per Caribbean territory (i.e. health status, risk factors, provision and quality of healthcare, care expenditures), and combine the available

scientific evidence with background information (77). In order to achieve the regular publication of these reports, we suggest the following steps:

First, the members of the platform should establish a health research strategy for the Dutch Caribbean. This research strategy strives to optimize health outcomes by questioning what we can do to improve population health (33) and adheres to the Essential National Health Research (ENHR) principles (78). With more concentrated efforts, the Dutch Caribbean territories will be in a better position to fulfill the research-related functions 1 and 11 of the Essential Public Health Functions (EPHF), a set of actions formulated by the PAHO/WHO that contributes to the broader context of health system strengthening (79). The health research strategy aims to establish a sound and effective health information system in each territory, with a focus on the harmonization and alignment of current research efforts and the identification and resolution of current short-comings in health research capacity and infrastructure. The aim of this is to establish a baseline on which future progress can be monitored. A tangible outcome is a list of national indicators, specifying definitions, periodicity of data collection and (potential) data sources, and attuned to provide data for international initiatives such as the Sustainable Development Goals (SDG's) from the United Nations and health indicators from the Pan American Health Organization/World Health Organization (PAHO/WHO).

Second, the members of the platform, or their related institutes, provide or guide technical support for the collection, analysis and dissemination of data that are needed for the national indicators. This will not only facilitate the production of comparative data across Dutch Caribbean territories, but also optimize the available research capacity by resource sharing. For example, a researcher specialized in mortality statistics can manage data collection and analysis for all territories. In cases where a specific specialty is unavailable on the islands, the platform can facilitate collaborations with Dutch health research institutes. To make these efforts sustainable, an approach is required that makes health data collection, analysis and dissemination eventually a normal and routine part of the policy-making process in each territory.

Three, the platform offers opportunities to stimulate the use of health information for evidence-based policy practices in the Dutch Caribbean. For example, the members of the platform can support interdisciplinary discussions on pressing health problems and their potential solutions, organized for and with local stakeholders and decision-makers. This inquiry will also provide the background information needed for the interpretation of the scientific evidence and recommendations in the population health reports.

Implications for policy in the Dutch Caribbean

This thesis showed that there is an urgent need for optimization of health services (**chapter 3**) and implementation of health policies (**chapter 6**) in the Dutch Caribbean. The potential avoidability of the specific causes-of-death, however, also suggests that in current health policy efforts, limited focus is directed towards addressing the health needs of the Dutch Caribbean population. Setting priorities for health policy should direct the efforts towards fixing this imbalance. We recommend that this includes health policy areas related to the avoidable causes-of-death for which the current mortality rates are disproportionately higher in the Dutch Caribbean than in the Netherlands and the French islands (figure 1). The reason for this is that, in the absence of more detailed information on morbidity, effective interventions in these areas are likely to produce the largest health gains among the population.

It is important to note that the conclusions in this thesis are based on comparative analyses of national outcomes, life expectancy data and cause-specific mortality rates in particular. The benefit of national outcomes is that it allows for cross-territory comparisons to benchmark local health outcomes. Nonetheless, these results alone do not give insight in what needs to be done for health policy areas of suboptimal performance. In order to do this, the national outcomes need to be linked with health system processes during consultations with stakeholders. For example, our study in **chapter 3** identified perinatal conditions as an important contributor to excess avoidable mortality in Curaçao. For the next step, it is key to investigate access and quality of mother and child care services in more detail so that certain aspects that are viable for effective targeting can be identified. This assessment should determine what the shortcomings of current processes are, and should identify the interventions and resources needed for improvements. Most likely, incremental policy implementation will not be enough to improve national outcomes, and a number of complementary interventions will be selected. Strategies that are recommended by the PAHO/WHO were previously proven effective and can serve as guidelines to achieve effective policy making.

As Oliver notes, however, “science can identify solutions to pressing public health problems, but only politics can turn most of those solutions into reality” (80). Past experiences also reveal that it would be naïve to assume that political commitment automatically translates in tangible results (81). Thus, resource allocation, both financial and human capital, need to reflect the commitment to improving population health. By focusing on specific health policy areas of suboptimal performance, these concentrated policy efforts are likely to stimulate the much needed health progress in the Dutch Caribbean.

Overall conclusion

Overall, this thesis gives a better insight into the health situation in the Dutch Caribbean, and the factors related to this health situation, the political context and health policy performance in particular. We show that the health status of the Dutch Caribbean population in Aruba and Curaçao is poorer than in the Netherlands and in other politically affiliated states (**chapter 2, 3 and 5**). People in Aruba and Curaçao were more likely to die from causes that are avoidable in the presence of timely and effective healthcare and/or interventions in public health and prevention than in the Netherlands, Guadeloupe and Martinique: breast cancer, cervix cancer, ischemic heart disease, cerebrovascular disease, pneumonia, nephrosis/nephritis and transport accidents. In Curaçao, important additional contributors of excess mortality are HIV/AIDS, cancer of the colon and rectum, diabetes, hypertensive heart disease, perinatal deaths and violence. This suggests that an important aspect contributing to the poorer mortality outcomes in the Dutch Caribbean is that the local governments have, so far, not optimally addressed their population's health needs. Therefore, health outcomes in the Dutch Caribbean can potentially improve with targeted actions that improve the access and quality of health care services (**chapter 3**) and stimulate the implementation of “best practice” health policies (**chapter 6**).

Like other studies before us, we demonstrated a positive effect of a strong political affiliation to a Western country on population health and, relatedly, health policy performance, in Caribbean states (**chapter 4, 5 and 6**). The studies in this thesis expand the existing knowledge in two important ways. First, we show that life expectancy in currently sovereign states was already unfavorable than in currently affiliated states during the colonial period, that decolonization coincided with a reduction in life expectancy growth, and that the gap in life expectancy between current sovereign and affiliated states continues to increase to the present day (**chapter 4**). Second, we show that the differences in life expectancy trends of Caribbean states that are politically affiliated to France, the UK and the US, and the Netherlands reflect the ways in which these states are governed. The trends in life expectancy are more favorable in territories with less political autonomy, Martinique, Guadeloupe, and the British Islands, than in territories with more political autonomy, Puerto Rico, the US Virgin Islands, Aruba and Curaçao (**chapter 5**). The degree of political autonomy translates into various governance structures in the area of public health, which suggests that local governments in Caribbean states where health organizations collaboratively work with their corresponding organizations in the country of their Western administrator are more successful in improving and protecting of the health of their population. For example, Martinique and Guadeloupe were more likely to have implemented “best practice” health policies

(chapter 6), possibly because territories with less political autonomy have more human capital, financial resources, investments and technologies at their disposal to identify and address health problems, but also because they have more effective bureaucracies to turn plans into practice.

Conversely, this also indicates that the halfhearted political situation between the Dutch Caribbean islands and the Netherlands, in which discussions about the political autonomy and financial sustainability of the islands have dominated in recent decades, contributed to the current health situation in the Dutch Caribbean. Although this may imply that discussions about the constitutional character of the Kingdom of the Netherlands and the scope of responsibility of the Kingdom council are necessary, this mostly calls for an increased awareness of the increasing health deprivation of the Dutch Caribbean population relative to the populations in the Netherlands and in other politically affiliated Caribbean states, as well as a determination to address the current health situation.

Future health research on the Dutch-Caribbean islands should focus on the monitoring of population health and healthcare so that relevant and timely information can be provided to decision-makers. To improve population health in the Dutch Caribbean, we recommend prioritizing health policy areas of suboptimal performance, as effective interventions in these areas are likely to produce the largest health gains among the population. If our findings on the more favorable health situation in Martinique, Guadeloupe and the British Islands offer any inspiration, it is that the feasibility of the successful implementation of these recommendations benefits from strong collaborations with Dutch (health) organizations.

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English summary



The Netherlands is at the forefront of population health monitoring, but not much is known about the health of inhabitants in the Caribbean territories of the Kingdom of the Netherlands. The information that is available seems to fit Sir Michael Marmot's statement that "all too commonly where health is poorest, health information tends to be poorest". Life expectancies are shorter, and infant and maternal mortality rates are higher, in the two largest Dutch Caribbean islands, Aruba and Curaçao, than in the Netherlands. The causes of the poorer health outcomes of the Dutch Caribbean people are largely unknown, but are commonly ascribed to unspecified regional, biological or cultural characteristics. Beyond these general descriptions, however, more specific explanations are necessary to inform policy strategies that are aimed at improving the health of inhabitants in the Dutch Caribbean islands.

The main objective of this thesis is to provide a better insight into the health situation of the Dutch Caribbean, and the factors related to this health situation, in particular the role of the political context and health policy performance. In order to address this aim, we have made use of data that are derived from cross-sectional health surveys, mortality registration systems, harmonized international databases, and country reports. To address the multidisciplinary aspects of the determinants of population health, we cover theory from the fields of public health, medicine, political science, organization science, economics, and sociology.

First, we sought to explore how the health status of the Dutch Caribbean population compares to the Dutch population, and to the populations of other Caribbean states. We considered three different health measures: self-reported health indicators, life expectancy and cause-specific mortality rates. Overall, we found that the health status of the Dutch Caribbean population is poorer than that of the Dutch population (**chapter 2 and 3**), and that of populations in Caribbean states politically affiliated to France, the United Kingdom (UK), and the United States (US) as well (**chapter 5**).

In **chapter 2**, we made a three-way comparison between the Dutch Caribbean population living in Curaçao, Dutch Caribbean migrants living in the Netherlands, and non-migrants living in the Netherlands. The results of **chapter 2** indicate that, perhaps surprisingly, the Dutch Caribbean population reported better physical and mental health than Dutch Caribbean migrants in the Netherlands. Health outcomes were poorer for Dutch Caribbean migrants compared to non-migrants living in the Netherlands as well. These results persisted even when controlling for sociodemographics (age, marital status, education and employment), risk factors (tobacco and alcohol use, overweight and physical activity) and urbanization (in the Netherlands). The exceptions were overweight/obesity and diabetes; prevalence rates for overweight/obesity (men

only) and diabetes (both genders) were similar for the Dutch Caribbean populations living in Curaçao and in the Netherlands, and higher than in Dutch non-migrants. For Aruba, no comparative data were available to include in this study.

The study in **chapter 3** demonstrates that levels of amenable mortality, deaths from causes that are considered unnecessary in the presence of timely and effective healthcare, have been consistently higher in Aruba and the NA/Curaçao than in the Netherlands during the 1988-2014 period. If mortality from amenable causes were reduced to similar levels as in the Netherlands, men and women in Aruba would add respectively 1.19 years and 0.72 years to their life expectancies. In Curaçao, this would be 2.06 years and 2.33 years. If mortality from amenable circulatory causes (which includes ischemic heart disease, cerebrovascular disease, and hypertensive disease) were reduced to similar levels as in the Netherlands, men and women in Aruba would add respectively 1.02 years and 0.56 years to their life expectancies. In NA/Curaçao, this would be 0.65 years and 0.55 years. Perinatal deaths are an important additional contributing cause-of-death in NA/Curaçao, and are responsible for 0.79 years (men) and 0.90 years (women) of the total mortality gap with the Netherlands. Nephritis/nephrosis is also important for NA/Curaçao, where it contributes 0.12 years for men and 0.21 years for women. In addition, reduction in breast cancer mortality to the level of the Netherlands would add 0.22 years in Aruba and 0.21 years in NA/Curaçao to female life expectancy.

The results of **chapter 5** show that Aruba and NA/Curaçao experienced declines in male and stagnation in female life expectancy, and that life expectancy trends have diverged relative to the Netherlands during the 1980-2014 period. In contrast, life expectancy trends in Caribbean dependencies that had relatively low levels of autonomy, Martinique, Guadeloupe and the UK islands, ran in parallel with those in their administrator countries. Decomposition of life expectancy differences between Western countries and their dependencies point to the important contribution of mortality from cardiovascular diseases and external causes to the excess mortality in the Caribbean states. The magnitude of mortality differences with Western countries, however, differs greatly. Unlike other affiliated states, Dutch dependencies did not experience substantial improvements in cardiovascular mortality during the 1980-2014 period. Also, NA/Curaçao experienced sharp rises in homicide during the study period, alongside US territories Puerto Rico and the US Virgin Islands. In addition, transport accidents are an important additional contributor to higher external cause mortality in NA/Curaçao, and the main contributor to higher external cause mortality in Aruba.

Second, we assessed the role of the political context and health policy performance as potential factors that influence population health variations between Caribbean states. We considered three determinants for the political context: current political sovereignty status, decolonization and degree of political affiliation. Overall, we found that decolonization has increased the life expectancy gap between currently sovereign and affiliated Caribbean states, and that a strong political affiliation to a Western country is positively related to population health and health policy performance in Caribbean states.

In **chapter 4**, we assessed how disparities in life expectancy between currently sovereign and affiliated Caribbean states have developed over time. We saw that life expectancies in currently sovereign states were already lower than in currently affiliated states before the decolonization events in the last half of the 20th century. Decolonization, the process in which a colony becomes politically independent, coincided with reductions in life expectancy growth in the decade after independence, which did not correspond with similar changes in economic performance. After the decolonization events, the gap in life expectancy between currently sovereign and affiliated states accelerated in the 1990's, and it continues to increase to the present day.

In **chapter 5**, we investigated whether differences in life expectancy trends between Caribbean dependencies and their Western administrators were related to their degree of political independence. We found that Caribbean states with a strong political affiliation to their Western administrators, Martinique, Guadeloupe, and the UK islands, experienced more favorable life expectancy trends during the 1980-2014 period than Caribbean states with higher levels of autonomy, the US Virgin Islands, Puerto Rico, Aruba and Curaçao. In comparison with the Western administrator, the underlying trends in causes-of-death are similar among Caribbean states and possibly reflect region-specific drivers. The politically affiliated Caribbean states, however, differ greatly in the magnitude of changes in mortality, most notably for cardiovascular diseases and external causes. The least favorable trends are found for affiliated states with a high degree of political autonomy.

In **chapter 6** of this thesis, we determined whether and why 16 Caribbean states vary in health policy performance in 11 different policy areas related to regional health objectives of the Pan American Health Organization (PAHO) during the 2010-2015 period: 1. HIV/AIDS, 2. Communicable disease, 3. Cancer screening, 4. Tobacco, 5. Fertility, pregnancy and childbirth, 6. Child health, 7. Diabetes, 8. Hypertension, 9. Alcohol, 10. Road safety, and 11. Violence. Our findings suggest that variations in population health outcomes between Caribbean states are related to differences in the implementation of effective health policies. In other words, Caribbean states

with better health outcomes were more likely to have implemented a comprehensive set of best practice health policies for the 11 policy areas included in this study. Martinique, Cuba and Guadeloupe had the highest health policy performance summary scores, and Guyana, Belize and Suriname had the lowest. Aruba has the lowest health policy performance summary score of five politically affiliated Caribbean states included in this study, indicating that performance in 11 policy areas related to important regional health objectives is suboptimal compared to other politically affiliated Caribbean states. In terms of health outcomes, Aruba performs considerably worse on breast cancer, lung cancer and road traffic mortality, and on teenage pregnancies. The latest available mortality data from Curaçao dated from 2007 and we therefore had to refrain from doing a similar analysis for Curaçao.

Again, we found a strong association with political sovereignty status: Caribbean states that remained politically affiliated to Western countries had generally higher health policy performance scores. Health policy performance was also better in states where the population density, GDP per capita, and control of corruption is high, and states that are less religiously fragmented. In this analysis, Cuba stands out as an overachiever considering its political independence, its low economic development and its exceptional health outcomes. The potential for mortality reduction from causes that are avoidable by health policy interventions varies greatly between Caribbean states, and is considerable for the Caribbean as a whole: if the mortality rates of Martinique applied in other Caribbean states, an overall mortality reduction of 12% could be obtained.

Overall, this thesis gives a better insight into the health situation in the Dutch Caribbean, and the factors related to this health situation, the political context and health policy performance in particular. We show that the health status of the Dutch Caribbean population in Aruba and Curaçao is poorer than in the Netherlands and in other politically affiliated states (**chapter 2, 3 and 5**). People in Aruba and Curaçao were more likely to die from causes that are avoidable in the presence of timely and effective healthcare and/or interventions in public health and prevention than in the Netherlands, Guadeloupe and Martinique: breast cancer, cervix cancer, ischemic heart disease, cerebrovascular disease, pneumonia, nephrosis/nephritis and transport accidents. In Curaçao, important additional contributors of excess mortality are HIV/AIDS, cancer of the colon and rectum, diabetes, hypertensive heart disease, perinatal deaths and violence. This suggests that an important aspect contributing to the poorer mortality outcomes in the Dutch Caribbean is that the local governments have, so far, not optimally addressed their population's health needs. Therefore, health outcomes in the Dutch Caribbean can potentially improve with targeted actions

that improve the access and quality of health care services (**chapter 3**) and stimulate the implementation of “best practice“ health policies (**chapter 6**).

Like other studies before us, we demonstrated a positive effect of a strong political affiliation to a Western country on population health and, relatedly, health policy performance, in Caribbean states (**chapter 4, 5 and 6**). The studies in this thesis expand the existing knowledge in two important ways. First, we show that life expectancy in currently sovereign states was already unfavorable than in currently affiliated states during the colonial period, that decolonization coincided with a reduction in life expectancy growth, and that the gap in life expectancy between current sovereign and affiliated states continues to increase to the present day (**chapter 4**). Second, we show that the differences in life expectancy trends of Caribbean that are politically affiliated to France, the UK and the US, and the Netherlands reflect the ways in which these states are governed. The trends in life expectancy are more favorable in territories with less political autonomy, Martinique, Guadeloupe, and the British Islands, than in territories with more political autonomy, Puerto Rico, the US Virgin Islands, Aruba and Curaçao (**chapter 5**). The degree of political autonomy translates into various governance structures in the area of public health, which suggests that local governments in Caribbean states where health organizations collaboratively work with their corresponding organizations in the country of their Western administrator are more successful in improving and protecting of the health of their population. For example, Martinique and Guadeloupe were more likely to have implemented “best practice” health policies (**chapter 6**), possibly because territories with less political autonomy have more human capital, financial resources, investments and technologies at their disposal to identify and address health problems, but also because they have more effective bureaucracies to turn plans into practice.

Conversely, this also indicates that the halfhearted political situation between the Dutch Caribbean islands and the Netherlands, in which discussions about the political autonomy and financial sustainability of the islands have dominated in recent decades, contributed to the current health situation in the Dutch Caribbean. Although this may imply that discussions about the constitutional character of the Kingdom of the Netherlands and the scope of responsibility of the Kingdom council are necessary, this mostly calls for an increased awareness of the increasing health deprivation of the Dutch Caribbean population relative to the populations in the Netherlands and in other politically affiliated Caribbean states, as well as a determination to address the current health situation.

Future health research on the Dutch-Caribbean islands should focus on the monitoring of population health and healthcare so that relevant and timely information can be provided to

decision-makers. To improve population health in the Dutch Caribbean, we recommend prioritizing health policy areas of suboptimal performance, as effective interventions in these areas are likely to produce the largest health gains among the population. If our findings on the more favorable health situation in Martinique, Guadeloupe and the British Islands offer any inspiration, it is that the feasibility of the successful implementation of these recommendations benefits from strong collaborations with Dutch (health) organizations.

Nederlandse samenvatting



Nederland loopt voorop in het monitoren van de volksgezondheid, maar er is weinig bekend over de gezondheid van de inwoners van de Caribische gebieden in het Koninkrijk der Nederlanden. De informatie die beschikbaar is komt overeen met de uitspraak van Sir Michael Marmot dat "maar al te vaak waar de gezondheid gering is, is de informatie over de gezondheid ook gering". De levensverwachting is korter en de kinder- en moedersterfte zijn hoger op de twee grootste Nederlands-Caribische eilanden, Aruba en Curaçao, dan in Nederland. De oorzaken van de ongunstigere gezondheidsuitkomsten onder de Nederlands-Caribische bevolking zijn grotendeels onbekend, maar worden vaak toegeschreven aan -verder- niet-gespecificeerde regionale, biologische of culturele kenmerken. Naast deze algemene omschrijvingen zijn echter meer gerichte verklaringen nodig voor de ondersteuning van beleidsstrategieën voor het verbeteren van de gezondheid van de inwoners op de Nederlands-Caribische eilanden.

Het doel van dit proefschrift is om een beter inzicht te geven in de gezondheidssituatie van de Nederlands-Caribische bevolking en de factoren die verband houden met deze gezondheidssituatie, in het bijzonder de rol van de politieke context en de prestaties van het gezondheidsbeleid. Om dit doel te bereiken maakten we gebruik van data uit cross-sectionele gezondheidsenquêtes, sterfteregistraties, geharmoniseerde internationale databases en rapporten. Voor de beschouwing van de multidisciplinaire aspecten van gezondheidsdeterminanten behandelen we literatuur uit de disciplines publieke gezondheid, geneeskunde, politieke wetenschappen, organisatiekunde, economie en sociologie.

Op de eerste plaats onderzochten we hoe de gezondheidstoestand van de Nederlands-Caribische bevolking zich verhoudt tot die van de Nederlandse bevolking en de bevolking in andere Caribische gebieden. We bekeken drie verschillende gezondheidsmaten: zelfgerapporteerde gezondheidsindicatoren, de levensverwachting en oorzakspecifieke sterftecijfers. We laten zien dat de gezondheidstoestand van de Nederlands-Caribische bevolking minder gunstig is dan die van de Nederlandse bevolking (**hoofdstuk 2 en 3**) en ook dan die van de bevolking van Caribische staten die politiek verbonden zijn met Frankrijk, het Verenigd Koninkrijk (VK) en de Verenigde Staten (VS) (**hoofdstuk 5**).

In **hoofdstuk 2** maakten we een drievoudige vergelijking tussen de Nederlands-Caribische bevolking op Curaçao, de Nederlands-Caribische migranten in Nederland en de niet-migrant in Nederland. De resultaten in **hoofdstuk 2** geven aan dat, misschien verrassend, de Nederlands-Caribische bevolking op Curaçao een betere lichamelijke en geestelijke gezondheid rapporteerde dan de Nederlands-Caribische migranten in Nederland. De gezondheidsuitkomsten van

Nederlands-Caribische migranten is ook minder gunstig dan die van niet-migranten in Nederland. Deze resultaten bleven significant wanneer we corrigeerden voor sociodemografie (leeftijd, burgerlijke staat, opleiding en werk), risicofactoren (tabak- en alcoholgebruik, overgewicht en lichamelijke activiteit) en verstedelijking (in Nederland). De uitzonderingen waren overgewicht/obesitas en diabetes; de prevalenties voor overgewicht/obesitas (alleen mannen) en diabetes (beide geslachten) onder de Nederlands-Caribische bevolking op Curaçao en in Nederland waren vergelijkbaar, en hoger dan voor Nederlandse niet-migranten. Voor Aruba waren geen vergelijkende gegevens beschikbaar om in deze studie op te nemen.

De resultaten in **hoofdstuk 3** laten zien dat de sterfte aan vermijdbare oorzaken, oorzaken die in de aanwezigheid van tijdige en effectieve gezondheidszorg als vermijdbaar worden beschouwd, tussen 1988 en 2014 consistent hoger waren op Aruba en op de NA/Curaçao dan in Nederland. Als de vermijdbare sterfte wordt teruggebracht tot een vergelijkbaar niveau als in Nederland, zouden mannen en vrouwen op Aruba respectievelijk 1,19 jaar en 0,72 jaar toevoegen aan hun levensverwachting. Op de NA/Curaçao zou dit 2,06 jaar en 2,33 jaar zijn. Als de sterfte door vermijdbare oorzaken van de bloedsomloop (waaronder ischemische hartziekte, cerebrovasculaire aandoeningen en hypertensieve aandoeningen) wordt verlaagd tot een vergelijkbaar niveau als in Nederland, zouden mannen en vrouwen op Aruba respectievelijk 1,02 jaar en 0,56 jaar toevoegen aan hun levensverwachting. Op de NA/Curaçao zou dit 0,65 jaar en 0,55 jaar zijn. Perinatale sterfgevallen zijn een belangrijke additionele doodsoorzaak op de NA/Curaçao en zijn verantwoordelijk voor 0,79 jaar (mannen) en 0,90 jaar (vrouwen) van de totale mortaliteitskloof met Nederland. Nefritis/nefrose is ook belangrijk voor de NA/Curaçao en draagt 0,12 jaar bij voor mannen en 0,21 jaar voor vrouwen. Een vermindering van de borstkankersterfte tot het niveau van Nederland zou op Aruba 0,22 jaar en op NA/Curaçao 0,21 jaar aan de vrouwelijke levensverwachting toevoegen.

De resultaten in **hoofdstuk 5** geven aan dat Aruba en de NA/Curaçao tussen 1980 en 2014 een daling van de mannelijke en een stagnatie van de vrouwelijke levensverwachting hebben ervaren. De trends in levensverwachting zijn daarmee gedivergeerd ten opzichte van Nederland. De levensverwachtingstrends in politiek afhankelijke Caribische staten met relatief weinig autonomie, Martinique, Guadeloupe en de Britse eilanden, liepen daarentegen parallel met die van hun westerse bestuurder. Een verdere uitsplitsing van de verschillen in levensverwachting tussen westerse landen en hun geaffilieerde Caribische gebieden toont dat de sterfte aan hart- en vaatziekten en externe oorzaken een belangrijke bijdrage levert aan de overtollige sterfte in de Caribische gebieden. De omvang van sterfteverschillen met westerse landen verschilt echter sterk.

In tegenstelling tot andere geaffilieerde gebieden verbeterde de cardiovasculaire sterfte in de Nederlands-Caribische staten tussen 1980 en 2014 niet substantieel. De NA/Curaçao maakte ook een sterke stijging van het aantal moorden mee tijdens de onderzoeksperiode, evenals de Amerikaanse gebieden Puerto Rico en de Amerikaanse Maagdeneilanden. Daarnaast draagt sterfte aan verkeersongevallen ook in belangrijke mate bij aan het hoge sterftecijfer voor externe oorzaken op de NA/Curaçao, en is dat de belangrijkste oorzaak van de hogere sterfte aan externe oorzaken op Aruba.

Op de tweede plaats onderzochten we twee potentiële factoren die de gezondheidsverschillen tussen Caribische staten beïnvloeden, de politieke context en de prestaties van het gezondheidsbeleid. We bekeken drie factoren voor de politieke context: de huidige politieke status, dekolonisatie en de mate van politieke autonomie. We laten zien dat dekolonisatie het verschil in levensverwachting tussen de huidige soevereine en geaffilieerde Caribische staten heeft vergroot en dat een sterke politieke band met een westers land positief gerelateerd is aan de gezondheidsuitkomsten en de prestaties van het gezondheidsbeleid in Caribische staten.

In **hoofdstuk 4** bekeken we hoe de verschillen in levensverwachting tussen de huidige soevereine en geaffilieerde Caribische staten zich in de loop van de tijd hebben ontwikkeld. We zagen dat de levensverwachting in de huidige soevereine staten al lager was dan in de huidige geaffilieerde staten vóórdat dekolonisatie in de laatste helft van de 20e eeuw plaats vond. Dekolonisatie, het proces waarbij een kolonie politiek onafhankelijk wordt, viel samen met een vermindering van de groei in levensverwachting in het decennium na de onafhankelijkheid, maar niet met soortgelijke veranderingen in economische groei. In de jaren 90 wijkt de kloof in levensverwachting tussen de huidige soevereine en geaffilieerde staten versneld uit elkaar, en deze blijft tot op de dag van vandaag toenemen.

In **hoofdstuk 5** onderzochten we of trend verschillen in levensverwachting tussen de geaffilieerde Caribische staten en hun westerse bestuurders verband houden met hun mate van politieke autonomie. We laten zien dat het verloop van de levensverwachting tussen 1980 en 2014 gunstiger was voor Caribische gebieden met een sterke politieke band met hun westerse bestuurder, Martinique, Guadeloupe en de Britse eilanden, dan voor Caribische staten met een hoge mate van autonomie, de Amerikaanse Maagdeneilanden, Puerto Rico, Aruba en Curaçao. In vergelijking met de westerse bestuurder zijn de onderliggende trends in doodsoorzaken vergelijkbaar tussen de Caribische staten en weerspiegelen daarom mogelijk regiospecifieke factoren. De politiek geaffilieerde Caribische staten verschillen echter sterk in de omvang van de sterfteveranderingen,

vooral voor hart- en vaatziekten en externe oorzaken. De minst gunstige trends worden gevonden voor geaffilieerde gebieden met een hoge mate van politieke autonomie, Aruba en Curaçao.

In **hoofdstuk 6** van dit proefschrift bekeken we of, en waarom, 16 Caribische staten verschillen in hun prestaties voor gezondheidsbeleid tussen 2010 en 2015, op 11 verschillende beleidsterreinen die verband houden met regionale gezondheidsdoelstellingen van de Pan-Amerikaanse Gezondheidsorganisatie (PAHO): 1. HIV/AIDS, 2. Infectieziekten, 3. Kanker screening, 4. Tabak, 5. Vruchtbaarheid, zwangerschap en bevalling, 6. Gezondheid van kinderen, 7. Diabetes, 8. Hypertensie, 9. Alcohol, 10. Verkeersveiligheid en 11. Geweld. Onze bevindingen suggereren dat variaties in gezondheidsuitkomsten tussen Caribische staten gerelateerd zijn aan verschillen in de implementatie van effectief gezondheidsbeleid. Kortom, Caribische staten met betere gezondheidsuitkomsten voor de 11 beleidsterreinen in deze studie hadden vaker “best practice” gezondheidsmaatregelen ingevoerd. Martinique, Cuba en Guadeloupe scoorden het hoogst voor hun prestaties in gezondheidsbeleid, en Guyana, Belize en Suriname het laagst. Aruba had de laagste prestatiescore van de vijf politiek geaffilieerde Caribische staten in dit onderzoek, wat laat zien dat de Arubaanse prestaties op deze beleidsterreinen suboptimaal zijn. Wat de gezondheidsresultaten betreft, presteert Aruba aanzienlijk ongunstiger voor sterfte aan borstkanker, longkanker en verkeersongevallen, en voor tienerzwangerschappen. De meest recent beschikbare sterftegegevens van Curaçao dateren uit 2007, waardoor we moesten afzien van een vergelijkbare analyse voor Curaçao.

We vonden nogmaals een sterke associatie met politieke status: Caribische staten die politiek verbonden zijn aan een westers land hadden hogere prestatiescores voor het gezondheidsbeleid. De prestaties van het gezondheidsbeleid zijn ook beter in gebieden waar de bevolkingsdichtheid, het bbp per hoofd van de bevolking en de controle op corruptie hoog zijn, en gebieden die minder religieus gefragmenteerd zijn. In onze resultaten onderscheidt Cuba zich door haar politieke onafhankelijkheid, haar lage economische ontwikkeling en haar uitzonderlijke gezondheidsresultaten. De mogelijke sterftevermindering voor oorzaken die door “best practice” gezondheidsbeleid kunnen worden vermeden verschilt sterk tussen Caribische staten en is aanzienlijk voor het Caribisch gebied als geheel: als de sterftecijfers van Martinique in andere Caribische staten zouden gelden, zou een algemene sterftevermindering van 12% kunnen worden verkregen.

Samenvattend geeft dit proefschrift een beter inzicht in de gezondheidssituatie van de bevolking in de Nederlands-Caribische eilanden, en de factoren die verband houden met deze

gezondheidssituatie, de politieke context en de prestaties van het gezondheidsbeleid in het bijzonder. We laten zien dat de gezondheidstoestand van de Nederlands-Caribische bevolking op de eilanden Aruba en Curaçao ongunstiger is dan in Nederland en dan in andere politiek geaffilieerde Caribische staten. Zo sterven mensen op Aruba en Curaçao vaker dan in Nederland, Guadeloupe en Martinique aan oorzaken die vermijdbaar zijn door tijdige en effectieve gezondheidszorg, en/of interventies op het gebied van volksgezondheid en preventie: borstkanker, baarmoederhalskanker, ischemische hartziekten, cerebrovasculaire aandoeningen, longontsteking, nefrose/nefritis en verkeersongevallen. Op Curaçao leveren HIV/AIDS, dikke darm- en endeldarmkanker, diabetes, hypertensie, perinatale sterfgevallen en geweld een belangrijke bijkomende bijdrage aan de hogere sterfte onder de bevolking. Dit suggereert dat een belangrijke oorzaak van de ongunstigere sterftcijfers in de Nederlands-Caribische eilanden is dat de lokale overheden tot dusver niet optimaal hebben geïnvesteerd in de gezondheidsbehoeften van hun bevolking. Het is daarom waarschijnlijk dat de gezondheidsuitkomsten in de Nederlands-Caribische eilanden kunnen verbeteren met gerichte acties die de toegang en kwaliteit van de gezondheidszorg verbeteren (**hoofdstuk 3**) en de uitvoering van “best practice” beleidsmaatregelen stimuleren (**hoofdstuk 6**).

Evenals eerdere studies tonen we een positief effect aan van een sterke politieke band met een westers land op de volksgezondheid in Caribische staten en, daarmee samenhangend, betere prestaties in het gezondheidsbeleid (**hoofdstuk 4, 5 en 6**). De studies in dit proefschrift voegen op twee belangrijke manieren aan de bestaande kennis toe. Ten eerste laten we zien dat de levensverwachting in de huidige soevereine staten tijdens de koloniale periode al ongunstiger was dan in de huidige geaffilieerde staten, dat dekolonisatie samen viel met een vermindering van de groei in levensverwachting, en dat de kloof in levensverwachting tussen huidige soevereine en geaffilieerde staten tot op de dag van vandaag blijft toenemen (**hoofdstuk 4**). Ten tweede tonen we aan dat de verschillen van de trends in levensverwachting van de Caribische gebieden die politiek verbonden zijn met Frankrijk, het VK en de VS en Nederland de wijze waarop deze gebieden bestuurd worden weerspiegelen. De trends in levensverwachting zijn gunstiger in gebieden met weinig politieke autonomie, Martinique, Guadeloupe, en de Britse eilanden, dan in gebieden met meer politieke autonomie, Puerto Rico, de Amerikaanse Maagdeneilanden, Aruba en Curaçao (**hoofdstuk 5**). De mate van politieke autonomie vertaalt zich in verschillende bestuursstructuren op het gebied van de gezondheid, wat suggereert dat lokale overheden in Caribische gebieden waar gezondheids(zorg)organisaties samenwerken met hun overeenkomstige organisaties in het land van de westerse bestuurder succesvoller zijn in het verbeteren en beschermen van de gezondheid van hun bevolking. Martinique en Guadeloupe hadden

bijvoorbeeld vaker “best practice” gezondheidsmaatregelen geïmplementeerd (**hoofdstuk 6**), waarschijnlijk doordat gebieden met minder politieke autonomie meer menselijk kapitaal, financiële middelen, investeringen en technologieën tot hun beschikking hebben om gezondheidsproblemen te identificeren en aan te pakken, maar ook doordat zij effectievere bureaucratieën hebben om plannen in uitvoering te brengen.

Omgekeerd geeft dit ook aan dat de halfslachtige politieke situatie tussen de Nederlands-Caribische eilanden en Nederland, waarin discussies over politieke autonomie en financiële beheersbaarheid van de eilanden in de afgelopen decennia overheersten, heeft bijgedragen aan de huidige gezondheidssituatie in de Nederlandse Cariben. Hoewel dit kan betekenen dat besprekingen over het constitutionele karakter van het Koninkrijk der Nederlanden en de bevoegdheden van de Rijksministerraad nodig zijn, impliceren onze resultaten vooral dat een groter bewustzijn van de toenemende gezondheidsachterstand ten opzichte van Nederland en van andere politiek geaffilieerde Caribische staten nodig is, alsook een vastberadenheid om deze gezondheidsachterstanden aan te pakken.

Toekomstig gezondheidsonderzoek op de Nederlands-Caribische eilanden zou zich meer moeten richten op het monitoren van de volksgezondheid en de gezondheidszorg om besluitnemers te voorzien van relevante en tijdige informatie. Voor het terugdringen van de gezondheidsachterstanden raden we aan om prioriteit te geven aan beleidsterreinen waarin suboptimaal wordt gepresteerd, omdat effectieve interventies op deze gebieden waarschijnlijk de grootste gezondheidswinst opleveren onder de bevolking. Als onze bevindingen over de gunstigere gezondheidssituatie op Martinique, Guadeloupe en de Britse eilanden enige inspiratie bieden, dan is het wel dat de haalbaarheid van een succesvolle uitvoering van deze aanbevelingen profiteert van samenwerkingen met Nederlandse (gezondheids)organisaties.

Resúmen na papiamentu



Hulanda ta kana dilanti riba tereno di monitoreo di salú di poblashon, pero tokante poblashon di e teritorionan di Reino Hulandes den Karibe no tin muchu informashon di salú disponibel. Kisas esei tin di aber ku loke Sir Michael Marmot a yega di bisa, esta ku “generalmente, kaminda hende ta mas pober, informashon riba salú tambe ta mas pober”. Riba e dos islanan mas grandi di Karibe Hulandes, Aruba i Kòrsou, ekspektativa di bida ta mas abou kompará ku na Hulanda, i mortalidat di yu chikitu i mama ta mas haltu. Apénas ta konosí kiko ta e kousanan tras di e sifranan ménos faborabel na Karibe Hulandes. E splikashon ku sa bin padilanti ta ku esaki tin di aber ku sierto karakteristiká regional, biológiko i kultural; ma kiko spesífikamente no ta ser mensioná. Pero e deskripsionnan genérico akí no ta sufisiente pa por formulá strategia di maneho pa hisa nivel di salú di e habitantenan di Karibe Hulandes.

Meta prinsipal di e tésis akí ta di duna un mihó bista di e situashon di salubridat na Karibe Hulandes, i muestra kua ta e faktornan ku ta hunga un ròl den e situashon akí. Spesífikamente, nos ta enfoká riba konteksto polítiko i prestashon di maneho di salubridat. Pa hasi esei, nos a usa dato di enkuesta representativo di salú, registro di mortalidat, base di dato internashonal harmonisá i rapòrt nashonal. En bista di e aspekto multidisciplinario di e faktornan ku ta determiná salú di un poblashon, nos ta inkorporá informashon tumá for di literatura di un variedat di disiplina: salubridat públiko, medisina, siensia polítiko, siensia organisashonal, ekonomia i sosiologia.

Promé, nos a investigá kon ta pará ku salubridat di poblashon di Karibe Hulandes kompará ku poblashon di Hulanda i poblashon di e otro estadonan den Karibe. Nos a traha ku tres diferente manera di midí salú: loke e doño di kurpa mes ta ekspresá tokante su salú, ekspektativa di bida, i sifra di mortalidat ku kousa spesífiko. Nos a konstatá ku salú di poblashon di Karibe Hulandes ta ménos bon ku di Hulanda (**kapítulo 2 i 3**) i ménos bon ku di e estadonan karibense ku ta afiliá polítikamente na Fransia, Reino Uní (UK) i Merka (US) (**kapítulo 5**).

Na **kapítulo 2**, nos a hasi un komparashon ‘tripartit’ entre poblashon di Karibe Hulandes bibá na Kòrsou, inmigrante di Karibe Hulandes bibá na Hulanda, i persona no inmigrante bibá na Hulanda. E resultadonan di **kapítulo 2** ta indiká, kisas inesperadamente, ku e poblashon di Karibe Hulandes na Kòrsou ta bisa ku nan tin mihó salú físiko i mental kompará ku e inmigrantenan di Karibe Hulandes bibá na Hulanda. Salú di e inmigrantenan di Karibe Hulandes bibá na Hulanda tabata ménos bon ku di persona no inmigrante na Hulanda tambe. E resultadonan akí a persistí asta despues ku nos a hasi korekshon pa tuma na kuenta sierto variashon sosial i demográfiko (manera edat, estado sivil, nivel di enseñansa i situashon di empleo), faktor di riesgo (uso di tabako i alkohòl, sobrepeso i aktividat físiko) i nivel di urbanisashon (na Hulanda). Pa loke ta sobrepeso/obesidat i

diabétis, e situashon ta otro. Serka e poblashon di Karibe Hulandes bibá na Kòrsou, prevalensia di sobrepeso/obesidat (hende hòMBER so) i diabétis (tur dos sekso) ta similar ku serka e inmigrantenan bibá na Hulanda, i e ta mas haltu ku serka e personanan no inmigrante na Hulanda. Pa Aruba no tabatin dato ku por a usa pa hasi un komparashon den e investigashon akí.

Na **kapítulo 3**, e investigashon ta mustra ku, di 1988 pa 2014, e nivel di morto prevenibel (esta, morto debí na kousa ku lo no mester hiba na morto si e persona haña kuido di salú efektivu na tempu) tabata konsistentemente mas haltu na Aruba i na Antia/Kòrsou, kompará ku Hulanda. Si e sifra di mortalidat prevenibel na Aruba baha te na mas o ménos e nivel di Hulanda, ekspektativa di bida di hende hòMBER i muhé na Aruba lo subi ku 1,19 aña i 0,72 aña respektivamente. Na Kòrsou, e oumento lo ta di 2,06 aña i 2,33 aña. Si e sifra di mortalidat debí na enfermedat sirkulatorio prevenibel (manera enfermedat iskémiko di kurason, enfermedat serebrobaskular i enfermedat relashoná ku preshon haltu) baha te na mas o ménos e nivel di Hulanda, ekspektativa di bida di hende hòMBER i muhé na Aruba lo subi ku 1,02 aña i 0,56 aña respektivamente. Na Antia/Kòrsou, e lo subi ku 0,65 i 0,55 aña. Morto prevenibel ta responsabel pa 0,79 aña (hòMBER) i 0,90 aña (muhé) di e diskrepansia total den mortalidat ku tin entre e islanan akí i Hulanda. Nefritis/nefrósis tambe ta un faktor importante na Antia/Kòrsou. E ta responsabel pa 0,12 aña di e diskrepansia total den sifra di mortalidat serka hende hòMBER i 0,21 aña serka hende muhé. Ademas, si mortalidat debí na kanser na pechu baha te na e nivel di Hulanda, ekspektativa di bida di hende muhé na Antia/Kòrsou lo subi ku 0,22 aña i na Aruba ku 0,21 aña.

E resultatonan presentá na **kapítulo 5** ta mustra ku, di 1980 pa 2014, ekspektativa di bida di hende hòMBER na Aruba i Antia/Kòrsou a baha i di hende muhé a stagna, i e desaroyo akí a pone ku e diskrepansia den ekspektativa di bida entre e region akí i Hulanda a sigui krese atraves di aña. Na mes momento, atraves di aña, ekspektativa di bida den e teritorionan karibense ku tin relativamente poko outonomia, manera Martinique, Guadeloupe i e islanan britániko a kana pareu ku esun di e pais ku ta goberná nan. Un anáalisis mas detayá di e diferensianan entre ekspektativa di bida na e paisnan di Oksidente i na nan teritorionan afiliá ta mustra ku enfermedat kardiobaskular i faktor eksterno ta kontribuí supstansialmente na e sifranan di mortalidat mas haltu di e teritorionan den Karibe. Sin embargo, e diskrepansia den mortalidat entre e diferente paisnan karibense i nan paisnan oksidental ta varia bastante. Un diferensia entre e teritorionan hulandes i e otro partinan di Karibe ta ku na e teritorionan hulandes no tabatin un mehora supstansial den e periodo di 1980 pa 2014 riba tereno di mortalidat debí na enfermedat kardiobaskular. Ademas, e kantidat di homisidio na Antia/Kòrsou a oumentá drástikamente den e periodo akí, meskos ku a sosodé

tambe den e teritorionan estadounidense: Puerto Rico i U.S. Virgin Islands. Aksidente den transporte tambe ta un di e faktornan prinsipal ku a subi e sifra di mortalidat ku kousa eksterno na Antia/Kòrsou; na Aruba esaki ta e faktor prinsipal.

Di dos, nos a studia dos faktor ku por tin influensia riba e variashonnan den salú di poblashon bou di e diferente estadonan karibense, esta, konteksto polítiko i prestashon di maneho di salubridat. Nos a para ketu na tres aspekto di konteksto polítiko: stáтус polítiko aktual, dekolonisashon, i nivel di outonomia polítiko. Generalmente, loke nos a mira ta ku dekolonisashon a oumentá e diskrepansia di ekspektativa di bida entre e paisnan di Karibe ku awor ta soberano i esunnan ku ta afiliá na un pais di Oksidente. Tambe nos a konstatá ku na e paisnan di Karibe ku tin un afiliashon fuerte ku un pais oksidental, generalmente salú di e poblashon i prestashon di maneho di salubridat ta na un mihó nivel.

Na **kapítulo 4**, nos ta studia kon e diskrepansia den ekspektativa di bida entre e paisnan di Karibe ku aktualmente ta soberano i esunnan ku ta afiliá a desaroyá atraves di tempu. Loke nos a mira ta ku for di promé ku e proseso di dekolonisashon a tuma lugá meimei di siglo 20, ekspektativa di bida na e paisnan ku aktualmente ta soberano ya kaba tabata mas abou ku na e paisnan ku aktualmente ta afiliá. Dekolonisashon, esta, e proseso di independisashon polítiko di un kolonia, a bin kompañá pa un temporada, den e dékada despues di independensia, di ménos oumento den ekspektativa di bida, i e kambio akí no tabata konektá ku otro kambio similar den prestashon ekonómiko. Den e dékada di 1990, despues di e periodo di dekolonisashon, e diskrepansia den ekspektativa di bida entre e estadonan ku aktualmente ta soberano i esunnan afiliá a sigui krese mas lihé, i e ta sigui krese te dia djawe.

Na **kapítulo 5**, nos ta wak si tin un relashon entre e grado di outonomia polítiko ku un estado afiliá den Karibe tin i kon diferente su ekspektativa di bida ta kompará ku e pais oksidental ku e ta afiliá na dje. Loke nos a mira ta ku di 1980 pa 2014, na e paisnan di Karibe ku tin un laso fuerte ku un pais oksidental ku ta goberná nan, esta, Martinique, Guadeloupe i e islanan britániko, ekspektativa di bida a desaroyá mas favorabel kompará ku e estadonan karibense ku tin un nivel mas haltu di outonomia, esta, U.S. Virgin Islands, Puerto Rico, Aruba i Kòrsou. E kousanan di morto na e diferente estadonan karibense a desaroyá na un manera paresido, si kompará nan ku na e paisnan oksidental ku e estadonan akí ta afiliá na dje. Esei por indiká ku e kousanan di morto den Karibe tin di aber ku sierto faktor ku ta spesífiko pa e region akí. Sin embargo, e manera ku sifra di mortalidat a desaroyá atraves di tempu na e diferente estadonan karibense ku afiliashon polítiko ta varia bastante, prinsipalmente pa loke ta trata enfermedat kardiobaskular i kousa

eksterno. Kaminda e desaroyo akí tabata ménos favorabel ta den e teritorionan afiliá ku tin un nivel haltu di outonomia polítiko, esta, Aruba i Kòrsou.

Na **kapítulo 6** di e tésis akí, nos ta investigá si akaso, i dikon, tin diferensia entre 16 estado karibense den e periodo di 2010 pa 2015 pa loke ta prestashon di maneho di salubridat. Nos a konsiderá 11 tereno di maneho ku ta relashoná ku e metanan regional di salubridat fihá pa Organisashon Panamerikano di Salú (PAHO): 1. HIV/AIDS, 2. Enfermedat infeksioso, 3. Tèst preventivo di kánser, 4. Tabako, 5. Fertilidat, embaraso i parto, 6. Salú di mucha, 7. Diabétis, 8. Preshon haltu, 9. Alkohòl, 10. Siguridat den tráfiiko i 11. Violensia. Nos resultadonan ta indiká ku e diferensianan entre e diferente estadonan karibense riba tereno di salú por tin di aber ku diferensia den implementashon di maneho di salubridat efektivo. Ku otro palabra, frekuentemente, ta e estadonan karibense ku a introdusí medida di salubridat basá riba “best practice” ta skor mihó pa loke ta e 11 terenonan di maneho den e estudio akí. Martinique, Cuba i Guadeloupe ta esunnan ku a skor mas haltu pa prestashon di maneho di salubridat. Guyana, Belize i Sürinam ta e paisnan ku a skor mas abou. Di e sinku estadonan karibense polítikamente afiliá den e investigashon akí, Aruba a skor mas abou pa prestashon di maneho, loke ta indiká ku Aruba su prestashon di maneho no ta optimal. Pa loke ta resultado di salú, Aruba su prestashon ta bastante ménos favorabel pa loke ta morto debí na kánser na pechu, kánser na pulmon, morto den tráfiiko i embaraso hubenil. Pa Kòrsou no tin dato di mortalidat mas resien ku 2007 i debí na esei no por a hasi un análisis similar pa Kòrsou.

Aki tambe nos por mira ku un estado su stáтус polítiko ta hunga un papel importante: E estadonan karibense ku ta afiliá polítikamente na un pais oksidental a skor mas haltu pa loke ta prestashon di maneho di salubridat. Ta asina ku, generalmente, bo ta topa mihó prestashon di maneho di salubridat den área kaminda densidat di poblashon, produkto interno bruto pa kabes di poblashon i kontrol di korupshon ta haltu i kaminda tin ménos fragmentashon religioso. Den nos resultadonan, Cuba ta un eksepsion en bista di su independensia polítiko, su desaroyo ekonómiko limitá i su resultadonan eksepsional riba tereno di salú. Si wak kuantu mortalidat ku kousa prevenibel por baha si apliká maneho di salubridat basá riba “best practices”, e kontesta ta varia bastante di un estado di Karibe pa otro, pero pa Karibe den su totalidat, e potensial di redukshon ta supstansial. Si e otro estadonan di Karibe tabatin e mesun sifra di mortalidat ku Martinique, esei lo nifiká un redukshon general di 12% di mortalidat den Karibe.

Resumiendo, e tésis akí ta duna un mihó bista di kondishon di salú di poblashon di e islanan hulandes den Karibe i tambe di e faktornan ku tin di aber ku nan kondishon di salú,

partikularmente konteksto polítiko i prestashon di maneho di salubridat. Nos ta muestra ku kondishon di salú di poblashon na Aruba i Kòrsou ta ménos favorabel ku na Hulanda i algun otro estado karibense ku ta polítikamente afiliá. Kompará ku Hulanda, Guadeloupe i Martinique por ehèmpel, na Aruba i Kòrsou hende ta muri mas tantu debí na kousa ku por a prevení mediante kuido di salú na tempu i efektivu i/òf mediante intervenshon riba tereno di salubridat i prevenshon. Ta trata akí di kousa manera káncer na pechu, káncer na boka di matris, enfermedat iskémiko di kurason, enfermedat serebrobaskular, pulmonia, nefròsis/nefritis i aksidente di tráfiiko. Na Kòrsou, HIV/AIDS, káncer na tripa diki i na rekto, diabétis, enfermedat di kurason debí na preshon haltu, morto perinatal i violensia ta kontribuí substansialmente na e sifra di morto mas haltu. Esei ta indiká ku e sifranan di mortalidat ménos favorabel na Aruba i Kòrsou por tin hopi di aber ku e echo ku, te asina leu, e gobièrnunan lokal no a invertí na un manera optimal den e nesidatnan di salubridat di nan poblashon. P'esei, ku akshon dirigí pa mehorá aksesu na kuido di salú i kalidat di kuido (**kapítulo 3**) i si stimulá medida di maneho ku ta basá riba “best practices” (**kapítulo 6**), probablemente e resultadonan di salubridat riba e islanan di Karibe Hulandes por mehorá.

E investigashon akí, meskos ku algun otro investigashon anterior, ta muestra kon un laso fuerte ku un pais oksidental ta kontribuí na un mihó nivel di salubridat i mihó prestashon di maneho di salubridat den e estadonan karibense (**kapítulo 4, 5 i 6**). E investigashonnan den e tésis akí a aportá konosementu nobo i relevante riba dos diferente área. Di promé, nos a muestra ku for di tempu kolonial ya ekspektativa di bida den e estadonan ku aktualmente ta soberano tabata ménos favorabel ku den e estadonan ku ta afiliá aktualmente, ku e proseso di dekolonisashon a bai kompañá pa un periodo di ménos oumento di ekspektativa di bida, i ku te dia djawe e diskrepansia den ekspektativa di bida entre e estadonan ku aktualmente ta soberano i esunnan ku aktualmente ta afiliá ta sigui krese (**kapítulo 4**). Di dos, nos a muestra ku e diskrepansianan den e manera ku ekspektativa di bida a desaroyá den e teritorionan karibense ku ta polítikamente afiliá na Fransia, Reino Uní, Merka i Hulanda ta un refleho di e manera ku e teritorionan akí ta ser goberná. Den e teritorionan ku poko outonomia polítiko, esta Martinique, Guadeloupe i e islanan britániko, ekspektativa di bida a desaroyá mas favorabel kompará ku den e teritorionan ku tin mas outonomia polítiko: Puerto Rico, U.S. Virgin Islands, Aruba i Kòrsou (**kapítulo 5**). E midí di outonomia polítiko ta keda reflehá den e diferente strukturanan di gobernashon riba tereno di salubridat, i esaki por ta muestra riba e echo ku, den e teritorionan karibense kaminda e organisashonnan di salubridat ta kolaborá ku e organisashonnan den e pais oksidental ku nan ta afiliá na dje, e gobièrnunan lokal tin mas éksito den mehorá i protehá salú di nan poblashon. Martinique i Guadeloupe, por ehèmpel, a implementá mas tantu medida di salubridat basá riba “best practice”

(**kapítulo 6**). Esei probablemente ta debí ku e teritorionan ku ménos outonomia polítiko tin mas kapital humano, fondo, invershon i teknologia na nan disposishon pa por identifiká i atendé problema di salubridat, i debí ku e burokrasia den e teritorionan ei ta mas efisiente i por implementá plan mihó.

Di otro banda, e resultadonan akí ta mostra tambe riba e efekto di e situashon polítiko indesiso ku ta eksistí entre e islanan di Karibe Hulandes i Hulanda. Pa algun dékada kaba, ta outonomia polítiko i maneho finansiero di e islanan a dominá e diálogo entre e partinan di Reino. Tur esaki tambe a kontribuí na e situashon di salubridat aktual na Karibe Hulandes. Aunke e resultadonan akí por mostra riba un nesidat pa deliberá riba e karakter konstitushonal di Reino Hulandes i e responsabilidatnan ku Konseho di Minister di Reino tin, loke nos ke mostra na promé lugá ta ku falta mas konsientisashon tokante e atraso kresiente riba tereno di salubridat den Karibe Hulandes kompará ku Hulanda i tambe kompará ku otro estadonan karibense afiliá, i ku mester tin mas determinashon pa atendé e atraso akí.

Den futuro, investigashon riba tereno di salú riba e islanan di Karibe Hulandes lo mester konsentrá mas riba monitoreo di salubridat di poblashon i monitoreo di kuido di salú, pa asina esnan ku tin ku tuma desishon por tin informashon relevante i na tempu. Pa redusí e atraso riba tereno di salubridat, nos rekomendashon ta pa duna prioridat na e areanan di maneho kaminda e prestashon no ta optimal, ya ku ta riba e terenonan akí probablemente un intervenshon efektivu lo resultá den mas benefisio pa salú di e poblashon. Si loke nos a konstatá enkuanto e mihó situashon di salubridat na Martinique, Guadeloupe i e islanan britániko por sirbi komo inspirashon, loke mester saka for di esei ta ku un kolaborashon mas estrecho ku e organisashonnan (di salubridat) hulandes lo oumentá e posibilidat pa e rekomendashonnan akí por keda implementá eksitosamente.

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And lastly, to Curaçao. The island that feels like home and that I love. Warts and all.

About the author



Soraya Verstraeten was born in Breda, the Netherlands (1981). While working as an analyst in clinical microbiology at the University Medical Center of Utrecht, she simultaneously studied for her BAS in molecular biology, which she completed cum laude. During her time in Utrecht, she connected with people who stimulated her drive to explore how the world works and became interested in health research - specifically, in finding solutions for real-world problems using scientific methods. This led to her pursuit of a Msc degree in biomedical sciences at Utrecht University, which she completed in 2008. In the same year, she was nominated for the TopTalent scholarship programme of the NWO and started a PhD at the department of Cell Biology at the Erasmus MC. After a year and a half, Soraya left her PhD unfinished, as the disconnect between cell biology and society proved a stumbling block for her motivation. Next to microbiology and cell biology, she had the good fortune of being able to pursue her academic curiosities in the fields of (psycho)pharmacology, neurobiology, behavioral sciences, cardiology and molecular biology, before settling down in the field of public health

In 2010, Soraya moved to the beautiful island of Curaçao. There, she started working at the local Government in the middle of its historic constitutional change towards an autonomous country within the Kingdom of the Netherlands. In 2012, she co-founded the Institute for Public Health in Curaçao (Volksgezondheid Instituut Curaçao, VIC), where she coordinates data collection on health and healthcare through population-based surveys and data registration systems to support evidence-based policy making. As the principal investigator, she has led efforts on several large health studies, among which the national health surveys in 2013 and 2017 and the Global School-based Student Health Survey (GSHS) in 2015.

Wanting to know how to use sound research to promote good population health in a small island setting, Soraya went on to pursue her PhD with Prof. dr. Johan Mackenbach and Prof. dr. Hans van Oers. She completed her PhD at the Institute for Public Health (Ministry of Health, Environment and Nature, Curaçao) and the Department of Public Health (Erasmus MC, Rotterdam) in April 2020.

In her work, Soraya is driven by bridging the gap between scientific ideas and their pragmatic application for real-world problems. Next to research, she teaches general and organic Chemistry at the St. Martinus University School of Medicine and is involved with several initiatives that aim to develop and implement solutions to social challenges in Curaçao.

List of publications



This thesis

Verstraeten SPA, van Oers, HAM, & Mackenbach, JP. (2019) Health Policy Performance in 16 Caribbean States, 2010–2015. *American Journal of Public Health*, 109, 4, 626-632. <https://doi.org/10.2105/AJPH.2018.304733>

Verstraeten SPA, van Oers, HAM, & Mackenbach, JP. (2019). Differences in life expectancy between four Western countries and their Caribbean dependencies, 1980-2014. *European Journal of Public Health*. Ckz102. <https://doi.org/10.1093/eurpub/ckz102>.

Verstraeten SPA, van Oers, HAM, & Mackenbach, JP. (2019). Contribution of amenable mortality to life expectancy differences between the constituent countries of the Kingdom of the Netherlands. Submitted.

Verstraeten SPA, van den Brink CL, Mackenbach JP, & van Oers, HAM (2018). The health of Antillean migrants in the Netherlands: a comparison with the health of non-migrants in both the countries of origin and destination. *International Health*. 10, 4, 258-267. <https://doi.org/10.1093/inthealth/ihy026>

Verstraeten SPA, van Oers, HAM, & Mackenbach, JP. (2016). Decolonization and life expectancy in the Caribbean. *Social Science & Medicine*, 170, 87–96. <https://doi.org/10.1016/j.socscimed.2016.08.048>

Other (selection)

Verstraeten SPA. Health indicators in Curaçao 2018. Willemstad, 2018.

Verstraeten SPA. Resultaten monitor wachttijden medisch specialistische zorg. 2017.

Verstraeten SPA., Griffith-Lendering M, Pin R. De Nationale Gezondheidsenquête 2017. Resultaten, methode en tabellen. Willemstad, 2017.

Pin R.R., Verstraeten SPA., Griffith-Lendering M. De Nationale Gezondheidsenquête 2017. Themarapport Arme wijken. Willemstad, 2017.

Verstraeten SPA. The Curaçao Global School-based Student Health Survey (GSHS) Study 2015. Willemstad 2016.

Verstraeten, SPA., Jansen, I. De Nationale Gezondheidsenquête 2013. Themarapport ouderen. Willemstad, 2013.

Verstraeten, SPA., Jansen, I., Pin, R.R., Brouwer, W. De Nationale Gezondheidsenquête 2013. Methodologie en belangrijkste resultaten. Willemstad, 2013.

PhD portfolio



PhD training, teaching and other activities

Candidate	Soraya Petronella Adriana Verstraeten
Affiliation	Institute for Public Health (VIC), Ministry of Health, Environment and Nature, Curaçao and Department of Public Health, Erasmus MC, Rotterdam
PhD period	January 2015 – September 2019

Training

Courses – Public Health	Year	Workload (ECTS*)
Erasmus MC		
ESP11 Methods of Public Health Research	2015	0.7
ESP42 Methods of Health Services Research	2015	0.7
ESP45 Primary and Secondary prevention research	2015	0.7
ESP61 Social epidemiology	2015	0.7
ESP 63 Master class: Advances in Genomics Research	2015	0.4
ESP64 Masterclass: Advances in Epidemiologic Analysis	2015	0.4
ESP66 Logistic Regression	2015	1.4
Massive Open Online Courses (MOOC)		
PH555x Improving global healthcare focusing on quality and safety (HarvardX)	2014	1.7
PH201x Health and Society (HarvardX)	2014	1.7
PH210x United States Health policy (HarvardX)	2014	1.9
SW25x Global health: case studies from a biosocial perspective (HarvardX)	2014	1.7
PH231 Readings in global health (HarvardX)	2016	1.4
System thinking in Public health (John Hopkins University online)	2017	1.4
Community change in Public Health (John Hopkins University online)	2017	1.4
Courses – General		
Erasmus MC		
Scientific Integrity	2015	0.3
Massive Open Online Courses (MOOC)		
University teaching 101 (John Hopkins University)	2014	0.9
Writing in the Sciences (John Hopkins University)	2016	1.4
Total		18.8

*1 ECTS = 28 hours of workload

Presentations (selection)

Description	Institution(s)/event	Year(s)
Presentation “Global School-based Student Health Survey (GSHS) Curaçao 2015. Health behaviours and protective factors”	Ministerial management teams, policy makers, school boards, school directors and foundations	2015-2017
Workshop “Health Behaviour of adolescents in Curaçao”	Annual teachers seminar protestant school board (VPCO)	2017
Presentation results “National Health Survey Curaçao 2017”	Ministerial management teams, policy makers, and foundations	2017-2018
Panel discussion “It’s time to get real about food”	CoWorld	2017
Presentation “Poverty and health in Curaçao”	Conference “Poverty in Curaçao”, Dutch Caribbean Economists	2018
Presentation “A comparative analysis of population health in the Caribbean”	Annual symposium Public Health, Avalon University School of Medicine	2019
Presentation “Communicable diseases in Curacao, a comparison with the Netherlands and Aruba”	Parliament of Curaçao	2019

Teaching

Course	Institution	Year(s)
Training survey administrators, Global School-based Student Health Survey (GSHS) 2015	Institute for Public Health/Central Bureau of Statistics	2015
Training of survey administrators, National Health Survey Curaçao 2017	Institute for Public Health/Central Bureau of Statistics	2017
General and Organic Chemistry	St. Martinus University, Faculty of Medicine	2012-now

Other activities

Description	Institution	Year(s)
Researcher/project manager	Institute for Public Health	2012-now
Reviewer	Social Science & Medicine, Global Public Health and International Journal of Health Policy and Management	2016-2019
Guidance committee “Exploration monitor juvenile criminal law Dutch Caribbean”	WODC, Ministry of Justice and Security, the Netherlands	2019



This thesis focuses on population health in the Dutch Caribbean islands of Aruba and Curaçao, as compared to the Netherlands and other Caribbean states. It aims to provide a better insight into the health situation of the Dutch Caribbean, and the factors related to this health situation, in particular the role of the political context and health policy performance. In order to address this aim, we have made use of data that are derived from cross-sectional health surveys, mortality registration systems, harmonized international databases and country reports and cover theory from the fields of public health, medicine, political science, organization science, economics, and sociology.

The main conclusion of this thesis is that the health status of the Dutch Caribbean population is poorer than in the Netherlands and in other politically affiliated states. People in Aruba, and even more so in Curaçao, were more likely to die from causes that are considered avoidable in the presence of timely and effective healthcare and/or interventions in public health and prevention. This suggests that an important aspect contributing to the poorer health outcomes in the Dutch Caribbean is that the local governments have, so far, not optimally addressed their population's health needs.

