Universiteit van Amsterdam

Faculty of Medicine

# Charles O. Agyemang

# Healthy Migrants, Healthy Society

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*Rede*

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door

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*Esteemed Rector Magnificus,*
*Esteemed Dean,*
*Esteemed Members of the Board of Directors of the University of Amsterdam,*
*Distinguished colleagues,*
*Ladies and Gentlemen,*
I am grateful for the opportunity to deliver my inaugural lecture this evening.

## Migration in context

Migration by definition is a movement of people from one place to another with the intention of settling temporarily or permanently in the new destination. Typically, it involves movements over long distances and from one country or region to another. It is an essential element of humanity and will continue regardless of what we say about it. Human beings have been migrating throughout human history. In fact, our world today is what it is because of migration. Homo Sapiens or 'modern humans' now scattered across the world exist because of migration from East Africa about 200 000 years ago (Figure 1).[1] Migration has been a topic of discussion since time immemorial and some of the migration issues are even discussed in ancient HOLY books e.g. Bible on hosting migrants. Leviticus 19. 33 states: '*When a foreigner resides among you in your land, do not mistreat them*'. *The foreigner residing among you must be treated as your native-born…'* This was about 3460 years ago.

Each generation has its own unique migration patterns and challenges and our generation is no exception. Our world today is marred by wars, persecutions, and large inequalities in wealth, alongside globalisation and technological development all of which attract international migration. It is not surprising that in 2017, the estimated number of people living in a country other than their country of birth was 258 million— an increase of 49% since 2000.[2] This represent 3.4% of the world's inhabitants. If we group all these people together, it will be the 5$^{th}$ largest country in the world after China, India, USA and Indonesia, respectively.

Our generation has witnessed many waves of migration mainly from wars, violence and economic hardship leading to often humanitarian and refugee

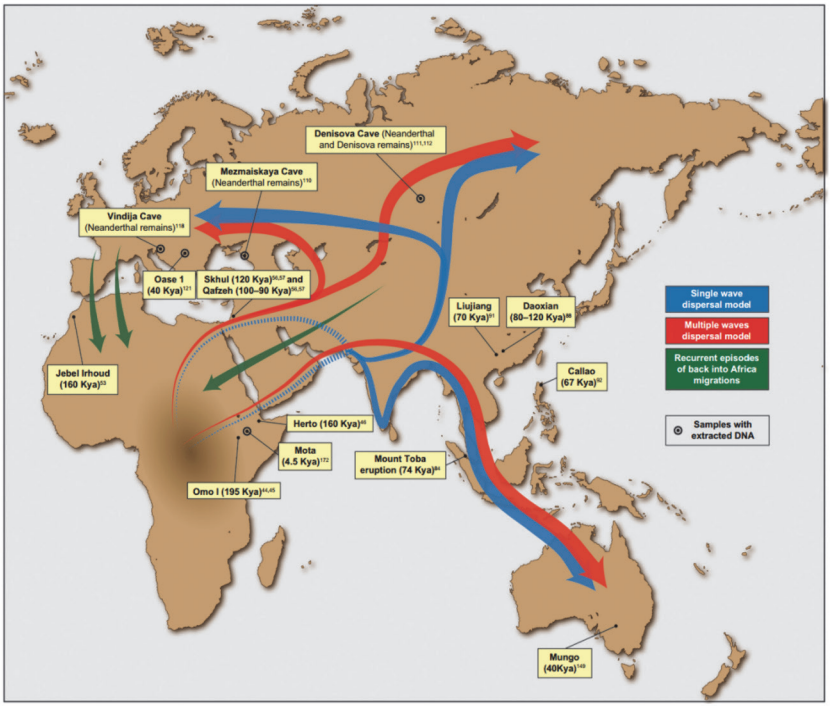


*Figure 1: Putative migration waves out of Africa and back migrations into the continent, as well as the locations of major ancient human remains and archeological sites (López et al. 2015).*

emergencies. Recent memorable ones include the Syrian war, which has resulted in over 5.3 million refugees as of 2018 according to UNHCR; and a wave of migration from North Africa to Europe. We have seen on our TV screens migrant children being snatched away by the sea; many boats capsized in the seas full of migrants and many coffins of unknown migrants who died while trying to seek safety or better life in Europe. It has been estimated that more than 50,000 people have lost their lives in the Mediterranean alone since 2000.[3] Many of these migrants were fleeing from instability caused by wars, violence, natural disasters and human rights abuses. We have seen how migration brings out the best and the worst in people. Some countries opened their borders and doors to desperate migrants seeking refuge, others wired their borders up and some are contemplating building beautiful walls even if there are no migration emergencies. We have heard of migrants being sold in Libya. We have seen mi-

grants' shops set ablaze in South Africa. We have seen a camerawoman for the Hungarian nationalist television channel who was filmed kicking two refugee children and tripping up a man carrying a child in his arms causing him to fall on the child at the border hotspot of Röszke. We have seen migration becoming a political football all around us and a rise in anti-immigration sentiments and xenophobia. Sometimes I wonder how the future generation will judge our current generation's response to our migration crisis.

Migration, in most part, is a natural safety net, so it is not surprising that migrants tend to migrate to high-income countries where they hope to feel safe. Others were actively encouraged to migrate as labour migrants e.g. Turkish and Moroccans in the Netherlands and African Caribbeans in the UK in the 1960s and 1970s.

The number of international migrants living in high-income countries rose from 9.6% in 2000 to 14% in 2017. In the European Union (EU), there were 36.9 million persons born outside the EU in 2017, while 20.4 million persons were born in a different EU Member State from the one where they were resident, together representing about 10% of the European population.[4] In the Netherlands, it is estimated that about 12.1% of the population are of first generation migrant origin.[5] When the first and the second generation are combined, the figure is about 23.1% of the total population as of 2018 (Figure 2). Migrants tend

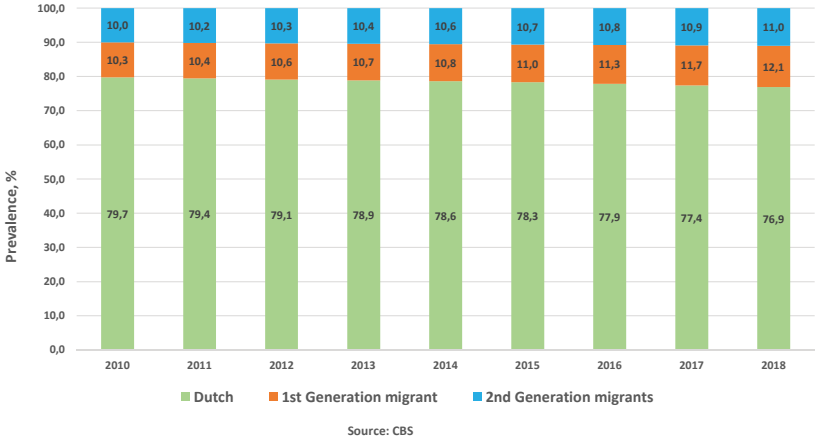


*Figure 2: Distribution of migrants and non-migrants in the Netherlands from 2010-2018*

to concentrate in urban centres in high-income countries. In major cities such as Amsterdam the number can be up to 30%.

*So what motivates people to migrate?* People migrate for all sorts of reasons including wars or conflicts, persecution and economic circumstances as mentioned above, but also for education, family reunion, and seeking better health among many others. Migration remains a double-edged sword. On one hand, it can improve migrants' and their families' socioeconomic circumstances through better education, higher income, and by providing a safety net from violence and persecution among those from war-torn countries. Most migrants migrate at young age and are willing to do the jobs that the destination populations are often unwilling to do as well as providing much needed high skilled workers for economic growth and, in the process, contributing massively to productivity and growth of the destination countries.

The health care sector stands out with migrants constituting a substantial portion of the health-care workforce in many destination countries especially in high income countries. In the United Kingdom (UK), for example, 37% of medical doctors gained their medical qualification in another country.[6] It is often said in the UK that the National Health Service would collapse if it was not for migrants. Health professionals migrate to high-income countries because of poor working conditions, high workload, low wage, and insufficient opportunities for professional development in their home countries. Many higher-income countries thus reap the benefits of these high qualified health professionals.
There is a general perception that migrants receive more social benefits than they contribute in taxes. The evidence, however, suggests that migrants actually make greater overall contributions than the social or welfare benefits they receive, except in countries with a high proportion of older migrants.[7] Evidence suggests that each 1% increase of migrants in the adult population increases the GDP per person by up to 2%.[8] Thus, migrants in general contribute more to the wealth of the host countries than they cost.

Migration does not only benefit host countries, but also migrants' home countries. Remittances from migrants is a major source of revenue for the sending countries for economic and social development. In 2017, for example, migrants sent US$613 billion to their families in their home countries; and about three-quarters of these remittances were sent to low- and middle-income countries according to the World Bank.[9] These remittances are 3-fold larger than all official development aid put together; and these funds are mostly spent on livelihood and education for more than 700 million family members left

behind and thereby transforming the lives of many people including vulnerable children in many poor countries.

A question that stands out is: *if migrants play such an important role in social and economic development in both the destination countries and their countries of origin, why then has migration become so politically polarised?*

This may be driven by misconception about migrants in the current socio-political climate where the term 'migrant' raises a litany of myths and inaccurate bigotries, stereotypes and falsehoods about migrants, which have frequently become acceptable in public. A common misconception is that there are too many migrants; and as a result citizens in many countries typically overestimate the number of migrants by three or four times.[10-11] For example, in Italy, the actual proportion of migrants in 2016 was 7%, but people thought it was 30%. Recent Brexit discussions in the UK showed similar patterns. People overestimated the proportion of EU migrants in the UK by a factor of almost three, thinking it was 16% when it was only 6%.[12]

This is not to say migration is all hunky-dory or not without challenges. Migration poses challenges to migrants themselves, those left behind in their home countries and the host countries, in spite of the positive effects of migration. For migrants, the challenges include vulnerability in the new destination including situations of violence, insecurity and poverty, marginalization due to hostility, nativism and financial pressures imposed on them from families in their home countries. For the home countries, migration comes with separation of families, including children, who often grow up without their parents.

For the host countries, migration can be threatening in terms of unknown cultures, perception of insecurity, poor integration and challenges of acculturation into norms of Western societies such as gender equality; perceived competition with the low socio-economic groups for wages and social services. This can provoke xenophobia and anti-migrant sentiments.

## Migrant Health

With these numerous challenges, it is not surprising that one of the major problems facing migrants is vulnerability to poor health. Promoting migrant health can go a long way to keep migrants healthy. The need to safeguard and promote migrants' health is well enshrined in several legal and human rights documents including resolutions WHA 61.17 in 2008, which called upon UN Member States to promote migrant-sensitive health policies, equitable access to health

promotion, disease prevention and care for migrants without discrimination on the basis of age, gender, religion, nationality or race.[13]

In addition to legal and human right obligations to safeguard and promote migrants' health, it also makes a whole lot of economic sense to keep migrants healthy. Healthy migrant population will boost their economic and social contributions towards the host countries and prevent health care costs associated with poor health, and provide the crucial support through remittances to their home countries to assist social and economic development that most of these countries desperately need. Keeping migrants healthy is therefore in the best interest of both the destination countries and the countries of origin because of the bi-directional contributions they make towards them. Unfortunately, for so long, the issue of migrant health has remained in the fringes of the health care system dialogue and a largely under-researched area in the health arena; although it is increasingly recognized as a global public health priority.[5]

*So what is the state of migrant health?* There are three main scientific approaches to gain insights into the health status of migrants including (i) ethnic inequalities, (ii) the role of context, and (iii) the role of migration. The ethnic inequalities approach evaluates migrant health status by comparing migrants with the host populations in the destination countries. The role of context approach evaluates the impact of national context on migrant health by comparing similar migrant population living in different destination countries. Lastly, the role of migration approach evaluates the impact of migration by comparing migrants with their compatriots that did not migrate and are living in their home countries.

Many studies in public health do not include migrants, and as a result, data on migrant health are limited particularly in cohort studies. A review in 2006, for example, found no cohort studies focused only on migrants in Europe.[14] Studies comparing migrants with the host populations remain the dominant approach among these limited studies in Europe and North America. Consequently, most of the current knowledge on migrant health is based on comparative analyses between migrants and the host populations. I will first discuss the knowledge gained from the studies on the ethnic inequalities in health approach, its pitfalls, and later discuss the relevance and the need to pay more attention to other approaches.

### *State of migrant health relative to the host populations*

Most of the studies on ethnic inequalities in health are cross-sectional designs in nature. Of late, however, the linkage technique has been used in a few

countries in Europe such as Scotland, Denmark, Italy and the Netherlands to generate retrospective studies due to limited longitudinal study designs. These studies have provided data on various migrant populations such as economic migrants, refugees, asylum seekers and the various generations of migrants. A large number of these studies on ethnic inequality have also focused on ethnic minority groups as a whole, which include migrants and their descendants, especially in countries such as the United Kingdom where the term 'migrant' carries a negative connotation.

The Department of Public Health in Amsterdam UMC, location AMC has been a major player in migrant health and ethnic minority heath research on a global stage. In a recent systematic review of papers using only 'migrants' as a key word, University of Amsterdam came 2nd in the worldwide ranking. The Department of Public Health in location AMC has played a very crucial role in this by setting up the SUNSET study and more recently the unique HELIUS study under the leadership of Prof. Karien Stronks & Prof. Koos Zwinderman and many others. In addition, in collaboration with Julius Centre, University of Utrecht (Dr Ilonca Vaartjes & Prof. Michiel Bots), we have set up a nation-wide prospective cohort study on cardiovascular diseases using the linkage technique.

These studies, including our own in the Netherlands, have provided very rich data and have revealed important differences in health outcomes including mortality and morbidity between migrants and the host populations. Some of these studies have shown lower overall mortality rates in some migrant groups than in the host populations. Because of this mortality advantage, a whole lot of theories have been generated, the most famous one being the 'healthy migrant effect' hypothesis and 'Salmon bias'. This 'healthy migrant effect' hypothesis theory suggests that the beneficial mortality advantage among migrants is due to selection bias whereby only healthy people migrate while 'Salmon bias' theory suggests that migrants who are severely ill go back to their home countries to die thereby creating statistical immortality. However, the healthy migrant effect phenomenon is not straightforward and depends on country and migrant group under study. In several European countries such as the Netherlands and Denmark, the mortality rates are actually higher in most migrant groups than in the host populations. For example, the Surinamese, Antillean and Turkish migrants have higher mortality rates than the Dutch majority population. In contrast, North African populations have a lower mortality rate than the Dutch general population.[15] The mortality advantage also depends on the European country where migrants live. While the Northern African migrants in the

Netherlands have a lower overall mortality than the general Dutch population, Northern African migrants in Spain have a higher mortality than their Spanish majority populations.

The picture of mortality rate differences gets even more complex when specific causes of death and different countries are considered. For example, mortality from infectious diseases and external causes in migrants is higher than in the host general populations. These observations seem to suggest that these popular theories of healthy migrant effect and Salmon bias may explain far less than people often give credit to, and suggest the need to consider alternative explanations for lower mortality rates observed in some countries such as poor quality of mortality data, migration history and health status of the host population to which migrants are compared. I will address the predicaments of these popular theories in detail later on.

Evidence indicates that chronic non-communicable diseases such as diabetes and cardiovascular disease incidence and prevalence rates differ importantly between migrants and the host populations in the destination countries depending on migrant background, disease type and the host country in which migrants live.[16] While the risks for cancers that are strongly related to a Western lifestyle such as colorectal cancer and cancers of the pancreas, lung, breast, ovary, and kidney are lower in migrants, the risk of infectious disease-related cancers such as hepatic cancer, Kaposi's sarcoma, cervical cancer and some lymphomas are higher in migrants than in the host populations.[17]

Diabetes stands out among migrants. Migrants and their descents are disproportionately affected by diabetes compared to the host populations in all destination countries. Our meta-analysis on type 2 diabetes among ethnic minority and migrant populations in Europe shows a higher prevalence of type 2 diabetes in all migrant groups ranging from 1.3 times in South and Central Americans to 3.7 times in South Asians compared with the European host populations (Figure 3). When the subgroups of South Asian populations were further assessed separately, the odds of type 2 diabetes was particularly striking among Bangladeshi individuals with a six-fold higher odds than the host European population.[18]

In addition, migrant groups have higher risks of cardiovascular diseases such as coronary heart disease and stroke compared with the host population although with some notable exceptions. For example, in the Netherlands, Surinamese, Antilleans and Indonesians have an increased risk of cardiovascular diseases such as stroke and acute myocardial infarction, but Moroccans have a reduced risk for cardiovascular diseases.[19] Even among Moroccans who ap-

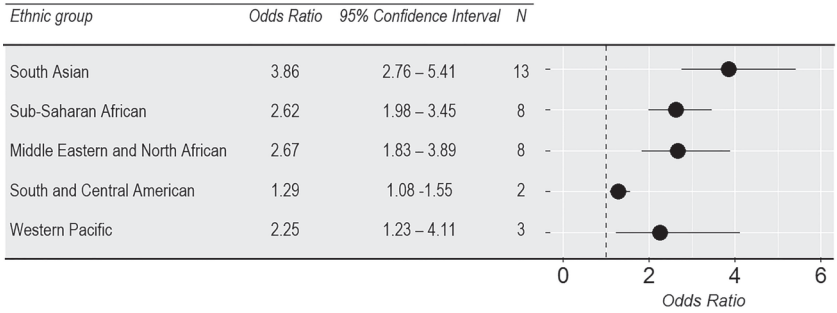


*Figure 3: Pooled odds ratios for type 2 diabetes for ethnic groups in Europe compared with the host European populations (adapted from Meeks et al., 2015). N = number of studies included.*

peared to have a lower risk of cardiovascular diseases, the emerging evidence suggests that their advantage is waning. For example, between 2000-2004, Moroccan migrants in the Netherlands had a significantly lower incidence of acute myocardial infarction compared with the Dutch majority population, but this advantage disappeared during 2005-2010.[20] Similar observations have been seen in other populations such as African Caribbean women in the United Kingdom who originally had a lower coronary heart disease, but now have a higher coronary heart disease rate than the English general population.

These differences reflect on other major metabolic risk factors such as hypertension and obesity. In the Netherlands, age-adjusted prevalence of hypertension is higher in all ethnic minority groups particularly among African origin people compared to the Dutch general population according to the HELIUS study. More striking is the change in advantage among Moroccans in the Netherlands. In 2006, we found that Moroccans had the lowest hypertension rate in the Netherlands.[21] This advantage has already been lost with Moroccans now having higher prevalence rates of hypertension than the Dutch general population.[22] Obesity is also a major problem among migrants especially in women.[16] These findings clearly demonstrate migrants' poor health vulnerability and the need to pay close attention even to those who have a health advantage.

Evidence also shows diverse and complex intergenerational differences. Among migrants from the former Dutch colonies such as Suriname, Indonesia, and Netherlands Antilles beneficial intergenerational changes in cardiovascular diseases have been observed with the second generation having lower acute myocardial rates while the first generation have higher rates compared with the Dutch general population.[23] In contrast, unfavourable intergenerational chang-

es have been observed among migrants from some countries such as China, Germany and Poland with the second generation having higher rates of acute myocardial infarction compared with the host Dutch populations.

### *Reasons for the differential risks between migrants and the host populations*

*So, what is behind these health differences between migrants and the host populations?* The reasons for these differentials are not well understood, but are thought to be driven by differential exposures to risk factors, and differences in health systems response to prevention and management of risk factors and complications. Indeed, exposure to a different environment can change migrants risk profiles in both positive and negative ways.

Positively, exposure to a new environment can improve migrants' nutritional status especially of those from war torn areas, and access to high quality preventive and curative care in the destination countries can improve migrants' health status significantly. Negatively, exposure to a new environment can lead to unfavourable health outcomes as a result of the detrimental interaction of multiple adverse individual and structural factors such as poor socioeconomic circumstances, unhealthy lifestyle changes, marginalisation, poor access to health care and epigenetics.

However, the knowledge on the key specific environmental exposures and specific genetic factors driving the negative health outcomes among migrants is limited due to the lack of appropriate studies to evaluate these factors. In the midst of inadequate data to help gain better understanding on migrant health inequalities, several hypotheses have been proposed. Some of these hypotheses, particularly the healthy migrant effect, Salmon bias, low socio-economic status effect and genetic factors have gained prominence, but they are largely untested. Although the healthy migrant effect hypothesis was originally developed to explain lower mortality rates in migrants in some countries, it has become so popular that it is now used to explain any health advantage that is observed in migrants compared with the host populations. By contrast, the migrant health disadvantage is generally explained by factors such as low socioeconomic status, unhealthy lifestyle and genetics. The two opposing explanations have consciously or unconsciously created a *'Comfy Zone*' explanatory model for migrant health researchers (Figure 4).

A pitfall for us as researchers, is that we do not have to think hard for the potential explanations for findings because of the *'Comfy Zone'* explanatory model; migrant health advantage is simply due to the healthy migrant effect and

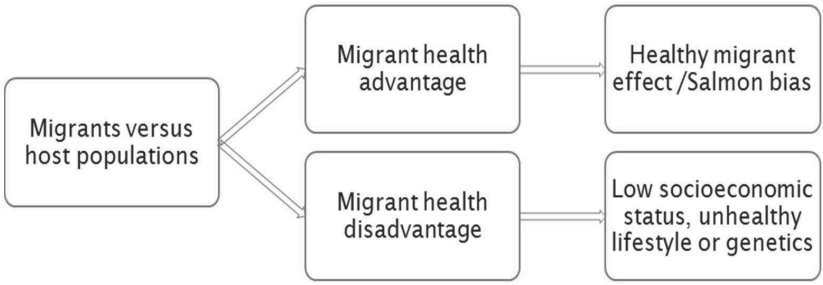


*Figure 4: Comfy Zone Explanatory Model for migrants' health inequalities*

poor health outcomes are due to low socioeconomic status, unhealthy lifestyle or genetics. The '*comfy zone*' explanatory model has gained so much popularity that it is not uncommon to see its application in the same migrant population. For example, the healthy migrant effect is usually used as an explanation for the low cardiovascular disease mortality among Moroccan migrants, but the high rate of diabetes mortality is often attributed to low socioeconomic status, genetics, unhealthy behavioural factors and early life factors such as higher low birth weight prevalence. If selective migration is responsible for the favourable cardiovascular mortality among Moroccan migrants, then why does this not apply equally to diabetes mortality?

Undoubtedly these hypotheses have served researchers in migration and health well for the last few decades. However, the reliance on these hypotheses has become a standing block for the development of the migrant health research field as they provide untested explanations in communicating our findings. Indeed, the validity of the healthy migrant effect has long been challenged due to the poorer quality of mortality data on migrants compared to the host populations and the inconsistent results across countries particularly in Europe. In our recent study in Denmark examining the potential role of the healthy migrant effect on health using a unique data set, we found that both refugees and family reunited migrants already had a higher disease burden within 5 years of arrival for most diseases than the Danish-born individuals.[24]

The idea that migrants who are severely ill tend to go back to their countries of origin in order to be cared for by their relatives in a familiar environment (i.e. Salmon bias hypothesis) has been challenged. There are indeed two sides to every story. Although the Salmon bias hypothesis seems attractive, it also raises an important question. The question it poses is this: why would migrants with access to high quality health care in high-income countries go back to their countries where access to essential care is often difficult especially at a time

when they need it most? It is of no surprise that the limited data to corroborate this theory are weak. We recently assessed whether migrants with severe disease were more likely to emigrate compared with migrants without severe disease. Contrary to the popular theory, we found that migrants with higher disease severity were less likely to emigrate.[25] These findings suggest that the destination countries need to put policies in place to address the health needs of migrants with severe illness rather than assuming that they will go home to die.

In contrast, the unhealthy lifestyle, genetic predisposition and low socioeconomic status have been suggested as potential explanatory factors for migrants' health disadvantage. However, less is known about the key unhealthy lifestyle and genetic factors driving the migrant health disadvantage. In addition, studies show complex relationships between low socioeconomic status and health among migrant populations. Unlike the clear inverse relationship between low socioeconomic status and health outcomes that are seen in the European populations, studies on migrant populations show inconsistent results and the available evidence indicates that low socioeconomic status does not entirely explain migrant health disadvantage.[26] While socio-economic status is very important in all populations, the issues surrounding migrant health are much broader than socioeconomic status and researchers need to cast their net further afield to include other important factors such as culture, early life social circumstances, psychosocial stress and epigenetics.

Unhealthy lifestyle factors such as physical inactivity, smoking, excess alcohol consumption and unhealthy diet have also been shown to influence migrants' health considerably. Migration-related lifestyle changes in most part are inevitable due to exposure to different social and economic systems, nutritional supply, environmental built and cultural traditions among many other factors. Despite the important role of lifestyle on migrant health, they do not entirely explain health differences between migrants and the host populations. This seems to suggest that other factors such as genetic predispositions and early life may be important. However, data on these factors are limited. Thus, to carefully assess health inequalities in migrants, we need to take into account all the necessary factors including pre-migration factors (e.g. early life factors), psychosocial factors, socioeconomic status, migration-related lifestyle changes, nutrition, genetics, epigenetics and contextual factors in the destination countries such as nutritional supply, integration policies and availability and accessibility of culturally tailored prevention programmes. Assessing all of these factors in a single study is hard and costly and requires considerable investment.

## Way forward to improve and maximise the impact of migrant health research

To make progress in understanding health differentials between migrants and the host populations, we need to move beyond the current *'Comfy Zone'* explanatory model and generate and test hypotheses in the real world. There is also a need to pay more attention to other approaches in assessing migrant health including studying the role of context and migration. Detailed understanding of key specific factors driving the migrant health differentials is essential in designing effective public health preventive- and clinical care strategies to address migrant health inequalities. In so doing, over the last few years efforts are being made to develop new theories. For example, the adipose tissue overflow hypothesis for the South Asians susceptible to central obesity and its atherogenic consequences, and the life course approach to understand migrant health although these hypotheses remain to be confirmed.

The need to pay more attention to other methods of assessing factors related to migrant health such as the role of context and the role of migration is increasingly gaining momentum as such methods have more potential to facilitate better understanding of the causes of migrant health inequalities.

Our team in location AMC has been at the forefront of broadening the scope of migrant health research including studying both the role of context and on the role of migration. In this section, I will discuss some of our team initiatives in broadening the scope of migrant health research and the translation of the research knowledge into prevention.

### *The role of context*

Assessment of factors within national contexts offers an important opportunity to gain insights into how circumstances, such as opportunities for socio-economic development of migrants, access to prevention programmes and healthcare for migrants and integrational policies in the individual host countries can shape migrants' health outcomes. Indeed, the host countries are not monolithic. Studies on these national contextual factors may contribute to pinpointing the key environmental exposures contributing to migrant health inequalities. This can be done by comparing, for example, similar migrant populations living in different European countries.

Our team, through the VENI subsidy I received in 2006 from The Netherlands Organisation for Scientific Research (NWO), standardised and merged two key studies carried out in the Netherlands (The SUNSET study) and En-

gland (Health Survey for England) on ethnic minority groups to assess the role of national context on several health outcomes among rather similar populations living in these countries. In a series of analyses, we demonstrated important differences between South Asian Indian and African Caribbean origin people living in the Netherlands and England. In general, the observed differences in cardiovascular disease risk factors between South Asian Indians and African Caribbeans living in these two countries were similar to the differences observed between the European origin Dutch and English people. For example, South Asian Indians and African Caribbeans in the Netherlands had a higher prevalence of smoking than their corresponding counterparts in England, a finding which reflected a higher prevalence of smoking among European Dutch compared with the English general population.[27]

Similarly, in a Migrant and Ethnic Health Observatory (MEHO) project, we found the lowest circulatory mortality rate in French locally-born population compared with locally-born populations in Denmark, England and Wales, The Netherlands, Scotland and Sweden. The circulatory mortality rates were similarly and consistently lower among all migrant groups living in France compared with their corresponding migrants groups living in these European countries.[28] Thus, evaluation of the role of national context has a huge potential to generate new hypotheses into the causes, control and consequences of cardiovascular disease and risk factors among migrant populations. To shed further light on the potential causal relations between contextual factors and health differentials among similar migrant populations living in different countries there is a need for more detailed data on contextual factors such as nutrition supply, integration policies and quality and access to preventive care services.

### *The role of migration*

Studies on the role of migration are essential to gain insights into the extent to which the health of migrants is influenced by the migration process and the exposure to the new environment in the destination countries. Studies on the role of migration can also play an important role by informing policy in migrants' home countries as changes in health outcomes upon migration to the destination countries, especially in high-income countries, provide indications of the potential future health threat in these countries as they continue to *Westernize*. In spite of the relevance of the role of migration, only a limited number of studies have compared health risk of migrants to the populations of the countries

of origin and these limited studies lacked critical data such as information on nutrition, psychosocial stress and migration-related lifestyle changes.

Therefore, in 2012, our team in location AMC set up a multi-centre RODAM study, supported by the European Commission, to gain insights into the role of migration in African migrants in Europe. This was done in collaboration with several European and African institutions. The RODAM study has sampled 6385 Ghanaian migrants living in three European cities (Amsterdam, Berlin and London) and their compatriots living in urban and rural Ghana.[29]

With over 30 papers published so far from this study and with 10 PhD students having been or being trained under this programme, we have been able to reveal important differences in health outcomes such as obesity, diabetes, hypertension, dyslipidaemia, and estimated cardiovascular risk as well as differences in the potential factors that may explain the differences such as lifestyle (physical activity, smoking, dietary behaviour), psychosocial stress, insulin resistance and beta-cell dysfunction, and epigenetics. Further lesson from this study is that while migrants are generally more affected by cardiovascular disease risk factors such as obesity, diabetes, and hypertension compared to their counterparts in the country of origin, the urban African populations are catching up very quickly. For example, prevalence of type 2 diabetes among urban Ghanaians is at par with their Ghanaian migrant peers. This may reflect rapid changes in lifestyle in urban centres driven by *'Westernization'* in low and middle-income countries in general. The New York Times editorial following the publication of these results put it very elegantly *'Obesity Was Rising as Ghana Embraced Fast Food, Then Came Kentucky Fried Chicken (KFC)'*. In addition, in collaboration with the genetic department (Dr Henneman & Prof. Mannens), we have also found that epigenetic factors contribute importantly to obesity and diabetes among these populations. For example, we have identified several differentially methylated positions for diabetes and the top six differentially methylated positions combined explained nearly 25% of variance in type 2 diabetes.[30]

Next to the quantitative design, we have conducted one of the largest qualitative studies on migrants and non-migrants with 26 focus groups including 180 individuals and 183 in-depth interviews under the leadership of Prof. Ama de-Graft Aikins to further shed light on the perception and knowledge of these conditions in both migrants and non-migrants to facilitate better understanding of the quantitative findings. The first qualitative paper on diabetes perception and knowledge found that there was a general awareness of diabetes as a serious chronic condition with life threatening complications, but knowledge of diabetes prevention and reduction of diabetes complications was very lim-

ited. Several analyses are currently ongoing and in the coming months we will learn a lot about perceptions and knowledge of chronic diseases among these populations, which will give us more insight into the observed differences in health outcomes between migrants and non-migrants.

Through European Research Council Consolidation grant that I received last year, our team in collaboration with Prof. Owusu-Dabo (Kwame Nkrumah University Science & Technology) has been given a unique opportunity to move the RODAM study onto the next level. In the coming years our team will transform the RODAM study into a *state-of-the-art* prospective cohort, which will help to fill the critical gap in knowledge about health among African migrants in Europe and their compatriots in rural and urban Africa by studying changes in risk factors over time including both environmental factors and epigenetic changes and their impact on hypertension and other health outcomes such as diabetes and chronic kidney diseases. Our main hypothesis is that migration from low resourced to high resourced environment leads to rapid changes in socio-environmental factors including lifestyle and psychosocial stress. This, in turn, leads directly to increased risk of hypertension or indirectly via epigenetic changes of hypertension risk genes and subsequent further increased risk of hypertension. The higher degree of environmental changes in migrants leads to higher risk of hypertension in migrants than in non-migrants.

These projects will further strengthen our team's international collaborations. Indeed, internationalisation is a major goal of all academic institutions including Amsterdam UMC. Building sustainable international collaborations especially in low- and middle-income countries remains a challenge. Even if collaboration succeeds, they tend to be top down as resources usually flow from the global North to global South. As a result, most collaborations lack local ownership, crucial for success and sustainability of the cooperation. Migrant health studies provide important entry points for building strong and sustainable collaborations. Studies on the role of migration are especially important as they tend to be win-win for all collaborators and therefore facilitate local ownership and sustainability. The RODAM study is a very good example. The RODAM study has provided a model whereby both the global North and global South partners participate in the project fully and all parties take leading roles in the project; and with full access to all databases and through publications create ownership of the project. This has facilitated both in global North and South partners to train their own PhDs in their respective institutions in collaboration with each other using the RODAM datasets. Through this project, Amsterdam UMC, location AMC has signed a memorandum of understanding with the University of Ghana. In the coming years, we will use

this platform to strengthen the collaboration through research, training and an exchange programme for students, scientist and specialists. We have already developed a joint Summer School programme with the first course scheduled to take place in July 2019.

We will also extend our collaborations within Amsterdam UMC and beyond to explore other relevant areas of research such as the role of microbiome in cardiovascular diseases among migrants and non-migrants in collaboration with Prof. Max Nieuwdorp, and oral health among migrants in collaboration with Prof. Geert van der Heijden (ACTA), and the development of cardiovascular risk algorithm targeted to migrants in collaboration with Prof. Rex Ahima (John Hopkins University).

### *Translation of research findings into public health interventions and policy*

Translation of the current knowledge into public health prevention and facilitation of clinical care remains an important aspect of our team efforts. Over the years, we have initiated and have been involved in several intervention studies including, among others, Culturally Adapted Hypertension Education, and the FAMILY project, which is currently evaluating the development and implementation of a family-based approach to improve cardiovascular health among disadvantaged families of African origin in Amsterdam under the leadership of Dr Erik Beune. Our team has also worked with migrant faith-based organisations in Amsterdam and trained key information persons who were nominated by these organisations to serve as the contact point persons for health information for their members. In addition, in collaboration with the Pentecostal Council of Churches in the Netherlands under the leadership of Pastor Dr Moses Alagbe and his team including young health professionals, we have established '*Your Health is Your Wealth*' programme, which provides information, and periodic health checks to migrant communities in Amsterdam. This programme has gained attention of AMC students and it has provided an important platform for some of the AMC students to have direct interaction with the migrant communities in Amsterdam.

Studies on culturally targeted lifestyle interventions have shown promising results. Our Culturally Adapted Hypertension Education intervention to improve hypertension treatment adherence and control among African migrant patients with uncontrolled hypertension led to significant improvements in blood pressure and adherence to lifestyle recommendations in Amsterdam.[31]

Furthermore, a meta-analysis of an intensive, culturally targeted lifestyle intervention to improve metabolic profile among South-Asians at risk of type 2 diabetes in the Netherlands and Scotland led to a 30% reduction in the incidence of type 2 diabetes.[32] These findings demonstrate the need for investment in developing, evaluating and scaling up culturally targeted lifestyle interventions that work for different migrant populations.

The current debates in health policy and practice are, however, very much focused on curative healthcare at the expense of preventive care. If we really want to improve the health of migrants, we also need to invest in preventive care by targeting, for example, major cardiovascular risk factors e.g. hypertension, diabetes and obesity that are highly prevalent in migrant communities. This will alleviate unnecessary suffering from illness and save the healthcare systems high costs of treating these conditions and their related complications. The main challenge is how to effectively scale-up these culturally targeted lifestyle interventions to reach a large number of people from different migrant backgrounds and to sustain the programme over time.

The current public health prevention efforts in the migrant communities are largely based on western individualistic cultural model. Our activities in the migrant communities in Amsterdam have taught us that we may need different models rather than the reliance on the individualistic cultural model to public health prevention. Indeed, several migrant communities operate through collectivistic cultural model and we therefore need to develop and test the impact of collectivistic cultures' public health prevention models among the migrant communities, e.g., through migrant community organisations such as churches and mosques.

Thus far, the work of our team in Amsterdam UMC has had a major impact at the global level by influencing public health policy and clinical practice at both national and international level. Important global and regional institutions such as the World Health Organisation, European Society of Cardiology, and the African Union, among many others, regularly use our work for policy and clinical guidelines development. However, we cannot afford to be complacent with current achievements. Identifying the key factors driving the poor health outcomes among migrant communities is crucial for developing effective interventions and policies in addressing the health needs of these populations. Our team will continue its global leadership role in contributing to this area of work in the coming years.

## *Migrant health and 'Health for All'*

As migrants form an important segment of the European society, there is a need for concerted effort to address the health needs of these populations. In some European cities, migrants form large proportions of the population. Thus, the societal quest to achieve *'Health for All'* cannot be realised without addressing the health needs of migrants. This is the basis for the title of my lecture *'Healthy Migrants, Healthy Society'*.

Addressing the health needs of migrants requires a concerted effort including resource allocation dedicated to migrant health research and the training of health scientists dedicated to migrant health, and training of health professionals on cultural humility or cultural competence. Several European countries have no dedicated funds for migrant and ethnic minority health research. This poses a major challenge for migrant health researchers in thriving in Europe. North American countries (e.g., USA) have dedicated funding bodies, e.g., The National Institute on Minority Health and Health Disparities. This has helped to strengthen minority research in these countries. European and national funding bodies such as the European Commission and NWO need to consider setting up such dedicated funding streams for migrant and ethnic minority health research and training to boost migrant health research in Europe. The dedicated multi-ethnic cohorts such as the HELIUS study, The RODAM study and ABCD study (Dr Tanja Vrijkotte) need to be supported to provide the necessary information to assist public health prevention and clinical care in the Netherlands.

The national funding bodies need to provide support to help minority researchers to progress. The NWO in collaboration with the Ministry of Education, Culture and Science, and the Association of Universities in the Netherlands have set up a brilliant funding support initiative (i.e. Aspasia) targeted at females academics to ensure that more female assistant professors progress to associate professor or full professor levels due to underrepresentation of females in the higher academic ladder. Migrant and ethnic minority groups are highly underrepresented in the higher academic ladder. Such initiative should therefore be considered for migrant and ethnic minority researchers as well, to help them to progress. The recent initiative of 'Refugee in Science' [Vluchtelingen in de Wetenschap] by NWO to reintroduce refugee scientists into science in the Netherlands is highly commendable. However, for sustainability there is a need for dedicated resources for migrant health research and training of migrant health researchers.

It is also important to train health professionals in order to build capacity to provide culturally sensitive prevention and clinical care to the diverse European populations. Our team in Amsterdam UMC, location AMC has been very active in contributing to the training of health professionals including undergraduate and postgraduate medical students on migrant health in several institutions across the Netherlands and Europe as well as other parts of the world. Whilst our team is playing a very active role in promoting diversity, it is important that the issue of diversity is placed on top of the institutional level agenda. Medical schools and other health professionals' training programmes need to incorporate diversity into the training curricula as an effective way of developing culturally responsive competencies in future health professionals. This also entails providing equal opportunities to students, teachers and researchers from migrant background.

Finally, there is a need for structural policies to improve migrants' position in society through integration, social protection, reduction in xenophobia, discrimination and stigma, and provision of opportunities for social and economic development. This will enhance migrants' contribution to the societies in which they live.

## *Conclusions*

- *Migration is human and it will continue in generations to come. Migrants play a very important role in social and economic development in both the destination countries and their countries of origin. As in all human endeavours, migration also has challenges. Most of these challenges are social and economic in nature including marginalization, insecurity and poverty, and therefore can be addressed like any other societal challenges if there is a political or societal will to do so. Addressing these challenges should involve building inclusive societies, provision of opportunities for socioeconomic development, and fighting the litany of myths and inaccurate bigotries, stereotypes and falsehoods about migrants that are driving xenophobia and anti-migrant sentiments. It is equally important that the needs of the vulnerable native population in the destination countries should also be addressed. Inequality in many destination countries is increasing with the elite getting richer and people at the lower end of the socioeconomic strata struggling to make ends meet. This fuels anti-migrant sentiments. Thus, inclusive societies should embrace all and leave no one behind.*
- *Studies comparing migrants with the host populations have provided very useful information about inequalities in health with most studies showing unfa-*

*vourable health outcomes among migrants compared with the host populations. While these studies have helped health policy development, they are not enough to gain deeper insights into the key factors that are driving migrants' poor health outcomes. Our reliance on healthy migrant effect and salmon bias hypotheses have created a Comfy Zone explanatory model for migrant health researchers; but the evidence to substantiate these beautiful hypotheses is weak and in the process they have become a standing block for the development of the migrant health research field. Migrant health researchers need to move out of their Comfy Zone and build on the current models where relevant and critically look into other models to facilitate better understanding in order to assist prevention and treatment efforts.*

- *Extension of migrant health research to evaluate the role of national context and the role of migration has a huge potential for gaining better understanding of factors driving migrant health disadvantage, but there is a need for investment in cross-national longitudinal studies. There is also a need to invest in culturally tailored lifestyle interventions by targeting the major risk factors in migrant communities. Achieving these objectives requires firm commitment by governments, funding bodies, local health authorities, and academic institutions to invest in migrants' health through research, training and capacity building. If we want healthy societies, we need to take care of the health of migrants.*

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Europe has diversified ethnically because of international migration. In some urban centres, the proportion of migrants can be up to 30% of the total population. As migrants form an important segment of European society, the societal quest to achieve '*Health for All*' cannot be achieved without addressing the health needs of migrants. This requires better understanding of factors driving migrants' poor health outcomes through research, and investment in culturally tailored public health interventions by targeting the major risk factors in migrant communities.

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