Hello from the other side

HELLO FROM THE OTHER SIDE

Access to and circulation of health information between migrants and their network members at origin

Inez Roosen

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they have no idea what it's like
to lose home at the risk of
never finding home again
to have your entire life
split between two lands and
become the bridge between two countries

immigrant – Rupi Kaur

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CHAPTER 1

General introduction

The presented dissertation reflects my PhD research conducted over the last years, analysing the role of transnational social exchanges from migrants on the health of their network members at origin, using a multi-disciplinary approach.

This chapter will introduce the diverse concepts of this dissertation to establish a common baseline among the diverse disciplines. At first, the research topic will be illustrated by an example story, after which a general introduction to migration theories and relevant theories and concepts of this dissertation follows. This introductory chapter will be concluded by introducing the following core chapters and explaining their aims concerning the primary goal of this dissertation: understanding the link between transnational social exchanges and the health of network members at origin.

Example story to illustrate research topic: Mbark – Moroccan migrant in Belgium

The presented story will illustrate transnational health-related information exchanges and their potential influences on the health of network members at origin. Even though this example story does not focus on the studied areas of this dissertation that are introduced later in this chapter, it still has been chosen as it is based on a real-life event observed during the COVID-19 pandemic and writing of this dissertation. It is a summarised version of the actual event focusing on a Moroccan migrant, Mbark, who lives in Belgium. After approval, the actual names of the individuals are kept.

Mbark is a 40-year-old Moroccan migrant living in Belgium, for 12 years, with his wife Anneke and their two children, Younes and Zahra. His main reason for migrating is love. During the COVID-19 pandemic, he could not visit his family in Morocco for almost one and a half years, which is why after being vaccinated, he was excited to travel home to visit his family in Agadir in the summer of 2021. He and his wife were vaccinated in Belgium, while afterwards his mother and father were vaccinated in Morocco, upon Mbark's advice and his positive experiences with his first vaccination. They caught up on missed quality time during this month-long holiday and enjoyed the sun and delicious Moroccan food. Even though Mbark and Anneke were fully vaccinated one month before they left, wore masks in public, and were strict on hand hygiene, they tested positive upon return to Belgium. According to Belgian rules, they and their kids needed to quarantine for ten days. They took the necessary measures to ensure that Anneke's mother, who lives at their house, would not be infected, and made work and school arrangements for their quarantine. Next to this, Mbark informed his family members, via text messages and phone calls, about the situation and checked if others also showed positive symptoms. In line with the Belgian rules, he strongly advised those who had symptoms to get tested and stay inside for ten days. Not all family members who showed symptoms were tested, as the waiting lines were too long, but they did follow Mbark's advice and stayed inside for ten days. Even though his mother and father were initially hesitant to get vaccinated, they mentioned during one of the calls that they were happy he pushed them as they did not get sick. This experience also motivated the younger generation of his family (e.g., siblings, nieces, and nephews) to listen to Mbark's advice to stay inside when showing symptoms and get vaccinated when possible.

Migration is common human behaviour

Even though it sometimes might seem that migration is a recent topic, it is not – it is part of human history. Interestingly, although migration is as old as the human species itself, the jury is still out on a universally accepted definition of who exactly a migrant is (1,2). The most common definition by the International Organization for Migration (IOM) is the following: *'A person who moves away from his or her place of usual residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons.'* ((2): p.132). In this definition, you can identify several important factors, such as the action of moving away (from home or usual residence); although not explicitly specified, the duration (temporarily or permanently); destination (either within country borders, as internal migrant or moving internationally, as an emigrant); and reason for migration, which can be various.

In absolute numbers, the global emigrant population increased over the last three decades from 197 million in 1990 to 281 million in 2020. However, compared to the proportion of the global population, this absolute number only represents a 0.71% increase (1990: 2.89%; 2020: 3.60%) (1). Noteworthy is the group of internal migrants, with approximately 763 million, is the often-forgotten majority of migrants (3). Emigration most frequently occurs from economically developing (top 2 origin countries (2020): India and Mexico) to economically developed nations (top 2 destination countries (2020): the US and Germany) (1).

Migrants move for various reasons, such as access to better jobs and income, gaining a better livelihood, studying, fleeing from war, persecution, political unrest, or environmental disasters, reuniting with family or marriage, such as in the case of Mbark in the example story, or a combination of reasons. Several academics have attempted to explain migration decision-making or movements, both on a micro and macro level. Ravenstein formulated the 'laws of migration' in 1885, where he explained the drivers of migration mainly by focusing on economic factors, where individuals decide to migrate from low-income to high-income areas (4). Lee (1966) updated this perspective by adding hindering and supporting factors related to origin and destination (such as economy, immigration laws, and distance), which migrants consider during their decision-making process, also commonly referred to as the 'push-pull-model' (5). Even though outdated according to scholars, these 'push-pull' perceptions are still prominent in migration policymaking and perspective among the public (6,7).

Several neoclassical theories (such as theories by Sjaastad (1962) and Todaro (1969)) formed a reaction to the classical migration models by Ravenstein (1885) and Lee (1966),

adding relatively scarcity of labour and considering migrants as rational actors who evaluate their human capital investment (8,9). Another critical reaction to the traditional understanding of migration drivers was the New Economics of Labour Migration (NELM), which focused on multiple factors influencing migration decision-making, including agency and existing structures (10). The NELM mentions the importance of income diversification by economic remittances to overcome failing state structures and existing inequalities at origin, as a decision made on household (HH)-level rather than solely on the individual level (6,7,10). This HH-level perspective will also be applied in this dissertation by using HH-level data when investigating this topic.

In addition to the more micro-level theories, macro-level theories have been developed to explain migration movements. These macro-level theories are, for example, based on changes in fertility and mortality rates, which could be linked to modernisation trends and development (Zelinsky, 1971); state formations and structures following development (Skeldon, 1997); and pre-existing colonial connections, which formed pathways based on cultural and linguistic links and structural interdependencies and inequalities (Wallerstein, 1974; Skeldon, 1997) (6,7,11–13).

Interestingly, some macro-level theories also refer to migrants' connections to their home countries and the flow of money, goods, and information, such as the founder of the migration systems theory Mabogunje (1970) (14). He stated that these networks were a reaction to previous migration movements, serving as feedback mechanisms and structuring migration flows (14). Inequality would initially grow as skilled individuals emigrate. However, due to the feedback mechanisms, these emigrants could contribute to the development of their origin country (6,7,14–16). This is the core topic of this dissertation: the exchange of information among migrants and their network members at origin and its potential influence on development, specifically on the health of those living at origin.

Hello from the other side

In the presented example, Mbark has his own life in Belgium with his wife, children, and job while maintaining connections to his family in Morocco by return visits, text messages, and calls. These typical connections that migrants can have crossing borders and balancing two worlds are also referred to as 'transnationalism', which Glick Schiller, Basch, and Blanc-Szanton coined in 1992 (17). Transnationalism revolutionised existing migration theories by supporting the increased intensity and durability of these connections between migrants and their network members at origin (NMOs). Migrants

play an increasingly important role in their home countries due to economic remittances, which are driven by numerous transformations such as rapid and radical changes in technology leading to cheaper and faster travel and communication opportunities and increased socio-political marginalisation of migrants at destinations driving them to search for a sense of belonging with their NMOs (18–21).

The relevance of the transnational perspective can be seen in how migrants identify 'home'. Home can have three meanings to migrants, namely home here and now (e.g., Mbark's life in Belgium), home there and now (e.g., current day-to-day life of Mbark's family in Morocco), and home there and then (e.g., memories, experiences, and normative structures of Mbark in Morocco before moving to Belgium). Successfully balancing these spaces and time is vital to migrants' wellbeing (22). Although this balancing act can also come with a downside, as transnational networks can be used for social control and establishing expectations and obligations, leading to frustrations and unsettling feelings. Furthermore, the awareness of loss and separation can lead to loneliness and helplessness (23–25). Yet, the desire to stay connected with loved ones across borders is vital in migrants and migrant families and their everyday lives. It enables both migrants and their NMOs to exchange resources (money, goods, and information) and support (26–28).

Transnational information

Via his transnational connections, Mbark advised his parents to be vaccinated before visiting Morocco, informed his family about their COVID-19 infection, and advised them what to do if they showed symptoms. The idea of transnational networks transferring ideas between migrants and their NMOs is not necessarily new as it has already been described a century ago by Thomas and Znaniecki (1918) in 'The Polish Peasant in Europe and America' (29). Also, previous theoretical work in the fifties by Myrdal (1957) and early seventies by Mabogunje (1970) described a transnational context in which the exchange of information occurs (6,7,14,15). In the times of Thomas and Znaniecki (1918), Myrdal (1957), and Mabogunje (1970), communication mainly was based on letters, (audio and video) cassettes, expensive phone calls, or occasional return visits. The introduction of cell phones, the internet, and diverse opportunities to travel and send packages or letters made communication more diverse, easier accessible, faster, more personal, and more affordable for both the migrant and their NMOs (21,28,30).

As a reaction to the extensive focus in migration and development studies on globalisation and monetary flows, also referred to as 'economic remittances', Peggy Levitt introduced in 1998 the concept of 'social remittances' to show that transnational exchanges also occur on a micro-level and contain more than solely money. Based on the concept of economic remittances, she described social remittances as the continuous and informal flow of

communication from migrants to their NMOs entailing four categories: (1) normative structures (e.g., ideas, values, beliefs, norms), (2) systems of practice (e.g., behaviours based on normative structures), (3) social capital (e.g., access to transporters of social remittances), and identities (e.g., related to traditions, gender norms and family values). Social remittances are identifiable, systematic and intentional, personal, and part-and-parcel of broader global processes of cultural diffusion (18). In 2011, Levitt and Lamba-Nieves redefined the term 'social remittances'. They revised the initial perspective that social remittances only move from migrants to NMOs, considering it a two-way process. They broadened their perspective on the impacts of social remittances on the home country, being positive as well as negative. The concept also was expanded by including experiences before migration, differentiating between the individual and collective level of information transfer, and scaling-up (information moves to higher levels in society) and scaling-out (translation of information to other practices) (19).

As previously mentioned, the concept of 'social remittances' is based on the conceptualisation of 'economic remittances', meaning it still unintentionally hints at similar actions, associations, outcomes, and processing between the two remittances (31,32). In order to reinforce Levitt and Lamba-Nieves's intended purpose when redefining social remittances in 2011 and to move away from the initial link to economic remittances, the more neutral term 'transnational social exchanges' (TSE) is proposed in this dissertation to refine and expand the concept of social remittances (31,32). TSE will be discussed in detail in Chapter 3.

Health for all

Important aspects often overlooked in research studying TSE are migrants' access to healthcare and health-related information at destination. This access can be analysed from an individual and structural level. At the personal level of the migrant, integration at destination should be considered. Integration can support migrants obtaining interpersonal information among trusted network members at destination (33). In the example of Mbark, some active social networks in Belgium can be identified as potential sources of information, such as those related to his work environment, Anneke's family, and his children's school environment.

At the structural level, fundamental factors can be related to the identified components of the human right to the highest attainable standard of health as found in Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR). The human right to health establishes the legal obligations of (destination) countries towards migrants' health - among others. Namely, it demands that healthcare and health-related information for migrants specifically, but also more generally, needs to be accessible,

available, acceptable, and of good quality (34). For example, according to the United Nations Committee on Economic, Social and Cultural Rights, a treaty body consisting of independent experts tasked with monitoring state compliance with the ICESCR, state parties to the ICESCR have a prioritised obligation 'to provide immunisation against the major infectious diseases' (34). One example of how Belgium fulfilled its obligation during the pandemic was implementing a free state-wide COVID-19 vaccination campaign, irrespective of nationality or residence status (35). Mbark was vaccinated around the same time as Anneke, meaning he, as a migrant received an invitation from the local Belgian government to be vaccinated around the same time as his (Belgian) wife. This example implies that these crucial aspects enabling access to healthcare and health-related information (e.g., accessibility and availability) in Belgium have been realised.

Processing information - Potential for migrants as change agents?

Mbarks' relatives sometimes either fully (e.g., the ten days of quarantine and vaccination) or partly (e.g., getting tested in case of symptoms) implemented his advice. This is only one case example; the NMOs could also have rejected the advice. This example indicates several important factors related to health behavioural change, such as information, persuasion, timeliness of information, decision-making, implementation, and perceived barriers. Furthermore, migrants can potentially diffuse information that can be innovative, different, or perceived as taboo by their NMOs (18,19). Therefore, this transnational information-sharing needs to consider the cultural contexts at origin and destination. These mentioned conditions can be retrieved from Rogers's Diffusion of Innovation model (2003). The behavioural changes can be linked to the innovation-decision process of Rogers (2003) (see Figure 1), which describes five phases: knowledge, persuasion, decision-making, implementation, and confirmation. In addition to the innovation-decision process, Rogers (2003) also described characteristics, prior conditions, and perceived characteristics of the innovation as relevant factors to consider during the diffusion of innovation process. The acceptance of a new or different behaviour by different groups and cultures depends on where on the adoption curve the receivers of information (in this example, the NMOs) are situated regarding their willingness to change (36). For example, NMOs situated most left on the adoption curve are referred to as 'innovators' and will be the first and most eager to adopt an innovation, while NMOs most right on the curve are referred to as 'laggards' and are the last and most resistant to adopt an innovation. Therefore, most of the following chapters of this dissertation will consider Rogers' innovation-decision process and the identified relevant factors during the diffusion of innovation as the core of information processing of NMOs when receiving information from migrants.

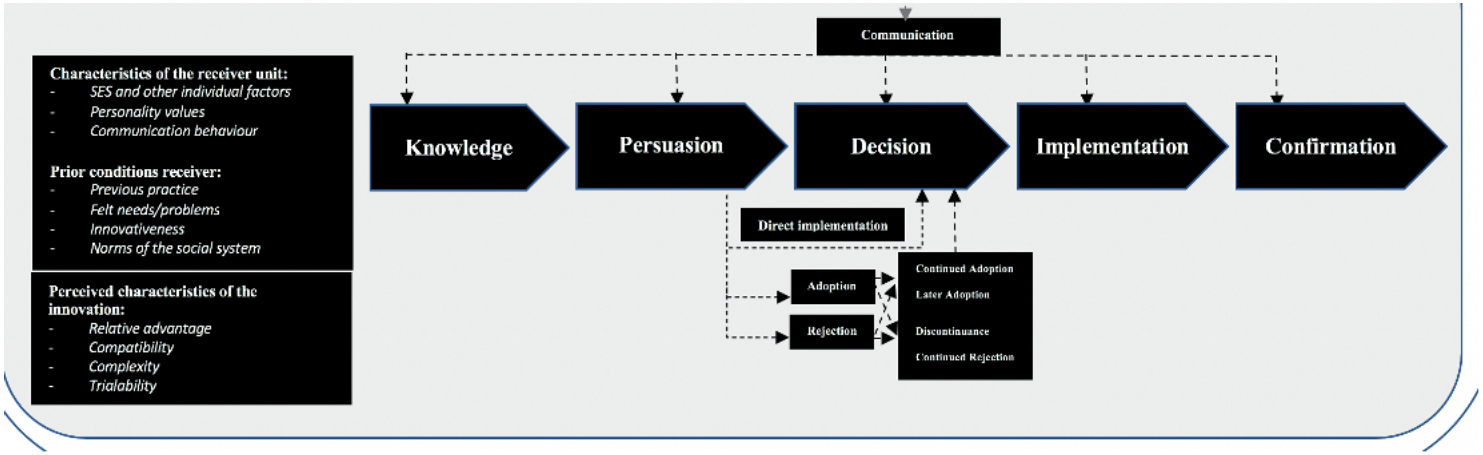

Figure 1. Model of Five Stages in the Innovation-Decision Process (Adapted from: (36))

The following chapters explained

Five separate papers form the core chapters of this dissertation, addressing different goals to support the main aim: ***understanding the link between transnational social exchanges and the health of network members at origin***. These stand-alone papers follow a common thread throughout my research on this topic. I will start by synthesising existing literature on the topic using a systematic narrative literature review (Chapter 2). After providing this overview, I will continue with a brief conceptual analysis, proposing a multi-disciplinary conceptual framework for future research on this topic, which is labelled as the *Comprehensive transnational exchange of Health informATion (CHAT)-model* (Chapter 3). Two country case studies, namely Afghanistan (Chapter 4) and Pakistan (Chapters 5 and 6), will study different components of the proposed CHAT-model.

Synthesising previous research (Chapter 2)

In their systematic literature review, Villa-Torres et al. (2017) identified relevant elements of transnational networks that can be linked to migrant health, such as the possibilities of return migration and the necessity of active transnational networks. However, this review missed the opportunity to study the complete transnational perspective, including the health of network members at origin (NMOs) and a comprehensive reflection on the role of transnational social exchanges (TSE). Transnational networks have been a common topic in migration and development studies but only recently received more attention in health and care research (37). Therefore, Chapter 2 aims to gain a more profound understanding of the role of TSE on the health of both migrants as well as their NMOs in current research by conducting a systematic narrative literature review.

Conceptual analysis, introducing the CHAT-model (Chapter 3)

Health and care researchers' increased research on transnational networks also reveal the lack of a clear conceptual framework guiding this research. This absence sometimes leads to similar yet different conceptual and theoretical approaches when studying the link between TSE and the health of NMOs. Furthermore, this topic, in its essence, combines different disciplines and needs to be studied using a multi-disciplinary perspective (32). Chapter 3 aims to summarise conceptual and theoretical approaches in previous research and suggests the *Comprehensive transnational exchange of Health informATion (CHAT)-model* as an answer to the current conceptual framework gap. The CHAT-model provides a necessary multifaceted perspective on the mechanisms of the TSE-process, reflecting on both the TSE-sending and receiving sides. The CHAT-model integrates Rogers' model with the concepts of social remittances, the human right to the highest attainable standard of health, Berry's model of acculturation, and aspects of the transnational theory. Understanding this complex TSE-process can potentially

lead to a quadruple win situation for: (1) migrants (access to health at destination), (2) destination (increased health outcomes for minority populations, such as migrants), (3) NMOs (receiving TSE from migrants that potentially can benefit (or harm) their health, which they can translate to other similar behaviours (scale-out)), and (4) origin (learned or observed behaviours of NMOs can create a domino effect to other layers in society (scale-up), improving the general health at origin).

Country case studies, studying the CHAT-model (Chapters 4, 5, and 6)

Chapters 4, 5, and 6 aim to research different components of the CHAT-model by studying sexual and reproductive health (SRH) outcomes of NMOs in Afghanistan and Pakistan (see Table 1 country overview of Afghanistan and Pakistan). This research will add to current studies on the topic by opening the scope of geographical reference by studying Asian country contexts, considering origin and destination contexts when studying TSE, and using a conceptual framework to guide the case studies.

The decision to focus on Afghanistan and Pakistan is based on a combination of migration and SRH factors. Over the last two decades, emigration increased most in Asia, by 74% (1,38). Both countries also offer an interesting and diverse mix of migration reasons (refuge, economic opportunities, and family reunification) and trends (international and internal migration), leading to differences in access to healthcare and health-related information at destination locations. Both countries show well-established transnational ties, with Pakistan as the highest remittances receiving country while Afghanistan, with its more than four decades of conflict, created the largest protracted refugee population in the world (38–42).

Furthermore, women in the South Asian region experience several SRH threats (e.g., the highest risk of dying during pregnancy or childbirth (1 out of 43)) (43). Afghanistan and Pakistan show similar, however not identical, factors undermining SRH, such as high maternal mortality rates, low birth control use, more conservative social norms regarding sexuality, and a lack of SRH education and awareness programmes (44–51).

By analysing the 2010 Afghanistan and 2017-2018 Pakistan Demographic and Health Surveys (DHS), this dissertation aims to research different components of the CHAT-model and their association with birth control awareness and use of NMOs in Afghanistan (Chapter 4); birth control awareness, intention to use, and use of NMOs in Pakistan (Chapter 5), and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS by NMOs in Pakistan (Chapter 6).

Table 1. Country overview Afghanistan and Pakistan

Country names *(Conventional short and long form and local long form)*	**AFGHANISTAN** **Formerly Islamic Republic of Afghanistan** **Formerly Jamhuri-ye Islami-ye Afghanistan**	**PAKISTAN** **Islamic Republic of Pakistan** **Jamhuryat Islami Pakistan**
Country flag		
Map		
Capital	Kabul	Islamabad
Population	37.5 million (2021 est.)	238.2 million (2021 est.) (5th largest country in the world)
Area	652,230 km^2 land (landlocked country)	770,875 km^2 land and 25,220 km^2 water
Climate	Arid to semiarid; cold winters and hot summers	Mostly hot, dry desert; temperate in northwest; artic in north
Terrain	Mostly rugged mountains; plains in north and northwest	Divided into three major geographic areas: the northern highlands, the Indus River plain in the centre and east, and the Balochistan Plateau in the south and west
Ethnicity	Pashtun, Tajik, Hazara, Uzbek, and Other	Punjabi, Pashtun, Sindhi, Saraiki, Muhajirs, Balochi, and Other
Official languages	Afghan Persian or Dari or Pashto	Urdu and English
Religion	Muslim (99%: Sunni 84.7% – 89.7%, Shia 10% - 15%) (2009 est.)	Muslim (96.5%: Sunni 85% - 90%, Shia 10% - 15%) (2020 est.)
Median age	19.5 years	22 years
Birth rates	35.46 births / 1,000 population (2022 est.; world ranking: 15/228)	26.48 births / 1,000 population (2022 est.; world ranking 41/228)
Death rate	12.33 deaths / 1,000 population (2022 est.; world ranking: 13/228)	6.02 deaths / 1,000 population (2022 est.; world ranking: 158/228)

Country names *(Conventional short and long form and local long form)*	**AFGHANISTAN** **Formerly Islamic Republic of Afghanistan** **Formerly Jamhuri-ye Islami-ye Afghanistan**	**PAKISTAN** **Islamic Republic of Pakistan** **Jamhuryat Islami Pakistan**
Country flag		
Map		
Maternal mortality ratio	638 deaths/100.000 live births (2017 est.; world ranking: 11/228)	140 deaths / 100,000 live births (2017 est.; world ranking: 61/228)
Infant mortality rate	106.75 deaths / 1,000 live births (2021 est.; world ranking: 1/228	55.26 deaths / 1,000 live births (2021 est.; world ranking: 18/228)
Life expectancy at birth	53.25 years (2021 est.; world ranking 227/228)	69.37 years (2021 est.; world ranking: 176/228)
Total fertility rate	4.72 children born / woman (2021 est.; world ranking: 14/228)	3.53 children born / woman (2021 est.; world ranking: 38/228)
Contraceptive prevalence rate	18.9% (2018) (women aged between 12 and 49)	34% (2018/2019)
People living with HIV/AIDS	12,000 (2020 est.; world ranking: 97/228)	200,000 (2020 est.; world ranking: 30/228)
Physicians density	0.28 physicians / 1,000 population (2016)	0.98 physicians / 1,000 population (2018)
Hospital bed density	0.4 beds / 1,000 population (2017)	0.6 beds / 1,000 population (2017)
Literacy rate *(age 15 and over can read and write)*	37.3% (2021)	58% (2019)
Real GDP *(purchasing power parity)*	$77.04 billion (2020 est.; data in 2017 dollars; world ranking: 97/228)	$1,021.13 billion (2020 est.; data in 2017 dollars; world ranking: 24/228)
Real GDP per capita	$2,000 (2020 est.; data in 2017 dollars; world ranking: 214/228)	$4,600 (2020 est.; data in 2017 dollars; world ranking: 177/228)
Population below poverty line	54.5% (2016 est.)	24.3% (2015 est.)

Data and images based on the CIA's World Factbook ((126,177), accessed 16/03/2022)

CHAPTER 2

2

Transnational social networks, health, and care: a systematic narrative literature review

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Abstract

While transnational social ties and exchanges are a core concern within migration studies, health researchers have often overlooked their importance. Continuous and circular exchanges of information within transnational networks, also defined as 'social remittances', facilitate the diffusion of innovations, potentially driving contemporary social and cultural change. Influences on health, wellbeing, and care-seeking are important, but under-researched, dimensions for consideration. We undertook a systematic narrative evidence synthesis to describe the current state of knowledge in this area and to identify gaps and future directions for health researchers to take. Between April 2017 and May 2019, an iterative series of searches in Medline, Embase, PsycINFO and PubMed, plus backward and forward citation searches identified 1173 potential papers. Screening resulted in 36 included papers, eighteen focused on migrant populations and eighteen on those who remain behind. The top three health topics were health-seeking strategies, sexual and reproductive health issues, and healthcare support. And, while not always explicitly identified, mental health and wellbeing was a further prominent, cross-cutting theme. Articles on migrant populations were all conducted in the global North and 13 out of 18 used qualitative methods. Five main themes were identified: therapeutic effect of the continuing social relationships, disrupted social relationships, hybridisation of healthcare, facilitation of connections to healthcare providers, and factors encouraging or undermining transnational social exchanges. Papers concerned with those who remain behind were mainly focused on the global South and used a mix of qualitative and quantitative approaches. Four main themes were identified: transnational transfer of health-related advice, norms, and support; associations between migrant linkages and health behaviours/outcomes; transnational collective transfer of health knowledge; and power and resistance in exchanges. Findings suggest that transnational social exchanges can both support and undermine the health of migrants and those who remain behind. This review confirms that the volume and quality of research in this area must be increased so that health policy and practice can be informed by a better understanding of these important influences on the health of both migrants and those who remain behind.

Introduction

Humans are social beings, part of social networks. Social selection and social influence shape the attitudes, values, norms, and behaviours of network members, leading to similar behaviours within a group (52,53). Even our health, wellbeing, and care-seeking behaviours are influenced by our social networks, both on a personal and group-based level (54).

With the increasing developments in information technologies, we can connect and exchange information even faster than before within our social network (55,56). The connection and exchange of information within social networks is especially interesting when considering migrant populations, as they are known to be living in (at least) two worlds – with one foot in their destination and another in their origin (57). Glick Schiller, Basch, and Blanc-Szanton first raised the term – transnationalism – in 1992, meaning that social networks cross borders connecting migrants with their network members who remain behind in the country of origin. Within these transnational networks an exchange of information occurs. The communication between migrants and members in their home country can be seen as an informal transnational exchange of human and social capital, facilitated by telecommunication technologies (17). This communication flow, entailing ideas, norms, values, practices, and behaviours – also termed 'social remittances', as coined by Peggy Levitt in 1998, can be usefully extended to 'transnational social exchanges' – reflecting the way in which these movements happen circularly and continuously. These transnational social exchanges allow for the diffusion of innovations, driving contemporary social and cultural (ex)change (18,19,57,58).

The study of migration has, until relatively recently, been dominated by Western Anglo-Saxon scholars interested in the movement of people from the global South to the global North and has frequently been intertwined with policymaking concerns around the integration of migrant populations within Northern destination societies (59). More recently, this narrow orientation has been challenged, with the importance of understanding migration processes within the global South and the ongoing relationships between diasporic communities and their countries of origin being increasingly recognised (18,19,37). Nevertheless, while transnational social ties have become a core area of enquiry within migration studies, health and care researchers have commonly overlooked the importance of transnational networks and social exchanges in their research (37,60). However, understanding transnational networks and the associated social exchanges is relevant to comprehending and meeting health needs of both migrants and those who remain behind. Villa-Torres et al. (2017) provided a solid basis in their systematic literature review about the use of a transnational perspective in researching migrant health and its outcomes. They identified several relevant components concerning transnational migrant

health, such as migrants' ability to return temporarily for healthcare and the importance of active transnational networks to gain access to health-related information or supplies (such as traditional/home remedies). This review did not, however, focus specifically on transnational social exchanges and their influences on health (37). Furthermore, one of the specific gaps identified by Villa-Torres et al. (2017) is research on the health of those who remain behind. Therefore, we addressed these outstanding gaps by conducting a systematic narrative literature review, focusing on transnational social exchanges and their role in the health and wellbeing of migrants and those who remain behind. The overarching review question of this study was: *What role do social remittances (transnational social exchanges) play in shaping health-related practices and health outcomes for*

a) migrants, and

b) those who remain behind in the country of origin (with personal links to migrants)?

Method

We undertook a systematic narrative literature review using the software EPPI-Reviewer, ensuring transparency and standardisation during the process (61).

Search strategy

The search for this systematic narrative literature review took place in four steps, as described below.

Step 1: initial search

This systematic narrative review was based on initial searches conducted in April 2017 in three electronic databases - Medline, Embase, and PsycINFO. We developed and employed a bespoke set of search terms relating to two domains of interest - social exchanges and migrants (please see Table 1 for more information). The initial search strategy did not include health and care search terms as we tried to cover a broad perspective of studies on our topic and used our selected databases (Medline (biomedical), Embase (biomedical and pharmacological), and PsycINFO (interdisciplinary behavioural and social science research)) to provide relevant health and care related articles.

Step 2: supplementary search – focus on those who remain behind

During our initial search, we observed a limited number of studies focusing on those who remain behind. Hence, we decided to perform an additional search for these studies in PubMed. To receive more focused outcomes on our topic we decided using the main keywords [migrant] OR [immigrant] AND [transnational] OR [social exchanges] AND [health] up to January 2018. Only studies published in English and focused on those who remain behind were included. Furthermore, no additional filters were applied.

Table 1. Database search terms employed in initial searches April

# Search	Search terms used (searched in Medline, embase, and PsychInfo)
1.	Social remittances.mp.
2.	Social remittances.mp. [mp = title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading]
3.	transnational exchange$.tw.
4.	(social adj5 norm$).tw.
5.	(social adj5 practice$).tw.
6.	(social adj5 identit$).tw.
7.	Cultural diffusion.mp. [mp = title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading]
8.	((change$ or alter* or differen$) adj10 normative value$).tw.
9.	Social remitting.mp. [mp = title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading]
10.	social network$.tw.
11.	social exchange$.tw.
12.	kinship network$.tw.
13.	Friendship network$.tw.
14.	transnational transfer$.tw.
15.	transnational transmission$.tw.
16.	transnational communit$.tw.
17.	Knowledge transfer.tw.
18.	Information exchange.tw.
19.	(transfer adj5 information).tw.
20.	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 (DOMAIN 1: SOCIAL EXCHANGES)
21.	immigrant*.tw.
22.	emigrant$.tw.
23.	Immigration.tw.
24.	Emigration.tw.
25.	Source country.tw.
26.	Origin country.tw.
27.	Destination country.tw.
28.	Host country.tw.
29.	Stay behind.tw.
30.	stayer$.tw.
31.	(mover or movers).tw.
32.	Remain behind.tw.
33.	refugee$.tw.
34.	asylum seeker$.tw.
35.	21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 (DOMAIN 2: MIGRANTS)
36.	20 and 35 COMBINING DOMAIN 1 (SOCIAL EXCHANGES) AND DOMAIN 2 (MIGRANTS)

Step 3: general supplementary search

In addition, to expand our studies from the initial search, backward and forward citation searches were applied to all papers included via the database searches up to February 2018.

Step 4: final search to update studies

Finally, to update previous searches, we employed a forward citation search up to May 2019 for two seminal papers on social remittances (18,19).

Screening and study eligibility criteria

Empirical papers using any qualitative or quantitative methodology that explored topics related to [1] transnational networks/connections, social remittances/transnational social exchanges, and [2] health practices or healthcare use or health and wellbeing outcomes were included. All studies focused on transnational migrants (people living outside of their country of birth) or individuals who 'remain behind' (those identified as having a migrant family member or significant other). All studies were in English; had no restrictions on date, country of origin or destination, and migrant status.

We undertook a two-stage screening process. In stage one, all papers were screened on title and abstract by one of three researchers to remove any that were obviously out of remit. The first ten papers screened by each reviewer were cross-checked by a second reviewer to ensure consistent application of the inclusion criteria. Any uncertain papers were referred to group discussion and collective agreement on inclusion/exclusion. In the second stage, a full-text screen was applied to the remaining eligible papers. During the full-text screening, consistency checks again involved cross-checking the first ten papers and discussing any unsure papers within the group.

Quality assessment

For the quality assessment of our included studies, we decided to adopt an approach that captured the dimensions we felt were most important to evaluate our included studies. We created two quality assessment forms, one for quantitative and mixed-methods studies and another for qualitative studies, covering a customised set of dimensions such as research design, data collection, data analysis, and reporting (62).

Each article was assessed, and each component was either considered sufficient or insufficient. A summary assessment was given according to the following criteria: 'Low' (< 4 components assessed as sufficient), 'Moderate' (4–6 components assessed as sufficient), and 'Good' (7–9 components assessed as sufficient). Papers were not completely excluded based on study quality, but rather the contribution of findings

from poorer studies to the synthesis was stated. An overview of the quality assessments can be found in Tables 2, 3, 4, and 5.

Extraction and synthesis

An extraction template was developed iteratively, piloted, and refined in EPPI-Reviewer. The following information was extracted from the articles: general characteristics of the respondents, study design, country where the research was conducted, quality assessment, health outcomes, components of transnational social exchanges and transnationalism/ transnational networks, the link between transnational social exchanges and health. A narrative synthesis was conducted based on the extracted data, defining recurring themes to answer our research questions. A narrative synthesis was adopted suitable to accommodate findings from the diverse types of study (qualitative, quantitative, and mixed-methods). A systematic narrative review will provide a complete, analytical, and objective analysis of the available knowledge and be able to put these outcomes into context (63).

Table 2. Quality assessment – Qualitative tool - Migrants

Reference number	Study (n = 13)	Clear, explicit and appropriate aim	Clearly described context	Researcher reflexivity demonstrated	Source and volume of data appropriate to objectives	Data generation tools well described and appropriate	Analysis approach well described and appropriate	Consideration of limitations and trustworthiness evident	Claims/ findings adequately supported by data	Key concepts relating to migration/ ethnicity are explicit	Summary assessment
(64)	Bhattacharya, 2011	+	+	–	+	+	+	–	–	+	**
(65)	Chakrabarti, 2010	+	+	–	+	+	+	–	+	+	***
(66)	Escandell and Tapias, 2010	+	+	–	+	–	–	–	+	+	**
(67)	Heikkinen and Lumme- Sandt, 2013	+	+	–	–	+	+	–	–	–	**
(68)	Krause, 2008	+	+	–	+	–	–	+	+	+	**
(69)	McFadden, Atkin and Renfrew, 2014	+	+	+	+	–	+	–	+	+	***
(70)	Menjivar, 2002	+	+	–	+	–	–	+	+	+	**
(71)	Sanon, Spigner and McCullagh, 2016	+	+	+	+	+	+	+	+	+	***
(72)	Thomas, 2010	+	+	+	+	+	+	–	+	–	***
(73)	Tiilikainen, 2011	+	+	–	+	+	–	–	+	–	**
(74)	Viruell- Fuentes, 2006	+	+	–	+	–	+	–	+	+	**
(75)	Viruell- Fuentes and Schulz, 2009	+	+	–	+	+	+	+	+	+	***
(76)	Yearwood, 2007	+	+	–	+	+	+	+	+	–	***

Assessment: *+ (sufficient) and – (insufficient)*

Summary assessment: *Low (< 4 components assessed as sufficient), Moderate (4–6 components assessed as sufficient), and Good (7–9 components assessed as sufficient)*

Table 3. Quality assessment – Quantitative or mixed-methods tool - Migrants

Reference number	Study (n = 5)	Clear, explicit and appropriate aim	Clearly described context	Sampling approach appropriate and non- biased	Sample size adequate	Data generation tools well described and appropriate	Analysis approach well described and appropriate	Findings adequately supported by data (not overstated)	Consideration of limitations, bias and generalizability evident	Key concepts relating to migration/ethnicity are explicit	Summary assessment
(77)	Baquero, 2010	+	+	–	+	+	+	+	+	–	***
(78)	Hanley, Gravel, Lippel and Koo, 2014	+	–	–	–	–	–	–	–	–	*
(79)	May, 1992	+	+	–	–	+	+	+	+	–	**
(80)	Murphy and Mahalingam, 2004	–	+	+	–	+	–	+	+	–	**
(81)	Plaza and Plaza, 2019	+	+	+	–	–	–	+	+	+	**

Assessment: *+ (sufficient) and – (insufficient)*

Summary assessment: **Low (< 4 components assessed as sufficient), **Moderate (4–6 components assessed as sufficient), and ***Good (7–9 components assessed as sufficient)*

Table 4. Quality assessment – Qualitative tool – Those who remain behind

Reference number	Study (n = 8)	Clear, explicit and appropriate aim	Clearly described context	Researcher reflexivity demonstrated	Source and volume of data appropriate to objectives	Data generation tools well described and appropriate	Analysis approach well described and appropriate	Consideration of limitations and trustworthiness evident	Claims/ findings adequately supported by data	Key concepts relating to migration/ ethnicity are explicit	Summary assessment
(82)	Amin and Ingman, 2014	+	+	+	+	+	+	+	+	–	***
(83)	Chinouya, 2006	+	+	–	+	+	+	–	–	–	**
(19)	Levitt and Lamba-Nieves, 2011	+	+	–	+	–	–	–	+	+	**
(84)	Mekonnen and Lohnert, 2018	+	+	–	–	–	–	–	–	+	*
(85)	Patzer, 2018	+	+	–	–	+	–	–	+	+	**
(86)	Rubyan- Ling, 2019	+	+	–	–	+	+	–	–	+	**
(56)	Sobiech, 2019	+	+	–	–	+	+	+	+	+	***
(87)	Sriram, George, Baru and Bennett, 2018	+	+	+	+	+	+	+	+	–	***

Assessment: *+ (sufficient) and – (insufficient)*

Summary assessment: **Low (< 4 components assessed as sufficient), **Moderate (4–6 components assessed as sufficient), and ***Good (7–9 components assessed as sufficient*

Table 5. Quality assessment – Quantitative or mixed-methods tool – Those who remain behind

Reference number	Study (n = 10)	Clear, explicit and appropriate aim	Clearly described context	Sampling approach appropriate and non-biased	Sample size adequate	Data generation tools well described and appropriate	Analysis approach well described and appropriate	Findings adequately supported by data (not overstated)	Consideration of limitations, bias and generalizability evident	Key concepts relating to migration/ethnicity are explicit	Summary assessment
(88)	Battaglia, 2015	+	+	–	+	+	+	+	+	+	***
(89)	Beine, Docquier and Schiff, 2013	+	+	+	+	–	–	–	+	–	**
(90)	Creighton, Goldman, Teruel and Rubalcava, 2011	+	+	+	+	+	+	+	+	+	***
(91)	De, 2013	+	+	–	+	+	+	+	+	+	***
(92)	Diabate and Mesplé- Somps, 2019	+	+	–	+	+	+	–	+	+	***
(93)	Fargues, 2011	+	+	–	–	–	–	–	+	–	*
(94)	Frank, 2005	+	+	+	+	+	+	–	+	+	***
(95)	Lindstrom and Muñoz-Franco, 2005	+	+	–	+	+	+	–	+	+	***
(96)	Lindstrom and Muñoz-Franco, 2006	+	+	+	+	+	+	–	–	+	***
(97)	Roosen and Siegel, 2018	+	+	–	+	+	+	–	+	+	***

Assessment: *+ (sufficient) and – (insufficient)*

Summary assessment: **Low (< 4 components assessed as sufficient), **Moderate (4–6 components assessed as sufficient), and ***Good (7–9 components assessed as sufficient)*

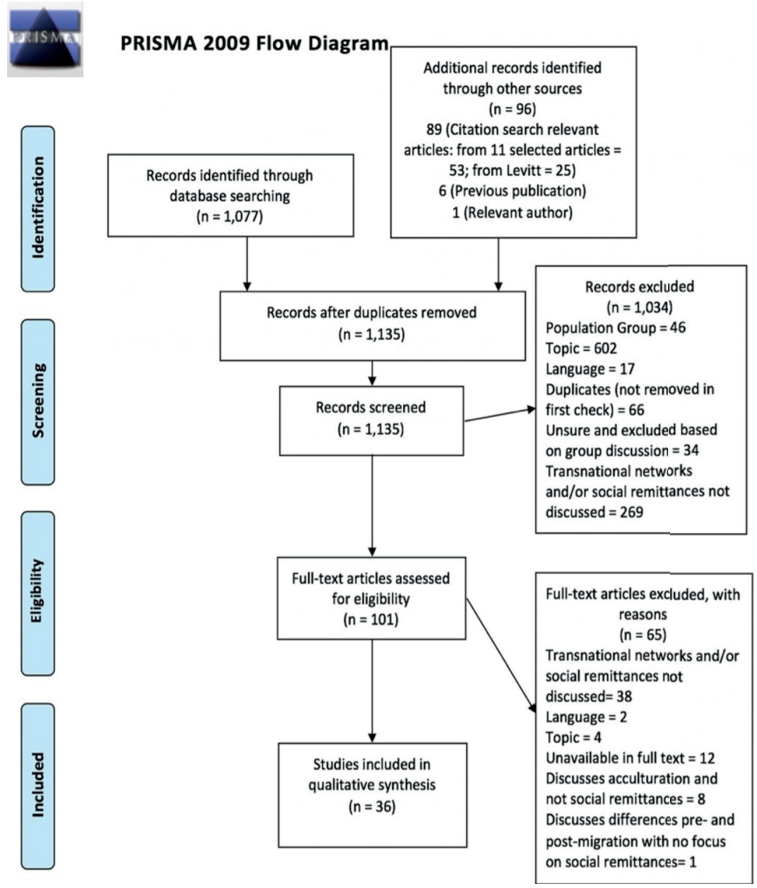

Fig. 1 Prisma flow

Results

Study characteristics

Figure 1 presents the PRISMA flow chart. From 1,173 potential items 1,137 were excluded.

Half of the 36 included articles focused on migrant populations (n = 18) and the other half focused on those who remain behind (n = 18). Thirty-three of the papers were published in a peer-reviewed journal, two were PhD dissertations (56,77), and one was an international report (92). The top three health topics that were studied were related to health-seeking strategies (n = 9) (65,66,70–73,76,78,79), issues related to sexual and reproductive health (n = 9) (83,88,89,91–93,95–97), and healthcare support (n = 7) (65,69,74,75,81,82,85).

Migrants

The studies on migrants were all conducted in the global North, mainly focusing on the US (n = 10) (64,65,70,71,74–77,79,80), but also on Europe (n = 6) (66–69,72,73), and Canada (n = 2) (78,81). Thirteen papers adopted a qualitative methodology, predominantly using interviews (n = 13) (64–71,73–75,79,81). The assessed quality of the qualitative articles was moderate (n = 7) (64,66–68,70,73,74) to good (n = 6) (65,69,71,72,75,76). The quality of the three quantitative studies was assessed to be mainly of moderate quality (n = 3) (79–81). Two studies used mixed-methods, one was assessed to be of moderate quality (77) and the other of low quality (78) (please see Table 6 for more information).

Those who remain behind

Articles researching those who remain behind were mainly based in the global South, focusing on North and Central America (n = 6) (88,90,91,94–96), Africa (n = 5) (56,83,84,86,92), Asia (n = 4) (82,85,87,97), and the Caribbean (n = 1) (19). Furthermore, two of the included articles (89,93) analysed multiple countries when studying transnational social exchanges and their influences on those who remain behind. Ten out of the eighteen articles (88–97) used quantitative analysis of secondary survey data. Eight of the eighteen articles (19,56,82–87) were qualitative. The assessed quality of the qualitative articles was moderate (n = 4) (19,83,85,86) to good (n = 3) (56,82,87). The quality of quantitative studies was assessed to be mainly of good quality (n = 8) (88,90–92,94–97). The included papers for this review focused on the influence of transnational social exchanges on the health of those who remain behind, both on the individual and collective level. Five articles (19,56,84,86,87) researched collective transnational social exchanges via Diaspora communities or organisations, and thirteen articles (82,83,85,88–97) studied the individual level. It is important to mention that twelve (82,83,88–97) of these thirteen studies indirectly presented the perspective of those who remain behind. Two papers (82,83) addressed this question via interviews with migrants, and ten articles (88–97) via analysis of secondary data (e.g., studying the association between having a migrant household member on the health outcomes of those who remain behind). Please see Table 7 for more information.

Table 6. Characteristics of included studies - Migrants

Reference number	Study (n = 18)	Country	Perspective	# of participants	Data collection	Analysis data	Health focus of study
(77)	Baquero, 2010	US	Mexican migrants	397 households (one respondent per household)	Secondary cross-sectional data from San Diego Prevention Research Center (SDPRC)	Multilevel (hierarchical) logistic regression model	Obesity
(64)	Bhattacharya, 2011	US	Indian migrants	17	Interviews (semi-structured)	Context-driven methodology Axial coding procedure	Acculturative stress
(65)	Chakrabarti, 2010	US	Bengali migrants	40	In-depth, semi-structured interviews	Grounded theory approach	Pregnancy care
(66)	Escandell and Tapias, 2010	Spain	Bolivian migrants	28 transnational families, comprising of 58 individuals	Participant observation and in-depth interviews	Constructivist approach within a transnational framework	Transnational healing strategies
(78)	Hanley, Gravel, Lippel and Koo, 2014	Canada	Precarious status workers (=temporary foreign workers or undocumented migrants)	-Survey: 78 -Interviews: not stated for this study specifically	Surveys and interviews	Not stated	Access to health and health-seeking behaviour
(67)	Heikkinen and Lumme-Sandt, 2013	Finland	Former Soviet Union migrants (Ukraine, Kazakhstan, and Russia)	11	Semi-structured qualitative face-to-face interviews	Content analysis	Transnational connections in later life
(68)	Krause, 2008	UK	Ghanaian migrants	36	-Ethnographic research -Narrative interviews	Not stated	Transnational therapy networks

Table 6. Characteristics of included studies - Migrants (*continued*)

Reference number	Study (n = 18)	Country	Perspective	# of participants	Data collection	Analysis data	Health focus of study
(79)	May, 1992	US	Middle Eastern migrants (Egypt, Palestine, and Yemen)	73	-Norbeck Social Support Questionnaire -Four Supplementary Social Support Questions -Support System Map -Child Health Interview Guide	-F-tests for independent samples -One-way analysis of variance (ANOVA) -Chi- square -Pearson product moment correlations -Content analysis	Help-seeking for child healthcare
(69)	McFadden, Atkin and Renfrew, 2014	UK	Bangladeshi migrants	-Focus groups: 14 -Interviews: 23	-Focus group discussions -In-depth interviews	Open and inductive coding using an ethnographic approach	Breastfeeding practices
(70)	Menjivar, 2002	US	Ladina and indigenous Guatemalan migrants	26 Also talked to others to complement findings	Participant observation and in-depth, semi-structured interviews	Not stated	Health-seeking behaviour
(80)	Murphy and Mahalingam, 2004	US	West Indian migrants	137	Surveys using the Transnationalism Scale	-Factor analysis -Bi-variate correlations	Mental health
(81)	Plaza and Plaza, 2019	Canada	Trinidadian migrants	-Surveys: 150 (2012) and 100 (2015) -Interviews: 10	-Two online Qualtrics surveys (2012 & 2015) - In-depth interviews	-Interviews: Constant comparative method of analysis -Surveys: Not stated	Transnational care chains
(71)	Sanon, Spigner and McCullagh, 2016	US	Haitian migrants	31	Semi-structured interviews and demographic questionnaire	LeCompte and Schensul's (2010) approach of qualitative analysis	Hypertension self-management

Table 6. Characteristics of included studies - Migrants (*continued*)

Reference number	Study (n = 18)	Country	Perspective	# of participants	Data collection	Analysis data	Health focus of study
(72)	Thomas, 2010	UK	Southern African migrants (Zimbabwe, Zambia, and South-Africa)	70	Focus group discussions	Grounded theory approach	Health-seeking and treatment behaviours
(73)	Tiilikainen and Koehn, 2011	Finland	Somali migrants	Paper connects 3 different studies: 14 22 main informants Not stated	Paper connects 3 different studies: Interviews Ethnographic research Social field observations and interviews	Paper connects 3 different studies: Not stated Not stated Not stated	Transnational healthcare
(74)	Viruell-Fuentes, 2006	US	Mexican migrants	40	Semi-structured in-depth interviews Participant observations to complement findings	Multistep analytical process	Transnational symbolic and affective characteristics
(75)	Viruell-Fuentes and Schulz, 2009	US	Mexican migrants	40	Semi-structured in-depth interviews	Inductive coding	Transnational social ties and Latino health
(76)	Yearwood, 2007	US	Caribbean migrants	12	Focus groups	Content analysis	Child healthcare decision making

Table 7. Characteristics of included studies – Those who remain behind

Reference number	Study (n = 18)	Country	Perspective	# of participants	Data collection	Analysis data	Health focus of study
(82)	Amin and Ingman, 2014	Bangladesh	Those who remain behind (respondents were Bangladeshi migrants in the US)	21	Interviews (in-depth semi-structured questionnaires)	Thematic coding strategy	Eldercare practices and experiences
(88)	Battaglia, 2015	Mexico	Those who remain behind	39,133	Secondary cross data from Mexican National Survey of Demographic Dynamics (ENADID—Encuesta Nacional de Dinámica Demográfica)	IV Regression	Teenage fertility
(89)	Beine, Docquier and Schiff, 2013	Analysis of 175 countries	Those who remain behind (worldwide perspective)	175 countries	Secondary data: -Fertility data (WDI) -Bilateral migration stocks (Parsons et al., 2007) -The skilled-to-unskilled ratio of emigration rates from Docquier, Lowell, and Marfouk, 2009 -Data on from the IMF database urbanisation rate (WDI) -The share of Catholics and Muslims in each source country population, and religious dummies; regions are consistent with the World Bank definition	-OLS regressions -IV regressions -Dynamic specification model	Fertility

Table 7. Characteristics of included studies – Those who remain behind (*continued*)

Reference number	Study (n = 18)	Country	Perspective	# of participants	Data collection	Analysis data	Health focus of study
(83)	Chinouya, 2006	Different sub-Saharan African countries (Zimbabwe, Uganda, Nigeria, Zambia, Burundi, Somalia, South Africa, Kenya and Malawi)	Those who remain behind (respondents were sub-Saharan migrants in the UK)	60	Interviews	Framework method	HIV status and transnational childcare taking
(90)	Creighton, Goldman, Teruel and Rubalcava, 2011	Mexico	Those who remain behind	3,593	Secondary longitudinal data from Mexican Family Life Survey (MxFLS)	Three-Level Random-Intercept Logistic Regression Models	Overweight / Obesity
(91)	De, 2013	Mexico	Those who remain behind	11,907	Secondary data from ENADID (Encuesta Nacional de Dinámica Demográfica or National Survey of Demographic Dynamics) survey	-Single Equation Probit Models -Instrumental Variable Regression	Contraceptive use
(92)	Diabate and Mesplé- Somps, 2019	Mali	Those who remain behind	5,138	Secondary data from ENEM-2009 (Enquête Nationale sur l'Excision au Mali)	-OLS regression -Instrumental Variable Regression	Female Genital Mutilation
(93)	Fargues, 2011	Morocco, Turkey, and Egypt	Those who remain behind	MENA countries	Secondary time-series data on birth rates and migrant remittances	-Demographic analysis -Time correlation	Birth rates

Table 7. Characteristics of included studies – Those who remain behind (*continued*)

Reference number	Study (n = 18)	Country	Perspective	# of participants	Data collection	Analysis data	Health focus of study
(94)	Frank, 2005	Mexico	Those who remain behind	565	Secondary data from a hospital-based postpartum survey that was implemented in eight different hospitals in Western Mexico (HPS 2001)	Multivariate analysis	Infant health
(19)	Levitt and Lamba- Nieves, 2011	Dominican Republic	Those who remain behind (Dominican Republican Diaspora communities in the US)	50	Semi-structured interviews and 20 years of fieldwork	Not stated	Home-Town Associations (HTA) involvement in health-related projects at COO
(95)	Lindstrom and Muñoz- Franco, 2005	Guatemala	Those who remain behind	2,531	Secondary data from 1995 Guatemalan Survey of Family Health (EGSF)	-Multilevel linear regression -Multilevel logistic regression	Contraceptive knowledge and use
(96)	Lindstrom and Muñoz- Franco, 2006	Guatemala	Those who remain behind	1,838	Secondary data from 1995 Guatemalan Survey of Family Health (EGSF)	Multilevel logistic regression	Maternal health services utilisation
(84)	Mekonnen and Lohnert, 2018	Ethiopia	Those who remain behind (Ethiopian Diaspora communities in Germany)	2 Diaspora associations located in Frankfurt	Key informant interviews, observations, and literature reviews on migration and development	Not stated	Diaspora engagement in health-related development

Table 7. Characteristics of included studies – Those who remain behind (*continued*)

Reference number	Study (n = 18)	Country	Perspective	# of participants	Data collection	Analysis data	Health focus of study
(85)	Patzer, 2018	-US -Philippines	Those who remain behind (respondents in US and Philippines)	Paper focuses on one case study of a migrant family (US-Philippines), supplemented with other observations	Multi-sited ethnography: participant observation, interviews, and the analysis of the use of new media for migrants in the US and those who remain behind in the Philippines	Not stated	Long-distance care and Food consumption
(97)	Roosen and Siegel, 2018	Afghanistan	Those who remain behind	25,419	Secondary data from cross-sectional data from the Afghan Mortality Survey (2010)	-Ordinary least squares regression -Propensity score matching -IV regression	Birth control knowledge and use
(86)	Rubyan- Ling, 2019	Sierra Leon	Those who remain behind (Sierra Leonean Diaspora communities in the UK)	Interviews: 10	Participant observation, semi-structured interviews	Not stated	Diaspora mobilisation during the Ebola outbreak
(56)	Sobiech, 2019	Ghana	Those who remain behind (Ghanaian Diaspora communities in Germany)	Interviews: 50	Semi-structured interviews, observations, and documents	Thematic analysis	Diaspora engagement in health-related development
(87)	Sriram, George, Baru and Bennett, 2018	India	Those who remain behind (different domestic, diasporic, and foreign organisations (e.g., from U.S., U.K., Australia, Singapore, and Saudi Arabia))	-Interviews: 87 -Document review: 248 -Participant observation: 6	In-depth interviews, document review, and non-participant observation of conferences and meetings	Framework method	Transfer of biomedical knowledge

Role of transnational social exchanges in health-related practices and outcomes among migrants

In answering the first component of the research question of this review, five main themes could be identified related to the role of transnational social exchanges on the health of migrants: Therapeutic effect of the continuing social relationships, disrupted social relationships, hybridisation of healthcare, facilitation of connections to healthcare providers, and factors encouraging or undermining transnational social exchange (please see Table 8 for more information).

Therapeutic effect of the continuing social relationships

Twelve of the eighteen articles, of which four were assessed to be of good (65,71,75,77) and eight of moderate quality (64,66,67,73,74,79–81), reported the continuity of social relationships between migrants and their transnational network members, despite the physical distance between them. Continuity of these transnational relationships gave migrants a sense of belonging and provided emotional support.

Continuation of transnational social networks was observed to especially provide emotional care and support to migrants (64,65,71,73–75,81). Transnational support, such as providing a sense of community and belonging, was important, especially when migrants experienced isolation, loneliness, marginalisation, cultural mourning, and acculturative stress (64,67,74,75,81).

> *'When you're homesick it helps you feel connected, sometimes as though you're still there . . . Pictures posted, FaceTime and chat on Facebook are the most important features for me to show my love.' (Paula – Indo-Trinidadian migrant in Canada)* ((81): p.14)

Additionally, three qualitative studies of which two researched Mexican migrants (74,75) and one studied Bengali migrants (65) in the US, referred to the substantial emotional value of these transnational networks, which played a central role in their daily life, especially for first-generation migrants.

> *'Look, our communication, I feel, is not only through the phone, (or) through letters, it is from heart to heart.' (Victoria – Mexican migrant in the US)* ((74): p.343)

The terminology used by a few researchers also reflected the value of these transnational networks, symbolically calling them *'transnational social therapeutic networks'* ((65): p.364) and *'circuits of affection'* ((74): p.343). Some of the migrant respondents in the good

quality qualitative study by Chakrabarti were able to powerfully describe the emotional value and symbolism of their connection with transnational network members and its influence on their wellbeing.

> *'So phone card has become like medicine you know.' (Tuhina – Bengali migrant in the US)* ((65): p.367)

Disrupted social relationships

Five qualitative papers (66,68,69,74,75) and one mixed-method study (79) reported findings that described alterations to the social relationships between migrants and their transnational network members that were perceived as making them less supportive and useful in case healthcare or support was needed.

Two qualitative studies (66,74), which were both assessed to be of moderate quality, observed a high secrecy level between migrants and their transnational network members (operating in both directions). The study by Escandell and Tapias (2010) revealed the secrecy between transnational network members when migrants would interrupt their interviews with requests such as, *"Don't tell my mother', 'Don't say anything to my sister',…'* ((66): p.413). Migrants preferred to carefully select the information to share with those who remain behind, thereby not always disclosing the truth about their situation. This secrecy came from migrants' fear that those who remain behind would worry or force them to return (66,74). Viruell-Fuentes (2006) referred in her research to Renata, a Mexican migrant living in the US, who reported avoiding asking her family in Mexico for support in case of need. Renata believed she was "living a better life" in the US, which (according to her) precluded her from asking any favours from those who remain behind, as they were living in a less fortunate position (74).

One qualitative paper of good quality (69) and a mixed-methods study of moderate quality (79) observed that migrants missed direct available support and advice from their family members at home. They would especially miss their female kin's support and advice when raising children and continuing traditional practices (i.e., breastfeeding) (69,79).

Hybridisation of healthcare

Eleven of the eighteen articles (65,66,68–73,76,78,79) presented data that described how migrants access and combine diverse healthcare practices, consultations, and advice from destination and origin. The qualitative study of moderate quality by Escandell and Tapias (2010) provided a good example of this hybridisation in Alejandro's case, a Bolivian migrant in Spain who suffered from a herniated disc.

> *'Alejandro faxed copies of his MRI scans, x-rays and lab reports to Bolivia. Luís (Alejandro's brother-in-law, who is a health professional in Bolivia) confirmed the diagnosis and urged him to return to Bolivia to have surgery. He decided to remain on the list, so Luís prescribed some stronger painkillers which Alejandro was able to obtain in Spain on the black market.' (Alejandro – Bolivian migrant in Spain)* ((66): p.417)

Two qualitative papers of good quality (65,69), and one mixed-methods paper of moderate quality (79), described how mothers and female family members in the country of origin would provide support. Examples of transnational support were related to pregnancy and childcare. Mothers or other female kin at origin would also pass on health traditions, such as breastfeeding or how to live a healthy pregnancy (65,69,79).

> *'...yes, I used to call up home regularly... my mother used to tell me some of the things that happen and are expected during pregnancy, comforting me if I got tensed about something...' (Mrinmoyi – Bengali migrant in the US)* ((65): p.367)

McFadden et al. (2014) described the process by which a Bangladeshi migrant mother, raised in the UK, evaluated the health-related information she received from transnational network members. The mother explained that she did not intend to listen to all the advice (related to breastfeeding) provided by her female relatives. She would evaluate the received information from origin with the retrieved information at destination and see what solution would serve her health and situation best (69).

Different studies that discussed the hybridisation of healthcare indicated diverse moments when migrants would request health-related advice from origin. Nine of the eleven studies that addressed the hybridisation of healthcare, of which four qualitative studies of good quality (69,71,72,76), four of moderate quality (66,68,70,73), and one mixed-methods research of poor quality (78), suggested that migrant respondents would consult their resources from destination and origin simultaneously. The study by Menjivar (2002) also highlighted migrants asking for advice from their transnational network members before contacting a health professional at destination. May (1992) and Yearwood (2007), who both researched child healthcare of migrants in the US, suggested the perceived seriousness of the illness as an important factor prompting migrants to search for either professional help at destination or help within their (transnational) social networks. If migrant parents consider a disease to be too serious, they would immediately reach out to the healthcare professional at destination; however, if the illness were found to be none-life-threatening, they would first contact

their (transnational) network members before searching for further professional help in their place of destination (76,79).

Facilitation of connections to healthcare providers

Five qualitative studies from which one was assessed as good quality (72) and four as moderate (66,68,70,73), suggested the importance of family members' input in migrants' healthcare decisions. Thomas (2010) studied the health-seeking and treatment behaviour of South African migrants in the UK. Nina, one of the focus-group members in the study, reflected on the crucial role of family members in health decision making. She described why family members back home should be contacted when a migrant in the UK needs to go to a hospital, especially when experiencing mental illness. It would be up to the family members' advice in South Africa to recommend whether or not the migrant needed to return for healthcare and the following steps they would need to take to recover (72).

Four qualitative articles studying transnational healing and healthcare practices of migrants in Europe (66,68,72,73) and one qualitative paper researching the health-seeking behaviour of Guatemalan migrants in the US (70) discussed the role of transnational network members facilitating connections between the migrant and healthcare providers in their country of origin. The studies suggested the essential role of transnational network members in connecting migrants with traditional healers. Migrants could attend the recommended healing sessions by returning to their home country. When migrants could not return, the consultation and healing sessions with the traditional healers would take place "transnationally", either via telephone or internet or via the transnational network members who would visit the traditional healer in their name. These remote healing sessions were believed to work because spiritual forces would not be limited by physical borders (70,73). Studies (66,68,72,73) reported that migrants generally experienced positive results from traditional healing practices. Lucia, a Bolivian migrant in Spain in the qualitative study of moderate quality by Escandell and Tapias (2010), described a moment when she had continuous headaches, which alarmed her family members at home. Without informing her, her parents consulted a traditional healer in Bolivia, who conducted a diagnostic ritual on a piece of Lucia's clothing. Based on this diagnosis, Lucia received instructions from her transnational network members to receive transnational healing. After this, her headaches vanished, which she attributed to the transnational healing (66).

Migrants would also return to receive professional healthcare at origin, as was discussed in the qualitative study of moderate quality by Menjivar (2002). Rosa, a Guatemalan migrant in the US, suffered from abdominal pain. She contacted a health professional in

the US who prescribed medication. Her pain, however, would not diminish after taking the prescribed medicine. In agreement with her mother and sister in Guatemala, Rosa decided to return and was operated on her gall bladder, which finally stopped her pain (70).

Factors encouraging or undermining health-related transnational social exchanges

Thirteen articles (65,66,68–70,72–76,78,79,81) suggested encouraging or undermining factors linked to health-related transnational social exchanges.

Encouraging factors

Factors that would encourage health-related transnational social exchanges could be related to the perceived structural barriers accessing healthcare at destination and migrant status (65,66,69,70,72–76,78,79,81).

Perceived structural barriers accessing healthcare at destination

Five studies (66,70,72,73,78) described the perceived structural barriers to accessing healthcare for migrants within their destination country. Important to note the variation in quality in these studies, where the qualitative studies were assessed as moderate (66,70,73) to good quality (72), the mixed-methods study (78) was assessed to be of poor quality.

Migrants would perceive their transnational resources as trustworthy and approachable in searching out health-related advice, information, and care (66,70,78). In the study by Menjivar (2002), a Guatemalan migrant who returned home for an operation explained that the reasons for her return were based on low-quality care, her mistrust of the healthcare, and the experienced misunderstanding and discrimination while accessing healthcare in the US.

> *'Just because we are poor and don't understand the language, doctors here think that we don't have a right to be cured. So they tell you that you have one little thing when in fact you may die.' (Rosa – Guatemalan migrants in the US)* ((70): p.457)

In studying the relevant articles for the narrative review, a few qualitative papers (72,73) described spirituality and religiosity as important components for migrant health and wellbeing. In their search for health, migrants might feel misdiagnosed, or they might even feel the proposed cure at destination to be improper for their illness (especially for mental health), as they relate certain diseases to these other components (72,73).

> *'In our culture, almost every mental health problem is related to witchcraft or spirits, or demons or probably that it's like a curse. If you go the hospital it's not going to go away, you have to go to a healer.' (Donald – Zimbabwean migrant in the UK)* ((72): p.610)

Migrant status

Two qualitative papers of moderate quality (66,68) and one mixed-methods paper of low quality (78) reflected on the role of migrant status in shaping access to healthcare at destination. The study by Hanley et al. (2014) researched precarious status workers, who mentioned their status would hinder them from accessing healthcare in Canada and their high dependency on their employer in accessing healthcare. When being ill, migrants would fear their contract would not be renewed, meaning a loss of income that they and their family who remain home depend on (78).

> *'What happens is that the company doesn't take you to the hospital when you want, but when they want to... They took me to the hospital and all they did was give me some medicine so that I could keep working.' (Interview S07) (Migrant worker in Canada)* ((78): p.11)

Undermining factors

Four qualitative studies of moderate (66,74) and good quality (69,72) and one mixed-methods study of moderate quality (79) indicated relevant factors undermining health-related transnational social exchanges, including changes in healthcare beliefs and scepticism of traditional practices (66,69,72,74,79).

Thomas (2010) described varied findings across UK-based South African migrant respondents. Notwithstanding the importance of traditional healing practices reported by some, others expressed scepticism about these practices, which they believed did not conform to their current religious beliefs. A few respondents also complained about the lack of authenticity and cleanliness of those performing the transnational traditional healthcare practices (72). These changes in attitudes towards traditional healthcare approaches meant that some migrants were not inclined to request or accept traditional healthcare advice from transnational network members.

Two qualitative studies (66,69) described migrants' changing perceptions of traditional health practices. The study by McFadden et al. (2014) described the grandmothers' reflections of young Bangladeshi migrant mothers residing in the UK and their resistance to (transnational) female family members' breastfeeding-related advice.

'G9 (Grandmother of Bangladeshi migrant in the UK): Whatever was practiced in the olden days has changed like everything previously was followed by listening to the elders and nowadays the daughters-in-law don't do that. They would not listen to the in-laws.' ((69): p.444)

Role of transnational social exchanges in shaping health-related practices and outcomes among those who remain behind

Four main themes could be identified in relation to the role of transnational social exchanges in the health of those who remain behind: Transnational transfer of health-related advice, norms, and support; associations between 'migrant exposure' (being part of a migrant household) and health behaviours/outcomes; transnational collective transfer of health knowledge; and power and resistance in health-related transnational social exchanges (please see Table 9 for more information).

Transnational transfer of health-related advice, norms, and support

Two qualitative studies of moderate (85) and good quality (82), and two quantitative studies of moderate (89) and low quality (93) indicated the transnational transfer of health-related advice, norms, and support from migrants to those who remain behind.

The two qualitative studies (82,85) referred to health-related advice or sometimes even instructions and emotional support. The multi-sited ethnographic research by Patzer (2018) helped to clarify the long-distance care between Philippine migrants in the US and their kin who remain behind through balikbayan boxes and related transnational dietary advice. Migrants would consciously provide clear instructions on how to use their economic remittances for food.

'She (Auring – Philippine migrant in the US) is speaking with a clear American accent. The girl in front of the computer is her niece, Nicole. The conversation (via Skype) follows: – Please tell your mother to give the $ 200 to Mr. Ed and get the rice.' ((85): p.142)

The qualitative research by Amin and Ingman (2014) studied the care practices of Bangladeshi migrants in the US towards their elderly parents residing in Bangladesh. Here, migrant children were found to especially provide healthcare advice and emotional support to their parents.

'I call my parents 2–3 times a week. I enquire about their health. My father has diabetes and a heart condition. I always remind him to take medicine

> *on time, check the sugar, walk, and eat appropriately.' (Bangladeshi migrant residing in the US)* ((82): p.319)

The quantitative studies by Beine et al. (2013) and Fargues (2011) analysed secondary data on a large-scale examining the relationship between international migration and fertility and birth rates. Fargues (2011) analysed secondary time-series data from Morocco, Turkey, and Egypt, finding a strong correlation between migrant remittances and birth rates in the country of origin. These changes in birth rates would depend on the existing norms of the country of destination, with increasing birth rates at origin related to migration to the Gulf and decreasing birth rates at origin with migration to the global North (93). Beine et al. (2013) constructed a dataset based on secondary data of 175 countries, observing a significant association between international migration and fertility rates. Similar to Fargues (2011), Beine et al. (2013) inferred these outcomes were a result of the diffusion of fertility norms from migrants to their origin countries, suggesting that the context where migrants live and come from was a relevant factor in the transfer of fertility norms (89).

> *'Our main finding (based on an Ordinary Least Squares regression analysis and an Instrumental Variables regression analysis) is that international migration results in a transfer of fertility norms from host to migrants' home countries, resulting in a decrease (increase) in home country fertility rates if they are higher (lower) than host country rates.'* ((89): p.1407)

Associations between 'migrant exposure' and health behaviours and outcomes

Eight quantitative studies of good quality (88,90–92,94–97) applied the analysis of secondary survey data to explore the possible influence of social remittances on the health of those who remain behind. When using secondary data, direct measures of the receipt of social remittances were not available, so that proxies were used, mainly 'having a migrant household member'. These studies reported a variety of associations.

The study by Battaglia (2015) analysed secondary cross-sectional data, identified that living in a migrant household reduced the likelihood of teenage pregnancies and increased the likelihood of child delivery by a professional healthcare worker and contraceptive knowledge by those who remain behind in Mexico. Creighton et al. (2011) analysed secondary longitudinal data where they observed a higher likelihood of becoming obese or overweight when Mexican children had a migrant household member living in the US. Using secondary cross-sectional data, the study by De (2013) identified positive associations between being part of a migrant household in Mexico and the use of modern birth control. While, Frank (2005), using secondary cross-sectional

data, described positive associations between Mexican women with migrant spouses and pregnancy practices, including receiving prenatal care, exercising, and taking multi-vitamins. Frank (2005) also identified that Mexican women who had a migrant husband were less likely to smoke and were less likely to breastfeed than those who did not have a migrant husband. Lindstrom and Muñoz-Franco (2005; 2006) performed two studies on the link between transnational social exchanges and the health of women who remain behind, using secondary cross-sectional data (95,96). In their study of 2005, Lindstrom and Muñoz-Franco observed a positive association between living in a migrant household and modern contraceptive knowledge and use in Guatemala (95). Their study of 2006 analysed the association between having a migrant household member and the use of formal prenatal care and delivery assistance, finding positive associations for both outcomes (96).

Two quantitative studies (92,97) identified both health-promoting and health-harming associations, suggesting the importance of the country context for migrants and those who remain behind, such as healthcare access and ruling norms when interpreting the results. Diabate and Mesplé-Somps (2019) observed that return migration reduced the likelihood of female genital mutilation in Mali. They found this result was mainly driven by migrants who returned from Côte d'Ivoire (92). In the study by Roosen and Siegel (2018), different associations were observed depending on cultural background and destination countries. Migration to Iran increased the likelihood of birth control knowledge of non-Pashtun women who remain behind in Afghanistan. While migration to Pakistan reduced the likelihood of birth control knowledge and use of Pashtun women who remain behind in Afghanistan (97).

Transnational collective transfer of health knowledge

Transfer of healthcare knowledge was observed not to be solely on the individual level, but five qualitative articles of good (56,87), moderate (19,86), and low quality (84) also identified this on a collective level from diaspora members to those who remain behind. Diasporic groups were found to be active in supporting healthcare projects in their country of origin. Diverse health-related activities from the diaspora were observed, such as promoting exercise, providing health education about taboo topics in health fairs, transferring experiences between health experts, providing advice and support during the Ebola outbreak, training healthcare students, and establishing emergency medicine (19,56,84,86,87). Migrants especially showed commitment to improving healthcare provision in their countries of origin. As an example, the qualitative study by Rubyan-Ling (2019) documented the engagement at different levels of several Sierra Leonean diaspora members residing in the UK during the Ebola outbreak.

> *'I basically wrote a few passages and came up with a small piece, which I put on Facebook, which I circulated with family and friends.' (Charles – Sierra Leonean migrant in the UK)* ((86): p.224)

> *'I started calling everyone I was in touch with, advising them what to do, what not to do.' (Ernest – Sierra Leonean migrant in the UK)* ((86): p.227)

Power and resistance in health-related transnational social exchanges

Six qualitative studies of good (56,82,87) and moderate quality (83,85,86) identified power and resistance in health-related transnational social exchanges.

Patzer (2018) observed the use of information technologies by migrants to control those who remain behind. With sending remittances and providing clear health-related instructions, migrants feel the need to check the adherence to their instructions from those who remain behind. This constant control could result in avoidance-behaviour of those who remain behind, finding excuses to not communicate (with a camera) with the migrant, avoiding the camera, or not even responding to the migrant when being in a Skype call (85). Patzer (2018) also stressed the relevance of migrant type on perception and acceptance at home. In the Philippines, they identify two types of migrants, one is the Balikbayan who already has been gone for a long time and is well-established in his or her new country, and the other is the Overseas Contract Worker, who is a hard-working temporary migrant suffering during his or her time abroad. Remittances of any kind were received differently from these two types of migrants - being accepted more positively from Overseas Contract Workers, while being resisted or resented from Balikbayans' who were even perceived as neo-colonisers (85).

Not all health-related transnational engagement was perceived as positive by those who remain behind (56,86,87). The study by Sobiech (2019) observed a mismatch of expectations between Ghanaian migrants in Germany and those who remain behind in organising transnational healthcare projects in Ghana. Conflicting desires around improvements to healthcare and general expectations of each other lead to friction between the two groups (56). During the Ebola outbreak, the respondents of the study by Rubyan-Ling (2019) described actions by some diaspora members who engaged in circulating rumours on Facebook about Ebola, negatively influencing the efforts of other diaspora members (86). Sriram, George, Baru, and Bennett (2018) also observed tensions between those who remain behind and diaspora members due to power imbalances between nationals and internationals, leading to a reduced role of diaspora members in their development efforts.

Table 8. Results – Migrants

Reference number	Study (n = 18)	Therapeutic effect of the continuing social relationships (12/18)	Disrupted social relationships (6/18)	Hybridisation of healthcare (11/18)	Facilitation of connections to healthcare providers (5/18)	Factors encouraging or undermining health-related transnational social exchanges (13/18)
(77)	Baquero, 2010	x				
(64)	Bhattacharya, 2011	x				
(65)	Chakrabarti, 2010	x		x		x
(66)	Escandell and Tapias, 2010	x	x	x	x	x
(78)	Hanley, Gravel, Lippel and Koo, 2014			x		x
(67)	Heikkinen and Lumme- Sandt, 2013	x				
(68)	Krause, 2008		x	x	x	x
(79)	May, 1992	x	x	x		x
(69)	McFadden, Atkin and Renfrew, 2014		x	x		x
(70)	Menjivar, 2002			x	x	x
(80)	Murphy and Mahalingam, 2004	x				
(81)	Plaza and Plaza, 2019	x				x
(71)	Sanon, Spigner and McCullagh, 2016	x		x		
(72)	Thomas, 2010			x	x	x
(73)	Tiilikainen, 2011	x		x	x	x
(74)	Viruell-Fuentes, 2006	x	x			x
(75)	Viruell-Fuentes and Schulz, 2009	x	x			x
(76)	Yearwood, 2007			x		x

Table 9. Results - Those who remain behind

Reference Number	Study (n = 18)	Transnational transfer of health-related advice, norms, and support (4/18)	Associations between 'migrant exposure' (being part of a migrant household) and health behaviours/ outcomes (8/18)	Transnational collective transfer of health knowledge (5/18)	Power and resistance related to health-related transnational social exchanges (6/18)
(82)	Amin and Ingman, 2014	x			x
(88)	Battaglia, 2015		x		
(89)	Beine, Docquier and Schiff, 2013	x			
(83)	Chinouya, 2006				x
(90)	Creighton, Goldman, Teruel and Rubalcava, 2011		x		
(91)	De, 2013		x		
(92)	Diabate and Mesplé- Somps, 2019		x		
(93)	Fargues, 2011	x			
(94)	Frank, 2005		x		
(19)	Levitt and Lamba- Nieves, 2011			x	
(95)	Lindstrom and Muñoz- Franco, 2005		x		
(96)	Lindstrom and Muñoz- Franco, 2006		x		
(84)	Mekonnen and Lohnert, 2018			x	
(85)	Patzer, 2018	x			x
(97)	Roosen and Siegel, 2018		x		
(86)	Rubyan- Ling, 2019			x	x
(56)	Sobiech, 2019			x	x
(87)	Sriram, George, Baru and Bennett, 2018			x	x

Two studies (82,83) referred to the non-disclosure of information. The qualitative study of moderate quality by Chinouya (2006) analysed how sub-Saharan African migrants who were HIV-positive would provide information to their children either living with them in the UK or at origin. Chinouya (2006) observed that migrants would request caregivers at origin to take their child for an HIV test. Children were not always informed they had had this test, the test results, or even the HIV status of their parents. When the child lived in the country of origin, parents preferred not to disclose this information hoping to protect the child from possible negative consequences and wanting to discuss in person something as delicate as their HIV-status (83).

> *'I cannot tell her on the phone, she has to see my face and show her my emotions how I feel about it. I feel I should be there. Face to face.' (mother)* ((83): p.14)

Discussion

This study investigated the role of transnational social exchanges in shaping health-related practices and health outcomes among migrants and those who remain behind, using a systematic narrative literature review approach.

Role of transnational social exchanges in health-related practices and outcomes among migrants

Transnational social relationships of migrants were observed to be continued despite physical distance as well as being disrupted, both influencing the emotional wellbeing of migrants. When living in a foreign country, migrants frequently experience isolation, loneliness, marginalisation, cultural mourning, and acculturative stress. Mainly these mental health stressors are why migrants experienced transnational care and support as especially valuable in maintaining a sense of belonging. These observations could reflect the increased stress and anxiety related to the acculturation process. Research has observed that migrants who identified themselves more with the host society showed increasingly more health literacy and health benefits. Although these higher levels of acculturation could also be related to several undesirable health behaviours copied from the host society (98).

While finding their way within a new society, migrants continuously find themselves balancing their identity between their host and home country's cultures (99). Migrants would evaluate the received healthcare advice at destination and origin to fit their situation best, resulting in hybrid health-seeking strategies and adaptations in their

health behaviours. Transnational family members were observed to also play an essential role in healthcare decision-making and connecting migrants to healthcare providers or healers at origin.

Reasons why migrants used transnational networks and traditional healers appeared mainly based on obstacles when accessing healthcare at destination and migrant status. Therefore, they perceived their transnational networks as more trustworthy and approachable sources in their search for health. Similar challenges (e.g., cultural and communication barriers) were identified for other minority groups, such as Indigenous and low SES populations. These overlapping barriers reveal the role of social marginalisation and low health literacy on healthcare access and utilisation (99–101). Interestingly, in the study of Priebe et al. (2011), healthcare professionals identified similar obstacles when providing healthcare to migrant patients.

Several papers reported that migrants perceive spirituality and religiosity as important to their health and wellbeing; elements that are often overlooked in Western biomedical approaches. Similar understandings are also found in Indigenous populations in North America, Australia, and New Zealand, believing that the imbalance of one's spirit is the origin of illness and seeking traditional health practices (101). Similarly, it is possible that in their search for health, migrants might miss the additional components to be addressed at destination or they might feel misdiagnosed as they relate certain illnesses to these other components. Possibly they try to fill these gaps by contacting transnational network members or traditional healers. The use of transnational traditional healing practices to deal with their illnesses was especially relevant for mental health. Migrants could receive the traditional healing transnationally, or they would return for a specific healing period. There are some indications that transnational healing is an emerging business in countries of origin (72,73).

Previous studies (102,103) did not research the role of transnational social exchanges in health but studied migrants' health information-seeking behaviour. Both studies observed the role of internet sites and forums in providing health-related information to migrants in their native language. Seo et al. (2014) found that migrant women would especially consult these online forums to talk to migrant women who were living in a similar situation as them. It appeared that the migrants considered other migrant women to be more relatable than those who remain behind (103). Depending on their identity transition, this could mean that migrants would not necessarily consult transnational network members, as they might not relate (anymore) to their counterparts who remain behind – possibly diminishing the role of transnational networks in providing health-related information (98).

Though not identified as one of the main health topics, mental health and wellbeing was often intertwined with other health topics, either directly or indirectly. Also, the terminology used in studies when referring to transnational networks, such as 'transnational social therapeutic networks' and 'circuits of affections', reflects its emotional weight and importance to migrants and those who remain behind. It was also observed that, especially first-generation migrants, found mental support via transnational networks essential. Depending on the phase of their life, mothers would often provide emotional support to their migrant daughters during and after their pregnancy.

Role of transnational social exchanges in shaping health-related practices and outcomes among those who remain behind

In the redefinition of 'social remittances', Levitt and Lamba-Nieves (2011) specified the different levels on which social remittances can occur, the individual and collective. These two levels of transnational social exchanges were also identified in our narrative review. Also, as redefined by Levitt and Lamba-Nieves (2011), positive and negative observations have been suggested in this review of transnational social exchanges on the health of migrants and those who remain behind. Migrants and diaspora organisations were observed to provide care and support to those who remain at origin, as was also reflected in one of the main health topics of the included studies of this review. Furthermore, health access and existing norms at destination could expose migrants to new or other health behaviours that they might share with their transnational network members, consequently possibly influencing health practices and outcomes of those who remain behind. Although, some studies of this review also observed resistance of those who remain behind to the transnational social exchanges from migrants or diaspora organisations. The possible adoption, rejection, or re-invention of these transnational social exchanges from migrants to those who remain behind could also be related to the stages (trial, enmeshment, and negotiation) of the identity management process from migrants and those who remain behind (98).

Transnational social exchanges potentially shape health-related practices for both the migrants and those who remain behind. Social remittances are considered to happen consciously between transnational network members (18,19). This review did observe some conscious transnational social exchanges and some other social exchanges that did not necessarily appear to be conscious, but more a natural exchange between loved ones sharing support and advice during a daily conversation. Therefore, it can be questioned whether all transnational social exchanges can be considered to be conscious.

Limitations and recommendations

Even though this study provides insight into the role of transnational social exchanges on the health of migrants and those who remain behind, some limitations must be acknowledged. The limitations will be discussed both in relation to our review methodology and in relation to the available body of literature.

At the beginning of our review-process, it became clear that researchers from different disciplines initially had different understandings of the main concepts ('social remittances' and 'transnationalism', what to include and exclude related to 'health'). By cooperation and thorough discussions on the topics, any misunderstandings were clarified, and we have been able to provide a strong base for our review. It is therefore recommended that future research on this topic should make use of multi-disciplinary teams. Also, this study did not exclude papers that were assessed to be of low quality, which might limit our implications. However, we addressed the quality of the studies when discussing the results in our review. Also, we acknowledge that by only including English articles, we have limited our results on the existing literature that might be available on this topic. During our literature search, we came across studies researching the migration and transnational social exchanges between the US and Latin American countries, and similar studies on EU migration. Unfortunately, none of the authors speak the languages in which some of these studies are published, such as Spanish, Russian, Polish, Czech, Bulgarian, or Romanian. As some of the studies included in our narrative review analysed the migrants and those who remain behind within the US - Latin American context, we could assume the majority of our findings could cover their results. However, only one study discussed the migrant perception within the EU (67). The reflection of migration experiences within the EU from migrants from 'newer' Member States to 'older' Member States are limited in this research. Studying these experiences could be interesting as the EU has open borders, potentially leading to additional findings on this topic.

Also, some limitations relating to the body of literature were apparent, such as the focus of the included studies on women. As a result of this focus, several other perspectives are not presented or underrepresented, such as men, children, elderly, and non-binary individuals. In addition, papers tended to have a narrow focus on a few health issues, restricting the findings to the discussed health areas. Furthermore, it was impossible to assess the relative importance of transnational networks versus local networks as none of the included papers addressed this. There were no quantitative studies that measured the actual transnational social exchanges of information nor its effects on health; all of them inferred to this. Additionally, the included articles mainly used single-site studies, making it difficult to grasp such a complex process as transnational social exchanges. Also, the studies of those who remain behind often could not truly reflect the voice

or the reality of those who remain because these studies mainly focused on migrants' perceptions or used secondary data that suggested the influence of migrant exposure. The final limitation related to the body of literature will stress the clear division of geographic locations between the studies focusing on migrants (global North) and those who remain behind (global South). This division indicates the prioritisation of research output based on South-to-North migration but does not reflect the reality of global migration patterns (104–106). Migration is diverse in its movements between and within the global North and South; by missing this aspect, we miss a genuine global perspective on transnational social exchanges and their influence on the health and wellbeing of migrants and those who remain behind (104,106,107). Furthermore, separating and associating research output of the global North with receiving developed countries and the global South with those who remain behind in developing countries provides another distorted perspective of the realities and potential of migration and transnational social exchanges (107).

As this was initial research synthesising the current studies on the topic, it was chosen for a narrative review to map all available studies using different methods. By using narrative analysis, the presented outcomes can provide recommendations for future policies and interventions (63). This review has possible implications for clinicians and policymakers. It is important to understand and acknowledge the transnational life migrants live and its potential influences on health. Furthermore, it is important to understand the use of transnational networks in health advice, consultations, and even (traditional) healing. Also, the prominent role of family members in healthcare decision making should be considered. Healthcare professionals need to recognise and be equipped with a better understanding and tools to respond to traditional medication and healing practices as well as differences in migrant's perceptions of health and healing. This review also raises issues around shared decision making, especially for minority populations with possibly low health literacy. When countries of destination invest in migrants' health, there is a possibility to create a domino effect of their investments on the health of those who remain behind. Policies investing in migrants' health could be specifically related to the main components of the human right to the highest attainable standard of health, namely availability, accessibility, acceptability, and good quality healthcare and healthcare-related information (34). In reducing health disparities in destination countries, cultural competence skills-building for healthcare providers and migrant patients could be a recommended strategy to build bridges (98).

Extra research on the role of transnational social exchanges on health and wellbeing is highly recommended, including a broader approach to target populations and health areas. Future research on this topic is strongly recommended to consider societies

outside the dominating global North to close the North-South research focus gap (108). Balanced research reflecting the world's reality and connecting knowledge of both global sides is required when studying transnational social exchanges. This review (105–107) also suggests a number of specific areas that deserve further investigation, including: the hybridisation of health practices; the influence of identified barriers (accessing healthcare at destination, migrant status, and defining health and healing from a migrant perspective) on transnational social exchanges; the role of destination countries in providing healthcare and health-related information to migrant populations and its possible consequences on the health of those who remain behind via transnational social exchanges; and transnational traditional healing as an emerging business in countries of origin. To get a complete picture of transnational social exchanges and its influences on health, it is recommended that researchers study both perspectives simultaneously, migrants and those who remain behind, by using mixed-methods studies and multi-sited ethnographic approaches. To shed light on the social processes explored it is recommended to engage sociological concepts and theories when researching transnational social exchanges.

Conclusion

This paper is the first systematic narrative literature review to examine what is known about the roles of transnational social exchanges in the health-related practices and health outcomes of migrants as well as those who remain behind. This research observed that transnational social exchanges potentially could be supportive or disruptive on the health of migrants and those who remain behind. The quality of the majority of the included studies was assessed to be moderate to good, and it has been observed that in the last fifteen years, more attention has been given to the topic. However, the identified differences in geographic locations and methods used when studying the two groups is still a point of attention for future studies, as well as the observed lack of representation of the perspective of those who remain behind. Policymakers and healthcare practitioners should seek to understand and be responsive to transnational social exchanges, given their implications for the health of both migrants and those who remain behind.

CHAPTER 3

3

Transnational social exchanges and their role in shaping health of network members at origin: a conceptual model

Roosen I, Kremers S, Sellin J, Crutzen R. Transnational social exchanges and their role in shaping health of networks members at origin: a conceptual model. (n.d.)

Abstract

While living abroad, migrants are exposed to health-related information at destination, which can be similar to, but also different from and even contradict the available information at origin. Within transnational networks, a continuous and circular flow of information allows for the possibility to diffuse (innovative) health-related knowledge, in this article referred to as transnational social exchanges (TSE). These TSE can play a role in shaping the health behaviours of network members at origin (NMOs). Even though research on this topic increased in the past decade, current literature lacks a conceptual model to guide future research. None or fragmented conceptual and theoretical approaches have been used to study TSE and their role in the health of NMOs. Therefore, a comprehensive conceptual model will provide an integrative view in researching this topic. Based on the conceptual and theoretical analysis of recent studies, this paper proposes the Comprehensive transnational exchange of Health informATion (CHAT)-model. The CHAT-model combines migration, health behaviour, and communication (social marketing) theories, integrating Rogers' model with the concepts of social remittances, the human right to the highest attainable standard of health, Berry's model of acculturation, and aspects of the transnational theory. The CHAT-model represents a multi-disciplinary perspective on the complex process of TSE and its influence on the health of NMOs and will aid future researchers in their considerations when studying this topic.

Introduction

Innovations are those ideas, practices, or objects that are perceived to be new to a person (36). When migrating to another country or region, migrants can be exposed to diverse innovations, which can be new or different than the ideas or practices from their origin. Consequently, they can internalise this (new) information available at destination. Based on Berry's model of acculturation, the level of internalisation of the innovations that migrants can be exposed to at destination depends on the evaluation of their home and host societies' values (33). This evaluation of two worlds can be complicated, living with one foot at destination and another foot at origin. Being connected to two worlds also results in different forms of social networks (57). Transnationalism refers to migrant ties that transcend borders to their social network members who live at origin. Within these transnational networks, an exchange of information occurs, which can be seen as an informal exchange of human and social capital, facilitated by telecommunication technologies (17).

Peggy Levitt coined the term 'social remittances' in 1998, referring to the circular and continuous transnational communication flow entailing ideas, norms, values, practices, and behaviours (18). The introduction of the concept social remittances enormously contributed to the migration and development field, acknowledging a broader perspective on transnational exchanges and their potential influences beyond the economic sphere. This paper aims to reinforce the redefinition of Levitt and Lamba-Nieves in 2011 by refining its terminology and expanding its meaning by proposing the term 'transnational social exchanges' (TSE), especially when studying its link to health, but potentially also relevant to other disciplines (e.g., political sciences) (18,19).

In 2011, its redefinition already made considerable and relevant updates to the concept of social remittances, and current debates also discuss intentionality, considering the need to recognize social remittances as both intentional and unintentional (18,19). These updates appear to be natural consequences of increased research on social remittances uncovering details and expanding knowledge covering diverse disciplines and settings. In addition, as the concept of 'social remittances' was based on the conceptualisation of 'economic remittances', it still unintentionally hints at similar actions, associations, and outcomes between the two remittances (18,19). These unintentional links are questionable and confusing when studying health behaviours. Therefore, we believe it is time to move away from this association to economic remittances while still acknowledging their co-existence by introducing the standalone concept of TSE (32). In confirmation of current debates and in addition to the sometimes-conscious exchanges of information, we also specifically characterise TSE as natural, fluent, and unstructured

exchanges of information, which also can be part of the observations within transnational inter-personal interactions. Furthermore, the content of exchange in economic remittances is money. Besides differences in currencies, money generally has a positive association and is frequently exchanged – upon request – within transnational networks. These associations often can be in contrast with the content of health-related TSE. Information regarding health-behavioural changes can potentially be new or different, might be offered involuntarily, and could be considered as undesirable information at times, especially as it might be linked to unknown or unwanted socio-cultural and/or (health-)behavioural changes. Also, comparing the two transnational exchanges, differences in outcomes and processing can be expected. Money can be exchanged and potentially invested fast, with almost instant observed results. While health-related information, especially innovative information, takes time to process and to implement into health-behavioural changes, particularly if necessary health infrastructures are missing, and even can take longer in observed health results. Despite these potential obstacles, research has shown the potential of TSE for the diffusion of health-related innovations, driving contemporary social and cultural (ex)change (18,19,31,32,57,58). *The presented conceptual model aims to describe the potential influences transnational social exchanges can have on the health of network members at origin.*

Previous research has observed that migrants can be change agents, influencing the health of NMOs (19,58). Even though specific information is missing on the mechanisms of the health-related TSE-sending behaviour of migrants, previous studies (89,92,93,97) indicated the importance of healthcare and health information accessibility for migrants at their destination. However, numerous difficulties are experienced by migrant patients when accessing healthcare at destination as well as by health professionals in providing healthcare to migrants (66,70,78,109–111). These challenges reflect that the components of the human right to the highest attainable standard of health, such as availability, accessibility, acceptability, and good quality healthcare, are not always fully realised by hosting countries (34,109). The human right to health can be found in several international instruments, most notably in article 25 of the 1948 Universal Declaration of Human Rights and article 12 of the 1966 International Covenant on Economic, Social and Cultural Rights (ICESCR), among others. The ICESCR establishes a legally binding obligation for the 171 states party to this treaty (at the time of writing in April 2022) to progressively realise the right to health for everyone within their jurisdiction. Receiving countries, therefore, have health-related human rights obligations, such as ensuring that healthcare and health-related information is accessible without discrimination, towards their migrant populations (34,109).

Villa-Torres et al. (2017) provide a solid basis for discussing the importance of transnational networks to the health of migrants. In addition, Roosen et al. (2021) also offer relevant insights into the existence, content, and consequences of TSE on the health and wellbeing of migrants and NMOs. Though, the mechanisms of health-related TSE-sending and -receiving and its effects on the health of NMOs remains understudied. There is also still no consensus in the approach on how to study this (37). Thus far, no conceptual framework has been proposed explaining the influence of TSE on the health of NMOs.

Furthermore, based on the systematic narrative literature review by Roosen et al. (2021), the overall reoccurring concepts and theories used in the included studies focusing on NMOs were mapped as a base for the presented conceptual model (see Table 1). This mapping also helped to identify three publication periods studying the link between TSE and the health of NMOs. The first period is before Levitt conceptualised social remittances, where no studies related to this topic were found. Second, we can identify the period between the first conceptualisation of social remittances in 1998 and the redefinition in 2011. During this second period, 22% (4/18) of the studies were published. The third period represents those publications from 2011 onwards, which reflected 78% (14/18) of the publications, showing signs that this area is slowly being recognised. Interestingly, from the publications of the third period, the majority either does not refer to the concept of social remittances (6/14) or uses the concept as defined in 1998 (4/14). Only a handful of studies (4/14) embraced the redefined concept of social remittances by Levitt and Lamba-Nieves (2011) when studying the link between TSE and the health of NMOs. The disparities among the articles in their use of the defined concept of social remittances show inconsistencies in their conceptual approach when studying this topic.

Transnational social networks are a core area of research in migration and development studies. Health and care researchers, however, have been lagging in recognising the importance of transnational networks and social exchanges when focusing on migrant populations (37). Acknowledging the role of transnational networks and the social exchanges within is relevant to comprehend and meet the health needs of both migrants and NMOs. Therefore, in response to the identified knowledge gaps and increased interest in the topic, it is timely to present a conceptual framework to support future research.

Relevant components when conceptualising transnational social exchanges and health of networks members at origin

Table 1 provides the overview of the concepts and theories used in the 18 included studies in the systematic narrative literature review focusing on the influence of TSE on the health and wellbeing of NMOs (112). This overview presents the key components that need to be considered when proposing a comprehensive conceptual model on this topic.

Table 1. Overview of concepts and theories discussed in reviewed articles studying transnational social exchanges and the health of networks members at origin

Articles (n = 18)	Theory of acculturation (6/18)	Transnational Theory (11/18)	Reference to concept 'social remittances' (Peggy Levitt) (10/18)	Diffusion of Innovations (6/18)
Amin & Ingman, 2014	No	No	(Only reference to financial remittances)	No
Battaglia, 2015	Yes	Yes	No	No
Beine et al., 2013	No	No	No	Yes
Chinouya, 2006	No	No	No	No
Creighton et al., 2011	Yes	Yes	Yes (Levitt, 1998)	No
De, 2013	Yes	No	No	Yes
Mesplé-Somps, 2016	No	No	Yes (Levitt, 1998)	No
Fargues, 2011	No	Yes	No	Yes
Frank, 2005	No	No	Yes (Levitt, 1998)	No
Levitt & Lamba-Nieves, 2011	Yes	Yes	Yes (expansion of Levitt, 1998)	Yes
Lindstrom & Muñoz-Franco, 2005	Yes	Yes	No (However, paraphrasing social remittances as 'diffusion of urban culture' referring to Levitt's 1998 article on social remittances)	Yes
Lindstrom & Muñoz-Franco, 2006	Yes	Yes	Yes (Levitt, 1998)	Yes
Mekonnen & Lohnert, 2018	No	Yes	Yes (Levitt, 1998)	No
Patzer, 2018	No	Yes	Yes (Levitt and Lamba-Nieves, 2011)	No
Roosen & Siegel 2018	No	Yes	Yes (Levitt and Lamba-Nieves, 2011)	No
Rubyan-Ling, 2019	No	Yes	Yes (Levitt, 1998; Levitt and Lamba-Nieves, 2011)	No
Sobiech, 2018	No	Yes	Yes (Levitt, 2001)	No
Sriram et al., 2018	No	No	No	No

Supported by this mapping, the majority of theories can be clustered into three areas. First, are those theories that discuss the migrant side, the access to healthcare and

health-related information that migrants are able to receive at destination. Theories of acculturation are used to explain the extent migrants internalise the available health-related information at destination. Second, are the theories related to the role of social networks – specifically transnational networks – in accessing and exchanging information from migrants to NMOs, including direct references to social remittances. Third, the role of the diffusion of health-related innovations and its influence on the health of NMOs. Hence, understanding how migrants can act as change agents influencing the health of NMOs via TSE requires a clear understanding of access to healthcare and health-related information, integration at destination, transnational networks, social remittances, and how the diffusion of TSE can change the health (behaviour) of NMOs. Such an integrative model is, however, lacking to date.

The proposed *Comprehensive transnational exchange of Health informATion (CHAT)-model* combines migration, health behaviour, and communication (social marketing) theories, integrating Rogers' model with the concepts of social remittances, the human right to the highest attainable standard of health, Berry's model of acculturation, and aspects of the transnational theory to provide the necessary multi-faceted perspective. The CHAT-model clarifies the sending as well as the receiving side from a multi-disciplinary perspective. The context of both sides is equally important when studying the influence of TSE on the health of networks members at origin (Figure 1).

Comprehensive transnational exchange of Health informATion (CHAT)-model

Predisposing factors senders/migrants and receivers/networks members at origin

Initially, in Rogers' model the predisposing factors were solely assigned to the receivers' side; in the presented CHAT-model, the receivers are identified as networks members at origin (NMOs) (36). However, in defining and redefining social remittances Levitt and Lamba-Nieves described the existing knowledge and experiences migrants have when arriving at their destination (18,19). Furthermore, they also highlighted the importance of migrant responses to innovations and their exposure to new or different influences at destination, which must be considered in the TSE-process (19). Additionally, it is deemed important to include the predisposing factors for NMOs (in the presented model, the receivers of information) and the migrant's side, who will be considered the senders of information in the CHAT-model to simplify the representation of the complex TSE-process. Including predisposing factors is important because the background characteristics and the evaluation of the innovation will influence the migrant's diffusion

Figure 1. Comprehensive transnational exchange of Health informATion (CHAT)-model

behaviour. Additionally, as described in Rogers' innovation-decision process, one also needs to consider the predisposing factors of the receivers, in this case NMOs, that can influence their acceptance of the diffused behaviour. In the presented CHAT-model, the receivers' predisposing factors will be identical to those of the senders, as these initially have been based on the ones defined for the receivers in Rogers' innovation-decision process (36). Rogers (2003) assigned three components related to predisposing factors that can influence diffusion behaviours, such as characteristics of the sender/receiver, prior conditions of the sender/receiver, and perceived characteristics of the innovation.

Characteristics of the sender/receiver are linked to three main sections, namely the socio-economic status and other individual factors (e.g., migration history and health status); personality values (e.g., dogmatism, empathy, and fatalism) that are believed to be associated with the diffusion of innovations; and communication behaviours that represent the existence of local as well as transnational networks and the perceived connectedness to their transnational network members (17,36).

Prior conditions of the sender/receiver reflect their perceptions of change and "readiness to change". Factors associated with the prior conditions of the sender/receiver are the previous practice of the innovation; the felt need of the innovation; the degree to which the sender/receiver is open to adopting innovations; and the existing norms of society and the need of the sender/receiver to comply with these norms (36). In addition, to identify the internalisation of the information received at destination, we include Berry's model of acculturation (33).

The final component related to the predisposing factors is the perceived characteristics of the innovation by the senders/receivers. These are their relative advantage, compatibility with existing norms and values, complexity in usage, the degree in which the innovation has been tested (trialability), and how far the results of the innovation are observable to others (36). A detailed overview of the constructs, definitions, and examples of operationalisations when studying the predisposing factors of the TSE-process can be found in Table 2.

Necessary conditions for transnational social exchanges to contribute to change in the health behaviour and outcomes of networks members at origin

Several conditions are conceptualised to moderate the influence of TSE on the health (behaviours) of NMOs. The migrant needs to have access to innovative and preferably evidence-based health-related information to remit within their transnational network. Furthermore, migrants need to have positive attitudes towards the received health-

Table 2. Overview constructs, definitions, and examples of operationalisations when studying the predisposing factors of senders/migrants and receivers/networks members at origin in the TSE-process

Constructs		Definition	Examples of operationalisations
Diffusion of Innovations (Rogers, 2003) Transnationalism (Glick Schiller et al., 1992)			
Characteristics of the senders/receivers	**Socio-economic status and other individual factors**	*'Socio-economic status is the position of an individual identified by variables related to income, wealth, education level, and the like in relation to others'* ((36): p.288). Individual factors are related to aspects that influence personal determinants of health behaviour, such as age, gender, migration status, time at destination, and many more (113,114).	"How old are you?" "How old were you when you left your country or community of origin?" "Are you married or in a relationship?" "Which your highest degree?" "What is your profession?" "Which languages do you speak?" "Do you have a relative that lives in another country?" "Have you ever migrated?"
	Personality values	*'Personal values are related to stable and persistent goals that one has in life. Some personality variables have been associated with innovativeness, such as empathy, dogmatism, rationality, and fatalism'* ((36): p.289).	Check validated (parts of) questionnaires to measure empathy, dogmatism, rationality, and fatalism
	Communication behaviour	Actions of communication related to the social participation, connectedness, and transnationalisation (17,36).	"Can you describe your social network?" "Where are the individuals you mention located?" "How connected do you feel to this person?" ***(To answer this question a sociogram can be used)***
Prior conditions senders/receivers	**Previous practice**	The actual application or use of an idea, belief, or method, as opposed to theories relating to it (115).	"Have you been able to try x birth control method before?"
	Felt needs/ problems	When something is deemed to be very important (need) or an extreme difficulty one encounters (problem) (115).	"Do you think you need to use a birth control method?" "Why?" "Which problem/issue will the use of a birth control method solve for you?"
	Innovativeness	*'The degree to which an individual is relatively earlier in adopting new ideas than the other members of a system'* ((36): p.267).	"Compared to your friends, would you say you were one of the first to implement x birth control method?" "Compared to your friends, how eager are you to try out a new idea/behaviour/gadget?"
	Norms of the social system	*'Norms define a range of tolerable and expected behaviour and serve as a guide or standard for the behaviour of members of a social system'* ((36): p.26).	"In case your friends/family/church would openly reject the use of birth control methods, in how far would you comply with their rejection?" "Why?"

Table 2. Overview constructs, definitions, and examples of operationalisations when studying the predisposing factors of senders/migrants and receivers/networks members at origin in the TSE-process (*continued*)

Constructs		Definition	Examples of operationalisations
Perceived characteristics of the innovation	**Relative advantage**	*'The degree to which an innovation is perceived as better than the idea it supersedes (economically, socially, convenience, and satisfaction)'* ((36): p.229).	"Do you think that x birth control method works better than an alternative method?" "Why do you think so?"
	Compatibility	*'The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of the (potential) adopter'* ((36): p.240).	"How well is x birth control method to prevent unwanted pregnancies?" ***(Match question with previously mentioned problems)***
	Complexity	*'The degree to which an innovation is perceived as difficult to understand and use'* ((36): p.257).	"How easy do you think it is to use x birth control method?" "Why?"
	Trialability	*'The degree to which an innovation may be experimented with on a limited basis'* ((36): p.258).	"Have you been able to test x birth control method, before you started using it as contraceptive method?"
	Observability	*'The degree to which the results of an innovation are visible to others'* ((36): p.258).	"Did your friends observe you using modern birth control methods and succeeding to prevent unwanted pregnancies?" ***(Match question with previously mentioned problems)***
Berry's Model of Acculturation (Berry, 1992)			
	Assimilation	When migrants do not maintain one's cultural heritage but do value to create relations with members living at destination (33).	"How important is it for you to stay in touch with your family at your country or community of origin?" "Why?" "Do you celebrate important holidays together with your family or with members from your community?" "Can you describe your social network?" "Where are the individuals you mention located?" "How connected do you feel to this person?" ***(To answer this question a sociogram can be used)***
	Integration	When migrants do maintain one's cultural heritage and value to create relations with members living at destination (33).	
	Marginalisation	When migrants do not maintain one's cultural heritage and do not value to create relations with members living at destination (33).	
	Separation	When migrants do maintain one's cultural heritage but do not value to create relations with members living at destination (33).	

Table 3. Overview constructs, definitions, and examples of operationalisations related to the examples of operationalisations when studying the necessary conditions for social remittances to contribute to change in health behaviour and outcomes of networks members at origin in the TSE-process

Constructs		Definition	Examples of operationalisations
Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR), the human right to the highest attainable standard of health (UNCESCR, 2000)			
Accessibility and availability of healthcare and health-related information for migrant at destination	**Availability**	'*Functioning public health and healthcare facilities, goods and services, as well as programmes, have to be available in sufficient quantity within the State party*' ((34): p.4).	"How many healthcare facilities are available to you within your state?"
	Non-discrimination	'*Health facilities, goods, and services must be accessible to all, especially the most vulnerable or marginalised sections of the population, in law and in fact, without discrimination on any of the prohibited grounds*' ((34): p.4).	"Has a health facility at destination ever denied access to you, based on your nationality?" "Has a specific health service ever been denied to you at destination, based on your nationality?"
	Physically (accessible)	'*Health facilities, goods, and services must be within safe physical reach for all sections of the population, especially vulnerable or marginalised groups*' ((34): p.4).	"How do you need to travel to the healthcare facility?" "Do you feel safe traveling this route?"
	Economically (affordable)	'*Based on the principle of equity, ensuring that health facilities, goods, and services, whether privately or publicly provided, are affordable for all, including socially disadvantaged groups*' ((34): p.4).	"Are possible expenses of a hospital/doctor visit holding you back of going to a health facility?" "Even when necessary?"
	Information Accessibility	'*Information accessibility includes the right to seek, receive, and impart information and ideas concerning health issues, without impairing the right to have personal health data treated with confidentiality*' ((34): p.4).	"How accessible is the SRH-related information provided by the healthcare professional at destination to you as a migrant?"
Quality and Acceptability of healthcare and health-related information for migrant at destination	**Respectful of medical ethics**	'*All health facilities, goods, and services must be designed to respect confidentiality and improve the health status of those concerned*' ((34): p.4).	"Did you experience that the healthcare professional at destination did not treat your health information confidential?"
	Culturally appropriate	'*All health facilities, goods, and services must be respectful of the culture of individuals, minorities, peoples, and communities, sensitive to gender and life-cycle requirements*' ((34): p.4).	"Can you relate to the SRH-related information provided by the healthcare facilities at destination?" "Is there anything in the provision of SRH that you find offensive?"
	Quality	'*Health facilities, goods, and services must be scientifically and medically appropriate and of good quality*' ((34): p.5).	"Did you experience the healthcare professional at destination to be unskilled to provide you the SRH programme?"

related information, preferably obtained from positive personal experiences related to the specific information. This means that migrants need to be able to access, accept and receive quality healthcare and health-related information (19,57,58,113,114).

The recommended conditions also reveal the responsibility and the role of the destination locations, for internal migrants and emigrants. Migrants need access to proper healthcare and health-related information. The human right to the highest attainable standard of health as found in Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR), requires that everyone, and therefore also migrants, should not only have physical access to healthcare and health information, but this access should also be affordable and non-discriminatory (34). Furthermore, to successfully remit new health-related information, migrants should gain positive experiences related to the new health behaviour and health outcome to boost acceptance on their part. Conceptually, the right to health as interpreted by the Committee on Economic, Social and Cultural Rights (CESCR), which is the expert treaty body established to monitor state compliance with the ICESCR, requires that health-related information and health services, facilities and goods are available, physically and economically accessible without discrimination, acceptable, meaning respectful of medical ethics and culturally appropriate, as well as of good quality (34) (see for more extensive information Table 3).

Diffusion of transnational social exchanges

Peggy Levitt initially defined 'social remittances' as the '*ideas, behaviours, identities, and social capital that flow from receiving to sending-country communities*' ((18): p.927). The information that is exchanged within the transnational network is part of the systems of practice (such as actions), normative structures (such as ideas, values, beliefs, and social norms), and identities (e.g., related to traditions, gender roles, and family values). Furthermore, being part of the transnational network, the migrant can serve as a role model or information source (social capital) for NMOs (19,57).

In addition to the previously stated recommended conditions to establish an influence of TSE on the health behaviours and health outcomes of NMOs, frequent exchange of information within an established transnational network needs to occur to increase the chances that the migrant can successfully diffuse the health-related information (57,114). The frequency and communication channels and sources need to be considered when measuring the transnational networks and the diffusion of innovations (36). A detailed overview of the constructs, definitions, and examples of operationalisations related to the diffusion of TSE can be found in Table 4.

Table 4. Overview constructs, definitions, and examples of operationalisations when studying the diffusion of transnational social exchanges in the TSE-process

Constructs		Definition	Examples of operationalisations
Social remittances (Levitt, 1998; Levitt-Lamba-Nieves, 2010)			
Normative structures	**Ideas**	'*Opinion or belief*' (115).	"What did you suggest to your relative in your home country to control pregnancies?" "Can, according to you, pregnancies be planned?"
	Values	'*Principles or standards of behaviour; one's judgement of what is important in life*' (115).	"Is the planning of pregnancies, according to you, good or bad?" "Do you think that the use of birth control is good or bad?" "Do you think that one should use birth control in order to be able to plan pregnancies?"
	Beliefs	'*Trust, faith, or confidence in someone or something*' (115).	"How much do you trust that birth control can reduce unwanted pregnancies?"
	Social norms	'*A standard or pattern, especially of social behaviour, that is typical or expected of a group*' (115).	"In how far do your parents/friends/co-workers approve the use of birth control?"
Systems of practice	**Actions shaped by normative structures**	'*The fact or process of doing something, typically to achieve an aim, which is based on the standards for the behaviours of members in a social system*' (115).	"Do you actively promote birth control to your family/friends at origin?"
Social capital	**Social capital**	'*The networks of relationships among people who live and work in a particular society, enabling that society to function effectively*' (115).	"With who at origin do you still have contact?" "How frequently?" ***(To answer this question a sociogram can be used)***
Identity	**Identity**	'*The characteristics determining who or what a person is*' (115).	"Do you think that being able to use birth control is empowering to you as a woman?" "Do you think that using a birth control makes you less of a good Christian/Muslim?"
Diffusion of Innovations (Rogers, 2003)			
Communication	**Communication channel**	'*The means by which a message gets from the source to the receiver*' ((36): p.204).	"Which channel do you mostly use when discussing SRH?" ***(To answer this question a sociogram can be used)***
	Communication source	'*This is an individual or an institution that originates a message*' ((36): p.204).	"With who outside your country do you discuss SRH?" "From who or where did you receive x SRH information?" ***(To answer this question a sociogram can be used)***

Health behavioural change following the diffusion of innovations – The innovation-decision process

Transnational networks facilitate the diffusion of ideas and information (TSE) back-and-forth across international borders. The output of the defined 'social remittances' overlaps with the input that can be related to the individual determinants necessary to influence health behavioural change, such as information, skills, practices, and social norms (18,19,114). Via TSE, migrants have the potential to affect individual health behavioural determinants such as knowledge, social norms, skills/self-efficacy, and attitudes of NMOs.

Living outside their country or community of origin, migrants are able to bring new information into their mostly homogenous transnational networks (95,96). Also, due to the often more prominent position of the migrant within the household and community and (unconsciously) tailoring of the health-related information that they diffuse, migrants could contribute to changes in health behaviours and health outcomes of their transnational NMOs. However, the diffusion of innovations does not guarantee acceptance; this decision may be moderated by the above-described factors, leading to resistance, rejection, or modification of the TSE to personal preferences and local contexts (19,36,95,114).

The innovation-decision process by Rogers (2003) describes five phases that an innovation passes, the knowledge, persuasion, decision, implementation, and confirmation phases. Rogers' model is often used in health behavioural sciences, especially when studying the importance of the acceptance and implementation of new health behaviour within socio-cultural contexts (e.g., boiling water before cooking and birth control use in rural areas of economically developing countries) (36).

The first phase of the innovation-decision process is the knowledge phase. An individual receives information about a specific innovation, raising awareness and understanding the innovation's functioning. Following the persuasion phase, the individual balances the pros and cons of the innovation, creating either a positive or a negative attitude towards the innovation or parts of the innovation. In the next phase, an individual decides whether or not to involve in actions that lead to a decision to either adopt or reject (parts of) an innovation. Based on his/her decision, the individual starts to act accordingly to initiate the implementation of (parts of) the innovation. When moving from the decision to the implementation phase, individuals begin to move away from the pure thinking and deciding exercises that made them choose to either implement (parts of) the innovation or reject it. The final phase of the innovation-decision process is the confirmation stage. The individual either confirms the previously adopted and

implemented innovation, changes it, or decides to reject it, possibly moving on to the next innovation-decision process of an alternative innovation (36).

An example of exchanging information related to emergency contraception from migrants to a female NMO is provided to clarify the discussed phases from the innovation-decision process. First, the NMO receives information about emergency contraception, such as copper-bearing intrauterine devices (IUDs) and emergency contraceptive pills (ECP) from the migrant. The migrant can provide more information about the IUD and ECP, such as the differences with other contraceptive methods as well as the use and effects of the IUDs and ECPs. Depending on the NMO's personal and social characteristics, this information can create awareness of the existence and possibilities of emergency contraception (*knowledge phase*). Second, the NMO starts to evaluate the advantages and disadvantages of using the IUD and ECP, considering her situation and social context (*persuasion phase*). Third, if she perceives more pros than cons in using an IUD than an ECP, she can decide to use this method and prepare actions to start using an IUD (*decision phase*). Fourth, after choosing to use an IUD and planning the implementation steps, the NMO can start implementing the prepared actions, such as visiting a gynaecologist to get an IUD (*implementation phase*). Fifth, when the IUD expires, the doctor can ask the NMO if she either wants another IUD or not. In this case, she can decide to either continue the method or reject it and possibly replace it with another contraceptive method (*confirmation phase*).

A comprehensive outline of the constructs, definitions, and examples of operationalisations related to health behavioural change following the diffusion of innovations – the innovation-decision process is presented in Table 5.

Table 5. Overview constructs, definitions, and examples of operationalisations related to health behavioural change following the diffusion of innovations – the innovation-decision process

Constructs		Definition	Examples of operationalisations
Diffusion of Innovations (Rogers, 2003)			
Knowledge	**Awareness-Knowledge**	'*Information that an innovation exists*' ((36): p.173).	"Have you ever heard of x birth control method?" "Which birth control methods do you know/ are you aware of?"
	How-to Knowledge	'*Information necessary to use an innovation properly*' ((36): p.173).	"Can you explain me how to use x birth control method?" "How often do you need to use x birth control method?" "When do you need to use x birth control method?"
	Principles-Knowledge	'*Information dealing with the functioning principles underlying how an innovation works*' ((36): p.173).	"Can birth control influence your reproduction?" "Can you explain how birth control can influence your reproduction?"
	Dissonance (Knowledge stage)	'*When an individual becomes aware of a need and seeks information about an innovation to meet his need*' ((36): p.189).	"When did you hear about x birth control method?" "When did you start searching information about x birth control method?" "Why?"
Persuasion	**Forward planning**	'*The ability of the individual to think hypothetically and counterfactually and to project into the future*' ((36): p.177).	"What if you apply x birth control method in the future?"
	Social reinforcement	'*The individual wants to know whether his or her thinking is on the right track in the opinion of peers*' ((36): p.175).	"How much do your friends agree with the idea that birth control can reduce unwanted pregnancies?"
	Attitude (main outcome persuasion phase)	'*A relatively enduring organisation of an individual's beliefs about an object that predisposes his or her actions*' ((36): p.174-175).	"Do you think that the use of birth control will empower you." "Why?" "Do you think that the use of birth control is unnatural." "Why?"
	Cue-to-Action	'*An event that occurs naturally or by a change agent at a time that crystallises a favourable attitude into overt behavioural change*' ((36): p.176).	"The moment I delivered my second baby, I decided to start looking into contraception options." "The moment I saw the consequences of my friend having an unwanted pregnancy, I decided to start looking into contraception options." "The moment I had an unwanted pregnancy scare, I decided to start looking into contraception options." "What was the moment that triggered you to start thinking about the use of birth control?"

Table 5. Overview constructs, definitions, and examples of operationalisations related to health behavioural change following the diffusion of innovations – the innovation-decision process (*continued*)

Constructs		Definition	Examples of operationalisations
Decision	**Small-scale trial (if possible, by individual self or by substitute peer)**	'*Try out the new idea on a partial basis*' ((36): p.177).	"Have you been able to test a condom before you started using it as contraceptive method?" "Did your friend tell you about his/her experiences of her first time using a condom, before you started to use it as a contraceptive method?"
	Dissonance (Decision and Implementation stage)	'*Discrepancy between what he or she believes versus what he or she is actually doing*' ((36): p.189).	"At the moment, what would hold you back to use x birth control method?"
	Re-invention	'*The degree to which an innovation is changed or modified*' ((36): p.181).	"Which components to prevent unwanted pregnancies do you think you will accept to implement and which not?" "Why?"
	Adoption	'*Decision to make full use of an innovation as the best course of action available*' ((36): p.177).	"Do you accept the idea of using x birth control method?" "In your opinion, how much percent will you take over the information from your friend in implementing your own birth control use?" "Do you think x birth control method is the best option to prevent unwanted pregnancies?"
	Continued Adoption	Consists of consistently deciding to make full use of the innovation as the best course of action available (36).	"Did you consider the idea of using x birth control method when you initially heard of it?" "After rejecting the idea of using x birth control method, did you test x birth control method?"
	Later Adoption	Consists of considering adoption of the innovation, even after initially rejecting it (36).	
	Rejection	'*Decision not to adopt an innovation*' ((36): p.177).	"In how far do you accept the idea of using x birth control method?"
	Active rejection	'*Consists of considering adoption of the innovation (including its trial), but then not to adopt it*' ((36): p.178).	"Did you consider the idea of using x birth control method when you initially heard of it?" "After rejecting the idea of using x birth control method, did you test x birth control method?"
	Passive rejection	'*Consists of never really considering the use of the innovation*' ((36): p.178).	
	Discontinuance	'*A decision to reject an innovation after having previously adopted*' ((36): p.178).	
	Continued Rejection	Consists of consistently rejecting the innovation (36).	

Table 5. Overview constructs, definitions, and examples of operationalisations related to health behavioural change following the diffusion of innovations – the innovation-decision process (*continued*)

Constructs		Definition	Examples of operationalisations
Implementation	**Implementation**	'*Occurs when an individual puts an innovation to use*' ((36): p.179).	"Do you use x birth control method?"
	Dissonance (Decision and Implementation stage)	'*Discrepancy between what he or she believes versus what he or she is actually doing*' ((36): p.189).	"At the moment, what would hold you back to use x birth control method?"
	Active information seeking	'*Takes place in order to answer questions related to the expected consequences of the innovation*' ((36): p.179).	"Do you know where to obtain x birth control method?" "Which problems do you expect to encounter when using x birth control method?" "How can you solve the mentioned problems?"
	Involvement/ Role change agents	'*Role of the change agent is to mainly provide technical assistance when he/she begins to use the innovation*' ((36): p.179).	"Who provided you the information to the above-mentioned questions?" ***(questions asked about active information seeking)***
	Length of time using the innovation	'*Period of time the individual is using the innovation*' ((36): p.180).	"How long are you using x birth control method?"
	Re-invention	'*The degree to which an innovation is changed or modified by a user in the implementation process*' ((36): p.180).	"Which components do you think you will implement to prevent unwanted pregnancies and which not?" "Why?" "Will you change the innovation to fit your needs?" "How?"
	Identity innovation	'*The innovation loses its distinctive quality as the separate identity of the new idea disappears*' ((36): p.180).	"How would you rate x birth control method as innovative?" "Why?"

Table 5. Overview constructs, definitions, and examples of operationalisations related to health behavioural change following the diffusion of innovations – the innovation-decision process (*continued*)

Constructs		Definition	Examples of operationalisations
Confirmation	**Confirmation**	'*Individual continues to use the innovation, even when exposed to conflicting messages about the innovation*' ((36): p.189).	"After using x birth control method for x amount of time, do you still believe this is the most effective method to plan for your pregnancies?" "Which problems do you experience when using x birth control method?" "How do you control for these problems?" "Even when experiencing these problems, do you still believe this is the most effective method to plan for your pregnancies?"
	Dissonance	'*An uncomfortable state of mind that an individual seeks to reduce or to eliminate.*' ((36): p.189).	"After using x birth control method for x amount of time, do you still feel that the use of x birth control method is the most effective way to plan for your pregnancies?"
	Discontinuance	'*A decision to reject an innovation after having previously adopted and implemented it*' ((36): p.190).	"How long did you use x birth control method, before deciding to stop using it?" "What were the reasons for you to stop using x birth control method?"
	Replacement discontinuance	'*A decision to reject an idea in order to adopt a better idea that supersedes it*' ((36): p.190).	"Did you find a better alternative for x birth control method?" "How likely is it that you will replace x birth control method with the mentioned alternative?" "Is the mentioned alternative method the reason you stopped using x birth control method?" "Where/from who did you receive the information about the mentioned alternative method?"
	Disenchantment discontinuance	'*A decision to reject an idea as a result of dissatisfaction with its performance*' ((36): p.190).	"What was the reason for you to stop using x birth control method?" "How satisfied were you with x birth control method?" "What were the advantages of using x birth control method?" "What were the disadvantages of using x birth control method?" "Did you find a better alternative for x birth control method?"

Discussion

Previous studies identified the potential of migrants and diaspora organisations as agents of change influencing the health of their NMOs via transnational social exchanges (TSE) (19,56,82–97). The presented CHAT-model describes this TSE-process. Migrants can bring (innovative) information that possibly can lead to (positive or negative) changes for their network members at origin (NMOs). These changes can start at an individual level and can possibly scale up to a larger – societal – level (18,19). The CHAT-model explains how migrants' access to healthcare and health-related information at destination exposes them to new or different health-related information. The internalisation of this information is based on the level of integration within the home and host society. Transnational networks need to exist to support the TSE from migrants to their NMOs. Finally, the characteristics and perceptions regarding the health-related information of both migrants and NMOs will influence their TSE-sending and receiving behaviour.

Considering all the components of the CHAT-model TSE could lead to a quadruple win situation. If migrants' access to healthcare and health-related information at their destination is of good quality and made available, accessible, and acceptable, this could lead to health improvements in migrant health (win #1), which translates to overall better health at destination (win #2). Assuming an existing and active transnational network is in place, TSE could positively (although negative influences could also occur, such as obesity) influence the health of NMOs (win #3), which could also scale-out to other behaviours and scale-up to higher levels at the origin society, potentially leading to positive development impacts at origin (win #4). Important to mention that based on the CHAT-model, it cannot be expected that migrants or diaspora organisations bear the burden of so-called development efforts by themselves, as previously has been noticed with economic remittances. A shift in expectations from states to migrants has already partly been observed in the trend of economic remittances, foreign development aid (FDA), and official development assistance (ODA). A steep increase in economic remittances and a decrease in FDA and ODA have been seen over the years. In the next five years, it is even expected that economic remittances will be more than FDA and ODA combined (116). Destination and origin still need to provide the appropriate support to enable sustainable development efforts.

Health for all is a relevant perspective the CHAT-model aims to highlight. The healthcare and health-related information people receive at destination can have the potential to be diffused beyond borders. Unfortunately, the main components of the human right to the highest attainable standard of health are not always fully realised by hosting countries, meaning that high quality and culturally appropriate health facilities, services,

and information are often not adequately available and accessible to migrants. Previous studies exposed the difficulties that migrants still experience when accessing healthcare as well as the challenges health professionals encounter when providing healthcare to migrant patients (34,66,70,78,109–111).

As much as destination plays a role in the diffusion process, the context of origin is as important in the evaluation. The presented CHAT-model uses Rogers' 'innovation-decision-process' to assess the personal and social context of the NMOs. The personal and social evaluations of the NMOs are considered in different stages, such as when receiving innovative or different information from the migrant as well as during the decision and implementation (or rejection) steps that follow. It is important to consider that NMOs might not completely implement the TSE, but only parts that seem relevant or acceptable to them or their social context (36).

In defining social remittances, Levitt rightfully argued they need to be discussed within a transnational context (18,19). The CHAT-model is therefore presented from a transnational perspective. It not only stresses the existence of transnational networks but also considers the frequency of interactions and the communication sources and channels within these networks. When analysing the role of TSE on the health of NMOs, one also needs to realise the role of migrants within the transnational network. Migrants are often perceived as influential members of their transnational network (31,32). However, as observed in the study of Patzer (2018), within the Philippine context, they identified two types of migrants. Balikbayans, who already have been gone for a long time and are well-established in their new country. And Overseas Contract Workers (OCWs), who are hard-working temporary migrants suffering during their time abroad. Remittances of any kind were perceived differently from these two types of migrants; more resentful from Balikbayans, even perceived as neo-colonizers, while the exchanges from OCWs had a more positive connotation (85).

The TSE-process is not necessarily different from the human and social capital that is exchanged within social networks inside a given country. Even though migrants always have been connected to their home countries, the dynamics – such as decreased costs in air travel, increased communication technologies, and economic connections – have transformed over the last decades, leading to changes in the interactions between migrants and networks members at origin (32,56). In addition, individuals with similar backgrounds living in a similar context inside a given country will rarely lead to innovative exchanges within the set boundaries of their social network (96). Living outside their country or community of origin, away from other transnational network members, migrants can access and absorb new or different information at destination.

This makes it possible for migrants to present innovative information to their (mostly) homogenous NMOs (95).

Some limitations should be considered related to the development of the CHAT-model. At the moment, only a limited number of studies researched the link between TSE and the health of NMOs. With the majority of the articles studying this either from the migrant's perspective (56,82–84,86,87) or by analysing migrant exposure when having a migrant household member (88,90–92,94–97). These studies already can provide some relevant insights into the process and influences of TSE on the health of NMOs but often still miss the voices of NMOs. The CHAT-model intends to help future researchers in their considerations when studying this complex TSE-process, as a conceptual framework is currently missing (32). Unfortunately, the observed research focus of this topic on the so-called global South poses several concerns. It misrepresents the reality of migration as well as separates and associates NMOs with "sending developing countries". Additionally, the presented conceptual model is based on concepts and theories of included studies dominated by a Western Anglo-Saxon perspective, missing relevant perceptions and knowledge from the so-called global South. We want to acknowledge these concerns and recommend future research to consider the presented CHAT-model as a base connecting knowledge of both global sides to reach a more authentic perspective on the TSE-process. Furthermore, the CHAT-model is presented linearly; however, we understand that TSE flow continuously and circularly between destination and origin, influencing both migrants and NMOs. Although the CHAT-model aims to provide a comprehensive and multi-disciplinary perspective, we acknowledge that this simplifies the dynamic and interactive nature of the process and its actors.

The presented CHAT-model clarifies the role of TSE on the health of NMOs for policymakers at origin and destination. It also shows the important role of transnational networks and the potential of the exchanges within. Whether these happen upon return or via social media or phone calls, it is important to have these structures in place to support TSE. When looking at possibilities for interventions, several entry points can be interesting such as the migrants or those who have a migrant family member or a migrant who returns. An interesting example that supports the role of migrants as change agents by sharing their knowledge with members from their origin country is the 'Connecting Diaspora for Development' (CD4D) programme of the International Organisation for Migration (IOM) (117,118).

In conclusion, the CHAT-model presented in this article discusses a framework in which transnational social exchanges (TSE) can be identified, and possible consequences on the health of networks members at origin (NMOs) can be further analysed in future studies.

The comprehensive and multi-disciplinary perspective the CHAT-model provides should be seen as an attempt to describe the complex process of TSE and its possible influences on the health of NMOs.

CHAPTER 4

Afghan case study: birth control awareness and use

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Abstract

Objective: The objective of this article is to investigate the link between migration and knowledge and use of birth control methods among female household members (of migrants) who stay behind in Afghanistan. Migrants can remit birth control information received in the destination country to non-migrants staying in the origin country, who may as a consequence adjust their health behaviour accordingly. The consequences of this interaction for knowledge and use are what we aim to test.

Study design: Population-based secondary analysis of cross-sectional data.

Methods: This study used cross-sectional data from the Afghan Mortality Survey (2010). Using ordinary least squares regression and propensity score matching, this research studies to what extent having a migrant in the household influences the knowledge and use of birth control among non-migrant Afghan women. Women who stay behind are defined in this research as those with a migrant household member who moved between 2005 and 2010.

Results: Results indicated that non-Pashtun women with a migrant household member showed greater knowledge of contraceptive methods using injectables, birth control pill and lactational amenorrhea method compared to those women without a migrant household member. Less knowledge of male sterilisation and emergency contraception is observed for all women (both Pashtun and non-Pashtun) with a migrant in their household on male sterilisation and emergency contraception compared to the women without a migrant in the household. In addition, we show that Pashtun women with a migrant in the household had lower levels of overall knowledge and were less likely to use birth control methods than women without a migrant household member.

Conclusion: In Afghanistan, given the proximity, religious similarity, and sociocultural customs mainly men migrate either to Pakistan or Iran. The findings suggest that migrants in different destination countries transfer different information (or fail to successfully transfer information) about birth control methods to members of their transnational networks, compounding disparities in knowledge and use of birth control methods among women staying in the origin country. Migrants have the potential to be health-related development agents, but the health information migrants receive while abroad and remit back to their home countries varies by destination country context.

Introduction

Health is one of the key components of development, which is also clearly represented in the Sustainable Development Goals (119–121). In developing countries, the main mortality causes for women are maternal-related complications due to sub-optimal health systems, gender inequalities and poor access to necessary information and education (122). The majority of maternal-related deaths can be prevented inter alia by using modern birth control. It can be assumed that the low knowledge and use of birth control hinder developing countries' progress (120–123).

When studying how migrants can contribute to the development of their countries of origin and their kin who remain behind, the bulk of research focuses on the influence of monetary transfers (financial remittances). However, the influence of the transfer of human and social capital (social remittances) on the development of individuals who stay behind continues to be understudied in current research. 'Social remittances' can be defined as informal, circular, and continuous exchange of information, skills, social norms and practices, which occurs within a transnational network between migrants and their kin who remain behind (18,19,57,124). Recognising the potential of migrants as development agents, social remittances even have the ability to reach a broader public and have a greater impact on a long-term development than money. Therefore, social remittances are considered to be more sustainable for development than economic remittances. Migrants often hold a more prominent position within the household and community. Further, they may (unconsciously) tailor the health-related information that they diffuse to those who stay behind. In this way, migrants could positively contribute to changes in health behaviours and health outcomes in their origin (18,19,57,58,125).

When remitting birth control-related information obtained in the destination country to those household members who stay behind, migrants have the potential to play a role in influencing the birth control knowledge of their kin who remain behind, consequently potentially stimulating birth control usage (18,19,57,58,125). In line with the expectation that social remittances can improve health outcomes among recipients, *this study analyses the link between migration and knowledge as well as use of birth control methods among female household members who stay behind in Afghanistan*. The majority of previous literature focuses on financial remittances or the influence of the absence of a migrant household member on the (sexual and reproductive) health of those left behind. In addition, the majority of the studies that research the link between health and migration focus on migration links and influences in Latin-American countries (especially Mexico) and their migratory movements to the US. This study not only adds to the existing literature by focussing on the role of social remittances on sexual and

reproductive health outcomes of women who stay behind but also opens the scope of geographical reference, by focussing on an understudied population and migratory patterns, namely Afghan women who stay behind in Afghanistan and the influence of their migrant household member(s) who migrated either to Iran or Pakistan on their birth control knowledge and use. It is done by using a large-scale quantitative data set based on the Afghan Mortality Survey (AMS) (2010). The analysis is done using a combination of ordinary least squares (OLS) regressions and propensity score matching (PSM). In this study, the influences of migration on birth control knowledge and usage are compared for Pashtun and non-Pashtun women separately. The split in Pashtun and non-Pashtun women also serves as an indication of the main destination countries of their migrant household members, assuming Pashtuns are mainly associated with migration to Pakistan, while non-Pashtuns primarily migrate to Iran. Among the women in the non-Pashtun sample, having a migrant in the household corresponds to mostly positive outcomes on the knowledge of birth control methods, with a few specific exceptions. For Pashtun women, migration corresponds to negative outcomes relating to knowledge and usage of contraceptives.

Background

Afghanistan is a country characterised by decades of political struggles. In the last century, three main political conflicts can be classified within Afghanistan: the Soviet Invasion (1979-1992), the Taliban regime (1992-2001) and the end of the Taliban regime (after 2001) (40,126). Afghanistan is yet to recover after decades of war and remains one of the poorest and least developed countries in the world, with a high dependency on foreign aid (126,127). The continuous political conflicts have created an instable socio-economic framework which is unable to support the detrimental living circumstances of the Afghan citizens (40,126). Numerous socio-economic indicators evidence the lack of a poor socio-economic framework. Afghanistan ranks at 169 out of 187 on the human development index (HDI) (2015: 0.479) and on the inequality adjusted HDI (2015: 0.327) (125,128). Of the Afghan population, 39.1% live below the national poverty line, and 22.6% are unemployed (129). The country is also characterised by diverse ethnic populations, made up mainly of Pashtuns (40%), Tajiks (30%), Hazaras (15%), Uzbeks and Turkmen (10%) (130).

Afghanistan faces one of the highest gender inequalities in the world, ranking 154 out of 159 on the gender inequality index (128). The poor living conditions of Afghan women translate into negative, gender-specific health outcomes such as high maternal mortality rates (396/100,000 live births) (125,126,131,132). Important factors undermining maternal health in Afghanistan are poor knowledge (33%) and usage (16.3%) of contraceptive methods among married women. Birth control knowledge and

use not only supports birth spacing but also is often related to female empowerment (45,123,133,134).

Migration has traditionally been a part of survival strategies in Afghanistan, practiced by significant shares of the population, especially the males, and is embedded in the local culture (135). Before mid-2014, for over three decades, Afghanistan had produced the largest number of refugees because of ongoing conflict and insecurity. Under the mandate of the United Nations High Commissioner for Refugees (UNHCR) the country currently still has the second largest refugee population and the largest protracted refugee population in the world (136–138). The Afghan net migration rate has always varied over time, and in recent years, the country has observed the rise of mixed migration, including circular labour migration (40).

Previous studies (89,93,95) stress the importance of values, social norms, and the availability of correct birth control information in the destination country that migrants can obtain and consequently remit to those household members who remain to successfully contribute to health behavioural change in the origin countries. For Afghan migrants, the main destination countries are Pakistan and Iran given the proximity, religious similarity, and sociocultural customs (40). Owing to the low level of formal education and general lack of health-information distribution in Afghanistan, social remittances can be a useful way of transferring health knowledge to those who stay in the country (139).

Previous studies and theories suggest that the information migrants are able to remit differs by country of destination and by the social and economic contexts in which migrants, as well as the recipients of remittances, live (18,19,57,58). As such, it is essential to gain a deeper understanding regarding accessing correct birth control-related information in the main destination countries of Afghans. Also, the sociocultural and ethnic differences among Afghan population groups need to be considered because these differences can influence the knowledge, attitudes and social norms related to the diffusion of birth control-related information. The AMS (2010) captures the migrant and health situation in Afghanistan between 2005 and 2010 (140). Therefore, the information utilised in this study needs to be framed within this time period.

Pakistan

Circular labour migration between Afghanistan and Pakistan is relatively common, resulting in strong transnational networks, which are primarily ethnic-based. In 2005, over 80% of all Afghans in Pakistan were Pashtuns, mainly living in the 'Pashtun belt' (40,141).

Particularly in the Pashtun belt, Afghan migrants and especially women experience restricted access to healthcare services and resources (142–146). Similar to Afghanistan, Pakistan can also be described as a strong patriarchal society in which many families have a strong preference for sons, translating in higher total fertility rates and limited use of birth control (125,146,147). Pakistani religious leaders and politicians strongly oppose birth control promotion programmes, resulting in ineffective or even non-existent birth control and maternal care programmes (48). The lack of birth control programmes in Pakistan can currently be observed in their high maternal mortality rates (178/100,000 live births) and low contraceptive use (21.7% uses any modern method) (45,148).

Additionally, the influence of migrants on the knowledge and use of birth control methods among women who remain in Afghanistan must be understood within the context of social norms and values (141). Social norms are assumed to vary across ethnic groups, and related to these social norms, different health behavioural outcomes can, therefore, be expected (113,114,149,150). The largest ethnic group within Afghanistan is the Pashtuns, who often live according to Pashtunwali. Pashtunwali is a very strict and conservative interpretation of Islam mixed with ancient traditions, which is deeply embedded into Pashtun daily life and identity, shaping their values and norms (40,141). Pashtunwali very likely influences Pashtun perceptions regarding sensitive subjects, such as birth control (141). Tober et al. (2006) found that for the case of Afghans in Iran, ethnic differences related to different interpretations of Islam strongly shaped perceptions and usage of birth control among Afghan women, with the biggest differences in practice between those of Pashtun and non-Pashtun ethnicity (including women of Tajik, Hazara, Uzbek, Turkmen, Nuristani, Baloch and Pashtun origin). Pashtuns were found to hold more conservative opinions about the use of birth control than other Afghan ethnic groups (147).

Findings of past literature stress, particularly in the case of Afghanistan, the importance and relevance of the socio-ethnic context in Afghanistan, especially related to birth control (40,48,141). Therefore, the analysis in this research is split into two sub-populations: Pashtun and non-Pashtun women[1]. This split will also serve as an indication of destination countries of the migrants in the households in this study. It is assumed that Pashtuns primarily migrated to Pakistan while non-Pashtuns are associated with migration to Iran (40,41,151).

1 As a first step, the analysis was performed on all the eligible women, combining the Pashtun and non-Pashtun women. The first analysis resulted in no significant differences between the combined group of women with and without a migrant in their household on the knowledge and use of birth control methods.

Related to the previously discussed information about birth control-related information and service availability in Pakistan combined with the Pashtunwali culture, the researchers expect no differences in the outcomes for birth control knowledge (H1) and use (H2) among Pashtun women with and without a migrant in their household.

Iran

Following decades of war, strong transnational networks have been established between Afghanistan and Iran, which currently support labour migration movements (41,151). As of 2006, the Afghan population in Iran was fragmented among ethnic groups, with the largest single share (40.5%) comprised of members of the Hazara ethnicity. Tajiks accounted for 22.1% of the Afghan population in Iran and Pashtuns, 8.8%, and the remaining 28.6% were other ethnic groups. Officially, basic medical care, such as primary healthcare, maternal and childcare and family planning are guaranteed to all Afghans, without discriminating by migrant status (143). Between the 2005 and 2010 time period, the healthcare system of Iran was well established and innovative, especially in the case of birth control promotion (40,143,147). After the 1979 Islamic Revolution, the cooperation between religious authorities and health officials resulted in the development of a comprehensive family planning education and promotion programme which provided free contraceptive methods and health guidance by trained staff starting in 1988 (147,152,153). Healthcare personnel promote the use of birth control methods to all adult married couples who visit healthcare facilities, which also includes Afghan migrants (147). The implementation of the birth control programme in Iran was highly successful, resulting in a decrease in the fertility rate from 6.8% in 1984 to 2.1% in 2000 and an increase in the use of birth control methods from 49% in 1989 to 73.8% in 2006 (152,153). Recently, however, the future of Iran's progressive birth control programme has been uncertain, as Ayatollah Ali Khamenei criticised the programme as too Western and stressed the objective of boosting the Iranian population. Under the Ayatollah's influence, the government passed a law in August 2014 that prohibits permanent contraception and the advertisement of birth control (154,155). It is important to mention that this prohibition took place years after the AMS survey (2010), and this influence will not be captured in this study.

Linked to the above information, it can be hypothesised that having a migrant household member will positively influence the contraceptive knowledge (H3) and use (H4) of non-Pashtun women that stay behind.

Theoretical framework

The theoretical framework of this research is based on a combination of migration and health behavioural theories, which is graphically presented in Figure 1.

Figure 1. Theoretical framework research: diffusion of health-related information within a transnational framework leading to health-behavioural change.

Transnational network

According to Levitt and Lamba-Nieves (2011) and Markley (2011), social remittances should be reviewed from a transnational perspective. The transnational framework considers the transnational network as the linkages between the migrants and those who stay behind as well as the exchanges that happen within this network. This framework focuses on the transfers of social and human capital via informal communication (e.g., phone and Skype calls, e-mails, Facebook messages and return visits) within these transnational networks. Several conditions need to be in place before a beneficial influence of social remittances on the knowledge and use of birth control can be expected. First, the migrant needs to have access to correct birth control information to remit to those who remain within their transnational network. This information transfer is part of the systems of practice (such as knowledge, skills, and self-efficacy) remitted to those who remain. Second, migrants need a positive attitude towards the retrieved birth control information, preferably obtained from positive personal experiences related to the specific information, supporting the transfer of normative structures (such as attitudes and social norms). Being part of the transnational network, the migrant can serve as a role model (social capital) to those household members who stay behind, increasing the success of the birth control-related remittances. Third, frequent exchange of information within an established transnational network needs to occur to increase the chances that the migrant can successfully remit birth control-related information (18,19,57,58,113,114).

Health-behavioural theories

Several factors can influence different health behaviours and related health outcomes. Health behaviours are defined as '*behaviour patterns, actions and habits that relate to health maintenance, to health restoration and to health improvement*' ((156): p.1). According to the health belief model, theory of reasoned action and planned behaviour and social cognitive theory, health behaviour decisions are made on the individual

level. Determinants that shape health behaviour on a personal level include knowledge, attitudes, perceived threat, skills/ self-efficacy, coping skills and social norms (113,114,149). Yet, the physical and socio-economical environmental influences, which weigh on these decisions, should not be neglected, as the physical, social, and economic environment influences the individual determinants, triggering the motivation and the intention to enable or disable healthy behaviours of an individual (113,114,149).

Theoretical framework

The theoretical framework of this research uses the output of social remittances within a transnational network as the input necessary for health behavioural change. Combining migration and health behavioural theories can explain how the remitted health-related information from the destination country, within an established transnational network, can serve as determinants for health behavioural change to those who stay behind. Assuming that the above discussed conditions hold, it can be expected that migrants can function as transnational development agents, potentially changing the health behaviours and consequently the related health outcomes of household members who remained behind via social remittances.

Previous study results

Previous studies (88,89,93,96) have addressed the influence of social remittances on fertility-related behaviours of adults who stay behind. In their cross-country analysis of the influence of international migration on fertility norms in origin countries, Beine et al. (2013) argued that migrants observe social norms regarding fertility in their countries of destination and that these can consequently shape fertility rates in the country of origin through social remittances. Depending on existing social norms in both origin and destination, fertility rates in the origin country may either increase or decrease in response to the norms migrants transmit. Changes in fertility rates were recorded by Fargues (2011), who researched how migrants in different host regions (namely the West or the Gulf) shaped birth rates in their countries of origin (Morocco, Turkey, and Egypt). In Morocco and Turkey, countries for which the majority of migrants resided in a Western country, birth rates were found to decrease among the family members of migrants who remain following information and values (smaller family sizes) received from those abroad. Birth rates were found to increase among Egyptians with migrant kin, which reflects the more conservative values migrants residing in the Gulf transmitted regarding family sizes (93).

De (2013) and Battaglia (2015), researched the sexual and reproductive health outcomes of Mexican women who stay behind. The study of De (2013) showed that Mexican women with a migrant in their household or women with a migrant past more often

used modern birth control than their counterparts without a migrant or without any migration experience (91). Battaglia (2015) argued that female household members who had at least one member who migrated to the United States experienced less often teenage pregnancies than those without a migrant household member. The observed decline in teenage pregnancies in the migrant households was attributed to the increased knowledge and use of modern contraceptives (88). In their analysis of the influence of social remittances on the knowledge and use of birth control of women in rural Guatemala, Lindstrom and Muñoz-Franco (2005) observed that both internal and international migrants shaped the contraceptive behaviours of female kin who stayed behind. The study indicated that rural Mayan women often distrust government-regulated birth control planning programmes and have lower rates of contraceptive use as a result. Knowledge and use of contraceptives, still, were higher among women who received information from migrants. The authors suggested that the more personal connection between rural women and migrants created a trustworthy source of information that increased the knowledge and use of contraceptive methods among rural Guatemalan women (95).

Methods

The data used in this study are derived from the AMS (2010). The AMS was part of the global MEASURE Demographic and Health Survey (DHS) project of the United States Agency for International Development. The AMS uniquely incorporated both migration and health-related questions, with a particular focus on family planning, which makes it a valuable data set for this research (140). The AMS contains a specific woman's section, questioning women between the ages of 12 and 49 years who usually lived in the household (140).

Dependent variables

To study the influence on the knowledge and use of birth control methods, several indicators were used which were retrieved from the woman's data set. Married female respondents were asked if they had ever heard of different birth control methods (female sterilisation, male sterilisation, intrauterine device, injectables, implants, pill, male condom, lactational amenorrhea method [LAM], rhythm method, withdrawal method, emergency contraception and other contraception method). The question '*Are you currently doing something or using any method to delay or avoid getting pregnant?*' ((140): p.229) was asked to the eligible respondents who were married and not pregnant at the time of the survey to study their contraceptive use.

Independent variable of interest

To calculate the influence of a migrant household member on those who remain, the following question in the AMS was used, '*Are there any members of your household who lived here in 1 Hammal 1384*[2] *but who have since moved away?*' ((140): p.205). As previously mentioned, the timeframe when a household could have a migrant was from 2005 to 2010. Women who were related to households that indicated yes to this question were subsequently coded as being a female household member who remains.

Control variables

In addition to the main independent variable (female has a migrant in her household) and dependent variables (knowledge of birth control methods and use of birth control methods), other independent variables were included in the current analysis based on relevant literature (40,113,114,141,147,149,150). The following variables were included as controls: region of household residence, type of residency, wealth, remoteness, education, ethnicity, age of woman and number of male children. All the control variables were measured on an individual respondent level.

Analytical methodology

This study used OLS regression and PSM comparing the contraceptive knowledge and use outcomes of Pashtun and non-Pashtun women with and without a migrant household member.

Ordinary least squares regression

As a first step, OLS regressions were conducted to understand the relationship between migration and birth control knowledge and use. It was decided to perform OLS regressions as this method '*minimised the sum of squared prediction mistakes*' ((157): p.190). The outcomes express percentage point differences of the knowledge and use of birth control methods of Afghan females when they have a migrant in their household in comparison to no migrant in their household.

Propensity score matching

Self-selection can be a serious methodological concern in migration studies, as migrants often differ from non-migrants based on both observable and unobservable traits. Individuals with higher levels of education and from wealthier households may be more likely to migrate. Previous research indicates that these characteristics (education and wealth) not only influence migrant selection but also shape the knowledge and use of

2 *1 Hammal 1384 is the date according to the Afghan calendar, which is converted to the Western calendar March 21, 2005 (Afghanistan Holding Group, n.d.).*

birth control methods. Data collected in the AMS are observational, meaning that it may include significant self-selection bias. One way of addressing this bias is to simulate an experimental design using the PSM method. Within this method, respondents are allocated into a 'treatment' or 'control' group based on the presence/absence of a migrant in the household (the 'treatment') and are then matched based on predefined observable characteristics (i.e., household wealth, residence locale and education level). This method can reduce the influence of the self-selection bias on the study outcomes, allowing calculation of an average treatment effect of the treated (ATT) (158–160). The PSM method was therefore chosen as an additional method to control the results of the OLS regression. Observable characteristics (such as wealth, education level and type of residence) were used to estimate the propensity score to explain the treatment. By using these observable characteristics, the balancing properties were satisfied, providing suitable comparison groups between women with a migrant and without a migrant in their household.

The analysis predicted the difference knowledge and usage of birth control among women in the control group (i.e., those without migrant household members) and the treatment group (i.e., those with migrant household members). Three matching techniques were used to compare the outcomes: the (1:1) nearest neighbour, kernel, and stratification (158–160).

Results

Descriptive results

The woman's data set included 48,190 women aged 12-49 years (140). Eligible respondents for the analysis of this study were married women. Therefore, all unmarried women were excluded from the analysis. Furthermore, women with non-response on one or more of the birth control questions as well as a missing answer on the ethnicity question were dropped from the analysis, resulting in a final sample of 25,419 eligible respondents.

As can be seen in Table 1, almost three out of 10 women had a migrant in their household. It can be observed that Pashtun women with a migrant were wealthier in comparison to those without a migrant, while the opposite is noted for the non-Pashtun women. The greatest share of women in the sample resided in rural areas. The majority of the female sample had no formal education, which was found to be significantly more when the females had a migrant in their household than when they had no migrant in their household.

In the AMS, a person was defined as a migrant if he or she left the household within a 5-year timeframe before the survey (2010). The survey did not make any distinction between international or internal migrants, hereby including a mix of migrants (140). Owing to data limitations, the specific migrant characteristics could not be included in the analysis of this study; therefore, Table 2 presents an overview of the migrant characteristics that was found in the migration dataset of the AMS.

Of the migrants in the households in the AMS, the majority of the migrants were male (approximately six out of 10). Furthermore, almost half of the households with a migrant had only one migrant in their household. The most frequent age category of the migrants is the age group between 12 and 25 years. The main reasons for migration differed per gender group; the main reason to move for males was work while females migrated primarily because of family.

Table 1. Means-comparison test between women without a migrant and a migrant in their household divided for the Pashtun and Non-Pashtun analytical sample

Women characteristics		Pashtun			Non-Pashtun			Total		
		No Migrant	Migrant	Total Pashtun	No Migrant	Migrant	Total Non-Pashtun	No Migrant	Migrant	Total
Wealth	Poorest	3.83**	2.67**	3.49**	26.02	27.09	26.32	16.32	16.08	16.25
	Poorer	11.21	10.84	11.11	20.78***	25.89***	22.23***	16.60***	19.10***	17.32***
	Middle	22.88	22.69	22.83	14.29	14.88	14.46	18.05	18.40	18.15
	Richer	32.50	32.41	32.47	12.33***	9.81***	11.62***	21.15**	20.01**	20.82**
	Richest	29.57*	31.38*	30.10*	26.57***	22.32***	25.37***	27.88**	26.41**	27.46**
Type of residence	Urban	23.74***	17.98***	22.05***	38.08***	30.26***	35.87***	31.81***	24.72***	29.77***
	Rural	76.26***	82.02***	77.95***	61.92***	69.74***	64.13***	68.19***	75.28***	70.23***
Level of education	No education	90.24**	91.83**	90.70**	81.76**	83.32**	82.20**	85.47**	87.16**	85.95**
	Madrassa	1.48**	0.82**	1.28**	0.79	1.05	0.87	1.09	0.95	1.05
	Primary education	4.44	4.37	4.42	8.31	8.16	8.27	6.62	6.45	6.57
	Secondary education	2.84	2.73	2.81	7.02**	5.69**	6.65**	5.19**	4.36**	4.95**
	Higher education	1.01***	0.24***	0.78***	2.12	1.77	2.02	1.63**	1.08**	1.48**
Percentage Total		71.97	28.03	100.00	71.02	28.98	100.00	71.42	28.58	100.00
Absolute total		7,927	3,292	11,219	10,195	4,005	14,200	18,122	7,297	25,419

Note: *Figures represent percentages of the total of women after the dataset merge*
Significance level: **** P < .01; ** P≤ 0.05; * P ≤ 0.10 (Significance levels based on Two-Sample T-test)*

Table 2. Descriptive data study – Characteristics of migrants in household

Migrants		Male migrant	Female migrant	Total
Number of migrants in household	1	47.42	44.50	46.36
	2	27.84	29.76	28.62
	3	11.54	10.30	10.94
	3 or more	13.04	15.20	13.89
Age group	0-11 years	4.69	5.39	5.00
	12-25 years	64.43	84.69	72.54
	26-49 years	27.41	8.36	19.78
	50+ years	2.95	1.08	2.19
Main reason migration	Work	72.12	1.88	44.17
	School	7.53	1.62	5.16
	Family	11.05	73.53	35.94
	Security	1.66	0.61	1.28
	Other	7.39	22.09	13.20
Total		59.76	39.07	98.82
Absolute Total		5,240	3,617	8,857*

Note: *Figures are presented in percentages*

** Information about the sex of the migrants was missing for 88 migrants, which accounted for 0.98% of the absolute total*

Non-Pashtun women

The OLS regressions (Table 3) indicate that non-Pashtun women with a migrant in their households had greater knowledge of specific birth control methods than women without migrant household members. Knowledge among women with migrant household members was higher regarding methods such as injectables, pill and LAM (with knowledge predicted to increase by between 1.2 and 3.1 percentage points). These findings were supported by subsequent PSM analysis (Tables 4 and 5), which confirmed that having a migrant in the household resulted in a greater knowledge of injectables, pill and LAM. However, also a slightly negative influence was observed in both the OLS and PSM estimations of having a migrant in their household on the knowledge of male sterilisation (by 2.6 percentage points) and emergency contraception (by 1.7 percentage points) (Tables 3-5).

The outcomes for the birth control knowledge variables for the non-Pashtun women of this study were triangulated by additional instrumental variable [IV] regressions, resulting in the confirmation of the previously found OLS and PSM results. The extra IV regressions for the non-Pashtun women can be found in Table 9 in the Appendix (40,161).

Pashtun women

The outcomes of the OLS regressions (Table 6) indicate that Pashtun women with a migrant in their household had less knowledge of the largest share of birth control methods than members of their cohort without a migrant. The greatest differences between Pashtun women with and without migrant household members related to knowledge of injectables, birth control pill and the withdrawal method, which were predicted to be lower by 3.3, 3.1 and 4.7 percentage points, respectively, for Pashtun women with a migrant. Furthermore, it was predicted that Pashtun women with a migrant in their household were less likely to use any birth control method than their counterparts without a migrant (by 1.8 percentage points). As can be seen in Tables 7 and 8, the results of the different PSM matching techniques used in the analysis confirmed the OLS findings, predicting that Pashtun women with migrant household members had significantly lower knowledge and use of birth control methods than members of the control group.

The outcomes for the birth control knowledge variables for the Pashtun women of this study were triangulated by additional IV regressions, resulting in the confirmation of the majority of the previously found OLS and PSM results. However, the IV did not confirm the previous result of birth control knowledge of implants. It is important to mention that the instrument used for the IV regressions for the Pashtun women was found to

be weak, referring to possible inconsistent outcomes. The extra IV regressions for the Pashtun women can be found in Table 10 in the Appendix (40,161).

The OLS regressions (Tables 3 and 6) also suggest that other factors of a woman's life can significantly influence her knowledge and use of birth control methods. Living in an urban area is associated with an overall greater knowledge and use of birth control methods for both Pashtun and non-Pashtun women, which has been observed in earlier studies (162). In general, higher wealth and education also correspond to greater knowledge of different birth control methods, in particular for the non-Pashtun group. The positive influence of wealth and education on the knowledge and use of birth control methods has been confirmed by previous research (147,162,163). Also, having a male child has been related to increased knowledge and use of the birth control methods, an outcome that reflects the traditional preference for sons for both non-Pashtun and Pashtun women (147,163).

Table 3. OLS regression results of knowledge and use of birth control methods between non-Pashtun women with and without migrant household members

Birth Control Non-Pashtun	Knowledge					Use of birth control
	Male sterilisation	***Injectables***	***Pill***	***LAM***	***Emergency contraception***	
Migrant in HH	-.026*** (.007)	.021** (.006)	.012** (.006)	.031** (.009)	-.017** (.006)	-.006 (.009)
Urban	.060*** (.011)	.037*** (.009)	-.005 (.008)	-.026** (.014)	.027** (.010)	.044** (.015)
Poorest (base)						
Poorer	.047*** (.009)	.061*** (.009)	.053*** (.008)	.105*** (.012)	.003 (.007)	.047*** (.012)
Middleclass	.108*** (.011)	.094*** (.010)	.096*** (.009)	.166*** (.015)	.046*** (.009)	.079*** (.014)
Richer	.122*** (.014)	.064*** (.012)	.071*** (.011)	.161*** (.018)	.062*** (.012)	.126*** (.018)
Richest	.187*** (.016)	.084*** (.012)	.088*** (.011)	.208*** (.019)	.102*** (.014)	.194*** (.019)
No education (base)						
Madrassa education	-.032 (.038)	.071* (.039)	.039 (.024)	.003 (.039)	-.004 (.035)	-.025 (.044)
Primary education	.021 (.014)	.039*** (.009)	.018** (.009)	.049** (.016)	.052*** (.013)	.075*** (.018)
Secondary education	.080*** (.018)	.022** (.011)	.021** (.010)	.101*** (.016)	.085*** (.017)	.097*** (.020)
Higher education	.218*** (.036)	.020 (.019)	.038** (.016)	.194*** (.025)	.174*** (.029)	.140*** (.032)
No male child (base)						
1 male child	.006* (.010)	.054*** (.010)	.050*** (.009)	.102*** (.013)	.013 (.008)	.137*** (.012)
2 or more male children	.031** (.009)	.064*** (.010)	.059*** (.009)	.112*** (.013)	.012 (.008)	.229*** (.011)
Constant	.014 (.018)	.731*** (.017)	.803*** (.015)	.451*** (.023)	.047** (.015)	.102*** (.023)
Observations	14,058	14,058	14,058	14,058	14,058	11,664
R-Squared	0.1074	0.1496	0.1058	0.1589	0.0158	0.1709

Notes: *Figures are the data after merging the datasets, main significant results are shown complete tables of the OLS regressions are available on request*

Significance level: **** P < 0.01; ** P ≤ 0.05; * P ≤ 0.10*

Table 4. Overview of OLS and PSM results of differences in knowledge of birth control methods between non-Pashtun women with and without migrant household members

Birth Control Non-Pashtun		OLS	Propensity Score Matching		
		β	NN ATT	Kernel ATT	Stratification ATT
Knowledge	***Male sterilisation***	-.026*** (.007)	-0.013*	-0.016**	-0.012*
	Injectables	.021** (.006)	0.035***	0.036***	0.036***
	Pill	.012** (.006)	0.021***	0.022***	0.022***
	LAM	.031** (.009)	0.042***	0.039***	0.043***
	Emergency contraception	-.017** (.006)	-0.013**	-0.016***	-0.012**

Notes: *Figures are the data after merging the datasets*
Significance level: **** P < 0.01; ** P ≤ 0.05; * P ≤ 0.10*

Table 5. Overview of OLS and PSM results of differences in use of birth control methods between non-Pashtun women with and without migrant household members

Birth Control Non-Pashtun	OLS	Propensity Score Matching		
	β	NN ATT	Kernel ATT	Stratification ATT
Use of birth control method at the time of the survey	-.006 (.009)	-0.008	-0.015	-0.009

Notes: *Figures are the data after merging the datasets*
Significance level: **** P < 0.01; ** P ≤ 0.05; * P ≤ 0.10*

Table 6. OLS regression results of knowledge and use of birth control methods between Pashtun women with and without migrant household members

Birth Control Pashtun	Knowledge							Use of birth control
	Male sterilisation	*Injectables*	*Implants*	*Pill*	*Rhythm method*	*Withdrawal*	*Other contraception method*	
Migrant in HH	-.017** (.007)	-.033** (.009)	-.022** (.008)	-.031*** (.008)	-.021** (.009)	-.047*** (.011)	-.012** (.003)	-.018* (.011)
Urban	.159*** (.012)	.102*** (.012)	.112*** (.013)	.086*** (.010)	.057*** (.014)	.272*** (.016)	-.013** (.005)	.045** (.017)
Poorest (base)								
Poorer	.072*** (.015)	.011 (.021)	.039 (.024)	-.005 (.018)	.098*** (.022)	.118*** (.027)	.030** (.012)	.089** (.030)
Middleclass	.096*** (.015)	-.019 (.021)	-.014 (.023)	-.034* (.018)	.099*** (.021)	.132*** (.027)	.030** (.012)	.076** (.030)
Richer	.122*** (.016)	.046** (.021)	.016 (.023)	.023 (.018)	.135*** (.021)	.196*** (.027)	.024** (.012)	.107*** (.030)
Richest	.117*** (.017)	.100*** (.022)	.069** (.025)	.095*** (.019)	.169*** (.023)	.209*** (.029)	.023* (.012)	.136*** (.031)
No education (base)								
Madrassa education	.095** (.033)	.055** (.022)	-.039 (.038)	.062** (.018)	.183*** (.044)	-.041 (.044)	-.016** (.007)	.162** (.054)
Primary education	.046** (.018)	.002 (.017)	.022 (.020)	-.022 (.016)	.047** (.022)	.064** (.025)	-.001 (.008)	.1009*** (.027)
Secondary education	.062** (.024)	.010 (.018)	.048 (.029)	-.013 (.016)	.073** (.031)	.086** (.031)	-.007 (.007)	.159*** (.035)
Higher education	.372*** (.056)	.028 (.024)	.314*** (.057)	.025 (.017)	.334*** (.062)	.125** (.054)	.031 (.029)	.152** (.061)
No male child (base)								
1 male child	.033** (.010)	.077*** (.013)	.011 (.013)	.059*** (.012)	.039** (.013)	.065*** (.016)	.001 (.006)	.125*** (.014)
2 or more male children	.024** (.009)	.065*** (.013)	.0004 (.012)	.062*** (.012)	.059*** (.012)	.044** (.015)	.0008 (.005)	.198*** (.013)
Constant	-.053** (.020)	.710*** (.030)	.097** (.030)	.789*** (.027)	-.097** (.028)	-.100** (.039)	-.013 (.014)	.077** (.039)
Observations	11,160	11,160	11,160	11,160	11,160	11,160	11,160	8,995
R-Squared	0.0718	0.1051	0.1240	0.1234	0.1393	0.0829	0.0518	0.0853

Notes: *Figures are the data after merging the datasets, main significant results are shown complete tables of the OLS regressions are available on request*
Significance level: **** P < 0.01; ** P ≤ 0.05; * P ≤ 0.10*

Table 7. Overview of OLS and PSM results of differences in knowledge of birth control methods between Pashtun women with and without migrant household members

Birth Control Pashtun		OLS	Propensity Score Matching		
		β	NN ATT	Kernel ATT	Stratification ATT
Knowledge	***Male sterilisation***	-.017** (.007)	-0.022***	-0.019***	-0.023***
	Injectables	-.033** (.009)	-0.071***	-0.070***	-0.073***
	Implants	-.022** (.008)	-0.074***	-0.074***	-0.077***
	Pill	-.031*** (.008)	-0.082***	-0.081***	-0.084***
	Rhythm method	-.021** (.009)	-0.080***	-0.078***	-0.081***
	Withdrawal	-.047*** (.011)	-0.055***	-0.048***	-0.053***
	Other contraception method	-.012** (.003)	-0.004**	-0.005**	-0.004**

Notes: *Figures are the data after merging the datasets*
Significance level: **** P < 0.01; ** P ≤ 0.05; * P ≤ 0.10*

Table 8. Overview of OLS and PSM results of differences in use of birth control methods between Pashtun women with and without migrant household members

Birth Control Pashtun	OLS	Propensity Score Matching		
	β	NN ATT	Kernel ATT	Stratification ATT
Use of birth control method at the time of the survey	-.018* (.011)	-0.032***	-0.030**	-0.033***

Notes: *Figures are the data after merging the datasets*
Significance level: **** P < 0.01; ** P ≤ 0.05; * P ≤ 0.10*

Discussion

Receiving accurate and positively framed birth control-related information together with an existing and active network will have a positive influence on the health behaviour of household members who stay behind. The theoretical framework proposes that these factors will lead to the dissemination of birth control-related normative structures, systems of practice and social capital. Consequently, the health outcomes might change for the non-migrants within the transnational network. The results of the analyses for the non-Pashtuns and Pashtuns will be discussed using the theoretical framework of this study (Figure 1).

Non-Pashtuns

Positive as well as negative associations were found for having a migrant in the household on the knowledge of birth control methods of non-Pashtun women. The provided birth control-related information and perceptions in Iran can explain these outcomes.

This study found positive associations between having a migrant in the household on the knowledge of injectables, birth control pill and LAM among non-Pashtun women. The accessibility of birth control is better in Iran, and therefore, we can infer that it is easier for Afghan migrants in Iran to remit this knowledge to their families that remain behind. Moreover, the normalisation of birth control use in Iran could influence the perception of Afghan migrants, a trend also observed by Piran (2004). Negative relationships are observed between having a migrant in the household and the knowledge of male sterilisation and emergency contraception among non-Pashtun woman, which can be explained by number of reasons. First, the process of the implementation of the birth control programme plays a significant role. At the start, both female and male sterilisations were not approved birth control methods in accordance with Islamic law. Subsequently, they were not freely available in public hospitals. Even though sterilisation was, at the time of the survey, an accepted and publicly available method in Iran, female sterilisation is still carried out six times more often compared to male sterilisation, which might reflect the lingering negative attitudes. Another important factor that influences the transfer of social remittances is strong transnational network, operating in Afghanistan and Iran (41,151). The outcomes of this study support the findings by Lindstrom and Muñoz-Franco (2005) who established a positive relationship between social remittances and the knowledge and usage of birth control methods for the case of rural Guatemala.

In sum, the hypothesis that non-Pashtun women with a migrant in their household had better knowledge of birth control methods than those without a migrant (H3) is cautiously accepted by the results. A positive relationship between the knowledge of certain methods was found, namely injectables, pill and LAM. This can be explained by the strong transnational network between Iran and Afghanistan and the positive attitude towards birth control in Iran. The hypothesis regarding the positive influence of having a migrant in the household on the use of birth control of non-Pashtun woman who stay behind (H4) could neither be confirmed nor denied.

Pashtun

For Pashtun women, a negative relationship was found between having a migrant in the household and knowledge and usage of birth control methods, which can be accredited to several factors. Pashtun migrants who move to Pakistan mainly go to the Pashtun belt where health facilities are deteriorating, and health access is limited (136,141,142,164). Many factors contribute to these findings such as lack of political support for birth control programmes and the conservatism entailed by Pashtunwali. This may explain why Pashtun migrants tend to be less likely to openly talk about and remit birth control information (141,147). Furthermore, as cultural norms regarding birth control are similar

in Pakistan and Afghanistan, migrants may not receive new information and are thus not challenged in their perceptions (48,141,146,147).

When reflecting on the theoretical framework, the conditions for the Pashtun migrants in Pakistan are not supportive for a positive and correct birth control-related information transfer. A negative influence of a migrant in the household on the knowledge and use of birth control methods for those Pashtun women who remain was found. Therefore, it can be assumed that incorrect birth control-related information, when remitted, has the potential to even reinforce the already negative and conservative social norms of the Pashtuns who stay in Afghanistan. In this context, the transnational ties between Pakistan and Afghanistan are also strong which supports the transfer of social remittances, having a high likelihood of influencing the behaviours of non-migrants. This research hypothesised that a migrant in a Pashtun household would lead to a neutral outcome in the knowledge (H1) and use (H2) of birth control methods of Pashtun non-migrant women. This study reports negative results for the birth control knowledge and use for Pashtun women who stay behind. This is due to the specific migration routes to Pakistan where a lack birth control information and negative attitudes regarding birth control use that are remitted within the established transnational networks can even reinforce the already conservative practices and social norms related to Pashtunwali, hereby negatively influencing birth control knowledge and use of Pashtun women who stay behind.

Importance of received information in destination country

The results of this research highlight the importance of information and attitudes regarding birth control methods that migrants receive in their countries of destination. This study shows that having a migrant in the household, related to a birth control supporting destination country such as Iran, has the potential to increase the knowledge about birth control methods of non-Pashtun women who remain back in comparison to those women without a migrant. By remitting birth control-related information that might influence the knowledge and use of birth control methods of those women who stay behind in Afghanistan, might result in conscious birth spacing. Conscious birth spacing is a critical tool to reduce maternal and infant mortality (165–167). Even though this research studies a unique population, Afghan women who stay behind, the outcomes of this analysis can serve as a base for the general understanding of the influence of social remittances on health behaviour and outcomes of those who stay behind. When reviewing the overall picture, migrants within their transnational network have the potential to function as development agents, positively influencing the health of those who stay behind. Crucially, this depends on the information they are able to remit from their country of destination as well as the social norms and values of the

migrants and those who remain. This study also outlines the negative influence migrants can have not only on the knowledge and use of birth control methods, especially in the case of those Pashtun women who stay behind, but also in case of the knowledge of male sterilisation and emergency contraception of non-Pashtun women who remain. It is possible that the negative, potentially incorrect, or even lack of information reinforces the harmful health behaviour, exemplified by the results of those Pashtun women who stay behind (57,58). These negative outcomes stress once more the importance of the conditions that need to be in place for a positive influence on the knowledge and use of birth control methods of those women who stay behind. The outcomes of this study indicate that migration has the potential to influence the knowledge and use among women who stay in Afghanistan. The results suggest that migrants in different destination countries transmit different information about birth control methods to members of their transnational networks, supporting disparities in knowledge and use of birth control methods among women remaining in the origin country. Migrants have the potential to be health-related development agents, but the health information migrants receive and remit varies by destination country context.

Limitations

The majority of Afghan migrants have been living outside of Afghanistan for more than 20 years (40). By limiting the definition to household members who moved away from the household over the last 5 years (2005-2010), the AMS missed out on an important migrant group unique to Afghanistan, namely their protracted refugee population, and focused mainly on economic (non-circular) migrants (140). This adds to noise in the data. Additionally, the data set did not consider the fact that respondents could have been migrants themselves, returned by the assisted voluntary return and reintegration programme or by forced deportations, which still took place during the survey, or that respondents could have lived in high-return areas (40). Furthermore, relating the outcomes under investigation in this research to solely social remittances is challenging, as financial remittances might have also contributed to the possibility of using contraceptives is another noted limitation of this study. The specifics around the transmission of social remittances and details on the migrant household members (age, gender, and reason for migration) could not be controlled for due to lack of information. As generally not the poorest of the poor migrate, the outcomes of this article might have suffered from self-selection bias (57). To control for this bias and possible other confounding factors, PSM's complemented the OLS regressions (157–160,168).

Conclusion

This study is the first of its kind to research the influence of a migrant in the household on the knowledge and use of birth control methods of those women who stay in Afghanistan and thus contributes to filling the gap in knowledge (18,19,58,169). The outcomes of this study are the first indications of the link between migration and the knowledge and use of birth control methods of those women who stay in Afghanistan. This study can serve as a baseline on which further research in Afghanistan may build. Although the AMS provides a good starting point for the study of this subject, additional research is needed, taking the abovementioned limitations into account. It would be advisable to expand the AMS questionnaire to get a full picture of migration within the Afghan household. For instance, more migrant-specific questions are necessary, such as migrant's destination country/city, economic/social/ in-kind remittances, duration of migration and health experiences of the migrants. Especially in Afghanistan, the migration past of the respondents should be captured in a survey. Furthermore, it would be highly advisable to adjust the definition of a migrant to the Afghan context and to increase the 5-year timeframe to a 20-year timeframe. Longitudinal research on the influences of migration on the health of those who remain behind should be promoted, especially in Afghanistan, with its diverse mix of migration flows.

Appendix

Table 9. IV regression results of knowledge of birth control methods between non-Pashtun women with and without migrant household members

Birth Control Non-Pashtun	Knowledge				
	Male sterilisation	***Injectables***	***Pill***	***LAM***	***Emergency contraception***
Migrant in HH	-.323 (.176)*	.487 (.145)**	.469 (.130)***	.633 (.230)**	-1.235 (.265)***
Urban	.039 (.016)**	.064 (.014)***	.022 (.013)*	.011 (.021)	-.052 (.025)**
No education (base)					
Madrassa education	-.025 (.043)	.049 (.042)	.031 (.034)	-.005 (.045)	.027 (.075)
Primary education	.027 (.016)*	.032 (.013)**	.011 (.012)	.040 (.019)**	.073 (.025)**
Secondary education	.080 (.019)***	.025 (.014)*	.026 (.014)*	.106 (.020)***	.077 (.028)**
Higher education	.228 (.036)***	.008 (.028)	.026 (.025)	.184 (.035)***	.202 (.051)***
Poorest (base)					
Poorer	.065 (.014)***	.033 (.015)**	.025 (.014)*	.067 (.021)**	.080 (.024)**
Middleclass	.123 (.014)***	.075 (.015)***	.074 (.014)***	.139 (.021)***	.104 (.024)***
Richer	.131 (.016)***	.057 (.016)***	.061 (.015)***	.153 (.022)***	.092 (.025)***
Richest	.199 (.018)***	.066 (.016)***	.068 (.015)***	.182 (.024)***	.163 (.028)***
Tajik (base)					
Hazara	-.045 (.013)**	-.073 (.012)***	-.018 (.011)*	-.157 (.018)***	-.024 (.020)
Uzbek	-.041 (.010)***	-.109 (.013)***	-.074 (.012)***	-.122 (.018)***	-.011 .020
Turkmen	-.094 (.035)**	-.107 (.036)**	-.049 (.032)	-.082 (.052)	-.229 (.058)***
Nuristani	-.019 (.028)	-.628 (.044)***	-.445 (.048)***	-.448 (.050)***	-.174 (.060)**
Baloch	.075 (.042)*	.109 (.030)***	.033 (.032)	-.081 (.056)	.086 (.064)
Pashai	.012 (.036)	-.046 (.036)	-.059 (.037)	-.181 (.061)**	.078 (.069)
Other ethnicity	.051 (.023)**	.052 (.017)**	.046 (.017)**	.113 (.034)**	.074 (.037)**
Age group women (12-25) (base)					
Age group women (26-49)	.014 (.009)	.021 (.009)**	.008 (.009)	.039 (.013)**	.008 (.015)
No male child (base)					
1 male child	-.012 (.015)	.081 (.015)***	.076 (.014)***	.140 (.022)***	-.060 (.025)**
2 or more male children	.018 (.012)	.067 (.012)***	.067 (.011)***	.126 (.016)***	-.015 (.019)
Constant	.088 (.055)	.578 (.045)***	.659 (.041)***	.262 (.071)***	.413 (.084)***
Sample Instrument	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor
First stage F-statistic	28.128	28.191	28.333	28.006	29.018

Note: *In the Afghan context important triggers for migration are numerous environmental hazards, such as earthquakes, floods, and drought as well as lack of safe drinking water* (40,161). *Based on data from the Afghanistan Information Management Services (AIMS) (2014), a multi-dimensional environmental risk factor was created as Instrumental Variable* (40,161). *Three main environmental hazards were selected, namely earthquakes, floods, and drought, which were attributed to the relevant provinces where these risks most often took place by using a dummy variable.*

Note: *Regions and remoteness levels were additionally used as control variables for this IV regression*

Significance level: **** P < 0.01; ** P ≤ 0.05; * P ≤ 0.10*

Table 10. IV regression results of knowledge of birth control methods between Pashtun women with and without migrant household members

Birth Control Non-Pashtun	Knowledge						
	Male sterilisation	***Injectables***	***Implants***	***Pill***	***Male condom***	***Rhythm method***	***Withdrawal method***
Migrant in HH	-3.463 (1.542)**	-8.699 (3.702)**	.040 (.416)	-8.691 (3.859)**	-11.931 (5.357)**	-1.519 (.789)*	-7.226 (3.190)**
Urban	-.221 (.177)	-.843 (.427)**	.119 (.048)**	-.856 (.442)*	-1.070 (.616)*	-.105 (.090)	-.510 (.366)
No education (base)							
Madrassa education	-.044 (.139)	-.294 (.347)	-.043 (.041)	-.287 (.348)	-.495 (.487)	.117 (.071)*	-.340 (.292)
Primary education	.170 (.010)*	.303 (.242)	.022 (.024)	.283 (.246)	.481 (.338)	.101 (.049)**	.313 (.204)
Secondary education	.106 (.102)	.123 (.250)	.046 (.030)	.099 (.250)	.227 (.345)	.092 (.055)*	.176 (.210)
Higher education	-.012 (.222)	-.907 (.536)*	.310 (.072)***	-.906 (.547)*	-1.111 (.763)	.163 (.120)	-.645 (.448)
Poorest (base)							
Poorer	.286 (.139)**	.566 (.348)	.036 (.037)	.534 (.351)	.891 (.495)*	.191 (.069)**	.570 (.294)*
Middleclass	.298 (.134)**	.498 (.336)	-.016 (.035)	.473 (.339)	.872 (.478)*	.180 (.068)**	.555 (.284)*
Richer	.366 (.148)**	.672 (.368)*	.012 (.038)	.638 (.373)*	1.056 (.525)**	.238 (.074)**	.710 (.312)**
Richest	.482 (.193)**	1.023 (.475)**	.065 (.050)	1.010 (.487)**	1.539 (.684)**	.321 (.098)**	.974 (.405)**
Age group women (12-25) (base)							
Age group women (26-49)	-.127 (.073)*	-.335 (.173)*	.009 (.019)	-.353 (.180)**	-.463 (.249)*	-.044 (.036)	-.260 (.149)*
No male child (base)							
1 male child	.049 (.055)	.109 (.136)	.011 (.014)	.098 (.136)	.142 (.188)	.047 (.027)*	.100 (.114)
2 or more male children	-.028 (.055)	-.072 (.136)	.001 (.014)	-.076 (.137)	-.139 (.188)	.035 (.028)	-.058 (.114)
Constant	.898 (.452)**	3.066 (1.077)**	.079 (.119)	3.167 (1.125)**	3.467 (1.553)**	.312 (.228)	1.892 (.934)**
Sample Instrument	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor	Multi-dimensional environmental risk factor
First stage F-statistic	5.106	5.478	5.057	5.070	4.994	5.140	5.231

Note: *In the Afghan context important triggers for migration are numerous environmental hazards, such as earthquakes, floods, and drought as well as lack of safe drinking water* (40,161). *Based on data from the Afghanistan Information Management Services (AIMS) (2014), a multi-dimensional environmental risk factor was created as Instrumental Variable* (40,161). *Three main environmental hazards were selected, namely earthquakes, floods, and drought, which were attributed to the relevant provinces where these risks most often took place by using a dummy variable.*

Note: *Regions and remoteness levels were additionally used as control variables for this IV regression*

Significance level: **** P < 0.01; ** P≤ 0.05; * P≤ 0.10*

CHAPTER 5

5

Pakistan case study: birth control awareness, intention to use, and use

Roosen I, Kremers S, Sellin J, Crutzen R. Migrants as potential change agents: how transnational social exchanges can transform modern birth control awareness, intention to use, and use. (n.d.)

Abstract

Objective: This study investigates the link between migrant household members and birth control awareness, intention to use, and use among network members in Pakistan (main research question). A migrant household member can transfer birth control-related information received or observed at destination to their network members at origin (NMOs) (in this case Pakistan). This transfer of information is referred to in this article as transnational social exchanges (TSE). TSE could lead to health behavioural changes of NMOs. We test the potential consequences of these interactions, by considering different components of the Comprehensive exchange of Health informATion (CHAT)-model, including the role of the characteristics of the NMOs (sub-research question a), the characteristics of migrant household members (sub-research question b), and the destination locations of migrant household members (sub-research question c) on the birth control awareness, intention to use, and use.

Study design: Population-based secondary analysis of cross-sectional data.

Methods: This study used cross-sectional data from the 2017-2018 Pakistan Demographic and Health Survey. Using treatment effects and logistic regressions, this study examines to what extent having a migrant in the household influences the birth control awareness, intention to use, and use among network members in Pakistan. Respondents are considered as NMO when they had a household member who moved ten years before the survey was conducted.

Results: In this study, gender was an important factor for TSE. Furthermore, the outcomes showed how the lack of available, accessible, and acceptable good quality healthcare and health-related information for migrants at their destination hindered the awareness of several modern birth control methods or increased awareness of permanent methods of their NMOs. Also, the exchange of economic remittances within the transnational network supported TSE. Also, several characteristics of Pakistani network members were positively associated with birth control awareness, intention to use, and use, such as being exposed to existing family planning programmes via TV or newspapers/magazines, living in urban areas, and having an education level. TSE appeared to influence NMOs during different stages of their innovation-decision process.

Conclusion: The outcomes of this study reveal the potential positive and negative influences of TSE on the health of NMOs. The different components of the CHAT-model included in the research helped to understand the TSE-sending better and receiving behaviours.

Introduction

People are connected with each other through social networks. Being a member of a specific social network is based on similarities in characteristics and perceptions, which might lead to similar attitudes, social norms, and behaviours. Health behaviour is one example where social network members can influence each other (52–54,170–172).

In addition to sharing similar health behaviours, social networks also serve as an essential source of information for their network members (173). Social networks as an information source are especially interesting for migrant populations, because they are often connected to social networks in two worlds, at destination and origin (17,57). Glick Schiller, Basch, and Blanc-Szanton defined the connection between migrants and their network members at origin (NMOs) as 'transnational networks' (17). Particularly considering the technological developments over the last decades, the continuous exchange of information within transnational networks has become more convenient, cheaper, and faster than previously (174). During spontaneous online conversations, via video calls or messages, migrants can exchange information such as ideas, norms, values, practices, and behaviours (18). This idea of 'social remittances' was introduced by Levitt (1998) and will be referred to in this paper as 'transnational social exchanges' (TSE) because this allows for a more distinct differentiation between the two behaviours - of transferring money and ideas (See more information Chapter 3 – CHAT-model). This exchange of information among transnational network members can potentially influence social and cultural changes, including the health of NMOs (18,19,58).

Previous studies on the link between TSE and the health of NMOs revealed positive as well as negative results (19,56,82–97). Positive results are, for example, frequently related to sexual and reproductive health outcomes, such as increased awareness of birth control and more modern birth control use, reduction of teenage pregnancies, more positive behaviours during pregnancy (more often professional prenatal care and delivery assistance, frequent exercise, increased intake of multivitamins, and less likely to smoke during pregnancy) (88,91,92,94–97). Negative results are, for example, unhealthy dietary intake (increasing obesity) and less likely to breastfeed after delivery (90,94).

A limited number of studies (89,92,93,97) have identified relevant components to consider when studying the link between TSE and the health of NMOs, such as healthcare access and ruling norms at destination. In a study on return migrants' influences on social norms related to female genital cutting (FGC) in Mali, decreases in FGC were observed and progressive changes in FGC-related norms, which could mainly be explained by one

main destination country, Côte d'Ivoire (92). In Côte d'Ivoire, Malian migrants experienced and observed different social norms within an African context, where women were not pressured to undergo FGC or excluded when they refused FGC (92). Additionally, Fargues (2011) and Beine et al. (2013) identified the relevance of destination country context on fertility rates, observing increased fertility rates at origin when migrants resided in countries with higher fertility rates than origin and vice versa. They attributed these influences on fertility rates to the transfer of social norms by the migrants to their NMOs (89,93). Furthermore, the study by Roosen and Siegel (2018) found that access to acceptable family planning information at destination was associated with increased awareness of modern birth control methods of NMOs at origin. Not having access to this information at destination and being part of an ethnic group with more strict and conservative values and norms seemed to influence birth control awareness and use at origin negatively (97). These outcomes reveal the importance of looking at potential general influences of TSE and digging deeper into understanding the mechanisms of TSE on the health of NMOs. Consequently, this study aims to research the general as well as specific influences of TSE on the health of NMOs, by using the Comprehensive transnational exchange of Health informATion (CHAT)-model (see Figure 1).

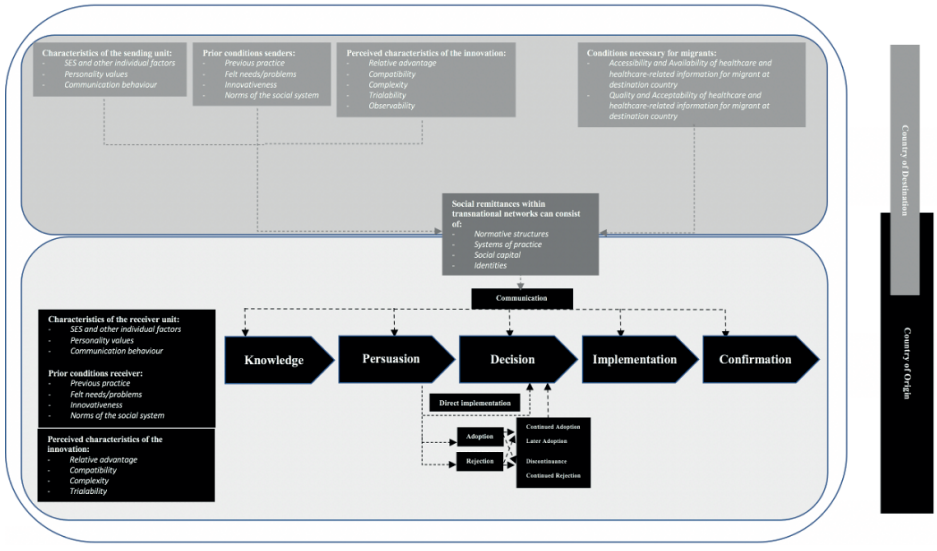

Figure 1. Comprehensive transnational exchange of Health informATion (CHAT)-model

The CHAT-model is a multi-disciplinary model based on extensive analysis of available literature on the topic (112). The CHAT-model provides a multifaceted perspective of the TSE-process by integrating migration, health behaviour, and communication theories with the concepts of social remittances, the human right to the highest attainable standard of health, Berry's model of acculturation, and aspects of the transnational

theory. It also covers both migrant perspectives as the sender of TSE and NMOs perspective as the receiver of TSE (See more information Chapter 3 – CHAT-model).

In the best-case scenario, TSE have the potential to influence the health of their NMOs positively. Considering Levitt and Lamba-Nieves's redefinition of 2011, these positive changes could translate to other behaviours (scale-out) or create a domino effect on those surrounding the NMOs and be implemented on a higher regional or national level (scale-up). As migrants frequently originate from economically developing countries, this reveals their potential as change agents (1). To study this potential influence of TSE on the health of NMOs, Pakistan serves as a relevant country case study due to its high internal and international migration and its concerning maternal mortality numbers and low contraceptive use (1,38,45,50,51,148). Globally, Pakistan is within the top 10 countries representing the most significant migration corridors and highest remittances receiving countries ($22,2 billion), impacting the social and economic development of the country (1,38,39). In 2015, 5,935,193 people of Pakistani origin lived abroad, with Saudi Arabia, the Gulf countries, the U.K., and the U.S. as the main destination countries (38). Economic reasons mainly drive Pakistani migration; only a relatively small number, 298 thousand, are recognised refugees who have been granted asylum (38). Pakistan's remarkable remittances receiving status could reflect existing and well-established transnational networks. Besides sending money, it can be expected that these networks could also serve as an information source to exchange relevant health-related information, such as information about birth control.

The lack of birth control programmes in Pakistan results in low contraceptive use. In 2019, 17.7% of all Pakistani women and 27.1% of the married women used any modern contraceptive method (45,50,175,176). Furthermore, Pakistan has a maternal mortality rate of 140/100,000 live births. This rate is not among the highest in the world (relatively speaking); however, being the 5th most populated country in the world (almost 240 million inhabitants), it makes Pakistan one of the six countries contributing to more than half of the maternal deaths globally (in an absolute sense) (48,51,148,177). One effective preventative method that could lead to a global decrease in maternal mortality rates annually by 104,000 deaths is modern contraception use (175). Using modern contraceptives would also meet human rights standards (e.g., the right to health and personal autonomy) and female empowerment (178). This study identifies modern birth control methods as: long-lasting contraception (irreversible: male and female sterilisation, and reversible: intrauterine device (IUD) and implants), hormonal contraceptives such as the pill and injections, barrier methods such as male condoms, and emergency contraception (176).

For migrants to acquire and successfully exchange birth control-related information, which consequently can influence birth control awareness, intention, and use of NMOs, the CHAT-model identifies several main components. The main components can be clustered into three groups. First, there are three similar components for migrants and NMOs, such as their characteristics, prior conditions, and perceived characteristics of the innovation. Second, one specific component only assigned to migrants is the necessary conditions at destination (availability, accessibility, acceptability, and good quality healthcare and health-related information). The third is one overlapping component for migrants and NMOs, the TSE within an active transnational network (See more information Chapter 3 – CHAT-model). For example, based on the CHAT-model, Pakistani migrants can acquire new or different information available at their destination (such as new or different birth control methods), which they can transfer within their active transnational networks to their NMOs. This information can be tailored to NMOs and provided when needed. Migrants also often have an established position within the origin society, making the exchanged information valuable and credible. Their position can be especially relevant when sharing sensitive or innovative information, such as modern birth control-related information (18,19,32,57,58,85,95,113,114,179,180). Depending on the previously described various identified components, TSE can be entirely accepted, partially accepted, or rejected (36).

As previously mentioned, research on the topic remains scarce and observed both positive and negative influences of TSE on the health of NMOs, but the mechanisms underlying the TSE-process are still unclear (112). Understanding these underlying mechanisms are essential considering its potential for development and can be done by using the CHAT-model. This study is unique as it contributes to current research by providing more insight into the TSE-process (32). This understanding will be given by including several relevant components of the CHAT-model, such as the characteristics of NMOs, characteristics of migrant household (HH) members, and destination location of a migrant HH member. Furthermore, as most research has concentrated on North and Central America, this research will also add information on country context by focusing on a South-Asian country, namely Pakistan (112).

The proposed study aims to research the association between migrant HH members and modern birth control knowledge, intention to use, and use of NMOs. By using Pakistan as a case study, this research will analyse the 2017-2018 Pakistan Demographic and Health Survey (DHS), using treatment effects and logistic regressions. This paper will study the following main research question: *to what extent do migrant HH members influence modern birth control awareness, intention, and use in Pakistan?* This main research question will be answered by considering *the role of the characteristics of*

Pakistani network members (sub-question a), the characteristics of migrant HH members (sub-question b), and the destination locations of migrant HH members (sub-question c).

Methods

To reach this aim, we analysed cross-sectional data of the 2017-2018 Pakistan Demographic and Health Survey (PDHS).

The 2017-2018 Pakistan Demographic and Health Survey data

The PDHS covered both migration and birth control-related questions. Data from three of the six questionnaires of the PDHS were used, namely the HH questionnaire that covered relevant information about migrant HH members and the women's and men's questionnaires, which covered essential questions related to birth control awareness, intention to use, and use (181).

The PDHS applied a stratified two-stage sample design, constructing a sampling frame based on previously created enumeration blocks of the Pakistan Population and Housing Census 2017. Stratification was done by generating 16 sampling strata, separating urban and rural areas for the eight regions within Pakistan: Punjab, Sindh, Khyber Pakhtunkwa (KPK), Balochistan, Islamabad Capital Territory (ICT), the former Federally Administrated Tribal Areas (FATA), Azzad Jammu and Kashmir (AJK), and Gilgit Baltistan (GB). During the first stage, 580 clusters were drawn. In the second stage, HHs were systematically sampled with a fixed number of 28 HHs per cluster, leading to approximately 16,240 HHs (181).

After pre-testing and training field staff, the National Institute of Population Studies (NIPS) collected the PDHS data between August 2017 and May 2018. Data processing started simultaneously with fieldwork. The PDHS teams only questioned pre-selected HHs without any replacements or changes to prevent bias. NIPS used translated (in Urdu and Sindhi) questionnaires in the field that were administered with computer assistance. Respondents did not receive any compensation for their participation. The HH questionnaire included relevant questions about the HH and was asked to the HH head. The HH questionnaire also listed all members and visitors of the selected HH, including migrant HH members who moved away in the last ten years before the survey. All ever-married women aged between 15 and 49 years old, either permanent residents of the selected HHs or visitors who stayed in the HHs the night before the survey, were eligible to be interviewed. At random, the men's questionnaire was asked to one-third of the ever-married male residents of the sampled HHs, aged 15 to 49. Response rates

of the included datasets were 96% for the HH questionnaire, 94% for the women's questionnaire, and 87% for the men's questionnaire (181).

NIPS calculated weighting factors for the PDHS, which are added to the datafiles. The included weights enabled representative data analysis for six out of the eight areas: Punjab, Sindh, KPK, Balochistan, ICT, and FATA, which will be referred to throughout this paper as the 'other regions. Areas GB and AJK were not included in the weight calculation, due to non-proportional sample allocation, and outcomes are therefore presented separately (181). A dummy variable was created to separate analyses for the different regions, based on the available variable representing the different regions (coded as other regions = 0; regions GB and AJK = 1).

Dependent variables

The outcomes of interest of this study are threefold: modern birth control awareness, intention to use birth control among non-users, and use of modern birth control methods among users of birth control. The included variables were based on questions from the women's and men's questionnaires. All included variables had a minimum of 100 respondents for each defined category.

Modern birth control awareness

The PDHS asked respondents, '*Have you ever heard of (METHOD)?*' ((181): p.439), following the question by a probe to clarify the birth control method if necessary. The list of different birth control methods included both modern as well as traditional methods. However, this study only reports on modern birth control methods, as previously defined, and therefore included the following birth control methods for analysis: emergency contraception, female sterilisation, male sterilisation, intrauterine device (IUD), injectables, implants, pill, and male condoms. Modern birth control methods were all dummy variables, recoded to 0 (meaning: no, I am not aware) and 1 (meaning: yes, I am aware).

Intention to use birth control methods among non-users

Whether respondents who did not use any birth control method at the time of the survey intended to use a method (not specified if this was modern or traditional) in the future was only asked to married female respondents. A dummy variable was created representing married women who did not use any birth control method at the time of the survey and who intended to use a birth control method in the future (0 = no; 1 = yes).

Modern birth control methods use among users of birth control

Due to limitations in terms of available data, it was decided to select the modern birth control use variable available in both men's and women's datasets. PDHS created a variable to identify those who used a modern birth control method versus those who were using a traditional or folkloric method at the time of the survey, classifying the following methods as modern: '*male and female sterilisation, injectables, intrauterine devices (IUDs), contraceptive pills, implants, male condoms, the standard days method, lactational amenorrhoea method, and emergency contraception*' ((181): p.114). Birth control use was only asked to married male respondents and married female respondents who were not pregnant at the time of the survey. A dummy variable was created representing those using a modern birth control method at the time of the survey (0 = no; 1 = yes).

Independent variables

For the presented research question and sub-questions, a selection was made based on the information retrieved from the HH questionnaire, which provided information about migrant HH members and men's and women's questionnaires for information about transnational network members in Pakistan (181).

General research question: Influence of migrant household member

No specific information was provided on TSE, which is why we decided to include two proxy variables reflecting the overall influence of having a migrant HH member on birth control awareness, intention, and use: one general variable and another more detailed variable.

The first variable was based on the question '*Are there any members of your HH who lived here in the past 10 years but who have since moved?*' ((181): p.418), of which a dummy variable was created (0 = no; 1 = yes). This variable gave a general perspective on whether a migrant HH member influenced birth control awareness, intention, and use.

The second variable was created based on a follow-up question after a migrant HH member was identified: '*Where has (name of migrant) travelled to?*' ((181): p.418). Five categories have been created: no migrant HH member (code = 0), only urban migrant(s) in the HH (code = 1), only rural migrant(s) in the HH (code = 2), only emigrant(s) in the HH (code = 3), and the combination of internal (urban and rural migrants) and emigrant HH members (code = 4). Aggregating migrant HH members' destinations allowed us to provide more nuanced interpretations of potential influences of migrant HH members who migrated internally (to urban or rural locations) or emigrated outside Pakistan compared to respondents without a migrant HH member.

Sub-research question a: Characteristics of transnational network members in Pakistan

Based on the CHAT-model, the characteristics of transnational network members influence the processing of birth-control information, which consequently influences the awareness, intention, and use of birth control methods. Based on the literature, the following list of relevant variables has been included: sex, currently working, married, place of residence, heard or read family planning information, wealth index, level of education, region, literacy level, native language, and age.

Before appending the women's and men's datasets, a dummy variable was created referring to the *sex* of the respondents, coded as 0 for the female respondents in the women's dataset and 1 for the male respondents in the men's dataset.

Currently working at the time of the survey was already included as a dummy variable (0 = no; 1 = yes) in the datasets and was kept as such.

PDHS only included male and female respondents who were either *married* at the time of the survey or who had previously been married; currently being married was included as a dummy variable (0 = no; 1 = yes).

Living in urban or rural areas was included as another dummy variable (0 = rural; 1 = urban), indicating the *place of residence* of the respondents.

Exposure to family planning information was covered by two dummy variables, which were available in the datasets: *heard family planning information on TV in the last few months* (0 = no; 1 = yes) and *read family planning information in newspaper or magazine in the last few months* (0 = no; 1 = yes).

The PDHS already calculated a *wealth index*, a score based on a combination of variables such as possessing consumer goods (TV or car) and housing characteristics (flooring, walls, and toilet) ((181); p.11). The wealth index identified five categories: poorest (coded as 1), poorer (2), middle (3), richer (4), and richest (5).

Level of education was also included as a categorical variable: no education (coded as 0), primary education (1), secondary education (2), and higher education (3).

Region was added as an additional categorical variable. As previously mentioned, the data needed to be analysed separately for regions GB and AJK and the other regions.

In the presented analysis, it was decided to limit the regional differences to the other regions: Punjab (coded as 1), Sindh (2), KPK (3), Balochistan (4), ICT (6), and FATA (8).

A categorical variable was created based on the available *literacy level* variable: cannot read at all (coded as 0), able to read only parts of sentence (1), able to read whole sentence (2). When recoding this variable, it has been decided, due to the low number of participants choosing these options, to recode categories no card with required language, meaning the native language was not included in the study material (n women = 4, and n men = 2), and blind/visually impaired (n women = 3, and n men = 1) as missing data.

Ethnicity can influence birth control awareness, intention, and use and was initially intended to be included in the analysis. However, data about ethnicity was not included in the available datasets, which is why *native language* was used to proxy potential ethnic influences. Native language was restricted in the analysis to the other regions covering: other native languages (code = 1), Urdu (code = 2), Sindhi (code = 3), Punjabi (code = 4), Sariaki (code = 5), Baluchi (code = 6), and Pushto (code = 7).

Age was included as a continuous variable, ranging from 15 to 49 years.

Sub-research question b: Migrant characteristics

Besides the characteristics of transnational network members, the CHAT-model also identified migrant characteristics as important components of TSE, which eventually can influence birth control awareness, intention, and use. Based on relevant literature and available PDHS data, three variables have been included in the analyses identifying migrant characteristics: the number of migrants in the HH, sex of migrant HH member, and migrant education level when he/she moved away.

The *number of migrants in a HH* was selected as a variable, ranging from one to ten. Based on the available variable, three categories have been created: one migrant HH member (coded as 0), two migrant HH members (1), and three or more migrant HH members (2).

Based on the variable identifying the *sex of the migrant HH member* to either male or female, a categorical variable was created aggregating information on HH level. The categorical variable identified if a HH with a migrant only had male migrant(s) (coded as 1), only had female migrant(s) (2), or had both male and female migrants (3).

Migrant education level was based on the question '*What was the highest class completed when he/she moved away?*' ((181): p.418), ranging from 0 (= no education) to 16 (covering

different education levels). A categorical variable has been created aggregating education levels of migrant HH members, based on the Pakistani school system: no education (coded as 1), primary education, classes one to eight (2), secondary education, classes nine to twelve (3), higher education, classes thirteen to sixteen (4), and a combination of education levels (5). Due to the low number of migrants in regions GB and AJK who had no education level (n = 37), it has been decided to exclude this category from analysis for this region.

Sub-research question c: Migrant destination locations

Another important component influencing TSE is the destination location where migrants travel to. The CHAT-model also refers to the importance of an active transnational network to support the transfer of TSE. In order to study how migrant's destination locations were associated to birth control awareness, intention, and use, we included four variables: destination of migrant HH members, destination of emigrant HH members, the main reason for migration, and sending or receiving economic remittances.

The *destination of the migrant HH members* was created as previously described (please see for more information the general influence of migrant HH members). The only difference in this analysis was that respondents without migrant HH members were excluded from analysis.

DHS – USAID provided, upon request, more specific information on the *destination of emigrant HH members*, which enabled us to generate three overall categories: Asia (coded as 1), Europe and Northern America (2), and Other countries (such as South America, Africa, Australasia, and the Pacific) or a combination of destinations (3). More specific information about emigrant destination locations allowed us to identify potential differences in countries outside Pakistan. This analysis was therefore only performed on respondents with emigrant HH members.

The *main reason for migration* was also included in the available datasets as a separate variable. Based on the question '*What was the main reason that the migrant HH member moved away?*' ((181): p.418), a categorical variable was created reflecting the main reasons of migration of migrant HH members: economic or job-related reasons (coded as 1), family-related reasons, such as marriage or accompany family (2), study-related reasons (3), and other reasons (not explicitly identified) or a combination of reasons (4). For regions GB and AJK, this variable was included without other reasons and a combination of reasons (code = 4), as only 35 respondents answered this question as such.

PDHS asked information about *economic remittances*, which could be used as a proxy to identify active transnational networks. Based on the question '*In the past one year did you send money or receive money from your migrant HH member(s)?*' ((181): p.418), a categorical variable was created reflecting if respondents sent economic remittances to their migrant HH member(s) (coded as 1), received economic remittances from their migrant HH member(s) (2), both sent and received economic remittances (3), or did not receive any economic remittances in the past year (4).

Control variables

The included control variables were identical to the previously described characteristics of transnational network members living in Pakistan.

Statistical methods

The PDHS included 14,540 HHs, 15,068 ever-married women aged 15-49, and 3,691 ever-married men aged 15-49. To analyse all stated research questions, the men's and women's datasets were appended with each other to create one individual dataset, resulting in 18,759 respondents. Consequently, the HH dataset, which included the relevant migration-related questions, was merged with the ever-married women and men datasets with the necessary birth control-related questions. After merging, data of 16 respondents were dropped as they could not be merged, resulting in a final sample size for analysis of 18,743 respondents (181). Treatment effects and logistic regressions were conducted using Stata SE 17. Outcomes were considered significant and included if $p \leq 0.05$.

Treatment effects

This study used secondary observational data, and treatment effects were therefore decided as chosen analytical method for the general research question, studying the overall influences of a migrant HH member on birth control awareness, intention, and use. The use of observational data and observable and unobservable differences between migrant and non-migrant HHs could lead to self-selection bias. Estimating treatment effects are one way to deal with self-selection bias and other confounding biases, as treatment effects simulate an experimental design using a treatment and control group. Furthermore, it also provides the opportunity to make causal inferences by calculating the average treatment effect of the treated (ATET), while including regression covariates do not (158–160,182–185).

The control in this study will be having no migrant HH member, and the chosen treatments will be (1) having a migrant HH member, using propensity score matching (PSM), and (2) having either only urban migrant HH members (treatment 1), only rural

migrant HH members (treatment 2), only emigrant HH members (treatment 3), or a combination of both internal migrant and emigrant HH members (treatment 4), using inverse probability weights (IPW). Matching occurs based on the estimated propensity scores, calculated based on the predefined observable characteristics (i.e., the previously described characteristics of transnational network members) (184,185).

The quality of treatment effects is highly dependent on balanced distributions of the propensity scores for treatment and control groups; to be able to apply this, a three-step process was used (184–187). First, before estimating treatment effects using 'teffects' in Stata, the included covariates were evaluated based on statistical outcomes of balancing the covariates in the two groups after using psmatch2. Based on the results, covariates were excluded from further analysis if the results of the t-tests were statistically significant ($p \leq 0.05$), meaning treated and control groups were statistically different for this variable, and if the percentage of bias was higher than the recommended 5%. This was chosen as an extra step, as teffects only allows a graphic post-test to control balancing properties. Second, the teffects commands 'psmatch' and 'ipw' were used to estimate ATETs. The teffects code was used in Stata, as this code reproduced more accurate standardised errors than the previous 'psmatch2' code. Third, after conducting the treatment effects, an additional graphic post-check was performed, evaluating the overlap between treatment and control groups. Matching was assessed to be successful if the propensity score mass was not grouped near 0 or 1 and mainly overlapped (184–187).

Logistic regression model

To acquire more information about the associations between the characteristics of transnational network members (sub-question a), the characteristics of migrant HH members (sub-question b), and destination locations (sub-question c) and birth control awareness, intention, and use, logistic regression models were used. Logistic regression was chosen as outcome variables were binary and as logistic regression models allow us to predict the relation between the explanatory and outcome variables, taking into account multiple covariates (188–190).

Before analysing, data distribution was checked and where necessary variables were excluded in parts of the analyses, such as previously described variables migrant education level and reason for migration for regions GB and AJK. Furthermore, correlation among independent variables was checked, most variables had a medium to low correlation, except for education level and literacy level of the respondents, which was between 0.70 and 0.90. An additional test was performed to diagnose multicollinearity, calculating the variance inflation factors (VIF) of the independent variables. The results

of the VIF indicated the independent variables to be either not correlated (score of 1) or to be moderately correlated (score between 1 and 5), not causing problems in terms of interpretation after fitting the model. Based on the VIF results it was decided to keep all selected independent variables in the model, including education and literacy level (190–192). However, it was decided when Stata indicated that specific variables caused collinearity in some specific cases, e.g., when focusing on a specific sub-sample such as emigrant HH members in sub-question c, these specific variables would be excluded from analysis. Additionally, the Likelihood Ratio Chi Square (LR chi^2) was included, comparing the presented models to a null model (191,192).

Results

Descriptive characteristics of respondents and migrant household members

Tables 1 and 2 present descriptive characteristics of the respondents, divided by sex (male/female) and having migrant HH member (yes/no), and are shown separately for the 'Other regions' (Table 1) and 'Regions GB and AJK' (Table 2). Individuals living in the GB and AJK regions more often had a migrant HH member than those living in the Other regions. For both regions (Other regions and Regions GB and AJK), women and individuals living in rural areas more frequently had a migrant HH member. Mean ages of the respondents appeared to be higher in regions GB and AJK than in the Other regions. Men in both regions mostly had a secondary education level, while women mainly indicated having no education. Respondents with a migrant HH member scored higher on the wealth index.

The descriptive characteristics of the migrant HH members have been presented in Table 3, divided by sex (male/female), having a migrant HH member (yes/no), and by studied regions (Other regions/Regions GB and AJK). In both regions, the migrant HH members appeared to be primarily male, mainly migrating inside Pakistan and mostly to urban areas. When comparing migrant characteristics of both regions, the Other regions more often had only female migrant HH members. In contrast, regions GB and AJK indicated more frequently only to have male migrant HH members.

In the Other regions as well as regions GB and AJK, female migrants would mainly move internally to both urban and rural areas in Pakistan. Their main reason for migration was often family-related, and regularly, no economic remittances would be sent or received. Male migrants primarily migrated to urban areas in Pakistan or outside Pakistan, mainly

for economic or job-related reasons. They generally sent economic remittances to their HH members living in Pakistan. Table 3 provides more detailed information.

Birth control methods – awareness, intention to use, and use

Tables 4 and 5 present a descriptive overview of the dependent variables: modern birth control awareness, intention to use birth control, and modern birth control use. For both regions, men were most aware of male condoms and least aware of implants. Women were mainly aware of the pill and injections and least aware of emergency contraception.

Table 1. Descriptive characteristics of respondents – Other regions

	Other regions					
	Males			Females		
	No migrant	Migrant	Total males*	No migrant	Migrant	Total females
Age [M (SD)]	35.06 (7.89)	33.96 (8.03)	34.87 (7.92)	32.41 (8.21)	31.78 (8.77)	32.26 (8.34)
Region [%]						
Punjab	48.77	71.94	52.72	49.84	66.49	53.65
Sindh	28.19	8.86	24.90	27.48	8.02	23.02
KPK	13.97	13.67	13.92	13.88	20.42	15.38
Balochistan	6.46	3.07	5.88	6.23	1.67	5.18
ICT	1.05	0.94	1.03	0.92	0.70	0.87
FATA	1.56	1.52	1.55	1.65	2.71	1.90
Type place of residence [%]						
Rural	59.43	61.90	59.85	60.75	71.58	63.23
Urban	40.57	38.10	40.15	39.25	28.42	36.77
Highest educational level [%]						
No education	26.66	19.49	25.44	50.50	44.71	49.17
Primary education	20.04	21.86	20.35	15.98	18.10	16.47
Secondary education	33.86	42.50	35.33	21.02	21.96	21.23
Higher education	19.44	16.14	18.88	12.50	15.23	13.13
Wealth index [%]						
Poorest	19.48	8.64	17.63	20.16	11.93	18.27
Poorer	19.53	19.30	19.49	19.55	20.05	19.66
Middle	19.80	18.91	19.64	19.92	21.32	20.24
Richer	21.16	23.88	21.62	20.03	24.15	20.97
Richest	20.04	29.27	21.61	20.35	22.55	20.85
Total						
n	2,608	535	3,143	9,521	2,831	12,352
% per category	82.97	17.03	100.00	77.08	22.92	100.00

**This total included one additional respondent due to the use of weights and rounding.*

Among female respondents who did not use any method at the time of the survey, the intention to use a birth control method in the following months was relatively low, 20.99% for the Other regions and 28.23% for regions GB and AJK. Women with a migrant HH member more often intended to use a birth control method. Of those respondents who indicated using a birth control method, a small percentage (< 30% overall) is using a modern birth control method. Respondents with a migrant HH member often showed lower rates in modern birth control use.

Table 2. Descriptive characteristics of respondents – Regions GB and AJK

	Regions GB & AJK					
	Males			**Females**		
	No migrant	**Migrant**	**Total males**	**No migrant**	**Migrant**	**Total females**
Age [M (SD)]	36.80 (7.50)	35.60 (7.85)	36.48 (7.61)	33.30 (7.66)	32.84 (8.66)	33.13 (8.05)
Region [%]						
GB	39.30	36.11	38.46	39.43	31.49	36.40
AJK	60.70	63.89	61.54	60.57	68.51	63.60
Type place of residence [%]						
Rural	49.25	72.22	55.31	52.69	64.63	57.23
Urban	50.75	27.78	44.69	47.31	35.37	42.77
Highest educational level [%]						
No education	13.68	9.72	12.64	35.84	33.53	34.96
Primary education	16.92	10.42	15.20	16.25	13.31	15.13
Secondary education	44.28	49.31	45.60	28.97	33.04	30.52
Higher education	25.12	30.56	26.56	18.94	20.12	19.39
Wealth index [%]						
Poorest	18.66	12.50	17.03	19.71	14.58	17.76
Poorer	30.35	22.22	28.21	28.02	31.00	29.15
Middle	23.63	29.86	25.27	23.84	24.98	24.27
Richer	12.19	13.89	12.64	16.01	16.42	16.17
Richest	15.17	21.53	16.85	12.43	13.02	12.65
Total						
n	402	144	546	1,674	1,029	2,703
% per category	73.63	26.37	100.00	61.93	38.07	100.00

Table 3. Descriptive characteristics of migrant household members

	Other regions				Regions GB & AJK			
	Only male migrant(s)	**Only female migrant(s)**	**Male and female migrants**	**Total**	**Only male migrant(s)**	**Only female migrant(s)**	**Male and female migrants**	**Total**
Main migrant destinations [%]								
Urban Pakistan	41.54	57.60	52.51	46.19	41.04	49.29	43.05	42.28
Rural Pakistan	7.93	34.38	9.07	13.63	11.79	38.57	11.26	14.92
Outside Pakistan	43.17	4.59	2.44	30.34	35.26	12.14	6.62	28.82
Combination	7.36	3.43	35.99	9.84	11.90	0.00	39.07	13.98
Economic remittances sent or received [%]								
Sent	38.69	6.59	48.35	33.05	26.98	15.00	32.45	26.26
Received	42.35	1.47	14.91	30.58	57.26	2.86	21.19	46.12
Sent and received	2.07	0.00	0.69	1.48	5.10	0.71	19.87	6.48
No economic remittances sent or received	16.89	91.94	36.05	34.90	10.66	81.43	26.49	21.14
Main reason for migration [%]								
Economic/job	91.34	1.81	50.76	67.80	82.20	1.43	47.68	68.12
Family	0.53	93.31	39.53	24.56	0.79	80.00	30.46	14.07
Study	6.34	1.88	1.60	4.86	14.97	15.71	13.25	14.83
Other or combination	1.79	3.00	8.10	2.78	2.04	2.86	8.61	2.98
General education level migrants [%]								
No education	14.09	23.73	12.40	15.93	2.83	8.57	0.00	3.15
Primary education	30.36	27.83	10.60	27.54	25.28	27.14	7.95	23.27
Secondary education	34.68	28.12	14.56	30.97	46.37	30.00	23.84	41.52
Higher education	5.97	9.57	6.20	6.75	8.84	27.14	0.66	9.97
Combination	14.90	10.76	56.25	18.81	16.67	7.14	67.55	22.08
Total								
n	2,269	709	389	3,366	882	140	151	1,173
% per category	67.40	21.05	11.55	100.00	75.19	11.94	12.87	100.00

Table 4. Descriptives birth control methods – awareness, intention to use, and use – Other regions

	Other regions					
	Males			Females		
	No migrant	**Migrant**	**Total males**	**No migrant**	**Migrant**	**Total females**
Ever heard of modern BC methods [%yes]:						
Emergency contraception	41.51	43.37	41.83	27.12	20.88	25.69
Pill	87.83	85.26	87.39	92.79	93.81	93.02
IUD	48.82	48.67	48.79	81.78	79.20	81.19
Injections	84.43	83.40	84.26	92.71	93.00	92.78
Male condoms	95.02	96.62	95.30	83.88	84.01	83.91
Female sterilisation	82.74	80.93	82.43	88.48	87.89	88.34
Male sterilisation	43.72	47.34	44.33	36.27	34.49	35.86
Implants / Norplant	31.70	20.92	29.87	53.61	47.18	52.13
Total						
n	2,608	535	3,143	9,521	2,831	12,352
% per category	82.97	17.03	100.00	77.08	22.92	100.00
Non-users – intention to use BC [%yes]*:						
				19.41	26.30	20.99
Total						
n				9,521	2,831	12,352
% per category				77.08	22.92	100.00
Users – Use of modern BC method [%yes]:						
	23.08	21.85	22.87	28.18	24.64	27.37
Total						
n	2,146	437	2,583	8,463	2,520	10,983
% per category	83.07	16.93	100.00	77.06	22.94	100.00

**Only asked to female respondents*

Table 5. Descriptives birth control methods – awareness, intention to use, and use – Regions GB and AJK

	Regions GB & AJK					
	Males			Females		
	No migrant	Migrant	Total males	No migrant	Migrant	Total females
Ever heard of modern BC methods [%yes]:						
Emergency contraception	41.04	36.11	39.74	31.18	33.53	32.08
Pill	88.31	92.36	89.38	94.50	94.17	94.38
IUD	60.20	63.19	60.99	89.96	87.95	89.20
Injections	81.09	86.11	82.42	95.34	94.36	94.97
Male condoms	93.78	96.53	94.51	87.57	86.30	87.09
Female sterilisation	83.08	82.64	82.97	85.30	87.66	86.20
Male sterilisation	56.97	54.17	56.23	45.88	41.79	44.32
Implants / Norplant	33.58	28.47	32.23	47.43	49.95	48.39
Total						
n	402	144	546	1,674	1,029	2,703
% per category	73.63	26.37	100.00	61.93	38.07	100.00
Non-users – intention to use BC [%yes]*:						
				26.46	31.10	28.23
Total						
n				1,674	1,029	2,703
% per category				61.93	38.07	100.00
Users – Use of modern BC method [%yes]:						
	27.60	28.10	27.73	29.53	21.55	26.50
Total						
n	331	127	458	1,772	639	2,411
% per category	72.27	27.73	100.00	73.50	26.50	100.00

**Only asked to female respondents*

Table 6. Summary results main research question: the association between migrant household member and birth control awareness, intention to use, and use – Other regions[#]

	Other regions									
	Emergency contraception	**Pill**	**IUD**	**Male condoms**	**Male sterilisation**	**Female sterilisation**	**Injections**	**Implants**	**Intention to use BC**	**Use Modern BC**
RQ: To what extent is having a migrant household member associated with modern birth control awareness, intention to use, and use in Pakistan? [Average Treatment Effects of the Treated (ATET) (95% CI)]										
1.No migrant versus migrant HH member (Base = No migrant in HH)										
Migrant in HH	-.038*** (-.059 - -.018)	n.s.	-0.042*** (-0.062 - -0.023)	-0.025** (-0.040 - -0.010)	-0.032** (-0.053 - -0.012)	-0.031*** (-0.047 - -0.015)	n.s.	-0.025** (-0.047 - -0.004)	0.030** (0.002 – 0.057)	0.039** (0.002 – 0.076)
Observations	15,474		15,464	15,471	15,475	15,475		15,474	8,056	4,525
2.No migrant versus general locations migrant HH member (Base = No migrant in HH)										
Only urban migrant(s) in HH			n.s.	n.s.	n.s.	-0.024** (-0.047 - -0.000)	n.s.		n.s.	n.s.
Only rural migrant(s) in HH	-.073** (-.127 - -.019)									
Only emigrant(s) in HH								0.056** (0.005 – 0.108)		
Internal and emigrants in HH		.045** (0.016 - 0.073)								
Observations	15,474	15,475				15,475		15,475		

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 7. Summary results main research question: the association between migrant household member and birth control awareness, intention to use, and use – Regions GB and AJK[#]

	Regions GB & AJK									
	Emergency contraception	**Pill**	**IUD**	**Male condoms**	**Male sterilisation**	**Female sterilisation**	**Injections**	**Implants**	**Intention to use BC**	**Use Modern BC**
RQ: To what extent is having a migrant household member associated with modern birth control awareness, intention to use, and use in Pakistan? [Average Treatment Effects of the Treated (ATET) (95% CI)]										
1.No migrant versus migrant HH member (Base = No migrant in HH)										
Migrant in HH	n.s.	n.s.	n.s.	n.s.	-0.040** (-0.078 - -0.002)	n.s.	n.s.	n.s.	n.s.	0.071** (0.004 – 0.137)
Observations					3,242					1,057
2.No migrant versus general locations migrant HH member (Base = No migrant in HH)										
Only urban migrant(s) in HH	n.s.	n.s.	n.s.				n.s.		-0.065** (-0.130 - -0.000)	
Only rural migrant(s) in HH				-0.067** (-0.129 - -0.005)		0.068** (0.022 – 0.114)				
Only emigrant(s) in HH					-0.079** (-0.155 - -0.004)	0.093*** (0.054 – 0.133)				0.104** (0.003 – 0.205)
Internal and emigrants in HH								0.113** (0.027 – 0.198)		
Observations				3,240	3,242	3,242		3,242	1,717	1,057

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 8. Summary results sub-research question a: the association between the characteristics of network members at origin and birth control awareness, intention to use, and use – Other regions[#]

	Other regions									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
RQa: To what extent are the characteristics of network members in Pakistan associated with modern birth control awareness, intention to use, and use? [Odds Ratios (OR) (95% CI)]										
Sex (Base = Female)										
Male	1.990**	0.341***	0.103***	3.369***		0.247***	0.311***	0.141***		
	(1.294 - 3.062)	(0.184 - 0.630)	(0.063 - 0.168)	(1.644 - 6.904)		(0.128 - 0.477)	(0.176 - 0.550)	(0.091 - 0.219)		
Age	1.035***	1.079***	1.063***	1.052***	1.054***	1.075***	1.057***	1.027***	0.949***	
	(1.020 - 1.051)	(1.052 - 1.106)	(1.046 - 1.079)	(1.032 - 1.073)	(1.040 - 1.068)	(1.056 - 1.095)	(1.030 - 1.085)	(1.013 - 1.040)	(0.932 - 0.966)	
Region (Base = Punjab)										
Sindh	2.602***		3.718***					8.160***	0.435***	
	(1.586 - 4.269)		(1.963 - 7.043)					(4.864 - 13.692)	(0.238 - 0.794)	
KPK					0.503**				0.331***	
					(0.297 - 0.851)				(0.175 - 0.626)	
Balochistan			0.295***			0.289***			0.071***	
			(0.155 - 0.563)			(0.129 - 0.643)			(0.028 - 0.180)	
ICT								1.534**	0.411***	
								(1.020 - 2.308)	(0.229 - 0.738)	
FATA		5.820***	0.394**	3.187***	0.235***			0.434**	0.173***	
		(1.683 - 20.131)	(0.190 - 0.818)	(1.405 - 7.225)	(0.109 - 0.508)			(0.225 - 0.835)	(0.077 - 0.392)	
Native language (Base = Other)										
Urdu			2.227**							
			(1.076 - 4.609)							
Sindhi								2.471**	2.550**	
								(1.202 - 5.078)	(1.025 - 6.344)	
Punjabi			2.564***			2.310**				
			(1.419 - 4.633)			(1.128 - 4.728)				
Sariaki			2.102**							
			(1.115 - 3.966)							
Baluchi			3.266**							0.100**
			(1.120 - 9.527)							(0.011 - 0.883)
Pushto	1.803**		1.718**							
	(1.118 - 2.907)		(1.064 - 2.774)							

Table 8. Summary results sub-research question a: the association between the characteristics of network members at origin and birth control awareness, intention to use, and use – Other regions[#] (*continued*)

	Other regions									
	Emergency contraception	**Pill**	**IUD**	**Male condoms**	**Male sterilisation**	**Female sterilisation**	**Injections**	**Implants**	**Intention to use BC**	**Use Modern BC**
Education level (Base = No education)										
Primary education										3.556** (1.035 - 12.218)
Secondary education									2.504*** (1.300 - 4.824)	
Higher education	2.101** (1.087 - 4.061)								2.414** (1.163 - 5.012)	
Wealth index (Base = Poorest)										
Poorer	2.245** (1.376 - 3.665)							1.549** (1.028 - 2.335)		
Middle				2.325*** (1.427 - 3.788)		1.984** (1.172 - 3.360)	2.508*** (1.248 - 5.040)			
Richer	1.838** (1.057 - 3.195)			1.871** (1.114 - 3.142)	2.137*** (1.272 - 3.591)					
Richest	1.875** (1.027 - 3.423)			2.557*** (1.371 - 4.769)	2.405*** (1.366 - 4.232)					0.230** (0.063 - 0.844)
Currently married (Base = Currently not married)										
Currently married				2.289*** (1.267 - 4.135)						
Currently working (Base = Currently not working)										
Currently working					1.510** (1.100 - 2.073)					

Table 8. Summary results sub-research question a: the association between the characteristics of network members at origin and birth control awareness, intention to use, and use – Other regions[#] (*continued*)

	Other regions									
	Emergency contraception	**Pill**	**IUD**	**Male condoms**	**Male sterilisation**	**Female sterilisation**	**Injections**	**Implants**	**Intention to use BC**	**Use Modern BC**
Heard family planning information on TV in last few months (Base = No)										
Yes	1.767***	1.948**		2.295***	1.575***		1.704**	1.669***		
	(1.344 - 2.324)	(1.123 - 3.381)		(1.408 - 3.742)	(1.216 - 2.040)		(1.060 - 2.738)	(1.285 - 2.167)		
Read family planning information in newspaper or magazine in last few months (Base = No)										
Yes	2.518***	4.179**	2.110**					2.359***		
	(1.537 - 4.127)	(1.025 - 17.039)	(1.152 - 3.865)					(1.403 - 3.966)		
Constant	.017***	1.020	0.126***	0.119***	0.046***	0.195***	1.767	0.142***	2.841**	5.287
	(.007 - .046)	(0.214 - 4.862)	(0.043 - 0.364)	(0.039 - 0.362)	(0.018 - 0.116)	(0.060 - 0.633)	(0.407 - 7.674)	(0.058 - 0.344)	(1.172 - 6.887)	(0.722 - 38.723)
LR chi^2	210.59***	107.65***	295.14***	155.64***	285.03***	221.78***	95.35***	318.00***	136.26***	34.05
Pseudo R^2	0.109	0.099	0.156	0.126	0.118	0.139	0.084	0.130	0.090	0.077
Observations	3,090	3,090	3,089	3,089	3,090	3,090	3,090	3,090	1,823	687

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 9. Summary results sub-research question a: the association between the characteristics of network members at origin and birth control awareness, intention to use, and use – Regions GB and AJK[#]

	Regions GB & AJK									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
RQa: To what extent are the characteristics of network members in Pakistan associated with modern birth control awareness, intention to use, and use? [Odds Ratios (OR) (95% CI)]										
Destination migrants (Base = Only urban migrant(s) in HH)										
Only rural migrant(s) in HH						2.461*** (1.352 - 4.480)				
Only emigrant(s) in HH					0.660*** (0.484 - 0.901)	2.731*** (1.611 - 4.628)				
Internal and emigrants										4.393** (1.236 - 15.613)
Sex (Base = Female)										
Male			0.052*** (0.023 - 0.117)			0.264*** (0.117 - 0.592)	0.139*** (0.051 - 0.381)	0.168*** (0.097 - 0.290)		
Age	1.021** (1.005 - 1.037)	1.085*** (1.047 - 1.124)	1.081*** (1.055 - 1.107)	1.058*** (1.033 - 1.084)	1.047*** (1.031 - 1.063)	1.090*** (1.063 - 1.118)	1.083*** (1.048 - 1.120)	1.031*** (1.015 - 1.047)	0.927*** (0.908 - 0.948)	
Place of residence (Base = Rural)										
Urban								1.423** (1.073 - 1.886)		
Wealth index (Base = Poorest)										
Poorer				1.822** (1.137 - 2.920)		2.093*** (1.263 - 3.469)		1.589** (1.048 - 2.409)		
Middle			2.208*** (1.209 - 4.032)	2.674*** (1.459 - 4.900)		2.404*** (1.322 - 4.371)		1.934*** (1.221 - 3.064)		
Richer		6.327*** (1.616 - 24.765)	3.705*** (1.720 - 7.981)	4.179*** (1.797 - 9.718)		3.240*** (1.483 - 7.081)		1.834** (1.090 - 3.085)		
Richest				4.147*** (1.504 - 11.436)		2.530** (1.100 - 5.822)		1.964** (1.114 - 3.462)		

Table 9. Summary results sub-research question a: the association between the characteristics of network members at origin and birth control awareness, intention to use, and use – Regions GB and AJK[#] (*continued*)

	Regions GB & AJK									
	Emergency contraception	**Pill**	**IUD**	**Male condoms**	**Male sterilisation**	**Female sterilisation**	**Injections**	**Implants**	**Intention to use BC**	**Use Modern BC**
Currently married (Base = Currently not married)										
Currently married				2.578** (1.088 - 6.112)						
Currently working (Base = Currently not working)										
Currently working	1.549** (1.044 - 2.298)		2.717** (1.270 - 5.814)					1.961*** (1.273 - 3.021)	1.912** (1.057 - 3.456)	
Heard family planning information on TV in last few months (Base = No)										
Yes			2.050** (1.181 - 3.560)				3.139** (1.200 - 8.210)	1.946*** (1.376 - 2.751)		
Read family planning information in newspaper or magazine in last few months (Base = No)										
Yes					1.927** (1.053 - 3.526)					
Constant	.154*** (.059 - .402)	0.821 (0.110 - 6.143)	0.363 (0.080 - 1.650)	0.139*** (0.037 - 0.519)	0.216*** (0.085 - 0.552)	0.080*** (0.020 - 0.324)	0.313 (0.051 - 1.936)	0.091*** (0.035 - 0.240)	5.431*** (2.408 - 12.250)	3.022 (0.504 - 18.132)
LR chi^2	35.20**	53.26***	151.30***	125.07***	87.31***	124.90***	76.50***	131.18***	98.41***	19.59
Pseudo R^2	0.013	0.101	0.152	0.142	0.055	0.138	0.133	0.081	0.098	0.069
Observations	1,172	1,171	1,172	1,172	1,172	1,172	1,172	1,172	730	256

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 10. Summary results sub-research question b: the association between the characteristics of migrant household members and birth control awareness, intention to use, and use – Other regions[#]

	Other regions									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
RQb: To what extent are the characteristics of migrants associated with modern birth control awareness, intention to use, and use of their network members in Pakistan? [Odds Ratios (OR) (95% CI)]										
Number of migrant HH members (Base = 1 migrant HH member)										
2 migrant HH members	n.s.	n.s.	n.s.	n.s.		n.s.	0.537*** (0.337 - 0.855)	n.s.	n.s.	
Gender of migrant(s) in HH (Base = Only male migrant(s))										
Male and female migrants										0.323** (0.121 - 0.864)
Education level of migrant(s) in HH (Base = Migrant(s) in HH have no education level)										
Migrant(s) in HH have a secondary education level					0.654** (0.440 - 0.972)					
Migrants in HH have a combination in education levels										4.624** (1.337 - 15.986)
Constant					0.047*** (0.018 - 0.122)		2.405 (0.559 - 10.342)			5.331* (0.766 - 37.086)
LR chi^2					291.95***		101.16***			58.67**
Pseudo R^2					0.121		0.093			0.120
Observations					3,090		3,090			687

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 11. Summary results sub-research question b: the association between the characteristics of migrant household members and birth control awareness, intention to use, and use – Regions GB and AJK[#]

	Regions GB & AJK									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
RQb: To what extent are the characteristics of migrants associated with modern birth control awareness, intention to use, and use of their network members in Pakistan? [Odds Ratios (OR) (95% CI)]										
Number of migrant HH members (Base = 1 migrant HH member)										
2 migrant HH members	n.s.	n.s.	n.s.	n.s.	n.s.	0.441*** (0.271 - 0.718)	0.513** (0.270 - 0.976)	n.s.	n.s.	n.s.
Gender of migrant(s) in HH (Base = Only male migrant(s))										
Only female migrant(s)						0.499** (0.263 - 0.947)				
Education level of migrant(s) in HH (Base = Migrant(s) in HH have primary education level)										
Migrant(s) in HH have a secondary education level						0.496*** (0.294 - 0.836)				
Constant						0.238* (0.056 - 1.007)	0.287 (0.043 - 1.932)			
LR chi^2						122.41***	77.57***			
Pseudo R^2						0.141	0.145			
Observations						1,135	1,135			

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 12. Summary results sub-research question c: the association between the conditions at destination ((1) for migrants in general and (2) for emigrants specifically) and birth control awareness, intention to use, and use – Other regions[#]

	Other regions									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
RQc: To what extent are the conditions at destination (of the migrants) associated with modern birth control awareness, intention to use, and use of their network members at Pakistan? [Odds Ratios (OR) (95% CI)]										
1.Migrant destination in general										
Destination of migrant HH members (Base = Migrant(s) in HH moved to urban area)										
Internal and emigrants in HH	n.s.			n.s.	n.s.	n.s.		0.655** (0.442 - 0.971)		n.s.
Economic remittances (Base = Economic remittances sent)										
Economic remittances received			1.518*** (1.107 - 2.082)						1.621*** (1.140 - 2.304)	
Economic remittances sent and received								2.955** (1.231 - 7.093)		
Main reason for migration (Base = Economic / job-related)										
Family							0.499** (0.254 - 0.981)			
Study		3.952** (1.256 - 12.433)							0.409** (0.168 - 0.995)	
Other or combination of reasons								1.831** (1.016 - 3.299)		
Constant		1.087 (0.217 - 5.438)	0.108*** (0.037 - 0.316)				2.107 (0.465 - 9.550)	0.138*** (0.056 - 0.341)	2.498** (1.000 - 6.240)	
LR chi^2		118.38***	307.12***				98.81***	323.95***	147.33***	
Pseudo R^2		0.104	0.161				0.091	0.135	0.102	
Observations		3,090	3,089				3,090	3,090	1,823	

Table 12. Summary results sub-research question c: the association between the conditions at destination ((1) for migrants in general and (2) for emigrants specifically) and birth control awareness, intention to use, and use – Other regions[#] (*continued*)

	Other regions									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
2.Emigrant destinations specifically										
Main destination of emigrant HH members (Base = Migrant(s) in HH moved to Asia)										
Migrant(s) in HH moved to Europe or North America						n.s.				29.014*** (4.823 - 174.532)
Migrants in HH moved to other destinations or a combination of destinations										0.325*** (0.143 - 0.740)
Economic remittances (Base = Economic remittances sent)										
Economic remittances received									1.910*** (1.192 - 3.060)	
Economic remittances sent and received								3.086** (1.097 - 8.687)		
Main reason for migration (Base = Economic / job-related)										
Family	2.472** (1.061 - 5.764)	5.551** (0.100 – 30.882)			2.297** (1.005 - 5.250)				2.999** (1.043 - 8.622)	
Study			5.611** (1.019 - 30.914)	31.210*** (2.343 - 415.643)					0.020*** (0.001 - 0.311)	
Other or combination of reasons							17.002** (1.186 - 243.739)			
Constant	.019*** (.003 - .104)	2.356 (0.123 – 45.235)	0.081*** (0.015 - 0.439)	0.096** (0.012 - 0.777)	0.021*** (0.004 - 0.121)		1.340 (0.066 - 27.076)	0.076*** (0.014 - 0.407)	3.212 (0.791 - 13.048)	0.005*** (0.000 - 0.057)
LR chi^2	101.46***	64.54***	132.12***	73.54**	145.28***		61.51**	123.03***	72.19**	86.72***
Pseudo R^2	0.125	0.126	0.161	0.139	0.165		0.157	0.138	0.081	0.296
Observations	1,289	1,110	1,289	1,289	1,289		1,192	1,289	835	471

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

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Table 13. Summary results sub-research question c: the association between the conditions at destination ((1) for migrants in general and (2) for emigrants specifically) and birth control awareness, intention to use, and use – Regions GB and AJK[#]

	Regions GB & AJK									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
RQc: To what extent are the conditions at destination (of the migrants) associated with modern birth control awareness, intention to use, and use of their network members at Pakistan? [Odds Ratios (OR) (95% CI)]										
1.Migrant destination in general										
Destination of migrant HH members (Base = Migrant(s) in HH moved to urban area)										
Migrant(s) in HH moved to rural area		n.s.		n.s.		2.458*** (1.317 - 4.585)	n.s.	n.s.	n.s.	n.s.
Migrant(s) in HH moved outside Pakistan						2.013** (1.147 - 3.533)				
Economic remittances (Base = Economic remittances sent)										
Economic remittances received						2.042*** (1.198 - 3.480)				
No economic remittances sent or received	.625** (.391 - .997)									
Main reason for migration (Base = Economic / job-related)										
Study			2.143** (1.043 - 4.403)		2.286*** (1.459 - 3.582)					
Constant	.221** (.079 - .614)		0.251* (0.051 - 1.227)		0.164*** (0.059 - 0.454)	0.055*** (0.012 - 0.258)				
LR chi^2	49.41**		153.47***		100.72***	142.60***				
Pseudo R^2	0.034		0.158		0.065	0.161				
Observations	1,137		1,137		1,137	1,137				

Table 13. Summary results sub-research question c: the association between the conditions at destination ((1) for migrants in general and (2) for emigrants specifically) and birth control awareness, intention to use, and use – Regions GB and AJK[#] (*continued*)

	Regions GB & AJK									
	Emergency contraception	Pill	IUD	Male condoms	Male sterilisation	Female sterilisation	Injections	Implants	Intention to use BC	Use Modern BC
2.Emigrant destinations specifically										
Economic remittances (Base = Economic remittances sent)										
Economic remittances received	.465** (.272 - .797)	n.s.	n.s.	0.272** (0.086 - 0.864)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
No economic remittances sent or received				0.218** (0.051 - 0.938)						
Main reason for migration (Base = Economic / job-related)										
Study				0.094*** (0.020 - 0.435)						
Constant	.122** (.020 - .735)			0.427 (0.029 - 6.383)		0.038** (0.002 - 0.805)				
LR chi^2	39.23**			50.88**		68.91***				
Pseudo R^2	0.061			0.149		0.224				
Observations	500			500		500				

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

The presented results in Tables 6 - 13 reflect the significant associations with the outcomes of interest for the posed research question and sub-questions for each studied birth control component - awareness, intention, and use. The description of the outcomes will combine the results of the two studied regions ('Other regions' and 'Regions GB and AJK') with the necessary nuances for each region separately where necessary.

Modern birth control awareness

For both regions, having a migrant HH member was associated with less awareness of some modern birth control methods, such as emergency contraception, IUD, male condoms, male sterilisation, female sterilisation, and implants. The observed negative association with awareness was small. On a scale between 0 (not being aware) and 1 (being aware), the respondents with a migrant HH member had an average lower awareness level between 0.025 for male condoms and implants and 0.042 for IUD.

For the Other regions, the respondents who only had emigrants or a combination of internal migrants and emigrants, compared to no migrant HH member, had a higher awareness of implants (0.056) and the pill (0.045). While only having urban migrants was related to lower awareness of female sterilisation by 0.024. Only having rural migrant HH members was associated with a lower awareness of emergency contraception by roughly 7%. For regions GB and AJK, female sterilisation awareness levels were higher in case respondents only had rural migrant HH members (approximately 7%) or emigrant HH members (approximately 9%). An approximate 11% higher awareness of implants was observed when respondents had internal migrants and emigrant HH members. Also, a lower awareness of male condoms (approximately 7%) was observed when having a rural migrant and male sterilisation (approximately 8%) when having an emigrant HH member.

Overall, for both regions, several positive associations between respondents' characteristics and modern birth control awareness were identified, such as higher age, living in an urban area, being richer than the poorest, being married at the time of the survey, working, having heard of family planning information on TV or read family planning information in a newspaper or magazine in the last few months. Being male was mostly negatively associated with the awareness of modern birth control methods, except for the awareness of male condoms and emergency contraception of respondents living in the Other regions. Especially for the Other regions, living in Sindh and ICT compared to Punjab, as well as all included native languages compared to 'other native languages' were related to higher awareness of modern birth control methods while living in KPK and Balochistan were related to lower awareness levels. Some specific outcomes were observed in regions GB and AJK related to having migrant HH members

at a specific destination and modern birth control awareness: the awareness of female sterilisation more than doubled when respondents only had rural migrant or emigrant HH members in comparison to urban migrants. While, compared to urban migrants, having an emigrant HH member was related to lower awareness of male sterilisation by 34%.

Compared to one migrant HH member, respondents with two migrant HH members had 50% lower awareness of injections in both regions and 56% lower awareness of female sterilisation in regions GB and AJK. In the Other regions, respondents with migrant HH members with a secondary education level had 35% lower awareness of male sterilisation compared to those with migrant HH members with no education. For respondents living in regions GB and AJK, only having female migrants compared to only male migrants and migrants having a secondary education level compared to primary education was negatively associated with lower awareness of female sterilisation, by approximately 50%.

For both regions, when respondents received economic remittances compared to sending remittances and when their migrant HH member moved to study instead of working, a higher awareness of some of the modern birth control methods was observed. For the Other regions, this resulted in a 50% higher awareness of IUD when economic remittances were received and a quadrupling in awareness of the pill if migrant HH members moved away to study. When respondents in regions GB and AJK had a rural migrant or emigrant HH member or received economic remittances, their awareness of female sterilisation would double. Also, respondents were twice as aware of IUD and male sterilisation if their migrant HH members moved away to study. Not receiving or sending any economic remittances over the last year was related to a lower awareness of emergency contraception by 37.5%. Furthermore, a negative association was found for the awareness of some of the birth control methods in the Other regions. For example, when having a combination of internal migrants and emigrants compared to urban migrants, the awareness of implants was lower by 34%. If migration was family-related compared to economic or job-related, awareness of injections was lower by 50%.

When zooming in on respondents with emigrant HH members, for the Other regions, receiving economic remittances in comparison to sending remittances tripled the awareness of implants. When emigrants moved for family-related reasons in contrast to economic or job-related reasons, this approximately doubled the awareness of emergency contraception and male sterilisation and was more than five times higher for the awareness of the pill. Also, higher awareness of IUD and male condoms was observed when moving for study-related reasons compared to economic or job-related

reasons. Moving abroad to study would be related to higher awareness of IUD and male condoms (approximately six and 31 times, respectively). Other reasons or a combination of reasons for emigration compared to economic or job-related reasons was positively associated with the awareness of injections by 17 times. In regions GB and AJK, receiving economic remittances compared to sending remittances showed mixed results; higher awareness of female sterilisation (3.5 times) and lower awareness of male condoms and emergency contraception (approximately 70% and 50%, respectively). Some factors were associated with a lower awareness of male condoms, such as not sending or receiving any economic remittances compared to sending economic remittances was associated with lower awareness levels by approximately 80% and emigrating for study-related reasons compared to economic-related reasons was associated with lower awareness levels by almost 90%.

The presented models explained awareness of modern birth control best when focusing on emigrant destinations: 16.5% for male sterilisation in the Other regions and 22.4% in the case of female sterilisation in regions GB and AJK. The explained variance of the model was lowest when concentrating on the characteristics of NMOs: 8.4% in case of injections in the Other regions and 1.3% for emergency contraception in regions GB and AJK.

Intention to use birth control among non-users

Among female respondents who did not use any birth control, a positive association was observed for the intention to use birth control (approximately 3%) by those living in the Other regions having a migrant HH member. For women living in regions GB and AJK who only had urban migrant HH members, compared to no migrant HH members, the intention to use birth control was lower by 6.5%.

In both regions, higher age was related to a relatively little lower (between 5% and 7%) intention to use birth control. The intention to use birth control would be more than double of women who lived in the Other regions when their native language was Sindhi compared to Other native languages, or when they had a secondary or higher education level, compared to not having any education. The intention to use birth control was lower when women in the Other regions lived in Sindh, KPK, Balochistan, ICT, or FATA compared to Punjab; approximately 83% lower for FATA and approximately 30% lower for Balochistan. For GB and AJK regions, the intention to use birth control would almost double if women worked.

No significant associations were observed between the characteristics of the migrant HH members and the intention to use birth control of the female respondents in both regions.

For women living in the Other regions receiving economic remittances of migrants or emigrants almost doubled their intention to use birth control than when they sent economic remittances. If the HH member migrated or emigrated to study, instead of for economic or job-related reasons, this would lower their intention to use birth control by approximately 60% for migrant HH members generally and approximately 98% for emigrant HH members specifically. In case an emigrant HH member moved away for family-related instead of economic reasons, this almost tripled the intention to use birth control. No significant results related to the conditions at destinations for migrants and emigrants were observed for regions GB and AJK.

For both regions, when focusing on the characteristics of NMOs, the explained variance of the models regarding the intention to use birth control accounted for 9% in the Other regions and approximately 10% in regions GB and AJK.

Use of modern birth control among users

When respondents used a birth control method at the time of the survey, having a migrant HH member was associated with a higher usage of modern birth control methods by 3.9% for the Other regions and 7.1% for regions GB and AJK. For respondents living at regions GB and AJK, having an emigrant HH member compared to no migrant HH member was related to a higher usage of modern birth control methods by 10.4%.

Different results for both regions were observed when studying the influence of the characteristics of NMOs on their modern birth control use. For the Other regions, primary education more than tripled modern birth control use than no education. Furthermore, having Baluchi as a native language compared to Other native languages and living in the highest wealth index compared to the lowest wealth index was negatively associated to modern birth control use by approximately 90% and 77%, respectively. For regions GB and AJK, having both internal and emigrant HH members more than quadrupled modern birth control use compared to only having urban migrants.

When observing the influence of migrant characteristics on modern birth control use, two results were identified for respondents living in the Other regions. First, when migrant HH members had a combination of education levels compared to no education, the use of modern birth control was almost five times higher. Second, having both male and female migrant HH members instead of only male migrant HH members, the use

of modern birth control methods was lower by approximately 68%. For regions GB and AJK, no significant results were observed.

For the association between migrant and emigrant destinations and modern birth control use, only significant results were observed for respondents living in the Other regions when focusing on emigrant HH members. Having HH members who emigrated to Europe or North America instead of Asia, modern birth control use was approximately 29 times higher. Emigrants residing in other destinations, or a combination of locations compared to Asia modern birth control use was lower by approximately 67%.

For both regions, when focusing on the characteristics of NMOs the models explained approximately 7% of modern birth control use. However, when looking at the likelihood ratio chi-square tests for these models, the improvements were not statistically significant, meaning that the presented models that focus on the characteristics of NMOs are not significantly different from those without any predictor variables. Only for the Other regions, focusing on migrant characteristics, the explained variance of the model explained 12% of modern birth control use, and zooming in on emigrant destinations, the explained variance of the model was almost 30%.

Discussion

This study focuses on the potential influences of migrant transnational social exchanges (TSE) on the health of network members at origin (NMOs) by studying the links between migrant household (HH) members and birth control awareness, intention to use, and use. The discussion of key results is structured according to the five components of the *Comprehensive transnational exchange of Health informATion (CHAT)-model*: characteristics of migrants, necessary conditions at destination, role of active transnational networks, characteristics of NMOs, and the innovation-decision process.

Characteristics of the migrants as senders of transnational social exchanges

This research revealed interesting differences in the awareness of, amongst others, male sterilisation, which could be related to the gender of migrants. Notably, having male migrant HH members decreases the awareness of male sterilisation, while having female migrants increases awareness of male sterilisation. These outcomes could be related to differences in preferences and perspectives of birth control methods by gender, especially for a permanent birth control method such as male sterilisation. A previous study showed that Pakistani men had little to no information about male sterilisation,

and the information they had mostly was based on misinformation (e.g., only performed on prisoners and causing impotence) (193). This misinformation concerned Pakistani men, as they should remain fertile if they want to be able to remarry. The men also perceived sterilisation as a responsibility of women. Whereas Pakistani women shared similar perspectives, they also showed more positive views related to male sterilisation. For example, believing that male sterilisation could be successful if men would adjust their diets after the procedure (193).

Intention to use birth control among Pakistani women who were not using any methods at the time of the survey also could be related to the gender of the migrant. Female NMOs with a male migrant HH member showed an increase in their intention to use, while those with female HH members revealed a decrease in their intention to use. These results are not necessarily surprising as they could be explained by the male migrant HH member mostly being the spouse of the female respondent. Meaning the woman had no reason to use any birth control at the time of the survey but is most likely planning to use birth control when her husband returns from abroad. Women discontinuing their birth control use while separated from their spouses is not uncommon in more conservative regions. Continuing to use birth control without their husband nearby could be perceived as promiscuous behaviour, as it is related to continued sexual activity (48,49,141,193,194).

Conditions necessary for migrants at destination

Receiving economic remittances of emigrant HH members unexpectedly decreases the awareness of emergency contraception. Receiving economic remittances can be related to an active transnational network in which knowledge is exchanged, and an increase in awareness would be expected (180). Therefore, it is relevant to zoom in on the destination context of emigrant HH members. Most of the emigrant HH members were men who moved to Asia, mainly Saudi-Arabia and the UAE (38). Little is known about the health and healthcare access of Asian labour migrants in the Middle East (195). However, a previous study described the experienced barriers by migrant workers in the Middle East, which are, for example, discrimination, language barriers, migrant status, endless working hours, insufficient salary (as previously agreed upon), and the lack of health insurance (195). These identified barriers are not in line with the necessary conditions for migrants at destination as mentioned in the CHAT-model and could explain the adverse outcomes regarding emergency contraception awareness.

As expected, NMOs with rural migrants were less aware of emergency contraception and male condoms but surprisingly more aware of female sterilisation. Migrants moving to rural areas are internal migrants within Pakistan, meaning they are more aware of

the Pakistani healthcare system. A key problem in rural areas is the availability and accessibility to good quality healthcare and health-related information (196). The lack of healthcare accessibility can hinder family planning practices, explaining the decreased awareness of emergency contraception and male condoms. Additionally, a previous study (179) showed that those living in rural areas often lack access to non-expired birth control methods and experienced health professionals. The lack of healthcare resources motivates their use of permanent methods such as female sterilisation, explaining the positive association between rural migrant HH members and awareness of female sterilisation (179).

Furthermore, the intention to use birth control and its usage also seemed to be supported by emigrant HH members, notable more specifically by female emigrants migrating to Europe and Northern America. Pakistani migrants moving to Europe and North America frequently have the UK and the US as main destinations (38). Migrant Integration and Policy Index (MIPEX) data show that both countries score slightly favourable on their health policies (in 2019: USA – 79/100 and UK – 75/100). Acknowledging the need for further improvements for migrants' access to healthcare in both countries, MIPEX remarked that they made efforts to support healthcare access for migrants and minority populations, e.g., by providing information and interpreters (197). Additionally, migrant women are known to continue their caring role for their family and transnational network members after migration; their TSE frequently focuses on the development (health and education) of their NMOs (198–200). Therefore, it is likely that the health-related information that female emigrants obtained in Europe or North America was shared with their NMOs, leading to positively influencing intention to use and modern birth control use.

Role of active transnational networks

The economic remittances of a migrant HH member and especially of an emigrant HH member positively influenced the awareness of IUD, pill, implants, and female sterilisation of NMOs. Receiving economic remittances reflects an active transnational network in which TSE can occur. Accepting migrants' advice could be considered as supporting the social role of the migrant within their society. The observed positive influences on the awareness of the identified modern birth control show the potential of TSE within transnational networks (179,180).

Characteristics of network members at origin as receivers of transnational social exchanges

Remarkably, family planning programmes diffused via different channels, such as TV, newspapers, or magazines increased modern birth control awareness of Pakistani

NMOs. A previous study showed the relevance of family planning promotion via media, depending on one's location on the poverty line (201). Receiving family planning information via TV positively influenced birth control use for those above and below the poverty line, while receiving such information via magazines or newspapers only positively influenced birth control use for those above the poverty line (201). The lack of influence of magazines or newspapers for those below the poverty line could be related to low education levels (201). The importance of education could also be observed when looking at intention and use; participants with higher education levels compared to no education were more likely to have a positive intention and use of modern birth control methods.

Furthermore, living in urban areas was also related to increased awareness of modern birth control methods, which can be related to more healthcare accessibility in urban areas compared to rural areas (196). Also, gender-specific outcomes were observed; Pakistani men were less often aware of modern birth control methods. This could be due to Pakistan's patriarchal society and the lack of health promotion programmes tailored to men, meaning that birth control might not interest men as much as women (48,193,196,202).

Innovation-decision process of network members at origin

The innovation-decision process of Rogers (2003) has been included in the CHAT-model as the final phase for NMOs to fully or partially accept and implement the received TSE or reject them (REF CHAT-model). In this study, we can identify three different steps in the innovation-decision process, namely awareness (knowledge), intention to use (decision), and use (implementation) (36).

Interestingly, being aware of modern birth control could be explained best by the model of the migrant and emigrant HH members' destination. Depending on their position within society, migrants can be considered influential and valuable sources of information. Their powerful role within their family at origin allows them to promote new or different information to their NMOs. As TSE most often occurs during casual conversations, the migrant can even tailor their information to the needs and cultural norms of the NMO (See more information Chapter 3 – CHAT-model; (19,32,57,58,85,95, 113,114,179,180)).

The intention to use seemed to be driven mainly by the personal characteristics of NMOs. Women's decision to use birth control is based on their evaluation of the received information, making sure their final decision fits their personal needs (203).

The variance in modern birth control use could be best explained by the destination locations of emigrant HH members. Remarkably, the implementation of birth control use seems to be mainly explained by emigrant destinations and receiving economic remittances. Destination location context is relevant for migrants to access relevant information leading to TSE and supporting their NMOs in using modern birth control methods (179). However, TSE and economic remittances are intertwined; sending economic remittances supports TSE diffusion (180).

Limitations

This study was unique in focusing on the link between TSE and the health of NMOs, using different perspectives of the CHAT-model. However, the use of secondary data also has certain limitations. For example, while the PDHS data included relevant migration and health-related questions, the use of a proxy (having a migrant HH member) was needed to estimate TSE. We have tried to minimise this shortcoming of only having a proxy available by including economic remittances and exposure to national family planning programmes in our analysis. Furthermore, it was impossible to identify specific destination countries, as this information was only available at the area level. We have based any further elaboration on a country level on available literature and migration data. Finally, the PDHS data was only collected among ever-married men and women between 15 and 49 years old, giving a relevant and important but restricted perspective. Also, due to PDHS weight calculations, data between GB and AJK regions and the Other regions needed to be analysed and presented separately. This separation of data and inclusion of only ever-married individuals does not allow us to generalise the results for Pakistan on a national level. However, due to the large-scale dataset of PDHS, we can still provide valuable insights into the topic for both regions and the studied population.

Recommendations

Future research should continue exploring this topic, preferably by collecting primary data, and focus more on the relationship of the different relevant components of the TSE-process on the health of NMOs. More focus on TSE-sending and receiving can be provided by using (components of) the CHAT-model. The DHS in general is already unique in including migration-related questions in some of their datasets and the number of such questions has increased in the last decade. When expanding their focus on migration, it is advised to include more specific questions related to TSE.

The discussed destination countries already supported certain aspects of healthcare access by focusing on migrant and minority populations, using interpreters, and providing extra information (197). Hindering factors were related to numerous experienced barriers by Pakistani migrants when accessing healthcare at the considered destinations. These

observations indicate the need to legally protect the health of Pakistani emigrants, which could be done via supporting healthcare policies at destination and bi- or multilateral agreements between the Pakistani government and its main destination countries (195). Furthermore, some specific recommendations can be identified for Pakistan's family planning programmes. Family planning programmes are recommended to continue as they increase modern birth control awareness, especially via TV. Extra attention could be given to additional supporting factors, such as increasing quality healthcare access in rural areas, improving education levels (especially for women), and focusing future family planning programmes on Pakistani men and existing gender inequalities.

Conclusion

This study showed potential positive and negative influences of transnational social exchanges (TSE) on birth control awareness, intention to use, and use of network members at origin (NMOs). These influences appeared to depend on different components that influence the TSE-sending and receiving behaviour. Birth control preferences and perspectives appeared to differ between men and women, influencing migrant TSE-sending behaviour. The identified conditions for migrants at destination are indeed necessary when considering TSE-sending behaviour. Supporting migrants' access to healthcare and health-related information at destination was related to increased intention and use of their NMOs. Hindering healthcare access to migrants at destination decreased modern birth control awareness. Active transnational networks mainly contributed to the modern birth control awareness of their NMOs. The characteristics of NMOs that contributed most to their TSE-receiving behaviour were being female, being exposed to family planning programmes over the last month, having a higher education level, and living in an urban area. Finally, TSE appeared to play a different role throughout the innovation-decision process. Migrants seemed to be an important source of information, increasing the awareness of modern birth control of their NMOs. However, the decision of female NMOs to intend to use birth control in the future was mainly based on their individual characteristics, such as increased age, having a secondary or higher education level, and working at the time of the survey. By providing social and financial support, migrants also could play a relevant role in the modern birth control use of their NMOs. Using different components of the CHAT-model allowed a more in-depth perspective on the complex TSE-process and its influences on the health of their NMOs.

CHAPTER 6

6

Pakistan case study: HIV/AIDS awareness and social rejection

Roosen I, Kremers S, Sellin J, Crutzen R. Breaking borders? Exploring the role of migrants as information sources for sensitive topics in a conservative setting. (n.d.)

Abstract

Objective: This study investigates the link between migrant household members and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS among network members in Pakistan (main research question). A migrant household member can transfer sensitive information received or observed at destination, such as information related to HIV/AIDS, to their network members at origin (NMOs). This transfer of information is referred to in this article as transnational social exchanges (TSE). NMOs consequently can adjust their health awareness and perceptions accordingly. We test the potential consequences of these interactions by considering different components of the Comprehensive exchange of Health informATion (CHAT)-model, including the role of the characteristics of NMOs (sub-research question a), the characteristics of migrant household members (sub-research question b), and the destination locations of migrant household members (sub-research question c) on the HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS.

Study design: Population-based secondary analysis of cross-sectional data.

Methods: This study used cross-sectional data from the 2017-2018 Pakistan Demographic and Health Survey. Using treatment effects and logistic regressions, this research studies to what extent having a migrant in the household influences HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS among network members in Pakistan. Respondents are considered NMO when they had a household member who moved ten years before the survey.

Results: No significant results were obtained for the general role of a migrant household member in HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS. However, diving deeper into the different components of the CHAT-model and the division between the results of male and female respondents allowed for more in-depth information. TSE-sending and receiving could be linked to gender. Due to the sensitivity of a topic such as HIV/AIDS, this is mainly discussed among peers of the same sex, which could be observed in a decreased HIV/AIDS awareness when respondents had a migrant household member of the opposite sex. In case migrants had access to healthcare and health-related information at destination, this positively influenced HIV/AIDS awareness, while a lack of access decreased awareness and increased the social rejection of individuals with HIV/AIDS.

Conclusion: The outcomes of this study reveal the potential positive and negative influences of TSE on HIV/AIDS awareness and the social rejection of individuals with HIV/

AIDS by NMOs. The different components of the CHAT-model included in this research helped better understand the TSE-sending and receiving behaviours.

Introduction

Social ties connect individuals. Social network members share characteristics and perceptions, translating into common normative structures, such as attitudes, values, and norms. The prevailing normative structures to which network members adhere creates homogeneity among them. Normative structures serve as unspoken rules for network members to evaluate behaviours to be either desirable and permissible or not (52,53,95,96,171,204,205). Behaviours or outcomes that do not conform to these normative structures are often discouraged (171,205–207). This discouragement can be in the form of stigmatisation, which is the social disapproval, discrediting, and devaluing of socially unaccepted behaviour (207). Stigmatisation can manifest overtly (e.g., avoidance, discrediting, and dehumanisation) or subtly (e.g., non-verbal expressions such as avoiding eye contact). This paper will focus on one form of overt stigmatisation, namely social rejection, which is the deliberate exclusion of individuals with socially undesirable behaviour (207).

Because migrants live outside their home country and often remain connected to their origin country, they can present different perspectives and novel information to their network members at origin (NMOs), consequently expanding their perceptions. The often-prestigious role of the migrant at origin and the ability to (subconsciously) tailor the novel or different perspectives and information could lead to changes in health behaviours and normative structures of their NMOs. As such, social networks as an information source are especially interesting when considering migrant populations and their NMOs (17,19,32,58,85,95,113,114,179,180).

The connections between migrants and their NMOs are defined as 'transnational networks' (17). Over the last decades, the rise of technological developments made the continuous exchange of information within transnational networks faster, more convenient, and affordable than ever before (174). Migrants spontaneously exchange information (e.g., ideas, norms, values, practices, and behaviours) during online conversations via video calls or messages, which Levitt defined in 1998 as 'social remittances' (17,18). In this paper, social remittances will be referred to as 'transnational social exchanges' (TSE) to allow for a more distinct differentiation between the transfer of money and information (See more information Chapter 3 – CHAT-model). This exchange of information among transnational network members has the potential to influence social and cultural changes, including the health behaviours and normative structures of NMOs (18,19,58).

Previous research revealed positive and negative influences of TSE on the health of NMOs (19,56,82–97). Some examples of positive results are frequently related to

sexual and reproductive health (SRH), such as increased awareness of birth control and modern birth control use, reduction of teenage pregnancies, positive behaviours during pregnancy (more often professional prenatal care and delivery assistance, frequent exercise, increased intake of multivitamins, and less likely to smoke during pregnancy) (88,91,92,94–97). Negative results are, for example, unhealthy dietary intake, weight gain, and decreased breastfeeding of new-borns (90,94).

Only a few studies have identified relevant components, such as healthcare access and ruling norms at destination and origin that should be considered when studying the link between TSE and the health of NMOs (89,92,93,97). A study in Mali observed progressive changes in Female Genital Cutting (FGC)-related norms and reductions in FGC, mainly explained by return migrants coming from Côte d'Ivoire (92). Côte d'Ivoire was one of the main destination countries for Malian migrants. In Côte d'Ivoire, the migrants experienced and observed different social norms within an African context, such as not pressuring women into FGC or excluding them in case they refused FGC. Other studies (89,93) revealed the relevance of destination and origin country context on fertility rates. Fertility rates increased at origin when migrants moved to destination countries with higher fertility rates than origin – and decreased when these rates were lower. The observed trends were associated with the transfer of social norms from migrants to their NMOs (89,93). Furthermore, one study (97) focusing on Afghanistan observed associations between increased awareness of birth control methods of NMOs and access to adequate family planning information for migrants at their destination. On the contrary, migrants who did not have access to this information at destination and were part of a more conservative ethnic group appeared to negatively influence birth control awareness and use of their NMOs (97). These studies underline the need to dig deeper into understanding the mechanisms of TSE on the health of NMOs. Consequently, this study aims to provide insight into the general and in-depth influences of TSE on the health of NMOs, by using the Comprehensive transnational exchange of Health informATion (CHAT)-model (see Figure 1).

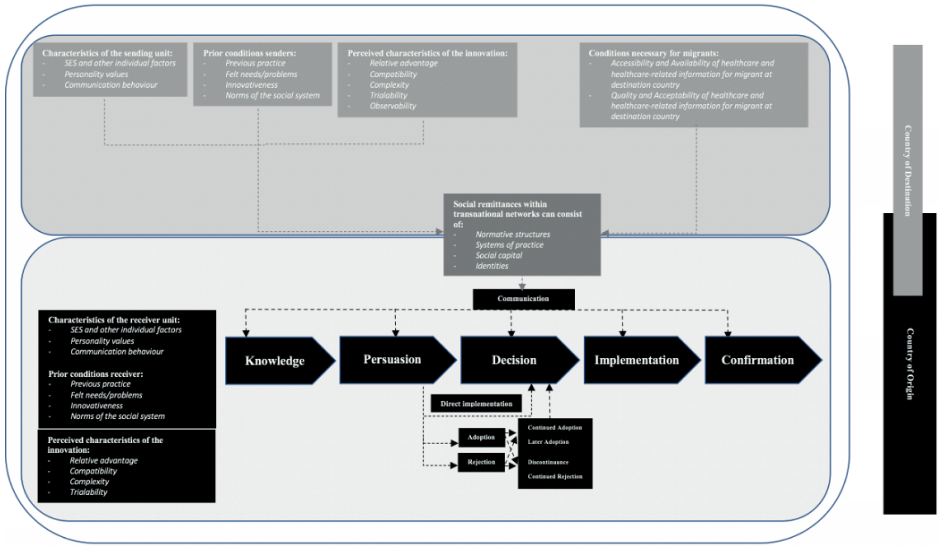

Figure 1. Comprehensive transnational exchange of Health informATion (CHAT)-model

The CHAT-model is a multi-disciplinary model based on extensive analysis of available literature on the topic. The CHAT-model provides a multifaceted perspective of the TSE-process by integrating migration, health behaviour, and communication theories with the concepts of social remittances, the human right to the highest attainable standard of health, Berry's model of acculturation, and aspects of the transnational theory. It also covers both migrant perspectives as the sender of TSE and NMOs perspectives as the receiver of TSE (See more information Chapter 3 – CHAT-model).

TSE can positively and negatively influence the health of NMOs. However, when focusing on the potential positive influences and considering Levitt and Lamba-Nieves's redefinition of 2011, these positive changes could translate to other behaviours (scale-out) or create a domino effect on those surrounding the NMOs when implemented on a higher regional or national level (scale-up). As migrants frequently originate from economically developing countries, this reveals their potential as change agents (1). To study this potential influence of TSE on the health of NMOs, Pakistan serves as a relevant country case study due to its high internal and international migration and concerning HIV/AIDS numbers, awareness, and social stigma (1,38,39,44–47,49). Globally, Pakistan is within the top 10 countries representing the most significant migration corridors and highest remittances receiving countries ($22,2 billion), impacting the social and economic development of the country (1,38,39). In 2015, 5.9 million people of Pakistani origin lived abroad, with Saudi Arabia, the Gulf countries, the UK, and the US as the main destination countries (38). Economic reasons mainly drive Pakistani migration; only a relatively small number, 298 thousand people, are recognised refugees who have

been granted asylum (38). Pakistan's remarkable remittances receiving status reflect existing and well-established transnational networks. Besides sending money, it can be expected that these networks could also serve as an information source to exchange relevant health-related information, such as information related to HIV/AIDS.

HIV/AIDS is an emerging problem in Pakistan. In 2018, Pakistan had 1.3 million HIV-infected individuals; however, only 22,333 were registered. HIV/AIDS is a concerning health threat for numerous reasons; for example, of the HIV-infected individuals: only 12,046 received antiretroviral therapy, and only 14% know their status. These concerns are represented in increased AIDS-related deaths by 369% between 2010 and 2018. There is a growing concern that the numbers of HIV cases will increase even more, especially among the younger Pakistani population, mainly due to heterosexual transmission (47,49,194). The main components that contributed to the rising numbers are – among others – lack of awareness, mainly in rural areas; lack of SRH and HIV/AIDS education and awareness programmes, due to strong opposition of Pakistani religious and political leaders; ruling stigmas regarding HIV/AIDS, hindering awareness; and unknown transmissions between HIV-infected migrants and their spouses upon their return (44,46–49,208).

This paper focuses on stigmatisation via social rejection of individuals with HIV/AIDS. For migrants to acquire and successfully exchange HIV/AIDS-related information, which consequently can influence the awareness and normative structures of NMOs related to stigmatisation, the CHAT-model identifies several main components. The main components can be clustered into three groups: (1) three similar components for migrants and NMOs, which are the characteristics of the migrant/NMO, prior conditions of the migrant/NMO, and perceived characteristics of the innovation by the migrant/NMO; (2) one specific component for migrants, which are the necessary conditions at destination; and (3) one overlapping component, which are the TSE within an active transnational network. Based on the CHAT-model, Pakistani migrants can acquire novel information regarding HIV/AIDS available at their destination, which they can transfer to their NMOs within their active transnational networks. This information can be tailored to NMOs and provided when needed. Migrants also often have an established position within their origin society, making the exchanged information valuable and credible. Their position can be especially relevant when sharing sensitive or innovative information, such as communication about HIV/AIDS (19,32,57,58,85,95,113,114,179,180). Depending on the characteristics of NMOs, TSE can be entirely accepted, partially accepted, or rejected (36).

Previous research on this topic remains scarce and observed both positive and negative influences of TSE on the health of NMOs. Moreover, the mechanisms underlying the TSE-process are observed to be essential to comprehend the potential of TSE for development, though they remain unclear (32,112). The CHAT-model provides the much-needed foundation to study this relevant TSE-process. This study is unique and contributes to current research as it provides more insight into the TSE-process by including several relevant components of the CHAT-model, such as characteristics of NMOs, characteristics of migrant household (HH) members, and destination location of a migrant HH member. Furthermore, as most research is concentrated on North and Central America, this research will add information on country context by focusing on a South-Asian country, namely Pakistan.

The aim of this research is to examine the associations between having migrant HH members and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS. By using Pakistan as a case study, this research will analyse the 2017-2018 Pakistan Demographic and Health Surveys (PDHS) data to answer the overarching research question: *to what extent do migrant HH members influence HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS in Pakistan?* In addition, this study will specifically focus on *the role of the characteristics of Pakistani NMOs (RQa), characteristics of migrant HH members (RQb), and destination locations (RQc).*

Methods

We analysed cross-sectional data of the 2017-2018 PDHS, conforming to the STROBE-checklist for cross-sectional studies.

The 2017-2018 Pakistan Demographic and Health Survey data

The PDHS included both migration and HIV/AIDS-related questions. Three out of the six questionnaires were selected: (1) the HH questionnaire covering relevant information about migrant HH members, (2) women's, and (3) men's questionnaires, including important questions regarding HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS.

The PDHS sampling frame was based on previously created enumeration blocks of the Pakistan Population and Housing Census 2017 and followed a stratified two-stage sample design. Stratification was done by generating 16 sampling strata, separating urban and rural areas for the eight regions within Pakistan: Punjab, Sindh, Khyber Pakhtunkwa (KPK), Balochistan, Islamabad Capital Territory (ICT), the former Federally Administrated

Tribal Areas (FATA), Azzad Jammu and Kashmir (AJK), and Gilgit Baltistan (GB). During the first stage, 580 clusters were drawn. In the second stage, HHs were systematically sampled with a fixed number of 28 HHs per cluster, leading to approximately 16,240 HHs (181).

Between August 2017 and May 2018, the National Institute of Population Studies (NIPS) collected the PDHS data. The questionnaires were pre-tested, and field staff was trained. The field staff only questioned the pre-selected HHs without any replacements or changes to prevent bias. Respondents also did not receive any compensation for their participation. NIPS used translated (in Urdu and Sindhi) questionnaires in the field administered with computer assistance. The HH questionnaire included relevant questions about the HH and asked the HH head. All members and visitors of the selected HH, including migrant HH members who moved away in the last ten years before the survey, were listed via the HH questionnaire. All ever-married women aged between 15 and 49 years old, either permanent residents of the selected HHs or visitors who stayed in the HHs the night before the survey, were eligible to be interviewed. The men's questionnaire was asked, at random, to one-third of the ever-married male residents of the sampled HHs, aged 15 to 49. Response rates of the included datasets were 96% for the HH questionnaire, 94% for the women's questionnaire, and 87% for the men's questionnaire (181).

The data files included weighting factors for the PDHS, calculated by NIPS. The included weights enabled representative data analysis for six out of the eight areas: Punjab, Sindh, KPK, Balochistan, ICT, and FATA, which will be referred to throughout this paper as the 'Other regions'. 'Areas GB and AJK' were not included in the weight calculations due to non-proportional sample allocation, and outcomes are therefore presented separately (181). A dummy variable was created to separate analyses for the different regions, based on the available variable representing the different regions (coded as other regions = 0; regions GB and AJK = 1).

Dependent variables

The outcomes of interest of this study are twofold: HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS. The included variables were based on questions from the women's and men's questionnaires. All included variables had a minimum of 100 respondents for each defined category within those variables.

HIV/AIDS awareness

The question '*Have you ever heard of HIV or AIDS?*' ((181): p.478) was asked to all male and female respondents. The variable representing the awareness of HIV/AIDS was a dummy variable coded as 0 (meaning: no, I am not aware) and 1 (meaning: yes, I am aware).

Social rejection of individuals with HIV/AIDS

When respondents confirmed they were aware of HIV/AIDS, several follow-up questions were asked, e.g., knowledge about HIV/AIDS transmission and stigma around HIV/AIDS. Ten questions were selected that could be related to stigmatisation of HIV/AIDS, such as '*Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had HIV?*' ((181): p.479), which aimed to assess avoidance or '*Do you think children living with HIV should be allowed to attend school with children who do not have HIV?*' ((181): p.479), in order to assess aversion to interaction.

Factor analysis has been performed based on the ten selected questions, resulting in three factors for both regions. One factor of the three (factor 1) has been selected for each region. The two remaining factors in both regions (factors 2 and 3) were not selected for two reasons. First, factor 2 did not include the same variables for both regions, making comparison difficult when creating a scale based on this factor. Second, the internal consistency was low for factor 2 for both regions (Other regions: α=0.57 and regions GB and AJK: α=0.59) and factor 3 for regions GB and AJK (Other regions: α=0.71 and regions GB and AJK: α=0.55).

Factor 1 was selected to develop the HIV/AIDS social rejection scale to support consistency in the included variables between regions and consider the strongest reliability factor for both regions (Other regions: α=0.75 and regions GB and AJK: α=0.73). This factor included five variables based on the following questions: '*Do you think people hesitate to take an HIV test because they are afraid of how other people will react if the test result is positive for HIV?*', '*Do people talk badly about people living with HIV, or who are thought to be living with HIV?*', '*Do people living with HIV, or thought to be living with HIV, lose the respect of other people?*', '*Do people living with HIV, get discriminatory treatment from the health service providers?*', and '*Do you agree or disagree with the following statement: I would be ashamed if someone in my family had HIV*' ((181): p.479-480), which could be related to the social rejection of individuals with HIV/AIDS (207). These five variables have been recoded to 0 (meaning: disagree), 1 (meaning: do not know or unsure), or 2 (meaning: agree). A new variable, the HIV/AIDS social rejection scale, has been created by calculating average scores based on the five selected variables, ranging from 0 (meaning: disagree) to 2 (meaning: agree).

Independent variables

For the present research question and sub-questions, a selection was made based on the information retrieved from the HH questionnaire, which provided information about migrant HH members and men's and women's questionnaires for information about transnational network members in Pakistan.

General research question: Influence of migrant household member

No specific information was provided on TSE, which is why we decided to include two proxy variables reflecting the overall influence of having a migrant HH member on HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS: one general variable and another more detailed variable.

The first variable was based on the question '*Are there any members of your HH who lived here in the past 10 years but who have since moved?*' ((181): p.418), of which a dummy variable was created (0 = no; 1 = yes). This variable gave a general perspective on whether a migrant HH member influenced HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS.

The second variable was created based on a follow-up question after a migrant HH member was identified: '*Where has (name of migrant) travelled to?*' ((181): p.418). Five categories have been created: no migrant HH member (coded as 0), only urban migrant(s) in the HH (1), only rural migrant(s) in the HH (2), only emigrant(s) in the HH (3), and the combination of internal (urban and rural migrants) and emigrant HH members (4). Aggregating migrant HH members' destinations allowed us to provide more nuanced interpretations of potential influences of migrant HH members who migrated internally (to urban or rural locations) or emigrated outside Pakistan compared to respondents without a migrant HH member.

Sub-research question a: Characteristics of transnational network members in Pakistan

Based on the CHAT-model, the characteristics of NMOs influence the processing of HIV/AIDS-related information, which consequently influences the awareness and the social rejection of individuals with HIV/AIDS by NMOs. Based on the literature, the following list of relevant variables has been included: sex, currently working, married, place of residence, wealth index, level of education, region, literacy level, native language, and age.

Before appending the women's and men's datasets, a dummy variable was created referring to the *sex* of the respondents, coded as 0 for the female respondents in the

women's dataset and 1 for the male respondents in the men's dataset. The analysis has been performed on all available data and on data for men and women separately for both regions.

Currently working at the time of the survey was already included as a dummy variable (0 = no; 1 = yes) in the datasets and was kept as such.

PDHS only included male and female respondents who were either *married* at the time of the survey or who had previously been married; currently being married was included as a dummy variable (0 = no; 1 = yes).

Living in urban or rural areas was included as another dummy variable (0 = rural; 1 = urban), indicating the *place of residence* of the respondents.

The PDHS calculated a *wealth index*, a score based on a combination of variables such as possessing consumer goods (TV or car) and housing characteristics (flooring, walls, and toilet) ((181): p.11). The wealth index identified five categories: poorest (coded as 1), poorer (2), middle (3), richer (4), and richest (5).

Level of education was also included as a categorical variable: no education (coded as 0), primary education (1), secondary education (2), and higher education (3).

Region was added as an additional categorical variable. As previously mentioned, the data needed to be analysed separately for regions GB and AJK and the Other regions. In the presented analysis, it was decided to limit the regional differences to the Other regions: Punjab (coded as 1), Sindh (2), KPK (3), Balochistan (4), ICT (6), and FATA (8).

A categorical variable was created based on the available *literacy level* variable: cannot read at all (coded as 0), able to read only parts of sentence (1), able to read whole sentence (2). When recoding this variable, it has been decided, due to the low number of participants choosing these options, to recode categories no card with required language, meaning the native language was not included in the study material (n women = 4, and n men = 2), and blind/visually impaired (n women = 3, and n men = 1) as missing data.

Ethnicity can influence HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS and was initially intended to be included in the analysis. However, data about ethnicity was not included in the available datasets, which is why *native language* was used to proxy potential ethnic influences. Native language was restricted in the analysis

to the Other regions covering: other native languages (coded as 1), Urdu (2), Sindhi (3), Punjabi (4), Sariaki (5), Baluchi (6), and Pushto (7).

Age was included as a continuous variable, ranging from 15 to 49 years.

Sub-research question b: Migrant characteristics

Besides the characteristics of transnational network members, the CHAT-model also identified migrant characteristics as important components of TSE, which eventually can influence HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS by NMOs. Based on relevant literature and available PDHS data, three variables have been included in the analyses identifying migrant characteristics: the number of migrants in the HH, sex of migrant HH member, and migrant education level when he/she moved away.

The *number of migrants in a HH* was selected as a variable, ranging from one to ten. Based on the available variable, three categories have been created: one migrant HH member (coded as 0), two migrant HH members (1), and three or more migrant HH members (2).

Based on the variable identifying the *sex of the migrant HH member* to either male or female, a categorical variable was created aggregating information on HH level. The categorical variable identified if a HH with a migrant only had male migrant(s) (coded as 1), only had female migrant(s) (2) or had both male and female migrants (3).

Migrant education level was based on the question '*What was the highest class completed when he/she moved away?*' ((181): p.418), ranging from 0 (= no education) to 16 (covering different education levels). A categorical variable has been created aggregating education levels of migrant HH members, based on the Pakistani school system: no education (coded as 1), primary education, classes one to eight (2), secondary education, classes nine to twelve (3), higher education, classes thirteen to sixteen (4), and a combination of education levels (5). Due to the low number of migrants in regions GB and AJK who had no education level (n = 37), it has been decided to exclude this category from analysis for this region.

Sub-research question c: Migrant destination locations

Another important component influencing TSE is migrant destination location. The CHAT-model also refers to the importance of an active transnational network to support the transfer of TSE. To study how migrant's destination locations were associated to HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS by NMOs, we included four variables: destination of migrant HH members, destination of emigrant

HH members, the main reason for migration, and sending or receiving economic remittances.

The *destination of the migrant HH members* was created as previously described (please see for more information the general influence of migrant HH members). The only difference in this analysis was that respondents without migrant HH members were excluded from analysis.

DHS – USAID provided, upon request, more specific information on the *destination of emigrant HH members*, which enabled us to generate three overall categories: Asia (coded as 1), Europe and Northern America (2), and Other countries (such as South America, Africa, Australasia, and the Pacific) or a combination of destinations (3). More specific information about emigrant destination locations allowed us to identify potential differences in countries outside Pakistan. This analysis was therefore only performed on respondents with emigrant HH members.

The *main reason for migration* was also included in the available datasets as a separate variable. Based on the question '*What was the main reason that the migrant HH member moved away?*' ((181): p.418), a categorical variable was created reflecting the main reasons of migration of migrant HH members: economic or job-related reasons (coded as 1), family-related reasons, such as marriage or accompany family (2), study-related reasons (3), and other reasons (not explicitly identified) or a combination of reasons (4). For regions GB and AJK, this variable was included without other reasons and a combination of reasons (code = 4), as only 35 respondents answered this question as such.

PDHS asked information about *economic remittances*, which could be used as a proxy to identify active transnational networks. Based on the question '*In the past one year did you send money or receive money from your migrant HH member(s)?*' ((181): p.418), a categorical variable was created reflecting if respondents sent economic remittances to their migrant HH member(s) (coded as 1), received economic remittances from their migrant HH member(s) (2), both sent and received economic remittances (3), or did not receive any economic remittances in the past year (4).

Control variables

The included control variables were identical to the previously described characteristics of transnational network members living in Pakistan.

Statistical methods

The PDHS included 14,540 HHs, 15,068 ever-married women aged 15-49, and 3,691 ever-married men aged 15-49. To analyse all stated research questions, the men's and women's datasets were appended with each other to create one individual dataset, resulting in 18,759 respondents. Consequently, the HH dataset, which included the relevant migration-related questions, was merged with the ever-married women and men datasets with the necessary HIV/AIDS-related questions. After merging, data of 16 respondents were dropped as they could not be merged, resulting in a final sample size for analysis of 18,743 respondents (181). Treatment effects and logistic regressions were conducted using Stata SE 17. Outcomes were considered significant and reported in the tables presented here if $p \leq 0.05$.

Treatment effects

This study used secondary observational data, and treatment effects were therefore decided as chosen analytical method for the general research question, studying the overall influences of a migrant HH member on HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS. The use of observational data and observable and unobservable differences between migrant and non-migrant HHs could lead to self-selection bias. Estimating treatment effects are one way to deal with self-selection bias and other confounding biases, as treatment effects simulate an experimental design using a treatment and control group. Furthermore, it also provides the opportunity to make causal inferences by calculating the average treatment effect of the treated (ATET), while including regression covariates do not (158–160,182–185).

The control in this study will be having no migrant HH member, and the chosen treatments will be (1) having a migrant HH member, using propensity score matching (PSM), and (2) having either only urban migrant HH members (treatment 1), only rural migrant HH members (treatment 2), only emigrant HH members (treatment 3), or a combination of both internal migrant and emigrant HH members (treatment 4), using inverse probability weights (IPW). Matching occurs based on the estimated propensity scores, calculated based on the predefined observable characteristics (i.e., the previously described characteristics of transnational network members) (184,185).

The quality of treatment effects is highly dependent on balanced distributions of the propensity scores for treatment and control groups; to be able to apply this, a three-step process was used (184–187). First, before estimating treatment effects using 'teffects' in Stata, the included covariates were evaluated based on statistical outcomes of balancing the covariates in the two groups after using psmatch2. Based on the results, covariates were excluded from further analysis if the results of the t-tests were statistically

significant ($p \leq 0.05$), meaning treated and control groups were statistically different for this variable, and if the percentage of bias was higher than the recommended 5%. This was chosen as an extra step, as teffects only allows a graphic post-test to control balancing properties. Second, the teffects commands 'psmatch' and 'ipw' were used to estimate ATETs. The teffects code was used in Stata, as this code reproduced more accurate standardised errors than the previous 'psmatch2' code. Third, after conducting the treatment effects, an additional graphic post-check was performed, evaluating the overlap between treatment and control groups. Matching was assessed to be successful if the propensity score mass was not grouped near 0 or 1 and mainly overlapped (184–187).

Logistic regression model

To acquire more information about the associations between the characteristics of NMOs (sub-question a), the characteristics of migrant HH members (sub-question b), and destination locations (sub-question c) and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS, logistic regression models were used. Logistic regression was chosen as outcome variables were binary and as logistic regression models allow us to predict the relation between the explanatory and outcome variables, taking into account multiple confounders (188–190).

Before analysing, data distribution was checked and where necessary variables were excluded in parts of the analyses, such as previously described variables migrant education level and reason for migration for regions GB and AJK. Furthermore, correlation among independent variables was checked, most variables had a medium to low correlation, except for working and sex and education level and literacy level of the respondents, which was between 0.70 and 0.90. An additional test was performed to diagnose multicollinearity, calculating the variance inflation factors (VIF) of the independent variables. The results of the VIF indicated the independent variables to be either not correlated (score of 1) or to be moderately correlated (score between 1 and 5), not causing problems in terms of interpretation after fitting the model. Based on the VIF results it was decided to keep all selected independent variables in the model, including working, sex, education, and literacy level (190–192). However, it was decided when Stata indicated that specific variables caused collinearity in some specific cases, e.g., when focusing on a specific sub-sample such as emigrant HH members in sub-question c, these specific variables would be excluded from analysis. Additionally, the Likelihood Ratio Chi Square (LR chi^2) was included, comparing the presented models to a null model (191,192).

Results

Descriptive characteristics of respondents and migrant household members

The descriptive characteristics of the respondents are shown separately for the 'Other regions' in Table 1 and for 'Regions GB and AJK' in Table 2, divided by sex (male/female) and having a migrant HH member (yes/no). More frequently, respondents of the GB and AJK regions had a migrant HH member than those in the Other regions. Overall, for both regions (Other regions and regions GB and AJK), mainly female respondents and respondents living in rural areas had a migrant HH member. Education levels differed between male and female respondents and between regions. Men mostly had a secondary education level, and females frequently had no education. Respondents living in regions GB and AJK had higher education levels than those living in the Other regions. Respondents with a migrant HH member seemed to be richer than those without a migrant HH member.

Table 3 provides more information about the characteristics of the migrant HH members. In general, migrant HH members were male, internal migrants, typically migrating to urban areas. Female migrants could be characterised as primarily internal migrants, moving both to urban and rural areas, mainly for family-related reasons, and often without sending or receiving economic remittances. Male migrants mainly migrated to urban areas in Pakistan or moved outside their country, primarily for economic or job-related reasons, and generally sent economic remittances to their HH members in Pakistan. When comparing both regions, the sex of the migrant HH members appeared to differ, with more often only female migrants in the Other regions and more often only male migrants in regions GB and AJK.

HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS

A descriptive overview of the two outcome variables, HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS can be found in Tables 4 and 5. For both regions, awareness of HIV/AIDS was twice as high among men compared to women and appeared to be higher for those with a migrant HH member than those without a migrant HH member. The average scores on the HIV/AIDS social rejection scale leaned more towards the 2 (agree) than 0 (disagree), with 1.26 as the lowest and 1.37 as the highest average scores. Even though the average differences appeared to be relatively small, it could be observed that women in general and especially women with a migrant HH member scored on average higher on the scale, meaning that women more often agreed with the posed statements related to the social rejection of individuals with HIV/

AIDS, while men with migrant HH members scored on average lower, indicating they disagreed more often with the social rejection statements.

Table 1. Descriptive characteristics of respondents – Other regions

	Other regions					
	Males			Females		
	No migrant	Migrant	Total males*	No migrant	Migrant	Total females
Age [M (SD)]	35.06 (7.89)	33.96 (8.03)	34.87 (7.92)	32.41 (8.21)	31.78 (8.77)	32.26 (8.34)
Region [%]						
Punjab	48.77	71.94	52.72	49.84	66.49	53.65
Sindh	28.19	8.86	24.90	27.48	8.02	23.02
KPK	13.97	13.67	13.92	13.88	20.42	15.38
Balochistan	6.46	3.07	5.88	6.23	1.67	5.18
ICT	1.05	0.94	1.03	0.92	0.70	0.87
FATA	1.56	1.52	1.55	1.65	2.71	1.90
Type place of residence [%]						
Rural	59.43	61.90	59.85	60.75	71.58	63.23
Urban	40.57	38.10	40.15	39.25	28.42	36.77
Highest educational level [%]						
No education	26.66	19.49	25.44	50.50	44.71	49.17
Primary education	20.04	21.86	20.35	15.98	18.10	16.47
Secondary education	33.86	42.50	35.33	21.02	21.96	21.23
Higher education	19.44	16.14	18.88	12.50	15.23	13.13
Wealth index [%]						
Poorest	19.48	8.64	17.63	20.16	11.93	18.27
Poorer	19.53	19.30	19.49	19.55	20.05	19.66
Middle	19.80	18.91	19.64	19.92	21.32	20.24
Richer	21.16	23.88	21.62	20.03	24.15	20.97
Richest	20.04	29.27	21.61	20.35	22.55	20.85
Total						
n	2,608	535	3,143	9,521	2,831	12,352
% per category	82.97	17.03	100.00	77.08	22.92	100.00

**This total included one additional respondent due to the use of weights and rounding.*

Table 2. Descriptive characteristics of respondents – Regions GB and AJK

	Regions GB & AJK					
	Males			Females		
	No migrant	Migrant	Total males	No migrant	Migrant	Total females
Age [M (SD)]	36.80 (7.50)	35.60 (7.85)	36.48 (7.61)	33.30 (7.66)	32.84 (8.66)	33.13 (8.05)
Region [%]						
GB	39.30	36.11	38.46	39.43	31.49	36.40
AJK	60.70	63.89	61.54	60.57	68.51	63.60
Type place of residence [%]						
Rural	49.25	72.22	55.31	52.69	64.63	57.23
Urban	50.75	27.78	44.69	47.31	35.37	42.77
Highest educational level [%]						
No education	13.68	9.72	12.64	35.84	33.53	34.96
Primary education	16.92	10.42	15.20	16.25	13.31	15.13
Secondary education	44.28	49.31	45.60	28.97	33.04	30.52
Higher education	25.12	30.56	26.56	18.94	20.12	19.39
Wealth index [%]						
Poorest	18.66	12.50	17.03	19.71	14.58	17.76
Poorer	30.35	22.22	28.21	28.02	31.00	29.15
Middle	23.63	29.86	25.27	23.84	24.98	24.27
Richer	12.19	13.89	12.64	16.01	16.42	16.17
Richest	15.17	21.53	16.85	12.43	13.02	12.65
Total						
n	402	144	546	1,674	1,029	2,703
% per category	73.63	26.37	100.00	61.93	38.07	100.00

Table 3. Descriptive characteristics of migrant household members

	Other regions				Regions GB & AJK			
	Only male migrant(s)	**Only female migrant(s)**	**Male and female migrants**	**Total**	**Only male migrant(s)**	**Only female migrant(s)**	**Male and female migrants**	**Total**
Main migrant destinations [%]								
Urban Pakistan	41.54	57.60	52.51	46.19	41.04	49.29	43.05	42.28
Rural Pakistan	7.93	34.38	9.07	13.63	11.79	38.57	11.26	14.92
Outside Pakistan	43.17	4.59	2.44	30.34	35.26	12.14	6.62	28.82
Combination	7.36	3.43	35.99	9.84	11.90	0.00	39.07	13.98
Economic remittances sent or received [%]								
Sent	38.69	6.59	48.35	33.05	26.98	15.00	32.45	26.26
Received	42.35	1.47	14.91	30.58	57.26	2.86	21.19	46.12
Sent and received	2.07	0.00	0.69	1.48	5.10	0.71	19.87	6.48
No economic remittances sent or received	16.89	91.94	36.05	34.90	10.66	81.43	26.49	21.14
Main reason for migration [%]								
Economic/job	91.34	1.81	50.76	67.80	82.20	1.43	47.68	68.12
Family	0.53	93.31	39.53	24.56	0.79	80.00	30.46	14.07
Study	6.34	1.88	1.60	4.86	14.97	15.71	13.25	14.83
Other or combination	1.79	3.00	8.10	2.78	2.04	2.86	8.61	2.98
General education level migrants [%]								
No education	14.09	23.73	12.40	15.93	2.83	8.57	0.00	3.15
Primary education	30.36	27.83	10.60	27.54	25.28	27.14	7.95	23.27
Secondary education	34.68	28.12	14.56	30.97	46.37	30.00	23.84	41.52
Higher education	5.97	9.57	6.20	6.75	8.84	27.14	0.66	9.97
Combination	14.90	10.76	56.25	18.81	16.67	7.14	67.55	22.08
Total								
n	2,269	709	389	3,366	882	140	151	1,173
% per category	67.40	21.05	11.55	100.00	75.19	11.94	12.87	100.00

Table 4. Descriptives HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS – Other regions

	Other regions					
	Males			Females		
	No migrant	Migrant	Total males	No migrant	Migrant	Total females
Ever heard of HIV/AIDS (yes) [%]:						
	65.83	74.36	67.28	31.60	35.09	32.40
Total						
Total #	2,608	535	3,143	9,521	2,831	12,352
Total %	82.97	17.03	100.00	77.08	22.92	100.00
HIV/AIDS Social Rejection scale (0 = disagree - 2 = agree) [M (SD)]:						
	1.26 [0.60]	1.26 [0.58]	1.26 [0.59]	1.32 [0.56]	1.34 [0.54]	1.33 [0.55]
Total						
Total #	1,736	347	2,083	3,015	853	3,868
Total %	83.34	16.66	100.00	77.95	22.05	100.00

Table 5. Descriptives HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS – Regions GB and AJK

	Regions GB & AJK					
	Males			Females		
	No migrant	Migrant	Total males	No migrant	Migrant	Total females
Ever heard of HIV/AIDS (yes) [%]:						
	70.90	77.78	72.71	33.63	37.90	35.26
Total						
Total #	402	144	546	1,674	1,029	2,703
Total %	73.63	26.37	100.00	61.93	38.07	100.00
HIV/AIDS Social Rejection scale (0 = disagree - 2 = agree) [M (SD)]:						
	1.33 [0.50]	1.29 [0.56]	1.31 [0.52]	1.32 [0.54]	1.37 [0.54]	1.35 [0.54]
Total						
Total #	285	112	397	562	390	952
Total %	71.79	28.21	100.00	59.03	40.97	100.00

Table 6. Summary results main research question: the association between migrant household member and HIV/AIDS awareness and social rejection of individuals with HIV/AIDS – divided by the two studied regions [#]

	Other regions						Regions GB & AJK					
	HIV/AIDS Awareness			HIV/AIDS Social rejection			HIV/AIDS Awareness			HIV/AIDS Social rejection		
	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All
RQ: To what extent is having a migrant household member associated with HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS in Pakistan? [Average Treatment Effects of the Treated (ATET) (95% CI)]												
1.No migrant versus migrant HH member (Base = no migrant in HH)												
Migrant in HH	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Observations												
2.No migrant versus general locations migrant HH member (Base = no migrant in HH)												
Only rural migrant(s) in HH		-0.054** (-0.107 - -0.002)	-0.073** (-0.122 - -0.024)	n.s.	n.s.		n.s.	n.s.	n.s.		0.180** (0.024 - 0.336)	0.189** (0.061 - 0.317)
Emigrant HH members						-0.127*** (-0.200 - -0.053)						
Internal and emigrants in HH	-0.543** (-1.029 - -0.057)		-0.066** (-0.132 - -0.000)							-0.241** (-0.476 - -0.005)	0.163** (0.019 - 0.307)	
Observations	3,136	12,343	15,479			5,957				397	952	1,348

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 7. Summary results sub-research question a: the association between the characteristics of network members at origin and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS – divided by the two studied regions [#]

	Other regions						Regions GB & AJK					
	HIV/AIDS Awareness			HIV/AIDS Social rejection			HIV/AIDS Awareness			HIV/AIDS Social rejection		
	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All
RQa: To what extent are the characteristics of network members in Pakistan associated with HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS? [Odds Ratios (OR) (95% CI)]												
Sex (Base = female)												
Male			5.481*** (3.349 - 8.971)	n.s.					3.729*** (1.927 - 7.217)	n.s.	n.s.	n.s.
Age		1.058*** (1.038 - 1.079)	1.051*** (1.033 - 1.070)					1.031** (1.009 - 1.054)	1.037*** (1.016 - 1.058)			
Region (Base = Punjab)												
Sindh	0.165** (0.042 - 0.651)		0.474** (0.254 - 0.884)		0.094** (0.010 - 0.855)	0.143** (0.023 - 0.897)						
KPK		0.302*** (0.149 - 0.611)	0.327*** (0.172 - 0.622)									
Balochistan		0.270*** (0.126 - 0.578)	0.373** (0.179 - 0.776)									
FATA		0.284** (0.109 - 0.744)	0.394** (0.172 - 0.899)									
Place of residence (Base = Rural)												
Urban								1.549** (1.086 - 2.211)	1.461** (1.034 - 2.065)			
Native language (Base = Other)												
Pushto	5.174** (1.040 - 25.739)		2.045** (1.125 - 3.717)		0.015** (0.001 - 0.463)	0.019** (0.001 - 0.426)						
Education level (Base = No education)												
Secondary education		6.157*** (3.035 - 12.490)	4.720*** (2.511 - 8.874)		0.024** (0.001 - 0.392)		36.008** (1.135 - 1,142.850)		3.684** (1.471 - 9.225)			
Higher education		29.995*** (13.485 - 66.718)	20.595*** (10.034 - 42.273)		0.010** (0.000 - 0.221)	0.049** (0.003 - 0.783)		10.768*** (3.583 - 32.360)	17.711*** (6.577 - 47.693)			

Table 7. Summary results sub-research question a: the association between the characteristics of network members at origin and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS – divided by the two studied regions # (*continued*)

	Other regions						Regions GB & AJK					
	HIV/AIDS Awareness			HIV/AIDS Social rejection			HIV/AIDS Awareness			HIV/AIDS Social rejection		
	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All
Literacy level (Base = Cannot read at all)												
Able to read only parts of sentence	6.733** (1.608 - 28.190)		2.285** (1.190 - 4.389)					3.125** (1.068 – 9.149)				
Able to read whole sentence	7.528** (1.840 - 30.800)		2.205** (1.242 - 3.916)		13.927** (1.041 - 186.338)			3.798** (1.398 - 10.319)	2.665** (1.121 - 6.335)			
Wealth index (Base = Poorest)												
Poorer							14.483** (1.090 - 192.497)		2.330** (1.100 - 4.933)			
Middle		2.995** (1.320 - 6.795)	2.795** (1.448 - 5.398)				59.766** (4.343 - 822.501)	4.326*** (1.873 - 9.991)	5.354*** (2.515 - 11.395)			
Higher	5.144** (1.195 - 22.151)	5.169*** (2.260 - 11.829)	4.827*** (2.483 - 9.383)				31.758** (1.287 - 783.401)	10.097*** (4.188 - 24.345)	11.388*** (5.085 - 25.505)			
Highest	6.848** (1.246 - 37.635)	6.696*** (2.837 - 15.806)	6.242*** (3.096 - 12.581)				67.380** (2.522 – 1,799.985)	8.379*** (3.340 - 21.020)	9.790*** (4.206 - 22.785)			
Working (Base = Currently not working)												
Working								2.964*** (1.670 - 5.262)	2.206*** (1.319 - 3.688)			
Constant	0.439 (0.036 - 5.336)	0.005*** (0.001 - 0.022)	0.007*** (0.002 - 0.023)		243.237** (1.155 - 51,227.660)	371.561** (6.359 - 21,712.720)	0.008** (0.000 - 0.746)	0.006*** (0.002 - 0.021)	0.005*** (0.002 - 0.014)			
LR chi²	94.66***	425.38***	532.12***		60.98***	86.31***	50.51***	503.73***	645.84***			
Pseudo R^2	0.357	0.365	0.388		0.198	0.195	0.403	0.369	0.404			
Observations	473	2,617	3,090		326	537	100	1,028	1,172			

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 8. Summary results sub-research question b: the association between the characteristics of migrant HH members and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS – divided by the two studied regions [#]

	Other regions						Regions GB & AJK					
	HIV/AIDS Awareness			HIV/AIDS Social rejection			HIV/AIDS Awareness			HIV/AIDS Social rejection		
	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All
RQb: To what extent are the characteristics of the migrants associated with HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS by NMOs in Pakistan? [Odds Ratios (OR) (95% CI)]												
Sex of migrant(s) in HH (Base = Only male migrant(s))												
Only female migrant(s)			n.s.	n.s.			0.079** (0.008 - 0.778)		n.s.	n.s.	n.s.	n.s.
Male and female migrants	0.192** (0.053 - 0.694)					8.845** (1.486 - 52.647)						
Primary education level migrant		0.576** (0.337 - 0.984)										
Higher education level migrant					32.837** (1.627 - 662.791)			0.475** (0.240 - 0.942)				
Constant	0.389 (0.027 - 5.524)	0.009*** (0.002 - 0.039)			2,543.099** (2.024 - 3.196191.000)	332.817** (2.925 - 37,870.840)	0.000** (0.000 - 0.241)	0.007*** (0.002 - 0.029)				
LR chi²	102.40***	442.75***			74.16***	105.67***	61.49***	490.17***				
Pseudo R^2	0.370	0.372			0.262	0.233	0.553	0.368				
Observations	473	2,617			298	537	86	995				

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Table 9. Summary results sub-research question c: the association between the conditions at destination ((1) for migrants in general and (2) for emigrants specifically) and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS – divided by the two studied regions [#]

	Other regions						Regions GB & AJK					
	HIV/AIDS Awareness			HIV/AIDS Social rejection			HIV/AIDS Awareness			HIV/AIDS Social rejection		
	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All
RQc: To what extent are the conditions at destination (of the migrants) associated with HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS by NMOs in Pakistan? [Odds Ratios (OR) (95% CI)]												
1.Migrant destination in general												
Economic remittances (Base = Economic remittances sent)												
Economic remittances received	n.s.		n.s.		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	10.183** (1.227 - 84.504)	n.s.
Economic remittances sent and received		2.504** (1.049 - 5.975)										
Main reason for migration (Base = Economic / job-related)												
Study				77.137** (2.655 – 2,241.232)								
Constant		0.005*** (0.001 - 0.021)		0.935 (0.003 – 313.356)							1.482 (0.005 - 436.809)	
LR chi^2		427.77***		32.87**							17.44	
Pseudo R^2		0.367		0.431							0.293	
Observations		2,617		133							205	

Table 9. Summary results sub-research question c: the association between the conditions at destination ((1) for migrants in general and (2) for emigrants specifically) and HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS – divided by the two studied regions [#] (*continued*)

	Other regions						Regions GB & AJK					
	HIV/AIDS Awareness			HIV/AIDS Social rejection			HIV/AIDS Awareness			HIV/AIDS Social rejection		
	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All
2.Emigrant destination specifically												
Main destination of emigrant HH members (Base = Migrant(s) in HH moved to Asia)												
Migrant(s) in HH moved to Europe or North America	5.053** (1.225 - 20.851)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.			n.s.	n.s.	n.s.
Migrants in HH moved to other destinations or a combination of destinations								0.300** (0.097 - 0.926)	0.341** (0.128 - 0.905)			
Economic remittances (Base = Economic remittances sent)												
Economic remittances received								0.379** (0.173 - 0.830)				
Constant	0.000*** (0.000 - 0.024)							0.039** (0.003 - 0.579)	0.001*** (0.000 - 0.039)			
LR chi^2	123.71***							129.35***	275.71***			
Pseudo R^2	0.482							0.294	0.398			
Observations	448							325	500			

Note: *Robust ci in parentheses*

Significance level: **** P < .001; ** P ≤ 0.05*

 # Only significant results (i.e., P ≤ 0.05) have been displayed to foster readability, please see: https://archive.org/details/osf-registrations-28b7c-v1 for the complete results of the analyses

Tables 6 - 9 present the outcomes reflecting the significant associations for the posed research question and sub-questions considering HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS. The description of the outcomes will combine the overall results of the two studied regions ('Other regions' and 'Regions GB and AJK') with the necessary nuances separately where necessary for each region and sex.

HIV/AIDS awareness

For both regions, no significant difference in HIV/AIDS awareness was observed between respondents with or without a migrant HH member. However, when zooming in on migrant locations, some nuances were identified for respondents living in the Other regions. It was observed that, compared to not having a migrant HH member, having a rural migrant HH member was associated with lower awareness levels of HIV/AIDS by 7.3%. This lower HIV/AIDS awareness level was mainly observed for female respondents with a rural migrant HH member (5.4%) in comparison to women without a migrant HH member. Furthermore, a combination of internal and emigrant HH members was related to lower awareness levels of HIV/AIDS by 6.6%, which was explicitly observed for male respondents (54.3%).

Several characteristics of the NMOs were significantly associated with HIV/AIDS awareness, in general, but also specifically for the male and female respondents. Being male compared to female and being wealthier than the poorest was related to higher HIV/AIDS awareness levels for both regions. Mainly for women, the following characteristics were related to higher HIV/AIDS awareness in both regions: being older and having a secondary or higher education level. For men living in the Other regions, specific characteristics, such as being able to read only parts or a whole sentence and having Pushto as a native language, were related to higher HIV/AIDS awareness, while living in Sindh was related to lower awareness. Living in KPK, Balochistan, and FATA was positively associated with HIV/AIDS awareness for women in the Other regions. For female respondents living in regions GB and AJK, being able to read only parts or a whole sentence, living in an urban area, and working at the time of the survey resulted in higher HIV/AIDS awareness levels.

No significant differences were observed in general when analysing HIV/AIDS awareness of NMOs based on the different characteristics of their migrant HH members. However, some results were observed when analysing these characteristics separately for the male and female respondents. For male respondents, the sex of the migrant HH member was associated with lower HIV/AIDS awareness. Compared to only male migrant HH members, awareness was lower if men had a combination of male and female migrant HH members (Other regions) (approximately 80%) or if they had only female migrants

(regions GB and AJK) (approximately 90%). For female respondents, migrants' education level was related to lower HIV/AIDS awareness. For women living in the Other regions, having a migrant HH member with a primary education level compared to no education was associated to lower awareness levels (approximately 40%). For women living in regions GB and AJK, having a migrant HH members with a higher education level than primary education was negatively associated with HIV/AIDS awareness (approximately 50%).

The HIV/AIDS awareness of female respondents living in the Other regions was two and half times higher when they sent and received economic remittances than when they only sent economic remittances. The HIV/AIDS awareness of men living in the Other regions who had an emigrant HH member living in Europe or North America was five times higher compared to their counterparts who had an emigrant residing in Asia. For those living in regions GB and AJK, having emigrant HH members who lived in other countries or a combination of destination locations was related to lower HIV/AIDS awareness levels by approximately 66%, compared to emigrants in Asian countries, especially for female respondents (70%). Furthermore, particularly women living in regions GB and AJK revealed lower HIV/AIDS awareness levels when receiving economic remittances of their emigrant HH members (approximately 60%) compared to sending economic remittances.

For both regions, the presented models explaining HIV/AIDS awareness were similar when focusing on the characteristics of NMOs; the explained variance of the presented models ranged from 35.7% (male respondents Other regions) to 40.4% (overall respondents regions GB and AJK). When focusing on migrant characteristics, the explained variance of this model for men living in regions GB and AJK was 55.3%. In the proposed models that concentrate on the destination locations of emigrant HH members, the explained variance was 48.2% for the male respondents living in the Other regions and 29.4% for women living in regions GB and AJK.

Social rejection of individuals with HIV/AIDS

For those living in regions GB and AJK, no significant differences were identified in having a migrant HH member in general, NMO characteristics, and emigrant location on the social rejection of individuals with HIV/AIDS. Compared to no migrant HH members, having only rural migrant HH members was related to higher scores on the HIV/AIDS social rejection scale, in general by 18.9% and especially for female respondents by 18%. Male respondents who had a combination of male and female migrants scored 24.1% lower on the HIV/AIDS social rejection scale, and female respondents scored 16.3% higher than their counterparts who had no migrant HH member. Furthermore, female

respondents who received economic remittances scored ten times higher on the HIV/AIDS social rejection scale than those who sent economic remittances. However, the improvements were not statistically significant when looking at the likelihood ratio chi-square tests for this model. The presented model that focuses on migrant destinations, including the role of economic remittances, is not significantly different from the model without any predictor variables.

Some significant results were observed for respondents living in the Other regions. Compared to not having a migrant HH member, respondents who had an emigrant HH member scored lower on the HIV/AIDS social rejection scale, by 12.7%. Some significant characteristics of the NMOs were related to lower scores on the HIV/AIDS social rejection scale, such as living in Sindh, having Pushto as a native language, and having a higher education level, especially for female respondents. Women who could read a whole sentence scored almost fourteen times higher on the HIV/AIDS social rejection scale than those who could not read. Respondents who had a combination of male and female migrant HH members scored nine times higher on the HIV/AIDS social rejection scale than those having only male migrant HH members. Women with migrant HH members who only had a higher education level compared to no education level scored almost thirty-three times higher on the HIV/AIDS social rejection scale. If the main reason for migration was to study, the HIV/AIDS social rejection scale score multiplied approximately seventy-seven times compared to those migrating for economic or job-related reasons.

The explanation of the social rejection of individuals with HIV/AIDS of the model for those living in the Other regions when considering the characteristics of NMOs was 19.5% in general and 19.8% for female respondents. When looking at migrant characteristics, the explained variance of the model was 23.3% in general and 26.2% for women specifically. When considering migrant locations, the explained variance was 43.1% for male respondents.

Discussion

We studied the link between transnational social exchanges (TSE) and the health of network members at origin (NMOs) in Pakistan, focusing on HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS. No differences were detected in HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS among respondents with and without a migrant HH member. Significant results were observed when focusing on the necessary nuances of the TSE-process, which was based for this research on the

Comprehensive transnational exchange of Health informATion (CHAT)-model. Therefore, based on these observations and distinct outcomes for men and women, we will discuss the key results separately for male and female NMOs based on the four included components of the CHAT-model: characteristics of migrants, necessary conditions at destination, the role of active transnational networks, and the characteristics of NMOs.

Male network members at origin

Characteristics of the migrants as senders of transnational social exchanges

Female migrant HH members decreased the HIV/AIDS awareness of male NMOs. It appeared that those female migrants mostly left the HH for family-related reasons, such as marriage, which could indicate a familial relationship (e.g., sibling or parent). A previous study revealed that men's primary sources of information about such a sensitive topic would be mostly their peers, television, or the internet, not their female relatives (49). Due to their relationship and the topic, it is highly likely that a sensitive topic such as HIV/AIDS would not be discussed among the female migrant and male NMO and, therefore, would not result in increased awareness.

Conditions necessary for migrants at destination

Interestingly, having an emigrant HH member decreased the HIV/AIDS social rejection score, meaning it made respondents, in general, less likely to agree with the posed statements related to the social rejection of individuals with HIV/AIDS. The majority of emigrant HH members are male migrants mostly moving to Asia for work-related reasons, mainly Saudi Arabia or the UAE (38). The Middle East and Pakistan share similar, more conservative perceptions about HIV/AIDS (209). Furthermore, labour migrants experience numerous barriers to accessing general healthcare in the Middle East, such as discrimination, language barriers, migrant status, and lack of health insurance (195). For HIV/AIDS specifically, the limited prevention programmes do not focus on the most crucial target populations, such as labour migrants (210). Regardless, labour migrants are frequently tested for HIV/AIDS, such as upon arrival and during their stay. They are immediately deported or denied entry if they test positive (211–213). The shared perceptions about HIV/AIDS and the experienced human rights violations in the Middle East would not immediately be expected to decrease the HIV/AIDS social rejection score. However, perhaps the obligatory tests unintentionally create awareness among labour migrants. Especially partly due to the obligatory tests, labour migrants represent the largest group of known HIV-infected individuals in Pakistan (46,208,210). The increased awareness and known HIV-infected individuals could potentially decrease HIV/AIDS-related stigma among migrants, which they can also discuss with their NMOs. If this would explain the observed decreased HIV/AIDS social rejection score, one would also expect

an increased HIV/AIDS awareness level related to these migrant groups (44,46,48,49). However, when looking at the HIV/AIDS awareness results, one notable finding was an increased awareness among NMOs with emigrant HH members living in Europe or North America. Emigrant HH members who moved to Europe or North America most often moved to the UK or the US (38). According to Migrant Integration and Policy Index (MIPEX) data of 2019, the health systems of both countries are considered to be slightly favourable for migrants. There is still progress necessary to improve migrants' access to healthcare. However, some positive healthcare practices were in place, such as tailoring healthcare support to the needs of migrant and minority populations, using interpreters, and offering additional information (197). Hence, it could be possible that emigrants are exposed to more accurate and less stigmatised health information about HIV/AIDS. This exposure could enable TSE about HIV/AIDS during emigrants' conversations with their NMOs, and this increased awareness could also potentially lead to a decreased social rejection of individuals with HIV/AIDS (44,46,48,49).

Role of active transnational networks

A combination of internal and emigrant HH members decreased the HIV/AIDS awareness of male NMOs, which could be related to the absence of economic remittances. Economic remittances are linked to active transnational networks and necessary to support TSE. A lack of economic remittances shows the observed network is most likely inactive and probably does not stimulate TSE-diffusion (See Chapter 3: CHAT-model; (180)).

Characteristics of male network members at origin as receivers of transnational social exchanges

Male respondents were more aware of HIV/AIDS than female respondents and the presented models predicted HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS best for male NMOs. The differences in HIV/AIDS awareness among Pakistani men and women was also observed in previous research studying HIV/AIDS-related knowledge, attitudes, and beliefs, with higher awareness of HIV/AIDS by Pakistani men (49). Also, social class was relevant in improving HIV/AIDS awareness, which could be linked to literacy (49).

Female network members at origin

Characteristics of the migrants as senders of transnational social exchanges

Female NMOs with a migrant HH member having a primary or higher education level, unexpectedly, decreased their HIV/AIDS awareness. These education levels were associated with male migrant HH members moving for economic reasons. Furthermore, having a higher education level and receiving economic remittances also, surprisingly,

increased the HIV/AIDS social rejection score of female NMOs, meaning that women would be more inclined to agree with the presented statements related to the social rejection of individuals with HIV/AIDS. Also, these outcomes were linked to the sex of the migrant HH member, who were mainly male migrants moving for job-related reasons. It can be expected that these male migrants are the spouses or relatives (e.g., brother or father) of the female NMOs. Due to the stigma related to HIV/AIDS and the specific gender roles in Pakistan, it is expected that women would not initiate discussing this topic with their spouses or male relatives, resulting in decreased awareness. Especially as HIV/AIDS is considered risky promiscuous behaviour linked to heterosexual transmission, while Pakistani women are expected to be innocent, obedient, and domestic (49,194,214). Furthermore, while men consult their peers about this sensitive topic, women would use their close family members (mothers and sisters) and married friends as their main source of information (49,194).

Conditions necessary for migrants at destination

Having rural migrant HH members decreased the HIV/AIDS awareness as well as increased the social rejection score for female NMOs. These results are not necessarily surprising and could be explained by a combination of factors, such as access to health-related information in rural Pakistan, gender inequality, and stigma. The lack of healthcare access in rural Pakistan would not support migrants receiving adequate and reliable health-related information in general, let alone about a sensitive topic such as HIV/AIDS (196,214). In addition, the existing gender inequality is even more pronounced in rural Pakistan, and the consequences for women infected by HIV are even more harmful than for men, which could reinforce the existing stigmatised perceptions about HIV/AIDS (49,209,214).

Role of active transnational networks

As expected, it appeared that an active transnational network influenced HIV/AIDS awareness for women. Although, the influence differed between the studied regions. Women living in the Other regions showed increased awareness of HIV/AIDS, related to an active transnational network, while their counterparts living in regions GB and AJK revealed decreased awareness levels. These conflicting results could be explained by the observed differences in sex of the migrant HH members in both regions. Those living in the Other regions more often had only female migrants, and those living in regions GB and AJK more often only had male migrants. Particularly for regions GB and AJK their decreased awareness was related to emigrant HH members of which economic remittances were received, who were primarily male emigrants. Based on these observations, it appeared that an active transnational network among women could increase HIV/AIDS awareness, while a social tie between a male migrant and female

NMO decreased awareness. Similar explanations could be provided as previously when discussing the gender differences in HIV/AIDS information sources.

Characteristics of female network members at origin as receivers of transnational social exchanges

Women were less aware of HIV/AIDS, and previous research also showed that the information that women exchange with each other was often incorrect. This lack of accurate information by Pakistani women is concerning, as HIV-infections are rising in Pakistan, especially women are more susceptible to getting infected, which could result in mother-to-child-transmissions (47,49,194,210).

Some characteristics appeared to influence HIV/AIDS awareness of Pakistani women positively: a higher SES, increased age, education, living in an urban area, and working, which is in line with previous studies (49,214). Moreover, one study found that women with a higher SES would also seek HIV/AIDS information from other, more reliable sources such as health workers (e.g., doctors) (49). Receiving more accurate information can change their vulnerable position and perceptions towards HIV/AIDS. Our study also revealed that women with a higher education level scored lower on the HIV/AIDS social rejection scale, which was related to the connection between SES and education.

Limitations

This study is unique in researching the link between TSE and the health of NMOs, using different perspectives of the CHAT-model. Nonetheless, this study also encountered certain limitations by using secondary observational data. For example, while the PDHS data included relevant questions related to migration and health, we needed to use a proxy (having a migrant HH member) to estimate TSE. We included the available variable regarding economic remittances in our analyses to reduce this flaw. In addition, information about migrant destinations was only available on the area level, making it impossible to identify specific destination countries. Therefore, we tried to complement any results on the area level with available literature and migration data. Furthermore, even though internal consistency of the items within HIV/AIDS social rejection scale were high, the questions included in the HIV/AIDS social rejection scale did not come from a validated questionnaire, and only half of the selected questions (five out of ten) could be included in the scale due to mismatch of variables between regions or internal consistency scores. Finally, the PDHS data were only collected among ever-married men and women between 15 and 49 years old, giving a relevant and vital but limited perspective to this age range. Also, due to PDHS weight calculations, data between GB and AJK regions and the Other regions needed to be analysed and presented separately. This separation of data and inclusion of only ever-married individuals does not allow us

to generalise the results for Pakistan on a national level. However, due to the large-scale dataset of PDHS, we can still provide valuable and reliable insights into the topic for both regions and the studied population.

Recommendations

Future research should continue exploring this topic, preferably by gathering primary data and concentrating more on the connection of the different relevant components of the TSE-process on the health of NMOs. The CHAT-model is recommended as a framework to focus on the essential TSE-sending and receiving components. The DHS, in general, is already unique in including migration-related questions in some of its datasets, and the number of such questions has increased in the last decade. When expanding their focus on migration, it is advised to include more specific questions related to TSE.

Some of the discussed destination countries already supported certain aspects of healthcare access by considering migrant and minority populations, using interpreters, and providing extra information (197). Factors hindering TSE were related to considerable experienced obstacles by Pakistani migrants when accessing healthcare at the concerned destinations. To establish supporting healthcare policies at destinations protecting the health of Pakistani emigrants, the Pakistani government could establish bi- or multilateral agreements between their government and the governments of the main destination countries (195). Furthermore, as HIV/AIDS numbers are rising in Pakistan, some additional suggestions can be proposed based on this study. One main concern was gender inequality, as Pakistani women showed an apparent lack of HIV/AIDS awareness but are at higher risk of getting infected with HIV and suffer higher consequences when infected than men (47,49,194). It is advised to invest in gender equality in general and HIV/AIDS education for women specifically to close their knowledge gap. Furthermore, it is advised to invest in the education of Pakistani women as this indirectly increases their HIV/AIDS awareness.

Conclusion

This study investigated the potential of migrants as change agents by studying the links between transnational social exchanges (TSE) and the health of their network members at origin (NMOs), focusing on HIV/AIDS awareness and the social rejection of individuals with HIV/AIDS. The results appeared to differ among the male and female NMOs and depended on the relevant components of the CHAT-model, which identified TSE-sending and receiving behaviours. Sensitive information, such as HIV/AIDS, mainly was discussed with transnational network members of the same sex, influencing

TSE-sending and receiving behaviours. Supporting migrants' access to healthcare and health-related information at destination was related to increased HIV/AIDS awareness, while a lack of access showed decreased awareness and higher scores on the statements related to the social rejection of individuals with HIV/AIDS. Furthermore, economic remittances create an active transnational network where TSE can be diffused. This study showed the potential of active transnational networks on HIV/AIDS awareness, especially for female NMOs, and revealed that inactive transnational networks resulted in decreased awareness. The characteristics of NMOs that contributed most to their TSE-receiving behaviour were being male, having an education, and not belonging to the poorest group. Using the components of the CHAT-model, this study provided an increased understanding of TSE and its influences on the health of their NMOs, especially considering a sensitive and highly stigmatised topic such as HIV/AIDS within a more conservative and gender unequal society.

CHAPTER 7

7

General discussion

This dissertation offers multi-disciplinary insights to *understand the link between transnational social exchanges and the health of network members at origin*. Relevant insights have been given to this link based on the synthesis of current research, by means of a systematic narrative literature review (Chapter 2), and concepts and theories, proposing the Comprehensive transnational exchange of Health informATion (CHAT)-model to support future multi-disciplinary research (Chapter 3). Subsequently, different components of the CHAT-model were studied in three case studies based on data from Demographic and Health Surveys in Pakistan and Afghanistan (Chapters 4-6).

This concluding chapter will start with a reflection on the main findings of the core chapters of this dissertation, followed by a critical reflection. Each part will include future recommendations for research and practice as "lessons learned" after each key observation. The main observations of this dissertation will focus on the role of gender, destination locations, and information processing concerning health-related transnational social exchanges. Furthermore, I believe academics have a social obligation to critically reflect on their research in general and their potential role in this. Therefore, in addition to the main findings, I added a critical reflection that discusses general observations in the literature in connection to personal experiences when studying this topic. This critical reflection has been based on four central areas that matter: (1) perspectives, (2) conceptualisations, (3) representation, and (4) cooperation.

Main findings of the core studies

This general discussion section will start by highlighting the main findings of my dissertation, focusing on the role of gender, destination locations, and information processing during the transnational social exchanges (TSE)-process. The order of the selected main findings follows the structure of the components of the CHAT-model and is not indicative of their respective relevance. Throughout these reflections, I will refer to the relevant chapters for more details.

The role of gender in the transnational social exchanges-process

The Comprehensive transnational exchange of Health informATion (CHAT)-model (Chapter 3) identifies the relevant characteristics of sending and receiving units as necessary factors to consider when studying TSE. Throughout the different case studies, it became apparent that sex plays a significant role in the TSE-process, both for the sending and receiving sides. In the Demographic and Health Survey (DHS), sex was measured instead of gender, but it can be assumed that individuals' gender (roles) may play a more important role than the sex individuals were assigned at birth. Hence, it has been assumed that someone's gender rather than the sex assigned at birth is an important factor for both sending and receiving sides. Therefore, I will refer to gender instead of sex in this general discussion.

Sending side - migrants

Gender plays a significant role from the migrant's side as senders of TSE, which became most apparent in the Pakistan case study discussed in Chapter 5. In the case of male birth control methods, such as the male condom and male sterilisation, a negative association was observed between the awareness of these birth control methods when network members at origin (NMOs) had a male migrant. The exchange of information can reflect gender preferences and perspectives; in this case, male migrants preferably do not discuss male condoms or male sterilisation with their NMOs. The existing gender preferences and perspectives may be based on information guided by social norms. For example, besides birth control being a female responsibility, in the case of male sterilisation, it is believed among men in Pakistani society that this birth control method would lead to infertility, which is not beneficial nor expected from a man, especially not when he can still potentially search for another wife (49,193,215).

In the case of female migrants, gender also explained the continuation of gender roles while abroad (Chapter 5). Having a female emigrant who sent economic remittances increased the intention to use birth control. This finding reflects gender-specific TSE-behaviours that are rooted in traditional gender roles, where women, in our example,

invest in the health of their NMOs (198,199). TSE-behaviours of female emigrants reflects an emotional and caring role and of male emigrants a traditional breadwinner's role. Female emigrants are considered more reliable senders of economic remittances. They would remit higher percentages of their earnings and would send additional items besides money (e.g., gifts, clothes, and household appliances) (198,199). While male migrants would send a higher sum but would be less reliable senders of economic remittances. The sum male emigrants remitted reflected a lower percentage of their overall earnings, as they would invest more in themselves at destination, and they are more inclined to only send money (198,199).

Receiving side – network members at origin

Gender could explain the personal relationship between the migrant and their NMO (Chapter 5). The intention to use birth control increased when the migrant could be classified as the spouse of the female NMO. This personal link could indicate that Pakistani women plan to (re-)use birth control methods when their husbands return from working abroad. To comply with expected appropriate behaviours in Pakistani society, women would not use any birth control method while their husbands are abroad. Using family planning methods while their husbands are not at home is perceived as promiscuous and undesirable behaviour, as it hints at continuing sexual activity (48,49,141,193,194,196).

Also, as observed in Chapters 5 and 6 the general awareness of the Pakistani respondents reflected gender differences, which could be based on ruling gender norms in a patriarchal Pakistani society. Birth control is perceived as a women's responsibility, which could explain why Pakistani women are more aware of them than men (49,193). However, Pakistani men would be twice as aware of HIV/AIDS than women, which is concerning, as HIV/AIDS numbers are growing in Pakistan due to heterosexual transmission. This awareness imbalance could reflect the existing gender inequality rooted in patriarchy and misogyny, resulting in a more pronounced stigma towards infected women than infected men. The more prominent stigma for infected women might have hindered women from discussing HIV/AIDS as they do not want to be associated with it. In addition to having less knowledge about HIV/AIDS, women often appear to have incorrect information, making them even more vulnerable to HIV/AIDS infections (47–49,193,194,196,202).

Sending and receiving sides – migrants and network members at origin

For both the sending and receiving units, gender appeared to be a relevant characteristic, which was reflected best in the Pakistani case studies discussed in Chapters 5 and 6. Especially in Chapter 6, gender reflected differences in information sources for sensitive information between Pakistani men and women. Pakistani men would mainly use their

peers, television, or the internet as information sources, explaining the decreased HIV/AIDS awareness when having a female migrant (49). The leading information sources of Pakistani women would be their close family members (e.g., mother or sister) and married friends, which explained the decreased HIV/AIDS awareness in case they had a male migrant (49,194).

Lessons learned

Current research on the link between TSE and the health of NMOs focuses on women and SRH (112). This dissertation reveals the relevant role gender plays in the TSE-process for both migrants and their NMOs. Therefore, it is advised that future research diversifies its target population by including the perspectives of men and non-binary individuals. Consequently, by diversifying target populations, more variety in health practices will be researched, leading to a better understanding of the TSE-process for different health practices and individuals.

Furthermore, practical recommendations based on the findings of this dissertation are to invest in family planning programmes for those living in rural areas targeting the lowest SES group and by educating men on family planning and existing harmful gender stereotypes. In addition, based on the Pakistani case study (Chapter 5), it appeared that the available family planning programmes on TV and in newspapers and magazines positively influenced birth control awareness; it is, therefore, advisable to continue investing in these types of programmes. This dissertation (Chapter 6) and previous studies have also observed that SES and education play an important role in HIV/AIDS awareness and social stigma reduction for women. In addition to educating men, educating women will allow them to expand their information sources to professional healthcare workers, making them more aware and protected from any potential risks (49,194).

Health for all? The role of destination locations in the transnational social exchanges-process

During the narrative review (Chapter 2), perceived structural barriers experienced by migrants when accessing healthcare at their destination were observed to stimulate migrants to search for other information sources. An alternative is asking for health-related information from their NMOs or returning to origin to receive (traditional) healthcare. The CHAT-model (Chapter 3) identifies four necessary conditions for migrants at destination, based on the human right to the highest attainable standard of health, namely available, accessible, acceptable, and good quality healthcare and health-related information at destination (34). The Afghan case study (Chapter 4) serves as an interesting example to elaborate on the role of the four necessary conditions for

migrants at destination (availability, accessibility, acceptability, and good quality) on birth control awareness and use. A division was made in the analysis between Pashtuns (having migrants mainly moving to the Pashtun belt in Pakistan) and non-Pashtuns (having migrants mostly moving to Iran), revealing positive and negative findings regarding birth control awareness and use of NMOs.

This example has been used to illustrate the role of the identified components of the human right to health. Even though this specific example focuses on emigrants moving to destinations outside their country of origin, also accommodations for internal migrants at destination locations within the country showed to influence the TSE-process, which has been observed in the Pakistani case studies (Chapters 5 and 6).

Afghan migrants in Iran

For non-Pashtun NMOs, having a migrant HH member increased awareness of specific birth control methods, such as injectables and the pill. This increased awareness could be explained by the conditions of the human right to health. According to official sources, healthcare, health-related information, and more specifically, birth control methods and family planning information were available for Afghani migrants in Iran (147,152,153). Afghans could also officially access basic medical care without direct discrimination by migrant status, including maternal and childcare and good quality family planning programmes developed by healthcare professionals (143,147). The Irani government established a comprehensive family planning education and promotion programme that provided free contraceptives, health guidance by trained staff, and access to information promoting birth control use to all adult married couples visiting healthcare facilities, including Afghans (147,152,153). Furthermore, the Irani health officials cooperated with religious authorities to increase the acceptability of their family planning programme. This cooperation resulted in tailored messages based on the Qu'ran. One example that emphasises the need to maintain a healthy family and family harmony is the slogan '"*not too late, not too soon, not too many" (nah kheili dir, nah kheili zoud, nah kheili ziad)*' ((147): p.52). Like the Irani population, the largest non-Pashtun group (Hazara) are Shi'a, meaning this tailored information was also considered culturally appropriate and acceptable for them (See more information Chapter 3 – CHAT-model; (19,57,58,85,95,113,114,179,180)) . However, also decreased awareness of emergency contraception and male sterilisation was observed. In the example of male sterilisation, this could be explained by the initial unavailability of this method in the Irani family planning programme, as this method was not acceptable according to Islamic law (41,151).

Afghan migrants in Pakistan – Pashtun belt

Having a migrant HH member was associated with a reduced awareness and use of birth control methods in the case of Pashtun NMOs. This observed decrease could be due to the deterioration and the limited availability of healthcare facilities for Pashtun migrants in the Pashtun belt (136,141,142,164). On the other hand, these migrants also experienced restricted access to healthcare services and information sources (136,141,142,164). Pashtunwali is a conservative and traditional lifestyle, common for Afghani and Pakistani Pashtuns living in the Pashtun belt. This similarity in lifestyles reflects that any available information would be considered culturally appropriate and most likely acceptable (141,147). Even though the information might be considered acceptable, the lack of access and availability of good quality healthcare and health-related information led to decreased outcomes in birth control awareness and use. Potentially, the confirmation of the existing conservative norms by the migrant HH members might have negatively reinforced the outcomes (209).

Lessons learned

According to the WHO, '*the enjoyment of the highest attainable standards of health is one of the fundamental rights of every human being without discrimination of race, religion, political belief, economic or social condition*.' ((216): par.1). Not only is this a fundamental human right, but this dissertation also shows the relevant role these components can play in the TSE-process. Until now, the formal care systems of (Western) destination countries do not consistently fully realise the identified components related to the human right to health (accessibility, availability, acceptability, and good quality healthcare and health-related information). (Western) destination countries cannot meet these conditions, and their right to health-related obligations, if they do not, at the very least, consider the needs of their documented and undocumented migrant populations (109,217). Policies ought to reflect and support the cultural diversity represented in a nation-state. An example for healthcare could be tackling health disparities among migrants by supporting healthcare professionals and migrant patients in building their cultural competence skills (98). For healthcare workers, these cultural competence skills could focus on understanding and responding to specific migrant healthcare needs, considering differences in defining health, and understanding the vital role NMOs play in their healthcare decision-making. The cultural competence skills-building for migrants could focus on understanding the healthcare context at destination, such as the healthcare system, the role of different healthcare workers, and how to approach and communicate with them.

Furthermore, the identified factors hindering the TSE-process could be related to numerous experienced barriers by Pakistani migrants when accessing healthcare at

the considered destinations. There is an identified need to legally protect the health of Pakistani emigrants, which could be done via supporting healthcare policies at destination and bi- or multilateral agreements between the Pakistani government and its main destination countries (195).

The role of information processing in the transnational social exchanges-process

The presented CHAT-model (Chapter 3) uses the innovation-decision process of Rogers (2003) to explain the information processing of NMOs of the received TSE by migrants. Both the narrative review (Chapter 2) and Pakistani birth control case study (Chapter 5) observed interesting findings related to this processing of the received information. Based on the Pakistani birth control case study (Chapter 5), three phases of the innovation-decision process of NMOs were distinguished, such as awareness, decision, and implementation (36).

Birth control awareness of Pakistani NMOs was explained best by the destination location context of migrants in general and emigrants more precisely. Migrants are considered influential and valuable sources of information by origin, and they also can tailor their information to the needs and cultural context of their NMOs. This unique combination makes the shared (innovative) information more acceptable, contributing to the awareness of their NMOs (See for more information Chapter 3 - CHAT-model; (179,180)). However, the narrative review (Chapter 2) showed that the perception and acceptance of information also depends on migrant type. Some migrants were seen as suffering abroad to contribute to their families at home. They were often perceived more positively than migrants that had established themselves abroad, forcing their (neo-colonising) perspectives on their NMOs, which were perceived as prestigious but less positively (85,112).

The decision phase was based on the intention to use birth control for female Pakistani NMOs. Personal characteristics of the NMO mainly drove this phase. Before deciding on using a birth control method, women will evaluate first if the chosen method meets their needs and fits their situation. This evaluation clarifies why personal characteristics best explain this phase in this example (203). The individual characteristics that significantly contributed to the intention to use were having an education, working at the time of the survey, and being of younger age.

Implementation was measured by the birth control use of the Pakistani NMOs. This phase was explained best by the destination of emigrant HH members, more specifically when NMOs received economic remittances. As previously discussed in the "Health for

all" section, depending on the availability, accessibility, acceptability, and good quality of healthcare and health-related information for emigrants, destination countries could be potential information sources, which could lead to supporting modern birth control use of their NMOs (179). This outcome is also linked to the relevance of economic remittances during the implementation phase, showing that economic remittances and TSE are entwined. Economic remittances develop and maintain the transnational networks needed to support the TSE-process (180).

Lessons learned

The observations of the diverse roles TSE played during the different phases of the innovation-decision process start to reveal the potential role of migrants as information sources during each phase. However, more research is necessary to identify the role of migrants and TSE in all phases of the innovation-decision process and expanding this to diverse populations and health outcomes.

The Pakistan birth control study (Chapter 5) identified that the decision to use a birth control method is mainly based on the personal characteristics of Pakistani women. Therefore, future family planning programmes could use decision aids to guide the autonomous decision-making of women in choosing their birth control method of choice. Decision aids will help form informed decisions that match their needs and situation best (100,218,219).

Critical reflections throughout my PhD journey

While unravelling the link between TSE and the health of NMOs throughout my PhD journey, I also have observed various general developments that will be discussed below. I will reflect on these developments by linking the observations in the literature with personal experiences during my PhD journey.

Perspectives matter

Time brought us a more nuanced development perspective, but do concepts always follow?

The migration-development nexus reflects a distinct theme in migration research since the mid-1990s, showing an evolution in development perspectives (220). Starting from an overly optimistic development perspective, with the expectation that the large sums of money, goods, and information migrants transfer to their NMOs positively support their development (116,220,221). This positive development perspective

is also reflected in Levitt's initial definition of social remittances in 1998, where she solely described the positive development outcomes of information flows on NMOs. The link between migration and development is undeniable; however, not limited to positive outcomes (220). In some cases, remittances could even negatively influence development as they are not guaranteed, automatic, or free and can increase existing inequality gaps at destination and origin, create dependency, or even perpetuate debt (220,221). This more nuanced perspective was also added to the redefinition of social remittances in 2011 (19). Conducting my PhD on this topic allowed me to dive into the literature and discuss my research topic with other scholars and migrants of the so-called global South. With the gained experiences, my previous perspective, as described in my first published research paper (Chapter 4), became more nuanced. The translation of these nuances can, for example, be read in the narrative review (Chapter 2), where Levitt and Lamba-Nieves' (2011) redefined concept of 'social remittances' has been used, considering both positive and negative influences of TSE on the health of NMOs.

This shift in development perspective could also be linked to two semantic shifts when referring to migrants and their NMOs. Initially, migrants were considered 'development agents', which then shifted to the more neutral – although slightly positive – term 'agents of change' or 'change agents'. The literature and my papers reflect this shift from referring to migrants as development agents to change agents. As a consequence of my initial overly optimistic development perspective, I used the term development agents when referring to migrants in my paper published in 2018 (Chapter 4). My migration-development nexus perspective changed throughout my PhD journey, which was reflected in the following papers by referring to migrants as change agents. Furthermore, the term 'those left behind' was initially used when referring to NMOs. During my migration studies, we were taught that research on NMOs is a recent development within the field. So, after searching for this term in earlier studies, it took me by surprise that I could go back to the end of the 1800s when it was already used in migration research to study European migration (English migration to Australia (222) and Irish migration to North America (223)). This term may reflect the period when it was first used. However, it is outdated as it hints at a lack of agency and a sense of hopelessness and dependency of NMOs on their migrants. Unfortunately, this term is still used in literature to date (for example: (224–227)), although to a much lesser extent, and has been commonly replaced by those who remain or stay behind. Even though this replacement is an improvement as it removes some of the seeming hopelessness of the NMOs, remaining or staying "behind" still negatively connotates this group of individuals who do not migrate. This dissertation shows a shift from using 'those left behind' (referred to once in the 2018 paper – Chapter 4) to using 'those who stay and remain behind' in papers published in 2018 (Chapter 4) and 2021 (Chapter 2). After reviewing this term, I finally

decided to choose a more neutral and descriptive term, namely 'network members at origin' (NMOs), to avoid the described negative connotations. The use of this new term can be read in the remaining papers (Chapters 3, 5, and 6).

Development responsibilities: the need to broaden our focus

Migrants send enormous amounts of money to their NMOs. These sums increased over the last 19 years by $591 billion (2000: $126 billion versus 2019: $717 billion) (1,116,221). Once states became aware of the enormous amounts that migrants send to their NMOs, a shift occurred, pushing states' development responsibilities to migrants and diaspora organisations. This transition is also reflected in a shift in the main source of external funding for economically developing countries, where economic remittances jumped over foreign direct investments removing them from their top position (116,221). This shift presumably emphasises the responsibilities of migrants for development opportunities at origin via the remittances they send to their NMOs (19,116,220,221). When referring to migrants, the term 'development agent' could also be linked to these changes in expectations. Due to this perspective, less focus has been given to the role and context of destination and origin to support the TSE-process and to the agency of the NMOs. Being a member of the Maastricht Centre for Human Rights, I had the opportunity early on in my PhD process to be introduced to the link between health and human rights. Over 170 states, including many states of destination for migrants, have recognised the human right to health through the ratification of the 1966 ICESCR. As such, they have voluntarily accepted a range of legal obligations, including to secure that health-related goods, services, facilities, and information is available, accessible, acceptable, and of good quality (34). I learned about these concepts and linked them to the context and responsibilities of destination. These conditions were already introduced in my first published research paper (Chapter 4). Additionally, the CHAT-model includes both the norms of the social system of destination and origin as well as the innovation-decision process of NMOs. Including these components gives a broader view of the TSE-process. Besides the migrant, including the role of origin and destination societies and focusing on the agency of the NMOs in processing the received information.

Lessons learned

It is recommended for future research on this topic to use more nuanced development perspectives, recognising both positive and negative influences of TSE on the health of NMOs. It is also advised to use more neutral and descriptive terms such as 'agents of change' and 'network members at origin' (NMOs). When studying the TSE-process, researchers need to broaden their perspective, considering the role of migrants, their NMOs, origin, and destination. The presented CHAT-model can be used to guide future research on this topic, reflecting the recommended perspectives from both sending and

receiving sides. Based on the above reflections, the comprehensiveness of the CHAT-model can be discussed and, if desired, expanded.

Using these nuanced and broader perspectives, including the correct use of semantics, is also highly advised in future policymaking that involves migrant populations. The transnational network does not only have a strong emotional value for both migrants and their NMOs, but it is also a primary requirement that needs to be in place to exchange TSE. Therefore, it is recommended that both sending and origin states have the necessary structures in place, enabling the connections between transnational network members, such as communication channels and travel opportunities (228–230). State policies and international regulations positively influence transnational family solidarity (228). Digital diaspora diplomacy could be a suggestion for origin states to maintain ties between origin and emigrants. Digital tools can enable the connection between emigrants and their country of origin, and the identified digital diplomacy tools could build relationships, strengthen communities, and leverage relationships (231).

Conceptualisations matter

Social remittances

As a reaction to the focus in migration and development research on the impacts of the monetary contributions of migrants to their origin countries, Peggy Levitt coined the term 'social remittances' in 1998. Social remittances are the informal and continuous non-economic flows migrants exchange with their NMOs, such as ideas, values, norms, and beliefs (18). The initial definition of the concept was updated in 2011 by Levitt and Lamba-Nieves, including a two-way process (instead of one-way), positive as well as negative output (instead of solely positive), pre-migration experiences, differences in individual and collective level information transfers, and scaling-up (information moves to higher levels in society) and scaling-out (translation of information into other practices) (19).

The concept of 'social remittances' was based on the conceptualisation of 'economic remittances'. Economic remittances are an essential component to support the development and maintenance of transnational networks in which information can be exchanged (180). However, as discussed in detail in Chapter 3, especially regarding health, it is recommended to move away from the (unintentional) connotation to economic remittances by renaming social remittances to transnational social exchanges (TSE). The need to differentiate between both remittances clearly and more specifically is because, in general, their actions, associations, outcomes, and processing inherently differ. In addition, TSE will also extend the current meaning of social remittances by

clearly including the described distinctions. The proposed concept of TSE supports future research by acknowledging the differences and challenges in especially identifying health-related TSE and potential long-term health consequences during the research and analysis process (232).

A conceptual framework to guide research on this topic was missing, which could explain the mixed theories and concepts used when studying TSE. When mapping the theories and concepts used in the included articles of the narrative review that studied the link between TSE and the health of NMO, three publication periods could be identified that were based on the conceptualisations of 'social remittances': (1) publications before 1998: before the conceptualisation of social remittances, (2) publications between 1998 and 2011: between the initial conceptualisation of social remittances and its redefinition, and (3) publications after 2011: after redefining social remittances. The majority of the papers (14/18) were published in the third period. However, six out of these fourteen articles in the third period did not refer to the concept of social remittances, and four out of the fourteen papers still used the initial definition of 1998. Only the remaining four out of the fourteen studies used the redefined concept of social remittances. The inadequate use of social remittances is concerning, especially as the redefinition in 2011 included relevant updates. Therefore, to guide future research on the topic, the Comprehensive transnational exchange of Health informATion (CHAT)-model has been proposed.

The holy tripod of health: sufficient to cover health for all?

According to the WHO, 'health' is based on three aspects: psychical, mental, and social wellbeing (233). I learned to describe health based on this WHO definition as a young health sciences student, and this is how I have applied the concept since then. When conducting the narrative review, it became clear there is an existing discrepancy between the WHO definition and migrants' understanding of health. Migrants at times appeared to add a spiritual or religious aspect when defining health. The additional aspects sometimes seemed to replace the psychological element of the WHO definition. These differences in definitions could lead to miscommunications among migrants and health professionals at destination. As migrants might feel misunderstood, they might experience this as one of the barriers to accessing healthcare at destination. When experiencing healthcare barriers, migrants would reach out to familiar information sources, such as their NMOs. NMOs would understand migrants as they often use the same or a similar description of health. NMOs would connect migrants to traditional or religious healers to accurately address the missed health aspects at destination, which migrants could contact via return visits or transnational healing sessions. Migrants

experienced these visits and healing sessions by the traditional or religious healers to positively influence their health.

Lessons learned

Based on the described observations, it is advised for future research to consider the accurate use of concepts when studying the influence of TSE on the health of NMOs. To refer to knowledge transfer within a transnational network can be done by using the proposed concept of 'TSE'. However, when still using the concept of 'social remittances', it is encouraged to use its redefinition of 2011.

Because of the chaotic nature of TSE, it is recommended to make transnational research as specific as possible (234). As the CHAT-model includes specific constructs, definitions, and examples of operationalisations, I believe the presented CHAT-model will help identify and specify relevant components necessary to study the complex TSE-process.

As the discussion about the health definitions revealed, it is essential to stay open-minded and potentially challenge deeply rooted definitions or concepts, moving to more patient-centred care. The dynamic concept of 'positive health' by Huber et al. (2015) can be a valuable tool for researchers, health practitioners, and policymakers to support this needed flexibility and patient-centred care. For example, it also addresses spiritual or existential and quality-of-life dimensions. The concept of positive health uses a genuinely holistic approach considering the input of patients and is especially positively evaluated by patients and nurses. However, because the positive health approach requires a lot of input and responsibility from patients and citizens, it is highly recommended to accurately guide those individuals with low health literacy levels, such as migrants (235).

Representation and cooperation matter

Moving forward: the need and increase of multi-disciplinary research

Research studying the link between health and migration increasingly uses a multi-disciplinary approach. Cooperation is positive and necessary to get an innovative and complete perspective (236). A great example of supporting international and multi-disciplinary health and migration research collaborations is the Migration Health and Development Research Initiative (MHADRI), supported by the Migration and Health Division of the International Organization for Migration (IOM). The research output of the MHADRI network aims to support evidence-based health policies and practices focusing on migrant populations. MHADRI is a network of researchers of diverse research focus and expertise (such as public health, health policy, refugee health, health and human

rights, epidemiology, health promotion and education, research ethics, global health diplomacy, and medical anthropology) covering institutes situated in Europe, North, Central and South America, Asia and the Pacific, and Africa. A selection of MHADRI's output to date is the call for papers discussing migrant experiences regarding COVID-19 vaccinations in the Journal of Migration and Health in 2022, creating an online migration and health course (held first in 2021), cooperating on updating IOM's Migration Health evidence portal in 2022, and the launch of the BMJ's migration health series in 2019 (237–239).

My own experiences cooperating with different disciplines during my PhD journey have been extremely positive but, at times, also challenging. To learn the most from multi-disciplinary research, clear and transparent communication and an open mind are key (220). For example, when conducting the narrative review with my colleagues in Sheffield, we initially used a different approach when defining 'transnational social exchanges' and 'health'. I used a more limited approach for TSE where my colleagues were more flexible in this definition and vice versa for health. Because of our good communication and built-in feedback moments, especially at the beginning of the process, we observed our differences in approach and discussed these. Our research was based on a solid and clearly defined approach, which was achieved by being open and flexible to each other's opinions. We learned from each other, developing t-shaped expertise on the topic, which generated creativity as through our discussions we noticed the limitation in the definition of social remittances, which served as the base to create TSE.

Standing still with a dominant Anglo-Western perspective

It became apparent from the narrative review that current research on the topic mainly focused on women and researched a limited number of health areas, restricting the representation of other relevant groups and health areas. In addition, there was a focus on South-to-North migration in current research. This limited migration perspective does not reflect the reality of migration because it occurs from and to all places, as the Afghan (migration to neighbouring countries) and Pakistan (internal migration or emigration mainly to the UAE or Saudi Arabia) case studies also showed. This South-to-North focus underrepresents the other migration routes. Furthermore, this migration focus reflects a dominant Anglo-Western perspective within this type of research that could also be observed in the used concepts and theories. When mapping the concepts and theories used in current research on the topic when developing the CHAT-model, only concepts of the so-called global North could be retrieved. This view means that relevant perspectives of the so-called global South, such as the voices of the NMOs, might have been missed. Missing these voices became apparent in the focus of the limited studies that have researched this topic. When studying the influence of TSE

on the health of NMOs, researchers mainly used either the migrant perspective or secondary data, studying migrant's exposure when having a migrant HH member. This restricted research approach is a general problem in transnational migration research, where research has been conducted from the migrant's perspective. By focusing on migrants, the crucial opinions of the NMOs are missing in understanding the complete TSE-process (234).

Lessons learned

All the described limitations in representation in current research are concerning, and hopefully, future research on this topic will broaden its perspective using an international multi-disciplinary approach. Especially for minority populations, their perspectives must be recognised and included in research and practice. Therefore, research, policy, and practice need to cooperate with migrant and NMO groups to represent their needs and perspectives. As current research on the topic mainly uses secondary data or focuses on the migrant's perspective, it is recommended to collect primary data from the migrant's perspective and their NMOs (234). Understanding how TSE can influence the health of NMOs in diverse contexts, future research needs to broaden its scope. Starting by reviewing the already discussed current South-to-North migration focus. This limited migration perspective does not only fail to represent reality; it also forgets a significant part of the migrant population, namely internal migrants (1,107,108). It is recommended to consciously consider the academic input of the so-called Global South in research and in teaching about this topic, by applying the Southern theory by Connell (2007). The Southern theory suggests that one should rethink social sciences and their relationship to knowledge, power, and democracy on a world scale. Migration and health are global topics, and only focusing on the knowledge of the so-called Global North when studying these topics provides a limited and distorted perspective. Also, the context that shapes our current perspectives needs to be considered and understood before addressing them. Therefore, shared learning possibilities are recommended where the available current knowledge can be used as a base for discussion in a global academic field (240). MHADRI is a recommended platform to start and guide these discussions as it reflects the global academic field of health and migration researchers (237–239). During these discussions, it is valuable to learn from each other, which perspectives, concepts, and theories are helpful, need revisions, or should be replaced. The base for these discussions needs to be respect and openness to listen and learn from each other, promoting intellectual freedom (240).

More lessons learned (a.k.a. Limitations and Strengths)

This dissertation provides relevant insights into the TSE-process and the influences of TSE on the health of NMOs. However, the presented research also experienced some limitations. '*The only time a mistake is truly permanent is if you don't learn from it*' (Charles Orlando). To learn from the experienced limitations, I will start this section with a critical reflection on the CHAT-model because it played a leading role in this dissertation. Then, I will continue by describing the methodological limitations, which sometimes can be connected to the limitations experienced when testing the components of the CHAT-model. This section will end by highlighting the strengths of this dissertation, as lessons cannot only be learned from limitations.

Critical reflection of the CHAT-model

Should we consider a broader perspective to reflect reality…?

Even though TSE flow continuously and circularly between destination and origin, the CHAT-model is presented linearly. It was chosen to present this as such to reflect the research focus of this dissertation and to narrow the focus of the complex TSE-process. However, this limited representation might simplify the dynamic and interactive nature of the TSE-process, where both migrants and NMOs are influenced. The narrative review clarified that migrants use a hybrid form of healthcare, accessing and combining diverse healthcare practices, consultations, and advice from destination and origin. Migrants would consciously balance the information from both sides and use (parts of) the advice as they see fit. This balancing act could potentially influence the information they share to origin. Even though not clearly visually represented, it is possible to include this hybrid interaction into the 'prior conditions of the sender', which covers previous practice, felt needs/problems, and norms of the social system. When analysing the prior conditions of the sender from a hybrid perspective, the different stages of migration are essential factors to consider. For example, previous practices could be extended to experiences before and during migration and at destination within a transnational setting. Furthermore, norms of the social system could also be understood in a transnational setting. A valuable addition to the prior conditions of the sender could be the identified roles of networks in the different stages of migration (before moving, in transit, at destination, and during transnationalism), as described by Bilicen and Lubbers (2021) (241). By clearly adding this to the CHAT-model, the necessary continuity of the TSE-process is considered, nuancing the limited unidirectional visual representation of the model (234).

…Or is a narrower perspective more advisable to make research manageable?

Transnational research cannot be limited to a national level, as this does not accurately reflect the dynamic spatial and temporal context of a transnational network (22,234). The CHAT-model includes both migrant and NMO perspectives, supporting the necessary dual perspective when studying the TSE-process. So, even though the CHAT-model represents the correct transnational perspective, due to the messiness and spontaneity of TSE, it can be questioned how manageable it is to apply the CHAT-model in real-life research.

Mazzucato (2020) advised using mixed-method social network analysis to overcome some of the challenges experienced when conducting transnational research, as this will help create structure in the chaos. It is advisable to collect on-site data simultaneously, where migrants and their NMOs are located. Collecting data simultaneously on-site from both migrants and NMOs prevents recall bias and enables researchers to develop the needed trust from respondents as they do not need to divide their time between the two locations, which will help to ask for sensitive information and conduct in-depth research. Note that this type of research still requires a well-trained and cooperative research team, including the necessary available time and resources (e.g., funding) (234).

Another suggestion would be using the hybrid approach of soft computing using Fuzzy Cognitive Maps (FCM) and machine learning, as suggested by Mkhitaryan et al. (2020). This hybrid approach is interesting as it addresses the complexity of the TSE-process by considering relevant interactions within and between the relevant factors identified in the CHAT-model. For example, the network structure of the FCM could be based on the diverse factors included in the CHAT-model to compute causal weights using quantitative and qualitative data. By matching FCM with machine learning, diverse future scenarios (analysing what-if scenarios) could be identified (242).

Considering the value of transnational networks

Transnational networks are emotionally charged for both migrants and their NMOs, which became clear from the narrative review. From a migrant perspective, continuing their social networks at origin gave them a sense of belonging and provided them with the sometimes much-needed emotional support, especially when feeling isolated and marginalised at destination. NMOs also considered their transnational networks as connections to emotional support. However, transnational networks also can induce stress due to a high secrecy level from both sides and too much control by the migrant. If a migrant becomes too controlling, this could lead to avoidance behaviours of NMOs, such as ignoring their calls or closing their camera during a call. Understanding the emotional bond, tensions, power imbalances, and efforts that network members put into

their transnational network is crucial in understanding the potential role these networks can play in the TSE-process (234). When using the CHAT-model, it is recommended to add the missing operationalisations of the transnational networks, as suggested in the following examples, to understand the context of the transnational networks in more depth. One operationalisation that could be added is by Amelina et al. (2012), who usefully identified transnationality as a multi-dimensional category, including various social and cultural/symbolic dimensions, such as interpersonal cross-border contacts, virtual cross-border communication, physical border-crossing, media use across borders, language use, dual citizenship, and membership of transnational organisations (243). Also, the identified visiting patterns of migrants (such as social relationships, the provision of care, affirmations of identities and roots, maintenance of territorial rights, and leisure tourism) by Cohen and Williams (2015) could be added to the CHAT-model to gain a more profound understanding of the transnational networks (244).

Methodological limitations

The consequences when using secondary quantitative data

The country case studies in this dissertation (Chapters 4, 5, and 6) have been based on quantitative data using the 2010 Afghan and 2017-2018 Pakistan DHS. The use of secondary quantitative data was a conscious choice with inevitable consequences that should be kept in mind, such as a lack of understanding of the reasons for the observed trends and the need to use proxies.

Understanding observed trends, but scratching the surface of a complex process

TSE is a complex process, and using the DHS data already offers us great insights into understanding the general trends of the TSE-process. Unfortunately, the results cannot be generalised as they are limited to the Afghani and Pakistani population between the ages of 12 (youngest age for Afghan DHS) to 15 (youngest age for Pakistan DHS) and 49 years. Due to this lack of data, we only can see the surface of the TSE-process and make assumptions based on the observed trends and available literature to understand the underlying drivers. To understand the complex TSE-process, we need to dive deeper, preferably combining quantitative data with qualitative research, such as observational ethnographic or anthropological research, and applying innovative hybrid techniques such as the previously described combination of FCM and machine learning (234,242). Using ethnographic research together with quantitative data will help us interpret the obtained quantitative outcomes. Furthermore, using a participatory approach (representatives of) the study population will be included throughout the research process, which will help to develop questions, make connections with the study population, and receive feedback on the results. In addition, to reduce the complexity of

the TSE-process, it is recommended to focus on parts of the puzzles in cooperation with a research team instead of studying the complete TSE-process at once by yourself (234).

The use of proxies

Due to the use of secondary data, only a limited number of components of the CHAT-model could be tested, frequently by using proxies. The combination of this limited number of tested components of the CHAT-model with the use of proxies provided several methodological limitations. The experienced data restrictions also led to an incomplete overview of the explanatory power of the CHAT-model.

While the 2010 Afghan and 2017-2018 Pakistan DHS data included relevant questions related to migration and health, a proxy (having a migrant HH member) needed to be used to estimate TSE. By using this proxy, the results of this research could not specifically be linked to TSE. Other factors could have contributed to the results, such as financial or in-kind remittances or exposure to local family planning programmes. The limited control of other influencing factors limited especially the Afghan case study. This flaw could be reduced in the Pakistan case studies by including relevant variables in the analysis related to economic remittances and exposure to family planning programmes.

The Pakistan case studies could observe the role of existing transnational networks on the health of Pakistani NMOs, by including the variable related to economic remittances. Sending or receiving economic remittances would reflect the existence of an established transnational network that can support TSE (180). However, using this proxy, the transnational network's meaning, intensity level, and duration of contact moments, as explained in the "meaning of transnational networks" section, could not be clarified (234).

Main destination locations in the Afghan case study were proxied based on ethnicity level. In addition, information about emigrant destinations was only available on the area level in the Pakistan case studies. These levels made it impossible to identify specific destination countries and their role in the TSE-process. Therefore, any further elaborations on a country level were based on available literature and migration data.

How to define a migrant?

The fact that an official definition of a migrant is still missing could be observed in the different approaches the DHS took in identifying a migrant HH member (1,2,140,181). In the Afghan case study, a migrant was based on someone leaving the HH over the last five years, while this was ten years for the Pakistan case studies. Especially for the Afghan case study, this limited period to identify a migrant HH member raised several concerns.

Due to the five-year limitation, a relevant migrant group unique to Afghanistan, namely their protracted refugee population who have lived outside Pakistan for more than 40 years, was left out of the survey (40,42,140). Also, due to the use of proxies based on ethnicity, only emigrants were identified, missing out on any influences of internal migrants on the health of Afghan NMOs.

Strengths

Descriptive level

A synthesis of current research on this topic was missing yet recommended (37). This dissertation fills this knowledge gap by creating an overview of the current body of literature using a systematic narrative literature review. This overview will help understand the current topics and research focus on how TSE has been studied to date. A narrative review is helpful when the included studies use various research methods, and its results also provide a solid foundation for practical recommendations (63).

As research has focused on economic remittances, the TSE-process is less understood (245). Even though using secondary data came with its limitations, due to the large-scale datasets of the 2010 Afghan and 2017-2018 Pakistan DHS, the presented country case studies still provide valuable and reliable insights into the topic for both regions and the studied populations. The Afghan and Pakistan case studies describe the association between TSE and the health of NMOs. By including components of the CHAT-model in the analysis, some initial insights into the TSE-process could be given, which will help us understand the bigger TSE picture.

It is known that it is not the poorest of the poor who migrate, hence influencing research studying migrant populations or populations linked to migrants (57). In addition, the use of observational data could lead to self-selection and other confounding biases. Treatment effects could reduce potential biases by replicating an experimental design comparing the identified treatment with the control group (157,159,160,168). The addition of treatment effects in the presented country case studies helped reduce the potential biases and allowed to make causal inferences by calculating the average treatment effect of the treated (ATET). The results of the treatment effects complemented the results of the OLS and logit regressions, which provided more information on the relation between explanatory and outcome variables considering multiple covariates.

By studying Afghanistan and Pakistan, a South-Asian context and a variety of migration patterns were added to current literature. Adding these contexts broadened the area of

research on this topic, as current research focused on a Northern and Central American perspective and South-to-North migration patterns (32).

Conceptual level

Based on mapping concepts and theories used in the studies included in the narrative review, it became apparent that a conceptual model guiding research on this topic is missing. This lack of a conceptual model led to mixed approaches in using concepts and theories in current research. This dissertation addressed this knowledge gap by developing the CHAT-model to guide future research. The conceptual model is based on a much-needed multi-disciplinary approach, including relevant components related to behavioural health, migration and development, and international law. Considering all its previously discussed limitations, we needed to limit our perspective for this dissertation, which can be seen in the unidirectional representation of the CHAT-model. To complement the limited visual representation, the chapter presenting the CHAT-model includes definitions of constructs used and examples of operationalisations, which should be seen as an attempt to explain and specify the messy TSE-process from both sending and receiving sides, enabling future research on the topic.

Furthermore, this dissertation also debated current concepts used on this research topic. During these discussions, more neutral concepts were suggested. The concept of transnational social exchanges (TSE) was introduced to refer to social remittances. Network member at origin (NMO) was proposed as an alternative to those who remain or stay behind.

Conclusion

In conclusion, I have shared the many lessons learned when researching the link between transnational social exchanges (TSE) and the health of network members at origin (NMOs), and at the same time much is still left to be explored in future research. Keeping the discussed limitations in mind, I believe the CHAT-model is a useful tool to guide this future research. The strength of this dissertation lies in its multi-layered contributions to research both on a descriptive and conceptual level. This dissertation connects several disciplines by using a multi-disciplinary approach, such as integrating health behavioural sciences, migration and development studies, and international law when studying the role of TSE on the health of NMOs.

Impact paragraph

Have you ever moved to another country for a short or long period? Maybe for your work, as a student, for your family, or perhaps because you were forced to? Or do you know someone who moved abroad? Have you ever thought about the effect it can have on your home country?

Even when residing abroad, people stay connected with their home country. Staying in touch has become much easier over the last decades. We do not need to wait for weeks for a letter from abroad; we can instantly receive emails, messages, or social media updates. We do not get frustrated anymore about defective phone cards or exceeding costs when calling abroad; Skype or Zoom allows us to video call without charges.

Migration is part of human nature, as, throughout history, we always have moved and always will move. And these movements play a vital role in societal changes. Unfortunately, the media mostly focuses on problems related to migration. Less attention has been given to the positive aspects related to migration. For example, migrants send money (also referred to as 'economic remittances') to others, such as family and friends, in their home country. In 2019, migrants sent about $717 billion to their home country. This money can help pay for education, housing, food security, or the health of family and friends in their home country, which can positively influence a country's development. In this way, migrants can be perceived as change agents.

While the amount and influence of remittances are large, there are downsides. You can do as much until the money is spent, meaning you will need more to achieve common or additional goals. As a consequence, people can get dependent on it. Of course, people do not only send money. By being connected, they also communicate. When you live in a country that might be completely different than your home country, you will have a lot to talk about. Your new experiences and observations, both positive and negative, can be discussed during Skype calls, Facebook posts, or return visits. These discussions can impact network members at origin (NMOs).

Have you ever heard the quote: *'Give a man a fish, and you feed him for a day. Teach him how to fish, and you feed him for a lifetime.*'? So, if money already can impact development, imagine the potential of spreading information about new or different ideas, practices, cultures, habits, and values. We do not have much information about these knowledge exchanges and what it does to NMOs. We especially have no idea about the consequences on health.

My findings on this topic revealed that migrants could influence the health of their NMOs by discussing new or different health behaviours – also referred to in this dissertation

as 'transnational social exchanges' (TSE). When considering all relevant elements related to TSE-process, a potential quadruple win can be identified for migrants (win #1), NMOs (win #2), origin (win #3), and destination (win #4). Interestingly, I have observed both negative and positive influences of TSE. The extent how migrants' information can contribute to the health of their NMOs depends on five main components:

- The availability, accessibility, and acceptability of good quality healthcare and health-related information for internal migrants and emigrants at destination locations.
- Possibility for migrants to internalise available health-related information at destination locations.
- The personal characteristics and social environments of the persons involved (migrants and NMOs).
- The existence of transnational connections among network members and their social exchanges within.
- Information processing – depending on the phase of the NMO in the innovation-decision process.

My research can impact YOU, as:

Migrant

Without a doubt, accessing good quality healthcare and health-related information is your right and should be made available to you. My research stresses the importance of receiving this right and the potential benefits to others. My research can push policymakers to implement health for all, including yours. It will also help health professionals understand different relevant components they should consider when providing healthcare to you (e.g., the role of your network members at origin during your health-decision-making and different perspectives on health).

I will summarise my key findings relevant to migrants and translate them into the main languages spoken in the Netherlands. These summaries will be distributed via various channels, starting in the Netherlands, e.g., municipal health services (GGDs) and GPs.

Network member at origin

My research shows that your migrant friends and family members can share information with you that can either positively or negatively can change your health. While some of the information you receive can benefit your health personally, you can also play a role by spreading helpful information you learned and from which you are benefitting with others within your community, by doing this you will create a domino effect on a larger scale.

Policymakers at destination

Did you know development aid is also allowed to be spent on specific target groups within your country? By investing in health for all, you will contribute to the general health and wellbeing of your migrant population. In addition, my research shows that if migrants receive the proper support from their country of destination, they have the potential to contribute to the health and wellbeing of their network members at origin. Your role as a destination country is to actively invest in the availability, accessibility, and acceptability of good quality healthcare and health-related information for your migrant population.

My key findings will be summarised in policy briefs. They will be sent to different ministries, starting with the Ministries of Health, Development Cooperation, and Migration of the Netherlands and Belgium. To enable health for all – especially for migrant populations, the contacted ministries are also urged to attend the WHO Global School on Refugee and Migrant Health.

Policymakers at origin

My research shows the potential of your migrant population for your country. Migrants remain connected to your country by staying in touch with their network members at origin. Your role is to support this connection and interactions between migrants and their network members at origin. Encouraging these interactions will help the exchange of health-related information and, consequently, if migrants have access to the available, acceptable good quality healthcare and health-related information at destination they can discuss this with their network members at origin, which can influence the health and wellbeing of their network members at origin. Important to mention that you are also responsible to invest in accessible, acceptable, and available good quality health facilities to support and enable the implementation of healthy behaviours of your population, including internal migrants. These potential influences on health can even create a domino effect on a larger scale, supporting the overall health outcomes of your country on the long-term.

My key findings will be summarised in policy briefs. They will be sent to different ministries, starting with the Ministries of Health and Migration of Afghanistan and Pakistan. To enable discussions with receiving countries to ensure health for your migrants abroad and your internal migrant, the contacted ministries are also urged to attend the WHO Global School on Refugee and Migrant Health.

Health professional

My research is interesting for you for two main reasons. First, in my systematic narrative literature review (Chapter 2), I analysed the role of the exchanges of information on the health of both migrants and network members at origin. In this narrative review, some observations can be of importance to you when helping migrants. Some examples of the observations and practical recommendations:

- Understand the important role of migrant family members at origin in their health-decision making. During the consult, consider asking about the migrant's family members and possibly include them during a video call to answer questions and make necessary clarifications.
- Recognise possible differences in the interpretation of health and wellbeing between yourself and your migrant patient. During the consult, make sure there is an opportunity to clarify possible different perspectives from both sides. Make use of translators if this will help your conversation.

These and other findings and practical recommendations will be summarised and distributed in cooperation with Pharos and Johannes Wier Stichting voor gezondheidszorg en mensenrechten for training and support. Furthermore, I will also discuss my research with the responsible of the 'terugkomdagen van de coassistenten' (days co-assistances return to reflect on their experiences) from Maastricht University to search for possibilities to include these results in current training for future GPs.

Academic

My dissertation is definitely of interest to you if you are researching the link between migration and health. Chapter 2 will provide you a deeper understanding of the role of transnational networks and the social exchanges within on the health of migrants and network members at origin. In case you are interested in studying the specific link between transnational social exchanges (TSE) on the health of network members at origin (NMOs), I recommend you to read Chapter 3, which discusses the Comprehensive transnational exchange of Health informATion (CHAT)-model. The CHAT-model will support the necessary multi-disciplinary and consistent conceptual approach when studying this topic. Chapters 4, 5, and 6 describe interesting case studies examining TSE and their role on the sexual and reproductive health of NMOs in Afghanistan and Pakistan.

My work will be disseminated among the broader academic world by my publications, conference presentations, and via the Migration Health and Development Research Initiative (MHADRI)-network, for example via the Migration Health Research Bulletins. I hope my dissertation got you as excited about the role of TSE on the health of NMOs as I

am. I am always looking forward to discussions and further collaborations on this topic, so please feel free to contact me (Inez.roosen@maastrichtuniversity.nl).

International Organisation

When discussing the importance of health and migration with the Member States, it is always important to stress how they can benefit from your recommendations. My research demonstrates several benefits on different levels, worthwhile investing in migrant health.

I will disseminate my dissertation together with policy briefs to IOM Migration and Health and WHO Regional Office Europe – Migration and Health. Via the MHADRI-network, I aim to cooperate with IOM Migration and Health to distribute my findings via their Migration Health Research Bulletins. Together with the WHO Regional Office Europe – Migration and Health, I aim to coordinate a training on the role of transnational social exchanges on the health of network members at origin during the WHO Global School on Refugee and Migrant Health.

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Summary

Human beings form spiderwebs of social networks. Within these networks, network members influence each other's health and health behaviours. Initially, research and practice focused on network members within proximity, at least within country borders. However, networks can easily cross borders due to globalisation and technological developments. These connections crossing borders have always existed for migrants, also referred to as transnational networks, but their potential has not been understood.

Besides their network members at destination, migrants often remain connected to their network members at origin (NMOs). Having one foot in two worlds allows them to be exposed to new or different information at destination and discuss their new observations and information with their NMOs. These information exchanges within transnational networks are interesting to study for four main reasons. First, migrants are often respected members of their society at origin and considered reliable information sources. Second, migrants are part of their society at origin but still heterogeneous enough from their NMOs to provide innovative information. Third, as migrants know the social norms and context of origin, they can tailor information to the situation and needs of their NMOs. Fourth, the technological developments over the last decades (such as social media and easy travel options) made it easier and cheaper to maintain transnational connections, making it possible to discuss diverse topics in more detail and privately (e.g., via personal chats) when desired.

Transnational network members are information sources for their NMOs. Levitt (1998) coined 'social remittances' to refer to these transnational information exchanges between migrants and their NMOs. In this dissertation, the term social remittances has been usefully extended to transnational social exchanges (TSE). Levitt (1998) identified four types of information exchanged between migrants and their NMOs: norms, practices, identities, and social capital. These types can be translated into several identified determinants (such as knowledge, attitudes, social norms, skills, and role models) that are known to influence health behaviours. When receiving TSE, NMOs can decide to accept the received information fully or partially or reject it.

Previous studies have identified the potential of TSE on the health of NMOs. However, studies are still limited in number, and much remains unanswered when understanding the overall picture of the complex TSE-process. Unravelling the overall TSE-process could potentially benefit (1) migrants, (2) NMOs, (3) origin, and (4) destination locations. Therefore, this dissertation's overall aim is to ***understand the link between transnational social exchanges and the health of network members at origin***. Five core chapters (Chapters 2-6) support the main aim of expanding current knowledge on the topic by summarising and understanding previous research, developing a conceptual framework

guiding future research, and adding evidence guided by the proposed conceptual framework. These core chapters are preceded by a general introduction (Chapter 1) and succeeded by a general discussion (Chapter 7).

Chapter 1 provides a general background to the topic. A practical example helps to explain the main multi-disciplinary concepts used throughout this dissertation when studying TSE and their influences on the health of NMOs. It also outlines the (sub-)goals of the five core chapters.

Chapter 2 provides a more profound understanding of the role of TSE on the health of both migrants as well as their NMOs in current research by synthesising existing literature conducting a systematic narrative literature review.

Highlights

- Transnational networks are of emotional value to migrants and their NMOs, both positively (support) and negatively (stress).
- TSE facilitate the diffusion of innovations, potentially driving contemporary social and cultural change.
- Migrants combine health-related advice from destination and origin, depending on urgency and experienced healthcare barriers at destination.
- The acceptance of TSE of the migrant depends on their status at origin and experienced power imbalances by their NMOs.
- TSE can occur individually (migrants - NMOs) or collectively (diaspora organisations - locations at origin).
- Research on the topic focused on South-to-North migration and misses the voices of NMOs.

Chapter 3 summarises conceptual and theoretical approaches in previous research and proposes the *Comprehensive transnational exchange of Health informATion (CHAT)-model* as an answer to the observed conceptual gap.

Highlights

- Research on the topic slowly increases but uses diverse conceptual and theoretical approaches, indicating a lack of conceptual framework.
- Papers published after the redefinition of social remittances in 2010 mostly do not refer to social remittances or refer to the old definition of 1998.
- A multifaceted perspective on the mechanisms of the TSE-process is needed, reflecting both TSE-sending and receiving sides.

- Based on the mapping of concepts and theories used in previous research, key components have been identified to develop the CHAT-model.
- The CHAT-model provides a multi-disciplinary view when studying this topic by integrating migration, health behaviour, communication (social marketing), and international law theories and concepts.

Chapters 4, 5, and 6 investigate different components of the CHAT-model by studying sexual and reproductive health (SRH) outcomes (birth control and HIV/AIDS) of NMOs in Afghanistan and Pakistan. This is done by analysing the 2010 Afghanistan Demographic and Health Survey (DHS) and 2017-2018 Pakistan DHS.

Highlights

- Migrants can be health-related change agents, influencing SRH of their NMOs (Chapters 4, 5, and 6).
- Active transnational networks are relevant in the TSE-process (Chapters 4, 5, and 6).
- The information internal migrants and emigrants receive and remit varies by destination context (Chapters 4, 5, and 6).
- Context of origin and characteristics of NMOs are relevant components to understand the acceptance and translation of TSE (Chapters 4, 5, and 6).
- TSE play a different role in the different steps of the innovation-decision process of NMOs (Chapter 5).
- Sending or receiving economic remittances support the transfer of TSE (Chapter 5); a lack of economic remittances could hinder the transfer of TSE (Chapter 6).
- Gender is a relevant component of the TSE-process influencing SRH outcomes (Chapters 5 and 6).

Chapter 7 reflects on the main findings of the core studies presented in this dissertation and the observed research developments linked to experiences during my PhD journey. Furthermore, the conceptual and methodological strengths and limitations of this dissertation have been reviewed. Also, recommendations to look forward to the future of research and practice on TSE and its influence on the health of NMOs have been proposed.

Samenvatting

Mensen vormen een kluwen van sociale netwerken. Binnen die netwerken beïnvloeden de leden ervan elkaars gezondheid en gezondheidsgedrag. Aanvankelijk focusten onderzoek en praktijk enkel op die netwerkleden die zich in de nabije fysieke omgeving van elkaar bevinden, dit wil zeggen die ten minste in één en hetzelfde land wonen. Met name door de globalisering en technologische ontwikkelingen is het echter steeds makkelijker voor sociale netwerken om over de grenzen heen contact te hebben en te houden ondanks de fysieke afstand. Die grensoverschrijdende verbindingen, ook wel transnationale netwerken genoemd, hebben voor migranten altijd bestaan, maar het potentieel ervan werd tot heden onvoldoende erkend.

Migranten hebben niet alleen contact met diegenen op de plek van bestemming, maar blijven ook vaak in contact met hun netwerkleden op de plek van herkomst (in deze samenvatting zal naar de Engelse afkorting gerefereerd worden, namelijk NMOs dat staat voor 'network members at origin'). Deze connecties reflecteren hoe migranten met één voet in beide werelden staan, waardoor ze worden blootgesteld aan nieuwe of andere informatie in het land van bestemming en ze deze kunnen bespreken met hun NMOs. Er zijn vier hoofdredenen waarom deze informatie-uitwisselingen binnen transnationale netwerken het bestuderen waard zijn. Ten eerste zijn migranten vaak gerespecteerde leden van de samenleving waar ze vandaan komen en worden ze dikwijls beschouwd als betrouwbare informatiebronnen. Ten tweede maken migranten deel uit van hun samenleving van herkomst maar verschillen ze genoeg van hun NMOs om vernieuwende informatie aan te leveren. Ten derde kunnen migranten de manier waarop ze informatie aanbrengen afstemmen op de situatie en de behoeften van hun NMOs, aangezien ze de sociale normen en context van hun maatschappij van herkomst kennen. Ten vierde hebben de technologische ontwikkelingen van de laatste decennia (zoals sociale media en het feit dat reizen gemakkelijker is geworden) transnationale verbindingen eenvoudiger en goedkoper gemaakt, wat het mogelijk maakt om verschillende onderwerpen meer in detail en privé (bijvoorbeeld via persoonlijke chatberichten) te kunnen bespreken, indien gewenst.

Transnationale netwerkleden vormen informatiebronnen voor hun NMOs. Levitt (1998) creëerde de term 'social remittances' om zulke transnationale informatie-uitwisselingen tussen migranten en hun NMOs te omschrijven. In dit proefschrift wordt de term 'social remittances' met succes uitgebreid naar 'transnationale sociale uitwisselingen' (in deze samenvatting zal de Engelse afkorting gehanteerd worden, namelijk TSE dat staat voor 'transnational social exchanges'). Levitt (1998) identificeerde vier types van informatie-uitwisseling tussen migranten en hun NMOs, namelijk: normen, gebruiken, identiteiten en sociaal kapitaal. Die types kunnen vertaald worden in verschillende geïdentificeerde determinanten (zoals kennis, attitudes, sociale normen, vaardigheden en rolmodellen)

waarvan aangetoond is dat ze gezondheidsgedrag beïnvloeden. NMOs kunnen ervoor kiezen om de ontvangen TSE geheel of gedeeltelijk te accepteren of om de informatie af te wijzen.

Eerdere studies tonen aan dat TSE potentieel de gezondheid van NMOs kunnen beïnvloeden. Echter, het aantal studies hierover is beperkt waardoor er nog veel vragen onbeantwoord blijven over het geheel van dit complexe TSE-proces. Uit de analyse van het globale TSE-proces blijkt dat zowel (1) migranten, (2) NMOs, (3) de plaats van origine en (4) de plek van bestemming er baat bij zouden kunnen hebben. Daarom is de globale doelstelling van dit proefschrift om ***het verband te begrijpen tussen transnationale sociale uitwisselingen (TSE) en de gezondheid van netwerkleden op de plek van herkomst (NMOs)***. De vijf centrale hoofdstukken (Hoofdstukken 2-6) zullen op verschillende manieren bijdragen aan deze algemene doelstelling en de bestaande kennis over het onderwerp vanuit verschillende perspectieven. Zo zal eerder onderzoek samengevat en geanalyseerd worden, een conceptueel kader voorgesteld worden dat toekomstig onderzoek kan leiden en bewijs aan de huidige literatuur toegevoegd worden dat wordt gebaseerd op het voorgestelde conceptuele kader. Deze centrale hoofdstukken worden voorafgegaan door een algemene inleiding (Hoofdstuk 1) en gevolgd door een algemene discussie (Hoofdstuk 7).

Hoofdstuk 1 geeft een algemene achtergrond van het onderwerp. De voornaamste multidisciplinaire concepten die in dit proefschrift gehanteerd worden om TSE en de invloeden ervan op de gezondheid van NMOs te bestuderen zullen aan de hand van een praktisch voorbeeld uitgelegd worden. Daarnaast worden in dit hoofdstuk de (sub) doelstellingen van de vijf kernhoofdstukken geïntroduceerd.

Hoofdstuk 2 gaat dieper in op de rol van TSE op de gezondheid van zowel migranten als NMOs in huidig onderzoek door de bestaande literatuur samen te vatten en nauwgezet te analyseren in een systematisch narratief literatuuronderzoek.

Kernpunten

- Transnationale netwerken zijn van emotionele waarde voor migranten en hun NMOs, zowel positief (steun) als negatief (stress).
- TSE vergemakkelijken de verspreiding van innovaties en stimuleren mogelijk hedendaagse sociale en culturele veranderingen.
- Migranten combineren gezondheidsadvies van hun land van bestemming met dat van hun land van herkomst, afhankelijk van de urgentie en ervaren gezondheidsdrempels op hun bestemming.

- In hoeverre TSE door NMOs aanvaard worden, hangt af van de status van de migrant op de plek van origine en of de NMOs eventuele ongelijkheden in macht ervaren.
- TSE kunnen op individueel (migranten – NMOs) of collectief (diaspora-organisaties – locaties op de plaats van herkomst) niveau plaatsvinden.
- Eerder onderzoek naar dit onderwerp focust op Zuid-naar-Noord-migratie en mist de stem van NMOs.

Hoofdstuk 3 vat de conceptuele en theoretische benaderingen van eerder onderzoek samen en stelt het CHAT-model (*Comprehensive transnational exchange of Health informATion*) voor als antwoord op de vastgestelde conceptuele kloof.

Kernpunten

- Onderzoek naar dit onderwerp neemt langzaamaan toe, maar maakt gebruik van diverse conceptuele en theoretische benaderingen, wat aantoont dat een conceptueel kader ontbreekt.
- (Wetenschappelijke) artikelen die gepubliceerd werden na de herdefiniëring van 'social remittances' in 2010 gebruiken deze term meestal niet of hanteren de oude definitie uit 1998.
- Er is nood aan een perspectief dat de mechanismes van het TSE-proces vanuit verschillende facetten benadert en zowel de TSE-zendende als -ontvangende kant belicht.
- Op basis van een overzicht van de gebruikte concepten en theorieën uit eerder onderzoek worden de kerncomponenten om het CHAT-model te ontwikkelen geïdentificeerd.
- Het CHAT-model verschaft een multidisciplinaire blik op dit onderwerp door migratie, gezondheidsgedrag, communicatie (sociale marketing) en internationaal recht gerelateerde concepten en theorieën in het onderzoek te integreren.

Hoofdstukken 4, 5 en 6 bestuderen verschillende componenten van het CHAT-model door onderzoek te doen naar seksuele gezondheid en voortplantings-gerelateerde uitkomsten (in deze samenvatting zal de Engelse afkorting gehanteerd worden, namelijk SRH dat staat voor 'sexual and reproductive health'), zoals anticonceptie en hiv/aids bij NMOs in Afghanistan en Pakistan. Deze analyse zal gebaseerd zijn op de 'Demographic and Health Surveys' (DHS) van Afghanistan (2010) en Pakistan (2017-2018).

Kernpunten

- Migranten kunnen gezien worden als 'change agents', doordat ze de gezondheids-gerelateerde uitkomsten van de NMOs (zoals SRH) beïnvloeden (Hoofdstukken 4, 5, en 6).

- Actieve transnationale netwerken zijn relevant in het TSE-proces (Hoofdstukken 4, 5, en 6).
- De informatie die interne migranten en emigranten ontvangen en verzenden, varieert afhankelijk van de bestemmingscontext (Hoofdstukken 4, 5, en 6).
- De context van de plek van herkomst en de eigenschappen van NMOs zijn relevante componenten om de aanvaarding en de toepassing van TSE te interpreteren (Hoofdstukken 4, 5, en 6).
- TSE spelen verschillende rollen in de verschillende stappen van het innovatie-beslissingsproces van NMOs (Hoofdstuk 5).
- Het sturen of ontvangen van transnationale financiele steun faciliteren de overdracht van TSE (Hoofdstuk 5); het ontbreken van deze transnationale financiele steun kan de overdracht van TSE hinderen (Hoofdstuk 6).
- Gender is een relevante component van het TSE-proces dat SRH-resultaten beïnvloedt (Hoofdstukken 5 en 6).

Hoofdstuk 7 reflecteert op de belangrijkste resultaten van de voorgelegde kernonderzoeken van dit proefschrift (de centrale hoofdstukken (Hoofdstukken 2-6)) en de opgemerkte en ervaren onderzoeksontwikkelingen doorheen mijn PhD-traject. Daarnaast worden de conceptuele en methodologische sterktes en beperkingen van dit proefschrift onder de loep genomen. Tenslotte worden er aanbevelingen voorgesteld voor toekomstig onderzoek en praktische toepassingen met betrekking tot de invloed van TSE op de gezondheid van NMOs.

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Gesprek tussen Ainoa (mijn nichtje van 8 jaar) en mij:
"Mete? Is het boek dat je aan het schrijven bent al bijna klaar?"
"Bijna… Maar ik moet nog een dankwoord schrijven en dat lukt maar niet…"
"Waarom niet? Je hebt net een heel boek geschreven!"
"Ja, maar dat was makkelijker dat ging over feiten en dit over emoties. Dàt is pas moeilijk!"
"Huh?! Dat begrijp ik niet, denk ik…"
Haar antwoord en haar blik maakt me aan het lachen en ik geef haar een dikke knuffel: *"Ja, ik begrijp u…"*

En hier zijn we dan, bij mijn dankwoord! Het einde en toch nog altijd het moeilijkste onderdeel van mijn PhD proces! ☺

Ik gok omdat mijn PhD nogal een hele ervaring was, er ook gewoon té véél mensen waren om hier te vernoemen. Waardoor ik uiteindelijk heb gekozen om een korte en gerichte merci te schrijven voor diegenen die het dichtst bij mij hebben gestaan doorheen dit traject. Natuurlijk wil dit niet zeggen dat ik al de andere mensen die niet specifiek vernoemd wordt niet wil bedanken, integendeel! **Aan iedereen die ik doorheen mijn PhD proces heb mogen ontmoeten: door jullie inspiratie, informatie, steun en uitdagingen heb ik mij kunnen vormen tot de persoon en onderzoekster die ik vandaag ben, MERCIKES!**

Conversation between Ainoa (my 8-year-old niece) and me:
"Mete (=Auntie)? Did you almost finish that book you were writing?"
"Almost… I just need to finalise my acknowledgements and I just can't do it…"
"Why not? You just wrote a whole book!"
"Well yeah, but that was a lot easier that was about facts and this about emotions. Now thàt's the difficult part!"
"Huh?! I don't understand, I guess…"
Her answer and the look on her face made me laugh and I give her a big hug: *"Yeah, I understand…"*

And here we are, my acknowledgments! The final yet the hardest part of my PhD process! ☺

I guess because my PhD was quite an experience, there were just too many people to thank. This made me decide to focus the acknowledgements to those who have been closest to me throughout this journey. Of course, this doesn't mean I don't want to thank all the other people who won't be specifically mentioned, quite the contrary! **To all of you who I have met throughout my PhD journey: your inspiration, information, support, and challenges have helped shaping me into the person and researcher I am today, MERCIKES!**

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Publication list

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Roosen I, Salway S, Osei-Kwasi HA. Transnational social networks, health, and care: a systematic narrative literature review. Int J Equity Health. 2021;20(138):1-28. https://doi.org/10.1186/s12939-021-01467-6

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Curriculum Vitae

Inez Roosen was born in Maaseik on August 30th, 1985. She completed her general secondary education at the Onze-Lieve-Vrouwlyceum in Genk, after which she went to study B.Sc. Health Sciences (major: health promotion, minor: policy and management) at Maastricht University (UM). Her health and migration interests started early on and became apparent in her Erasmus and thesis choices. For her Erasmus in Copenhagen, she made the necessary arrangements to study M.A. African Studies; for her B.Sc. thesis, she proposed to research the Western society's feelings towards the Islamic Hijab, as her thesis topic.

After finalising her Bachelor's degree, Inez worked for several years as a Continuous Improvement Program Coordinator Benelux (Panalpina World Transport BV), gaining experience in process monitoring, evaluation, improvement, and implementation. She also followed a Greenbelt Continuous Improvement course, successfully passing theoretical exams at the University of Twente, inspiring her to return to university and pursue her Master's degree.

She successfully graduated from the M.Sc. Health Education and Promotion (UM) and M.Sc. Public Policy and Human Development specialising in Migration Studies (double-degree: MGSoG and UNU-MERIT). After graduation, she continued working at the Migration and Development Research Group (MGSoG/UNU-MERIT), gaining experience managing migration and development research projects. She transitioned to a PhD Candidate position at the Department of Health Promotion (UM), under the supervision of Prof. dr. Stef Kremers, Prof. dr. Rik Crutzen, and dr. Jennifer Sellin. She translated her passions (health and migration) into her PhD-project, studying transnational social exchanges and their role in the health of network members at origin using a multi-disciplinary approach.

During her time as a PhD Candidate at the Department of Health Promotion, she was a PhD representative on several levels (research school, faculty, university, and national level). Additionally, she was involved in numerous educational tasks. In 2021, she also successfully obtained her University Teaching Qualification and was selected for the CAPHRI Research Talent Program to train and prepare future research plans and grant applications.

Inez is currently working as Lecturer at the Department of Health Promotion at UM while continuing her research on transnational social exchanges and their role in health.