

**Infectious and non-communicable health conditions among
newly arrived Eritrean migrants and refugees at arrival and
post integration in Switzerland**

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Afona Chernet

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von Prof. Dr. Marcel Tanner, Dr.med.Niklaus D. Labhardt, PD Dr. Yves-Laurent
Jackson**

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Prof. Dr. Martin Spiess

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*'The spiritual person feels that his life belongs
to people. God had given him this life to serve
people and to make them happy.'*

Pope Shenouda III

Dedication

Dedicated to a dear loving and supporting family; and especially to inspirational father, who had joined the migration stream since 33 years and still living in the exile, like son.

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Summary

In the recent past years, due to the unprecedented refugee influx worldwide, the awareness of migration has started to get momentum globally. Several key discussion themes had been raised so far by politicians, economists, international organizations, humanitarian activists, public health expertise, as well as researchers. Particularly in the European context, the continuous upsurge of migrants is of great concern.

Majority of immigrants from the south heading towards north are from the sub-Saharan African countries (SSA), where largest portion of them are in the category of low and middle-income countries (LMIC). Hence, migrants and refugees from this region are highly anticipated to have an earlier exposure to the endemic infectious diseases (IDs) before even they kick-off their migration tour. Moreover, due to economical impoverishment, the health system of most LMIC is incapable to provide even basic health care services. Adding to this, the exhausting journey along the Sahara desert and the stressful Mediterranean Sea voyage, expose refugees and migrants to destitute health statues. Even transit countries, being in an unstable condition, are not equipped to support them.

That is why several refugees and migrants arriving in Europe disembark with several infectious diseases (IDs), non-communicable diseases (NCDs), mental health (MH), as well maternal and child health related complications. Several international organizations, such as the WHO European region, international organization of migration (IOM), and European center for disease

prevention and control (ECDC), and others non-governmental organization (NGOs) have reported many easily treatable diseases on arrival and post-arrival.

In Switzerland, similar to other countries in Europe, the number of refugees and migrants is on the rise. The reports from the federal office of statistic, federal secretary of migration, and international Red Cross of the country shows majority of the recently arriving refugees from the south are from Eritrea. Currently, migrants and refugees from Eritrea account for more than 32% of the immigrants in the country, making them on top of the table for the last 10 years in a row.

Despite the large number of Eritrean refugees and migrants in the country, to our knowledge, the health condition of this population is not fully documented. Like most SSA, the health condition among the Eritreans is anticipated to be poor on arrival. But, apart from few case reported studies, there is no systematic screening procedure conducted.

Hence, using novel approach, we intended to systematically screen newly arrived, asymptomatic, feeling healthy, Eritrean refugees and migrants at base-line and follow them for two years cohort. In this cross-sectional base-line study, we recruited voluntary participants from both males and females. Invitation letter (written in both English and Tigriña, local language from Eritrea) was sent by post, using addresses retrieved from the registries' of social assistants' bureau. The study was conducted in two cantons in the north-west Switzerland, the Basel-Stadt and Basel-Landschaft.

At the base-line, among the screened IDs, schistosomiasis was reported in more than half of the asymptomatic refugees and migrants. Malaria was screened in 6%. Other IDs such as *Giardia lamblia* and *Hymenelopsis nana* were also reported. As to NCDs and their risk factors, majority of participants had vitamin D deficiency. Hence, a onetime intramuscular supplementation of vitamin D3 was important and significantly improved serum vitamin D level. Since most of our study participants were young (median age of 25 years), several of the NCDs risk factors were within the normal range of scale according to the WHO recommended measures.

In regarding to the mental health situation, nearly half reported symptoms of post-traumatic stress disorder (PTSD). This finding is similar to several studies conducted within Europe and outside Europe. This implies how demanding and frightening journey refugees and migrants had to overcome to reach their destination target in Europe. But the one year follow-up has showed an improvement toward their PTSD score in the post-migration statuses.

Though it is vital to investigate the poor mental health condition of immigrants using a qualitative assessment tool, findings from our study foresees the need of proper screening and handling. Some studies argue that, it is also possible the mental health of these immigrants to get worsened during the post-arrival, due to the anticipated delay of processing and inaccessibility to health care facilities.

Hence, basic screening protocols on arrival, particularly for refugees and migrants from IDs endemic countries and/or transiting through one of them, can be suggested to reduce the sequel of asymptomatic chronic infections. Similarly, since the trend of the disregard NCDs and their risk factors among young immigrants is more likely to shift, boosting the consciousness is essential. This could be through intervention such as, engaging immigrants into behavioral change practices, for example outdoor exposure, physical activities and applying healthy diet menus as well.

In general, our immigrants health study Switzerland (IHSS), has depicted the need of an extensive and broader study to understand the health disparities of migrants during pre-migration, along the migration path way and in post-migration. Only cross-sectional designed studies might fail to investigate and understand the roots, causes, progresses and epidemiology of the diseases. Similarly, health care services and demands of refugees and migrants may not be in-depth represented through quantitative approach alone. Hence, an integrated, holistic approach, embarrassing IDs, NCDs, mental health as well as maternity, childcare and family planning need to be implemented. As migration health is a complex theme to address discretely, collaborative efforts from regional and international organizations, including policy makers, NGOs, researchers and social workers and medical professionals and others need to join hand for the better health care services access to immigrants.

This joint effort toward establishing a sustainable, equitable and affordable (SEA) health care access would greatly minimize the unnecessary public health expenses, reduce the efficient utilization gap by immigrants, and would be a tool to establish an efficient surveillance system. Hence, a more healthier, productive and efficient immigrant community could successful be integrated into the host countries.

Zusammenfassung

In den letzten Jahren hat das Bewusstsein für Migration aufgrund des beispiellosen Flüchtlingszustroms weltweit an Dynamik gewonnen. Mehrere wichtige Diskussionsthemen wurden bisher von Politikern, Ökonomen, internationalen Organisationen, humanitären Aktivisten, Experten aus dem Bereich der öffentlichen Gesundheit sowie Forschern angesprochen. Vor allem im europäischen Kontext ist die anhaltende Zunahme der Migranten von grosser Bedeutung.

Die Mehrheit der Einwanderer aus dem Süden in Richtung Norden stammt aus afrikanischen Ländern südlich der Sahara (ASS), wobei der grösste Teil dieser Länder in die Kategorie der Länder mit niedrigem und mittlerem Einkommen (LNME) fällt. Es ist daher anzunehmen, dass Migrantinnen und Flüchtlinge aus dieser Region bereits vor Beginn ihrer Migrationsreise eine Exposition gegenüber endemischen Infektionskrankheiten (IK) hatten. Darüber hinaus ist das Gesundheitssystem der meisten LNME aufgrund der wirtschaftlichen Verarmung nicht in der Lage, selbst grundlegende Gesundheitsleistungen zu erbringen. Die belastende Reise entlang der Sahara und auf dem Mittelmeer beeinträchtigt den Gesundheitszustand der Migrantinnen und Migranten zusätzlich. Auch sind Transitländer, die sich in einem instabilen Zustand befinden, oft nicht in der Lage, sie zu unterstützen.

Aus diesem Grund treffen zahlreiche Flüchtlinge und Migranten mit mehreren Infektionskrankheiten (IK), nichtübertragbaren Krankheiten (NUK),

psychischen Störungen (PS) sowie gesundheitlichen Komplikationen bei Mutter und Kind in Europa ein. Mehrere internationale Organisationen wie das Regionalbüro für Europa der WHO, die Internationale Organisation für Migration (IOM) und das Europäische Zentrum für Prävention und Kontrolle von Krankheiten (EZPKK) sowie andere nichtstaatliche Organisationen (NSO) haben von vielen leicht behandelbaren Krankheiten sowohl direkt bei der Ankunft als auch in der Folgezeit berichtet.

Ähnlich wie in anderen europäischen Ländern nimmt die Zahl der Flüchtlinge und Migranten in der Schweiz zu. Die Berichte des Bundesamts für Statistik, des Staatssekretariats für Migration SEM und des Internationalen Roten Kreuzes zeigen, dass die Mehrzahl der vor kurzem angekommenen Flüchtlinge aus dem Süden aus Eritrea stammt. Gegenwärtig machen Migrantinnen und Flüchtlinge aus Eritrea mehr als 32% der Einwanderer im Land aus, so dass sie in den letzten zehn Jahren in Folge den grössten Anteil der Migranten aus dem Süden darstellen.

Trotz der grossen Anzahl von eritreischen Flüchtlingen und Migranten im Land ist unseres Wissens der Gesundheitszustand dieser Bevölkerung nicht vollständig dokumentiert. Wie bei den meisten ASS ist davon auszugehen, dass der Gesundheitszustand der Eritreer bei der Ankunft schlecht ist. Abgesehen von wenigen Fallstudien wird jedoch kein systematisches Screening durchgeführt.

Daher wollten wir neu angekommene, asymptomatische eritreische Flüchtlinge und Migrantinnen an der Baseline systematisch erfassen und sie für zwei Jahre im Rahmen einer Kohortenstudie untersuchen. In dieser Querschnitts-Baseline-Studie rekrutierten wir freiwillige Teilnehmer und Teilnehmerinnen. Das Einladungsschreiben (auf Englisch und Tgrigna, die lokale Sprache in Eritrea) wurde per Post verschickt, unter Verwendung von Adressen, die aus den Registern des Sozialhilfebüros abgerufen wurden. Die Studie wurde in zwei Kantonen in der Nordwestschweiz, Basel-Stadt und Basel-Landschaft, durchgeführt.

Von den untersuchten Infektionskrankheiten wurde Bilharziose bei mehr als der Hälfte der asymptomatischen Flüchtlinge gefunden. Bei 6% der Teilnehmenden wurde Malaria diagnostiziert. Zudem wurden weitere IK wie *Giardia lamblia* und *Hymenelopsis nana* gefunden. Was die nichtübertragbaren Krankheiten angeht, so hatten die meisten Teilnehmenden einen Vitamin-D-Mangel. Eine einmalige intramuskuläre Supplementation von Vitamin D3 führte zu signifikant verbesserten Serum-Vitamin-D Leveln. Da die meisten unserer Studienteilnehmer noch jung waren (mittleres Alter von 25 Jahren), lagen einige der Risikofaktoren für NUK nach den von der WHO empfohlenen Massstäben im normalen Bereich.

In Bezug auf die psychische Gesundheit wies fast die Hälfte der Studienteilnehmenden Symptome einer posttraumatischen Belastungsstörung (PTBS) auf. Dieses Ergebnis ist vergleichbar mit mehreren Studien, die in- und

ausserhalb von Europa durchgeführt wurden. Dies zeigt, wie anspruchsvoll und beängstigend die Reise ist, die Flüchtlinge und Migranten bewältigen mussten, um ihr Ziel in Europa zu erreichen. Die Nachuntersuchung nach einem Jahr zeigte eine Verbesserung der PTBS-Werte.

Obwohl es wichtig ist, die schlechte psychische Verfassung von Einwanderern mithilfe eines qualitativen Bewertungsinstruments zu untersuchen, zeigen die Ergebnisse unserer Studie die Notwendigkeit einer sorgfältigen Untersuchung und Behandlung auf. Einige Studien argumentieren, dass es auch möglich ist, dass sich die psychische Gesundheit von Immigranten während der Zeit nach der Ankunft aufgrund der zu erwartenden Verzögerung der Verarbeitung und der Unzugänglichkeit der Gesundheitseinrichtungen verschlechtert.

Grundlegende Screenings bei der Ankunft, insbesondere für Flüchtlinge und Migranten aus IK endemischen Ländern oder Flüchtlinge, die ein solches Land durchquert haben, können dazu beitragen, die Folgen von asymptomatischen Infektionen zu reduzieren. Da das Risiko für nichtübertragbare Krankheiten bei jungen Einwanderern in der Zukunft eher zunehmen wird, ist es ebenfalls wichtig, das Bewusstsein für diese Risikofaktoren und mögliche Präventionsmassnahmen zu stärken. Dies könnte dadurch geschehen, dass Immigranten in Verhaltensänderungspraktiken wie Bewegung im Freien, körperliche Aktivitäten und eine gesunde Ernährung einbezogen werden.

Im Allgemeinen hat unsere Gesundheitsstudie für Einwanderer in der Schweiz (GSES) die Notwendigkeit einer umfassenden und breiten Studie zum Verständnis der gesundheitlichen Unterschiede von Migranten vor, während und nach der Migration aufgezeigt. Querschnittstudien allein können die Ursachen, Verläufe und die Epidemiologie der Erkrankungen nicht untersuchen und verstehen. Für eine detaillierte Beschreibung der Gesundheitsdienste und der Bedürfnisse von Flüchtlingen und Migranten ist ein quantitativer Ansatz nicht ausreichend. Infektionskrankheiten, nichtübertragbare Krankheiten, psychische Gesundheit sowie Mutterschutz, Kinderbetreuung und Familienplanung sollten daher im Rahmen eines integrierten, ganzheitlichen Ansatzes untersucht werden. Da Migrationsgesundheit ein komplexes Thema ist, das diskret angegangen werden muss, sollten gemeinschaftliche Anstrengungen regionaler und internationaler Organisationen, einschliesslich politischer Entscheidungsträger, nichtstaatlicher Organisationen, Forscher und Sozialarbeiter und medizinischer Fachkräfte und anderer, für einen besseren Zugang zu Gesundheitsdiensten für Zuwanderer sorgen.

Diese gemeinsamen Anstrengungen zur Schaffung eines nachhaltigen, gerechten und erschwinglichen Zugangs zu medizinischer Versorgung würden Ausgaben für die öffentliche Gesundheit erheblich reduzieren, Hindernisse beim Zugang zum Gesundheitssystem für Einwanderer abbauen und ein Instrument zum Aufbau eines effizienten Überwachungssystems darstellen. So könnte eine gesündere, produktivere und effizientere Einwanderergemeinschaft erfolgreich in die Aufnahmeländer integriert werden.

ጽሁፍ ቅዱስ መጽናዕታዊ ጽሁፍ

Tigrigna (local Eritrean language) translation of Summary

ኣብዘን ዝሓለፉ ቀረባ ዓመታት፣ ብምኽንያት ኣብ ምሉእ ዓለም ብዝተራእየ ብዝኒ ዋሕዚ ስደተኛታት፣ ኣፍልጦ ብዛዕባ ስደት ክዓቢ ክኢሉ ኢዩ። ክሳብ ሕጂ፣ ብዙኃት ዝተፈላለዩ ንስደተኛታት ዝምልከቱ ሕቶታትን መዘራረቢ ዛዕባታትን ብፖለቲካኛታት፣ ክኢላታት ቁጠባ ፣ ኣህጉራውያን ማኅበራት፣ ኣብ ሰብኣዊ ኮነታት ዝነጥፉ ኣካላት፣ ክኢላታት ዓውዲ ህዝባዊ ጥዕናን ተመራመርትን ተላዒሎም ኢዮም። ብፍላይ ድማ ኣብ ኮነታት ኤውሮጳ፣ እዚ እንዳ ዓባይ ዝኸይድ ዘሎ ኮነታት ስደተኛታት፣ ዘተሓሳስብ ኢዩ።

ዝበዘሉ ካብቶኦም ካብ ደቡባዊ ክፍል ናብ ሰሜናዊ ክፍል ዝስደዱ ካብ ትሕቲ ሰሃራ ካብ ዘለዎ ሃገራት ኣፍሪቃ ኢዮም። ዝበዘሉ ካብዚኣን ድማ ኣብ ደረጃ ትሑት ኣታውን ማእከላይ ኣታውን ዓለም ዝምደባ ሃገራት ኢዮን። ስለዚ ድማ፣ ካብዘን ሃገራት እዚኣተን ዝመጹ ስደተኛታት፣ ዋላውን ቅድሚ ስደት ምጅማሮም፣ ኣብተን ሃገራት ዝውቱራት ብዝኾኑ ዓይነታት ተመሓላለፍቲ ሕማማት ኣቐዲሞም ናይ ምልካፍ ልዑል ተኸእሎ ኣለዎም። ብተወሳኺ፣ ብሰንኪ ድኽመት ቁጠባ፣ ኣገልግሎት ጥዕና ናይ መብዛሕትኣን ኣብ ደረጃ ትሑት ኣታውን ማእከላይ ኣታውን ዓለም ዝምደባ ሃገራት፣ ዋላውን መሰረታዊ ኣገልግሎት ንክህብ ብቐዕ ኣይኮነን። ኣብ ርእሲኡ፣ እቲ ኣዚዩ ኣህላኺ ዝኾነ ነዊህ ጉዕዞ ምድረ-በዳን ፈታኒ ዝኾነ ማእከላይ ባሕርን ተወሲኽዎ፣ ስደተኛታት ንዝተዳኸመ ኮነታት ጥዕና ዝተቐልዑ ይገብሮም። እተን ኣብ ጉዕዞ ዝሓልፍዎን ሃገራትውን ኣብ ርጉእ ኮነታት ብዘይምህላዎን፣ ኣገልግሎት ክህብኦም ድልዎት ኣይኮናን።

ስለዚ ድማ ኢዮም ብዙኃት ካብ ስደተኛታት ኣብ ኤውሮጳ ክበጽሑ እንከለው፣ ብተመሓላለፍቲ ሕማማት፣ ዘይምሓላለፉ ሕማማት፣ ሕማም ኣእምሮ፣ ምስ ጥዕና ኣደን ዕሸልን ምትእስሳር ብዘለዎም ዝተፈላለዩ ሕማማት ተጠቒሶም ዝጸንሑ። ብዙኃት ኣህጉራውያን ውድባት፣ ከም በዓል መዚ ውድብ ጥዕና ዓለም፣ ኣህጉራዊ ውድብ ንስደተኛታት፣ ማእከል ምክልኻልን ምቕጽጻርን ሕማማት ኤውሮጳን ካልኣት ዘይመንግስታውያን ውድባትን ማኅበራትን፣ ብዛዕባ እቶም ስደተኛታት ኣብ ኤውሮጳ ክኣትው እንከለውን ድኅሪ እምታዎምን ዝርኣዮ ብቐሊሉ ክፍወሱ ዝኸእሉ ሓማማት መዝጊቦም ኣለው።

ኣብ ስዊዘርላንድውን ከም ካልኦት ሃገራት ኤውሮጳ፣ ቊጽሪ ዋሕዚ ስደተኛታት ይዓቢ ኢዩ ዘሎ። ጸብጻባት ፈደራላዊ ቤት ጽሕፈት ስታትስቲክስ፣ ፈደራል ቤት ጽሕፈት ስደተኛታትን ከምኡውን ኣህጉራዊ ማኅበር ቀይሕ መስቀል ናይዛ ሃገር ከምዘመልከቶ፣ ዝበዝሑ ካብቶም ኣብ ዝሓለፈ ቀረባ እዋናት ካብ ደቡባዊ ክፋል ዝተሰደዱ ካብ ኤርትራ ምዃኖም ይሕብር። ኣብዚ ሕጂ እዋን፣ ብዝኒ ኤርትራውያን ስደተኛታት ኣብ ስዊዘርላንድ ልዕሊ ሠላሳን ክልተን ሚእታዊት ካብ ጠቐላላ ኣብ ቀረባ ጊዜ እተሰደዱ ስደተኛታት ብምኃዝ፣ ኣብዘን ዝሓለፉ ዓሠርተ ዓመታት ዝበዝኑ ስደተኛታት ተባሂሎም ብተኸታታሊ ኣብ ጸብጻብ ሰፊሮም ይርከቡ።

ይኹን ደኣ እምበር፣ ዋላኳ ዝበዝሃ ቁጽሪ እንተሃለዎም፣ ብዛዕባ ኮነታት ጥዕና ናይዞም ስደተኛታት እዚኦቶም ዛጊት ብግቡእ እተመዝገበ ኣይኮነን። ከም ኮሎም ስደተኛታት ጥሕቲ ሰሃራ ዝርከባ ሃገራት ኣፍሪቃ፣ ኣብ ኤውሮጳ ኣብ ዝበጽሑሉ፣ ኮነታት ጥዕንኦም ዝበኣሰ ክኸውን ትጽቢት ዝግበረሉ ኢዩ። እንተኾነ፣ እንትርፎ ውሑዳት ብውልቂ ዝተመዝገበ ተርእዮታት፣ ብግቡእ ዝተመዝገበ ሰፊሕ መጽናዕቲ ግና ዛጊት ኣይተኻየደን።

ስለዚ ድማ ኢና፣ ብሓድሽ ኣገባብ፣ ሓደስቲ ንዝመጹ ኤርትራውያን ስደተኛታት፣ ዝኾነ ምልክት ሕማም ንዘይብሎም፣ ኣብ መጀመርታን ኣብ ስዊዘርላንድ ካብ ዝኣትው ክልተ ዓመት ምስ ጸንሑ ተኸታቲልና ዝተማልአ መርመራታት ክንገብረሎም ዝመደብና። ኣብ መጀመርያ ናይቲ መጽናዕቲ፣ ወለንተኛታት ተሳተፍቲ ካብ ክልቲኦም ጾታታት፣ ደቂ-ተባዕትዮን ደቂ ኣንስትዮን፣ ኣብቲ መጽናዕቲ ከም ዝሳተፉ ጌርና። ካብ መዛግብቲ ቤት ጽሕፈታት ተሓጋዝቲ ስደተኛታት ብዘረኹብናዮ ሓበሬታ ኣድራሻታት ድማ፣ ብቋንቋታት እንግሊዝን ትግርኛን እተጻሕፈ ናይ ተሳታፍነት ወረቐት ዕድመ ብፖስታ ንዝምልከቶም ተሰዲዱ። እዚ መጽናዕቲ ኣብ ክልተ ኣብ ሰሜናዊ ምዕራብ ስዊዘርላንድ ዝርከባ ካንቶናት፣ ማለት ኣብ ካንቶን ባዝል-ሸታድን ካንቶን ባዝል-ላንድሻፍትን ኢዩ ተኻዪዱ።

ኣብ መጀመርያ፣ ካብቶም ዝኾነ ይኹን ምልክት ዘይነበሮም ስደተኛታት፣ ልዕሊ ፍርቂ ናይ ተሳተፍቲ ብቢልሃርዝያ (ሸሽቶሶም) ዝበሃሉ ሓሳኹ ተለኺፎም ተረኽቡ። ሕማም ዓሶ ድማ ኣብ ሸዱሽተ ሚእታዊት ተሳተፍቲ መጽናዕቲ ክርከብ ተኻኢሉ። ተወሰኹቲ ኣብ መርመራ እተርኽቡ ተመሓላለፍቲ ሕማማት ድማ ናይ መዓናጡ ሓሳኹ ከም ጃርድያ ዝኣመሰሉ ኢዮም። ንዘይተመሓላለፍቲ ሕማማት ዝምልከት ድማ፣ መብዛሕንኦም ስደተኛታት ዋሕዲ ቫይታሚን-ዲ ጸኒሕዎም። ስለዚ ድማ፣ ተወሳኺ ብመርፍእ ዝወሃብ ሓጋዚ ቫይታሚን-ዲ ክወሃብ ኣገዳሲ ኮይኑ ተረኺቡ። በቲ ሓደ ጊዜ ጥራይ እተዋህበ ተወሳኺ ቫይታሚን-ዲ ድማ፣ ርኡይ ምምሕያሽ

ዓቕን ኣብ ደም ዝርከብ ቫይታሚን-ዲ ተራእዮ። ዝበዝኡ ተሳተፍቲ ናይዚ መጽናዕቲ መንእሰያት ብምዃናም፣ ማለት ኣብ ክሊ ማእከላይ ገምጋም ዕድመ 25 ስለ ዝርከቡ፣ ብመሰረት ደረጃታት መዓየሪ ዓለማዊ ውድብ ጥዕና ዓለም፣ ብዙኃት ካብቶም ጠንቂ ንዘይተመሓላለፍቲ ሕማማት ክኾኑ ዝኸለሉ ረጅሒታት ወይ ባእታታት ኣብ ንቡር ዓቕን ከም ዘለው ክፍለጥ ተኸኢሉ ኣሎ።

ንኹነታት ጽዕና ኣእምሮ ብዝምልከት ድማ፣ ዳርጋ ፍርቂ ካብ ተሳተፍቲ ናይዚ መጽናዕቲ ንተዘኩሮታት ናይ ዘሰንበድ ሕሉፍ ትዝታ ወይ ተሞኩሮ ዝምልከት ምልክታት ከም ዝነበሮም ክምዝገብ ተኸኢሉ። እዚ ርኽበት እዚ ምስቲ ኣብ ኤውሮጳን ካብ ኤውሮጳ ወጻኢን ዝተረኸበ መጽናዕታዊ ጽሑፋት ዝዛመድ ወይ ዝመሳሰል ኢዩ። እዚ ኩሉ ድማ፣ ስደተኛታት ናብ መበገሲ ዕላመኡም ዝኾነት ኤውሮጳ ንኸበጽሑ ክሳብ ክንደይ ኣሰቓቂን ጻዕሪ ዝሓትትን ጉዕዞ ስደት ከም ዝሓልፉ ዘብርህ ብሩህ መግለጺ ኢዩ። እንተኾነ ድግሪ ሓደ ዓመት ኣብ እተገብረ ዳግማይ መርመራ ግና፣ እቲ ንተዘኩሮታት ናይ ዘሰንበድ ሕሉፍ ትዝታ ወይ ተሞኩሮ ዝምልከት ተርእዮ ምምሕያሽ ከም ዘርኣዩ ክፍለጥ ተኸኢሉ ኣሎ።

ዋላኳ ንትሑት ጥዕና ኣእምሮ ስደተኛታት ዝያዳ ንምርዳእ፣ ተወሳኺ ዕምቛት ዘለዎ ዓይነታዊ መጽናዕቲ ዝጠልብ እንተኾነ፣ ኣብዚ መጽናዕቲ ብዝተጠቐምናሉ መመርመሪ ረጅሒታት ጌርና ብረኽብናዮ ርኽበት ግና፣ ግቡእ መርመራን ሕክምናን ከም ዘድልዮ ንጹር ኢዩ። ገለ መጽናዕታት ከምዝብልዎ፣ ብምክንያት እቲ ድግሪ ስደት፣ ማለት ኣብ ናይ ዕቕባ ሃገር ምስ በጽሑ ዘጋጥም ዘይተጸበይዎ መስርሓትን ዕድላት ናይ ኣገልግሎት ማእከላት ጥዕና ብዘይምህላውን፣ ኩነታት ጥዕና ኣእምሮ ስደተኛታት ድግሪ ስደት ክብእስ ይኸእል ኢዩ ይብሉ።

ስለዚ ድማ፣ ሳዕቤን ብሰንኪ ምልክታት ብዘይብሎም ተመሓላለፍቲ ሕማማት ድኒሮም ዝመጹ ጉድለት ጥዕና ንምክልኻል፣ መሰረታዊ መርመራታት ንሓደስቲ ስደተኛታት፣ ብፍላይ ድማ ነቶም ካብ ዝውቑራት ዝኾኑ ተመሓላለፍቲ ሕማማት ዘለወን ሃገራት ዝመጹ፣ ወይ ድማ ብኣኣተን ኣቋሪጾም ንዝመጹ ስደተኛታት ክግበር ኣድላዪ ይኸውን። ብተመሳሳሊ፣ ኣብ መንጎ ሓደስቲ ዝመጹ መንእሰያት ስደተኛታት ዘሎ ህልው ኩነታት ደረጃ ዘይተመሓላለፍቲ ሕማማትን መበገሲ ጠንቆምን ኣብ መጻኢ ክቐየር ተኸኢሎም ምስ ምህላው፣ ኣፍልጦ ናይዘም ሕማማት እዚኣቶም ኣብ መንጎ ስደተኛታት ምዕባይ ወይ ምውሳኽ ኣገዳሲ ኢዩ። እዚ ድማ ንስደተኛታት ኣብ ናይ

ባህሪ ለውጢ ዘምጽእሉ ንጥፈታት ከም ኣካላዊ ምንቅስቃሳትን ከምኡ ዝኣመሰሉ ኣብ ደገ ዝግበሩ ንጥፈታትን፣ ከምኡውን ጥዑይ ኣመጋግባ ብምዝውታርን ክኸውን ይኸእል ኢዩ።

ብሓፈሻ እዚ 'መጽናዕቲ ጥዕና ስደተኛታት ኣብ ስዊዘርላንድ' ዝብል ምርምራዊ መጽናዕትና፣ ጸገማት ጥዕና ስደተኛታት ንምርዳእን ንምልላይን፣ ማለት ቅድሚ ስደት ምጅማርም፣ ኣብ ጊዜ ስደት፣ ከምኡውን ድኅሪ ስደት ንዘሎ ኰነታት ጥዕና ንምርዳእ፣ ኣድላዪነት ሰፊሕን ዕምቆት ዘለዎ መጽናዕቲ ኣገዳሲ ምዃኑ የርኢ። ሓደ ጊዜ ጥራይ ዝግበር መርመራ፣ ነቲ መበገሲ፣ ተንቂ፣ ምዕባለን፣ ኰነታት ሕማማት ንምርዳእ ብግቡእ ዘይውክል ክኸውን ይኸእል ኢዩ። ብተመሳሳሊ፣ ሕክምናዊ ጠለባትን ድሌታትን ስደተኛታት ንምርዳእ ብዝሓወ ወይ ዓቕናኢ መጽናዕትታት ንበይኖም (ብዘይ ዓይነታዊ መጽናዕትታት)፣ እኹላት ዘይኸኹ ይኸእሉ ኢዮም። ስለዚ ድማ ዝተዋሃደ ጥርኑፍ ኰለንተኣዊ ኣቕራቢ፣ ንኹሎም ዓይነታት ሕማማት ዘጠቓለለ፣ ማለት ተመሓላለፍቲ ሕማማት፣ ዘይተመሓላለፍቲ ሕማማት፣ ጥዕና ኣእምሮ ከምኡውን ጥዕና ኣደን ዕሽልን ውጥን ሥድራቤትን ኣቀራርባ ክህሉ ኣድላዪ ይኸውን። ጥዕና ስደተኛታት ዝተሓላለኹ ከም ምዃኑ መጠን፣ ብተናጸል ክፍታሕ ዝኸእል ስለዘይኮነ፣ ዝሓሸ ኣገልግሎት ጥዕና ስደተኛታት ንምድላው፣ ስጦም ዝተወሃሃድ ጸዕርታት ካብ ዘባውዮንን ኣህጉራውያንን ማኅበራትን፣ ከምኡውን መንግስታውያንን ዘይመንግስታውያንን ማኅበራት፣ ተመራመርቲ፣ ሰብ ሞያ ጥዕናን ተሓጋዝቲ ስደተኛታትን ካልኣትን የድሊ።

እዚ ከምዚ ዝበለ ዝተወሃሃደ ጸዕርታት ንምምስራት ቀጻልነት ዘለዎ ምዕሩይን ርትዓውን ኣገልግሎት ጥዕና፣ ዘይተደልየ ወጻኢታት የጉድል፣ ኣብ መንጎ ስደተኛታት ንዘሎ ዘይምዕሩይ ኣጠቓቕማ ኣገልግሎት ጥዕና ጋግ የጽብብ፣ ከምኡውን ውጽኢታዊ ስርዓት ወይ ኣገባብ ሓለዎን ምክትታልን ሕማማት ኣብ ምምስራት ሓጋዚ ኢዩ። በዚ ድማ፣ ዕውት ምውህሃድ ናይ ጥዑይን ኣፍራዪን ውጽኢታውን ስደተኛ ምስ ናይ ዑቕጣ ሃገራት ጋህዲ ይኸውን።

Abbreviation (only frequently used)

25(OH) D	25-hydroxy vitamin D
AUDIT	Alcohol Use Disorders Identification Test
CDC	Center for Disease Prevention and Control
ECDC	European center for disease prevention and control
EU	European Union
GAD-7	Generalized Anxiety Disorder-7
HbA1c	Glycated hemoglobin
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human immune deficiency virus
ID	Infectious Diseases
IHSS	Immigrant Health Study Switzerland
IOM	International Organization for Migration
IQR	Inter-Quartile Range
NA	North Africa
NCD	Non-communicable Diseases
NGOS	Non-governmental Organization
PHQ-15	Patient Health Questionnaire-15
PHQ-9	Patient Health Questionnaire-9
PHQ-SADS	Patient Health Questionnaire Somatic Anxiety and Depression Syndrome
POC-CCA	Point-of-Care Circulating Cathodic Antigen
PTSD	Post-traumatic Stress Disorder
RS-14	Resilience Scale 14-Item
SSA	sub-Saharan African
UNHCR	United Nations Higher Commission for Refugees
WHO	World Health Organization

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Chapter One: Introduction

1.1 A brief introduction to Eritrea

Eritrea is a young nation located on the horn of Africa along the Red Sea coast. Formerly, it was one of the three (Eritrea, Libya and Somalia) colonies of Italy, and after the World War II it came under British administration. It got its independence from Ethiopia on April 28th, 1993 through a popular referendum of 99.8% favor with 98.5% turnout, after two years lasted transition time following its freedom and liberty on May 24th, 1991. Asmara, the largest city and located at the central highland, become the capital city of the new born nation with six administrative zones as of 1996 (figure 1.1) (EASO, 2015). During the 30 years of armed struggle for self-determination and independence, several tenths of thousands had fled the country to spare their lives out of the iron hand colonization from neighboring Ethiopia and emigrated to every corner of the world.

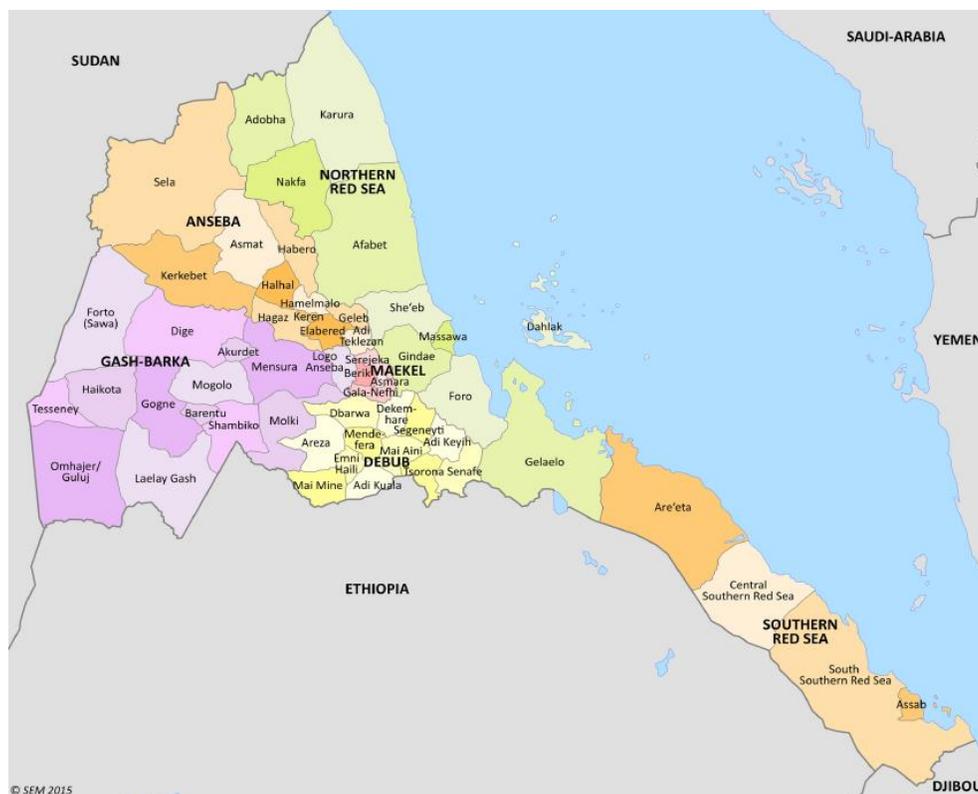


Figure 1.1: Administrative regions and sub-regions of Eritrea

Unfortunately the peace and tranquility of the treasured independence of the country did not survive for more than seven years. The unexpected border conflict with the former colonizer Ethiopia, blow out the fresh breath of freedom and stability. As a result, a new chapter of migration started before the first one closed.

This misfortune has turned out to cause humanitarian catastrophe, where the fleeing of thousands of Eritreans was recorded. That is why the country is notoriously categorized as one of the top 10 sources of migration in the world (Thomson Reuters Foundation, 2016). For this reason, it is usually a focal point of international mass-media discussions, and debates in many countries (Mail & Guardian, 2017; Stevis et al., 2016; Aljazeera, 2016; Kingsley, 2015; BBC, 2016; America Team for Displaced Eritreans, 2018). Particularly in Switzerland, from community (Gemeinde) to national level, the federal assembly (Bundesrat), it is repeatedly on the political agenda. Recently, the Neue Zürcher Zeitung (NZZ), a national Swiss daily broadsheet newspaper published in Zürich, reported that, 'there is almost no country as often discussed as Eritrea in Switzerland' (NZZ, 2017).

Nevertheless, the migration crisis of Eritrea is part and parcel of the global movement of people our planet is being challenged recently, especially since the end of the last century. People are on continues move, be it in search for safe place from violence, civil war, conflicts, persecution, torture, imprisonment, repression; or seeking a better life, looking for better future, to study and even for job hunting.

1.2 Global migration crisis

According to the United Nations Higher Commission for Refugees (UNHCR), in 2017, 65.6 million people were displaced worldwide (UNHCR, 2017a). In year 2016 alone, 10.3 million have been displaced. This implies that in every minute 20 people were displacing from their homes from fear of persecution, conflict, and other human right violations. Among the 22.5 million refugees recorded in 2017, more than half are unaccompanied minors, aged below 18 (UNHCR, 2017a).

However, majority of these refugees and migrants are sheltered in Africa (30%) and in the Middle East and North Africa (26%) (UNHCR, 2016). A comparison report from Michal Khan and colleagues has disclosed this discrepancies among the low-income countries and Organization for Economic Co-operation and Development Countries (OECD) as it can be inferred from figure 1.2 (Khan et al., 2016). The report estimated the number of refugees arrived in 2015 per 1,000 people of the host country (listed according to their gross domestic product [GDP] per person), using proportional bubble sizes. Hence, the largest bubble sizes on the left side of the plot imply that most refugees were shelter in countries with low GDP per person.

Among the 3.4 million new refugees and asylum seekers, 1.4 million had sought asylum in Europe (Abbott, 2016). According to the UN migration agency, International Organization for Migration (IOM) report of 2016, among the refugees who arrived in Europe, migrants from Eritrea made the second highest number with 20,718 refugees, following Nigeria with 37,551 refugees (IOM, 2017a).

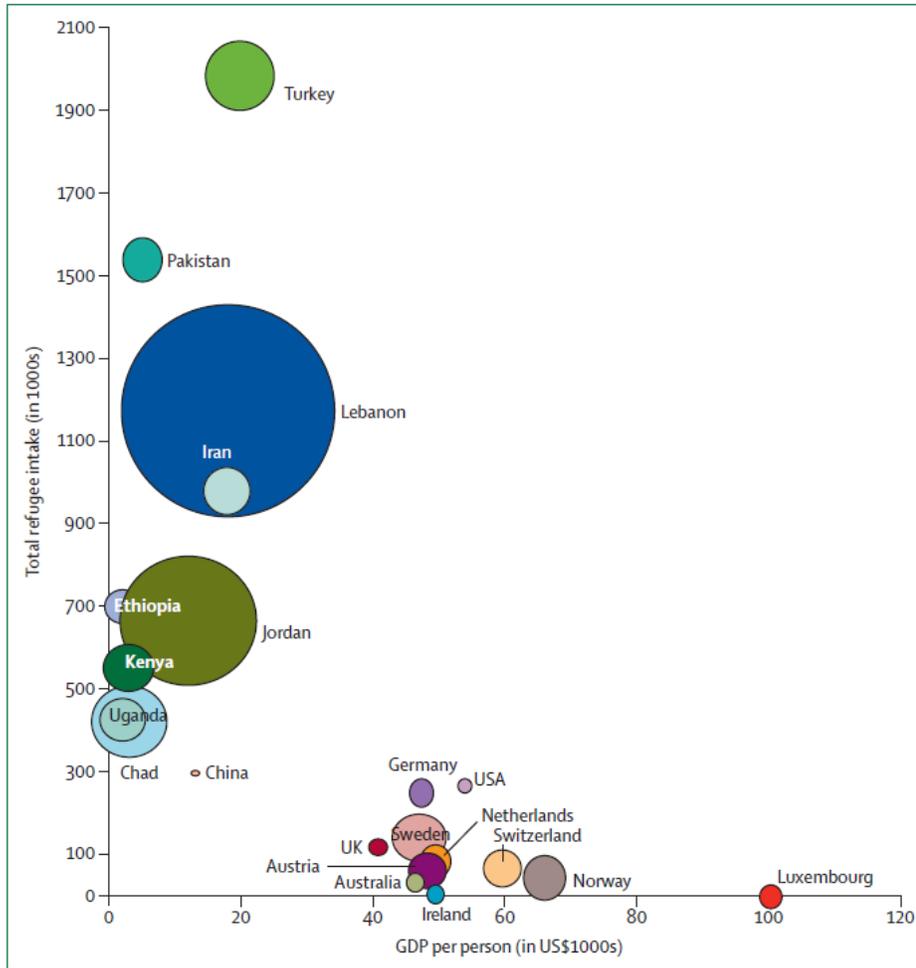
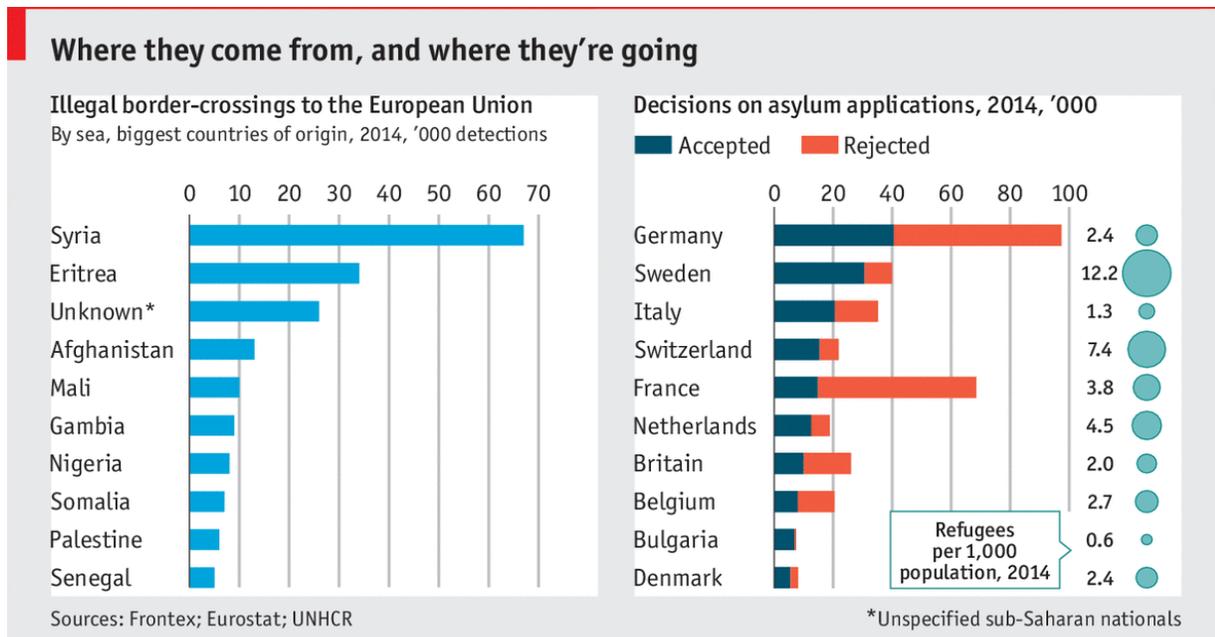


Figure 1.2: Refugees intake in low-income versus OECD, as of June 2015

Moreover, The Economist in its graphical presentation of the refugees crisis 2015 in Europe, figure 1.3 (left panel), has placed Eritrea in the second position of countries that are source of migration, only preceded by gigantic migration current from Syria, who arrived in mass the continent at that time (The Economist, 2015a). The top destinations for Eritrean refugees and migrants in Europe include Switzerland, Germany, the Netherlands and the Sweden (Open Migration, 2016).



Economist.com

Figure 1.3: Origin and destination refugees and asylum seekers in Europe in year 2014

Switzerland located in the heart of Europe, due to its geographical location and political viewpoint has been a center of attraction for refugees and asylum seekers. Particularly, with the global surge of migration in the late 20th and early 21st centuries, Switzerland has been hosting large number of immigrants from all corners of the world. According to the 2017 record of the Federal Statistical Office reported on the Swiss Info, since 2015 Switzerland is hosting more than two million foreigners accounting for 25.6% of its 8.3 million population (swissinfo.ch, 2017a). Among the 4.9% African origin foreigners, Eritreans make the largest portion with 32%. As compared to the overall population, the Eritreans account for 1.57% (figure 1.4), which is more than refugees from the Bosnia and Herzegovina (1.49%), who immigrated during the Balkan countries crisis in the 1990s.

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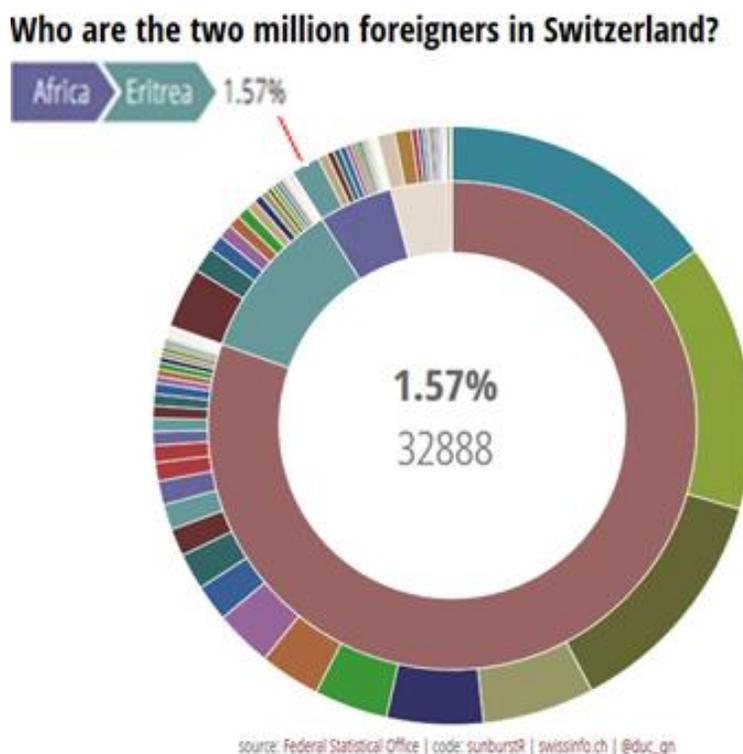


Figure 1.4: Two million foreigners living in Switzerland. The inside circle is showing the continent [representing brown=Europe, light blue= Asia, purple= Africa, and grey= America], and the outside circle representing the individual countries from the respective continents.

Despite the recently dropping number of refugees in Europe (“Europe impedes legal access for Eritrean refugees,” 2017) as well as in Switzerland (swissinfo.ch, 2018, 2017b), the number of Eritreans arriving to Switzerland remains top of the list. Hence, Switzerland still continues to be an important destination of Eritrean refugees in Europe. According to the European Asylum Information Database (aida) report based on the Staatssekretariat für Migration (SEM) of 2017, a total of 18,088 first time asylum applications were made in Switzerland for 2017 (aida, 2018).

Majority of the African origin immigrants are estimated to be south from the Sahara, especially from Eastern part of the continent (*Migration Report 2013.*, 2014). Refugees and migrants from Eritrea top the table of migrants in Switzerland for the last ten years in row. In 2017 alone, despite of the slowed rate of migration, and as a result the immigrants from Eritrea has been reduced by 34% from the previous year in the country 18.7% out of 18,088 refugees who step on foot in Switzerland were from Eritrea followed by 10.8% from Syria (Staatssekretariat für Migration, SEM, 2018).

1.3 Migration Health

Health of refugees and migrants on arrival could be different based on their origin countries (Ramos et al., 2011; Shiue, 2014). According to the World Health Organization (WHO) European Regional Office, among the common health problems are: accidental injuries, hypothermia, burns, gastrointestinal illnesses, cardiovascular events, pregnancy-and-delivery-related complications, diabetes, hypertension, maternal, newborn and child health problems, child and reproductive health problems, and violence (WHO-Europe, 2018).

In the post-migration, access to health services and medical attention of refugees and migrants could possibly be influenced by the health system policies of the hosting countries (Aida, n.d.; Langlois et al., 2016). Inadequate information and restriction to some services could be mentioned among others. In some instances, newly introduced policies to assist refugees and migrants may have little effect due to the discrepancies in the service provided and inconsistencies of supply (Bozorgmehr and Razum, 2016).

In many host countries, migration health is among prime discussion issues. The cost of diagnosis and treatment, the research ethics and funding, health insurances, and advanced equitable health care access, and others are points for discussion (Hyde, 2016; Davidson et al., 2007). Moreover, to some extent as witnessed in some countries, discrimination of migrants and refugees, particularly in case of specific diseases, such as HIV, migrants and refugees may exist, as reported from France (Després and Couralet, 2011; Vignier et al., 2018; Hyde, 2016; Bozorgmehr and Razum, 2016; Nöstlinger et al., 2014; Douay et al., 2016). Moreover, despite the strong recommendation of the regional European WHO office, HIV services are not provided for refugees and migrants with uncertain legal status in some parts of the region (WHO-Europe, 2018). The report further stresses that these discrepancies among the member states of the regional organization is not only for HIV, but also for hepatitis B vaccination and other health services. Some member states provide vaccination only if there is a proven public health risk, in spite of the concern they may have to an individual patient.

Migrants to Europe are usually perceived to present with infectious diseases (IDs). Sub-Saharan African (SSA) migrants in particular, are usually diagnosed with neglected tropical diseases, soil-transmitted helminthes, sexually transmitted infections, intestinal

parasites, urinary parasites, and blood parasites (Douillet et al., 2017; Du et al., 2016; Jenkins-Holick and Kaul, 2013; Mbah et al., 2013). Example is the recently conducted helminthiasis infection study among African migrants in Sicily, Italy (Patamia et al., 2017). Likewise, within the frequently diagnosed imported IDs among newly arrived African migrants and refugees in Spain are *Trichuris trichiura*, *Ascaris lumbricoides*, schistosomiasis, strongyloidiasis, malaria, filariasis, chronic hepatitis virus infection, tuberculosis (active and latent), HIV and syphilis (Cobo et al., 2016a; Monge-Maillo et al., 2015a; Salas-Coronas et al., 2018; Vilajeliu Balagué et al., 2014). However, refugees and migrants may also be equally vulnerable to non-communicable chronic diseases (NCDs) in their new host countries (Pavli and Maltezos, 2017; Yun et al., 2012a).

Though the pre-migration health condition might influence the overall wellbeing of migrants and refugees, the life threatening arduous and long migration routes they overcome during their journey, is highly anticipated to have a decisive factor in the physical and mental health. The complicated and long migration route from the south for example, as it makes a transit through the Sahara desert and the Mediterranean Sea (figure 1.5) (IOM, 2017a), its implication of the post-migration health condition is unavoidable.



Source: IOM GMDAC, 2017.

Figure 1.5: African migration routes along the Sahara desert. Bold orange lines showing heavy controlled boards (Example, boarder between Eritrean and Ethiopia can be mentioned)

In general, apart from some studies on broader health perspectives (Boateng et al., 2017; Kunst et al., 2017; Vignier et al., 2017), there are few in-depth systematic analyses on the epidemiology and public health risk of imported diseases with African origin immigrants. Some of them reported potential risk of NCDs (Ayinde and Gillum, 2014), and others included chronic communicable diseases (Gibney et al., 2009a). For example, some European studies reported higher prevalence of several NCDs, such as diabetes, cardiovascular diseases, dyslipidemia, anxiety and depression disorders as well as Hepatitis B Virus (HBV) or Hepatitis C Virus (HCV) infection among immigrants as compared to natives (Hahné et al., 2013; Khyatti et al., 2014a).

1.3.1 Infectious diseases (IDs)

Migrants and refugees are exposed to burden of IDs. Hence, screening them at the portal of entry would spare them from unnecessary chronic sequel (Barnett, 2004). Among the frequently reported parasitic infections in immigrants from East Africa are schistosomiasis, malaria, hepatitis, syphilis, HIV, and others (Serre-Delcor et al., 2018; Lingscheid et al., 2017; Redditt et al., 2015b; Caruana et al., 2006a).

Despite unavailability of evidence regarding potential public health threat in the host countries from imported IDs, several refugees and migrants are pre-exposed to different IDs (Castelli and Sulis, 2017; Semenza et al., 2016; Stich, 2016). Example is the sudden upsurge of new Tuberculosis (TB) cases by 30% recorded in Germany in 2015, due to the large number of newly arrived refugees and migrants (Kupferschmidt, 2016). The European Center for Disease Prevention and Control (ECDC), an agency of the EU has recently listed specific IDs which are reported among major immigrant groups according to their country of origin as can be inferred from table 1.1 below (ECDC, 2015). An earlier systematic review from the UK reported the prevalence of TB, HBV and HIV among asylum seekers and refugees (Clark and Mytton, 2007). A study among unaccompanied minors showed a 15.3% prevalence of potentially contagious IDs (Theuring et al., 2016a). However, several of the IDs reported in immigrants (such as TB or HIV) are not uniformly distributed among the different migrant groups (ECDC, 2014a).

Malaria studies conducted in Sweden (Sonden et al., 2014a) and in Israel (Kopel et al., 2010a; Saidel-Odes et al., 2011a) showed high prevalence of *Plasmodium vivax* infection among newly arriving Eritrean refugees. According to the ECDC technical

report, migrants and refugees from Eritrea are among the migrants who account for the 90%-95% chronic hepatitis B and 55%-60% of syphilis in Norway and Sweden respectively (ECDC, 2014b).

Schistosomiasis is one of the neglected tropical diseases (NTDs) endemic to large parts of Africa. Globally, the blood Flukes (Trematodes) are responsible for the morbidity of more than 206 million people in the tropics, and almost 90% of these are in Africa (WHO, 2017a), where the prevalence rate can hit to 50% of the population (CDC, 2017). The WHO report further reveals that only less than half (89.2 million) of those were treated with a preventive chemotherapy, Praziquantel, in 2016. The most prevalent *Schistosoma* species in the SSA are *S. mansoni* and *S. haematobium* causing intestinal and urogenital schistosomiasis respectively (CDC, 2012). Moreover, according to the recent analysis of TropNet Surveillance Data on travelers and migrants for 14 years, schistosomiasis still remains a frequently diagnosed ID (Lingscheid et al., 2017). The report implies schistosomiasis prevalence among asymptomatic patients of 39.0% and 47.4% using serology and microscopy diagnostic procedures respectively.

A study from Monge-Maillo and colleagues reported 5.0% prevalence of schistosomiasis among SSA migrants and refugees (Monge-Maillo et al., 2015a). A 2013 report made by Health Grove on schistosomiasis in Eritrea shows a mortality rate of 0.4 per 100,000 people, similar to other eastern SSA countries (Health Grove, 2013). However, in regards to the years of healthy life lost due to schistosomiasis, for Eritrea remains high, as compared to the eastern SSA countries, with 454.9 and 337.8 per 100,000 people respectively. Moreover, a recent country profile for schistosomiasis

reported by the University of Stanford commented a chemotherapy treatment for 8.4% of the population (Stanford University, 2016).

Disease	Indicator	Syria	Afghanistan	Iraq	Eritrea	Somalia
Diphtheria [3]	Cases reported to WHO in 2012, 2013, 2014	0, 0, and NA	0, 0, 0	3, 4, and 5	8, 0 and NA	65, 7 and NA
Typhoid fever	Risk of typhoid	✓	✓	✓	✓	✓
Cholera*	Risk	No recent outbreak	Recurrent outbreaks	On-going outbreak in Baghdad, Babylon, Najaf, Qadisiyyah, and Muthanna.	NA	Recurrent outbreaks
Hepatitis A [†]	Risk	High endemicity	NA	High endemicity	High endemicity	High endemicity
Hepatitis E [†]	Risk	NA	NA	High endemicity	NA	High endemicity
Helminthiasis [§]	Risk of soil transmitted helminthiasis (ascaris, whipworm, hookworm)	+	++	+	++	++
	Risk of urinary schistosomiasis	✓	Non-endemic country	✓	✓	✓
Leishmaniasis**	Risk of cutaneous leishmaniasis	✓	✓	✓	✓	✓
	Risk of visceral leishmaniasis	✓	✓	✓	✓	✓
Hepatitis B ^{††}	Prevalence of chronic hepatitis B	Intermediate prevalence: 5.6%	High prevalence: 10.5%	Low prevalence: 1.3%	High prevalence: 15.5%	High prevalence: 12.4%
Hepatitis C ^{††}	Prevalence	High prevalence: 3.1%	High prevalence: 1.1%	High prevalence: 3.2%	High prevalence: 1%	NA
HIV	Prevalence	Low	NA	Low	Low	Low
Malaria ^{§§}	Risk of malaria	Malaria-free	Risk of <i>P. vivax</i> >> <i>P. falciparum</i>	Malaria-free	Risk of <i>P. falciparum</i> >> <i>P. vivax</i>	Risk of <i>P. falciparum</i>
Measles*	Incidence per 100 000 in 2013 and 2014	1.84 and 2.68	1.41 and 1.75	2.09 and 3.02	0.77 and 0.02	2.17 and 9.12
Polio ^{***}	Cases reported to WHO in 2012, 2013 and 2014	0, 35 and NA	46, 17, and 28	0, 0, and 2	0, 0, and 0	1, 195 and 5
Tuberculosis ^{†††}	Incidence/100 000	Low: 17	High: 189	Low: 25	High: 40 to 499	High: 285
Antimicrobial resistance	Risk of carriage of multidrug-resistance Gram-negative bacteria	NA	NA	NA	NA	NA
Rabies	Risk level for humans contracting rabies	High	High	High	High	High

Table 1.1: Infectious diseases to be considered among migrants and refugees in Europe, according to the country of origin

Some of the underdiagnosed chronic viral infections are HBV and hepatitis C virus (HCV) infections causing substantial morbidity and mortality among immigrants (Hladun et al., 2014a). In a study conducted in Spain, HBV-infection was reported 4.6 times higher in immigrants as compared to Spaniards, and 11.7 times higher among migrants from the SSA countries (Soler-González et al., 2013a). Similar figures are reported from Italy with about two thirds (67.8%) of the liver diseases diagnosed among African origin migrants (Affronti et al., 2014). Moreover, other European study conducted in the Netherlands, Belgium, England, Italy, and Spain, also showed higher HBV and HCV among the North African and SSA immigrants as compared to the native population (Khyatti et al., 2014a). However, despite the high prevalence of chronic viral hepatitis, nearly 65-75% patients chronically infected with virus are not aware of their infections till they get the stage of advanced liver disease (Fretz et al., 2013).

One of the contagious infectious diseases notoriously screened for in immigrants, is TB. Due to its high public health risk, it is frequently screened for among immigrants globally. Particularly, as it is more prevalent in Africa and Asia, refugees and migrants from these areas are more likely to be screened at arrival in their destination host countries. The cause for sudden tripling prevalence of TB in the Seattle-King country, in the USA, reported in 2001 was due to the recently migrated refugees and migrants from the horn African countries (Eritrea, Ethiopia and Somalia) (CDC, 2002). A population based cross-sectional study conducted in the UK disclosed that immigrants with previous contact to tuberculosis patients are at high risk of infection (Aldridge et al., 2016). For example, as it can be inferred from figure 1.6, immigrants to the UK from

Eritrea and Somalia had 658 and 181 bacteriologically confirmed cases per 100,000 individuals respectively, figure 1.6 (Aldridge et al., 2016).

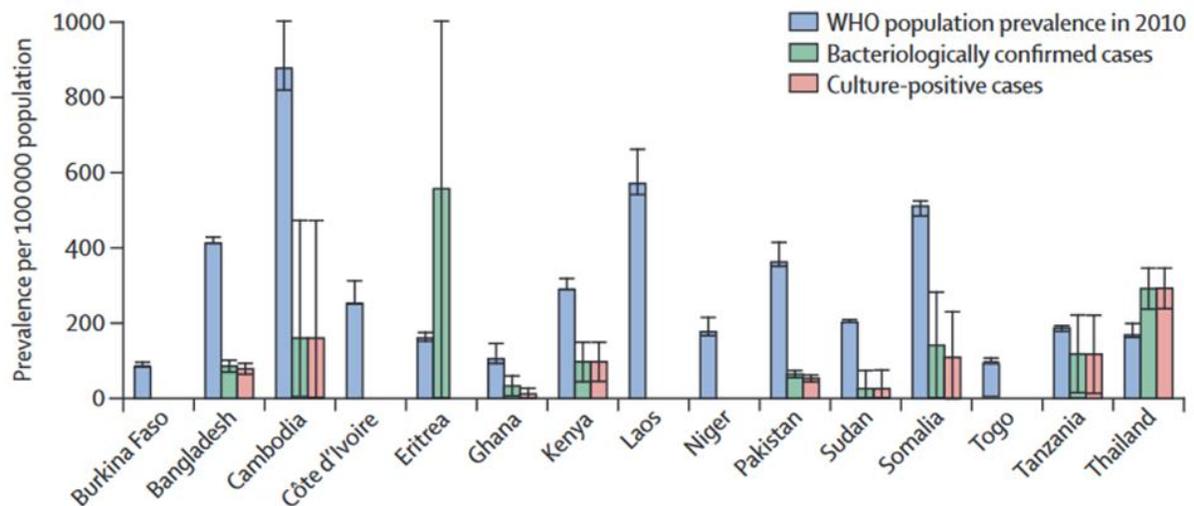


Figure 1.6: Age-adjusted and Sex-adjusted prevalence of bacteriologically confirmed and culture-positive tuberculosis at pre-entry screening, compared with 2010 WHO population prevalence estimates.

1.3.2 Non-communicable diseases (NCDs) and risk factors

Recently, increasing prevalence of NCDs in immigrants has been reported from several European countries (Modesti et al., 2014). Some of the NCDs reported among migrants in Europe include cardiac diseases, diabetes mellitus, psychiatric conditions, and rheumatologic conditions (Pavli and Maltezos, 2017). In addition, obesity, dyslipidemia, and arterial hypertension are among the reported risk factors (Affronti et al., 2014; Bennet et al., 2013; Hjern, 2012). A report from Sweden revealed that immigrants were particularly prone to risk-factors, such as smoking, diabetes and psychiatric disorders (Hjern, 2012). A comparative study between native residents and migrants from Iraq resulted higher level of cardiovascular disease due to the type II diabetes in the latter group (Bennet et al., 2013).

Vitamin D production is greatly affected by the amount of melanin pigment in the skin and the duration and intensity of exposure to the ultra-violet B (UVB) light in the sun (Holick et al., 2011b). Since the duration and intensity of UVB decreases from the equator toward the poles, lower production of vitamin D is anticipated, particularly during the winter season. Vitamin D plays an important role in the metabolic activities of the body, including bone and tooth health (Gallagher and Sai, 2010; O'Connor et al., 2013), insulin resistance (Hurskainen et al., 2012; Mezza et al., 2012), hypertension and other chronic diseases (Nicklas et al., 2011). Recent evidence also shows its effect on extracellular health such as cardiovascular diseases and airway infections (Holick, 2012; Zittermann et al., 2016).

As African migrants migrate northward, with the increase of latitude, they are less aware about the decreasing amount of sun exposure. As a result, they are more susceptible to a decreased vitamin D level (Eggemoen et al., 2013a; McGillivray et al., 2007a; van der Meer et al., 2011). Moreover, due to their dark skin, they require more sunshine exposure time for the production of vitamin D. Nevertheless, for cultural or/and safety or other reasons, many migrants hide and cover themselves and tend to avoid the exposure to the Sun and stay behind the doors (Benson and Skull, 2007a). An earlier study in refugee centers reported that 40-80% of the newly arrived immigrants had insufficient Vitamin D levels (Benson and Skull, 2007b).

The optimal amount of serum vitamin D level could be different according to the scales used to set the calibration. As a result, different scales of categorizing vitamin D level are applicable. The DACH (standing for Germany, Austria and Switzerland) reference value (German Nutrition Society, 2012), and the Institute of Medicine (IOM) in

the USA (Institute of Medicine (US) Committee to Review Dietary Reference Intakes for Vitamin D and Calcium, 2011a) consider serum 25(OH) D level of 50 nmol/L as appropriate or optimal or sufficient. However, according to the Endocrine Society, serum 25(OH) D levels between 52.5 nmol/L and 72.5 nmol/L are still insufficient (Holick et al., 2011a). In addition, though serum 25 (OH) D levels below 25nmol/L are generally considered as deficient, the Endocrine Society defines insufficiency below 50nmol/L.

East African migrants are also similarly exposed to several NCDs (Francis et al., 2014). Similarly, they are also exposed to several NCD risk factors during and after their migration. Refugees from horn of Africa living in Australia, 74% and 20% of females and males had vitamin D deficiency respectively (Erkal et al., 2006). Series of studies from Israel (Bursztyn and Raz, 1993) and the USA (Ghobadzadeh et al., 2014), have reported high prevalence of elevated blood pressure, dyslipidemia and impaired glucose among migrants and refugees from Ethiopia. Overweight among Somali immigrants was related to the length of stay in Norway (Gele and Mbalilaki, 2013). Similarly, the relationship of overweight and physical inactivity was reported among Sudanese and Moroccans immigrants (Toselli et al., 2014).

1.3.3 Mental health (MH)

In the post-migration life in the host country, the wellbeing of mental health is a crucial factor for migrants and refugees to be triumphant. The direct outcome will be a successful integration and assimilation into the community and become settled easily. Unfortunately the scar from the traumatic experience, weather it is from the pre-migration or during the arduous migration journey is likely to remain and persist. Hence, migrants are highly anticipated to present mental disorder symptoms. These symptoms

have been marked among several migrants. Some scholars also argue that mental health of refugees, particularly asylum seekers is more prevalent during the post-migration, where they are exposed to various stressors (O'Connell et al., 2016a).

Examples of the frequently diagnosed mental health conditions among immigrants include major depressive disorder, post-traumatic stress disorder (PTSD) and anxiety (Nakash et al., 2013; Schwarz-Nielsen and Elklitt, 2009) . A study conducted at a large emergency clinic in Switzerland revealed a fivefold increase of psychiatric morbidity among African refugees in the last ten years (Pfortmueller et al., 2012). Depressive disorders are more prevalent in first and second generation immigrants as compared to non-immigrants (Sieberer et al., 2012). Even psychiatric clinic study reports high prevalence of psychosis prevalence. A study among Somali refugees and non-Somali control group patients in the US showed higher rates of psychosis rate with 80% and 13.75% respectively (Kroll et al., 2011).

Moreover, a report from the UK National Health Services (NHS) on treatments and care for trafficked people revealed that among the trafficked females and male, 70% and 40% respectively, reported either anxiety, depression or PTSD (NHS, 2015). Females are more prone to traumatic events and stressors than compatriot male refugees. A comparison study on refugee and non-refugee females revealed that the former group are more prone to mental illness in their post-migration status (Hollander et al., 2011). Majority of the refugees and migrants, both adults and children, who arrived in Germany had traumatic experience (Abbott, 2016). Some of the frequently diagnosed traumatic events are listed in table 1.2.

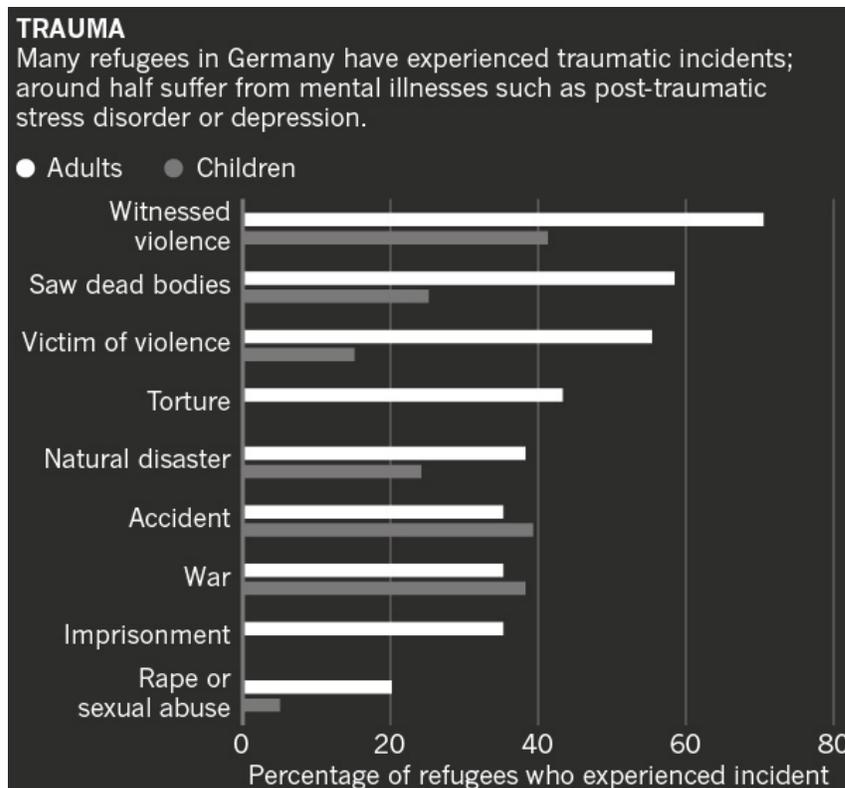


Table 1.2: Traumatic exposures of recently migrated refugees and migrants in Germany

As often foreseen in many least and middle income countries (LMIC), similar to other health care service facilities, the mental health care service setting in developing countries is even less prioritized. Likewise, the case in Eritrea cannot be expected to be different from others. The WHO, department of mental health and substance abuse, country report on the organization and service provided for mental health in Eritrea reveals that only one hospital provides mental health services in Eritrea (WHO, 2011). Nonetheless, apart from few studies that investigate domestic mental health and resilience (Almedom et al., 2005; Gruber, 2005; Almedom, 2004), and handful international perspectives, focusing on refugees and migrants (Nakash et al., 2015a, 2015b; Burki, 2015), there is no in-depth investigation and understanding of the mental health health of Eritreans neither within inside nor outside the country.

Chapter Two: Aim and Objectives

3.1 Rationale

The Eritrean refugees and migrants make the largest group of migrants in Switzerland. Nevertheless, their health condition, on arrival and post integration, is poorly understood. In addition, considering the ill health they might have due to the poor health system and access to health facilities in their home country makes them prime target to investigate their health condition on their arrival. Moreover, during their long and extended migration route to Europe, since they are exposed to the natural and man-made life challenging and threatening conditions, their health status is expected to be depleted further. Adding to these, the poor health care systems of the countries they come across during their journey, which in turn prevent and/or prohibit them from getting even the basic health care services, would further worsen the already weak health of these refugees and migrants.

Investigating and understanding health conditions of newly arrived migrants and refugees at an earlier stage, will have dual significant contribution to the public health of the host countries. First, screening and diagnosing imported IDs, can benefit patients by providing timely treatment and preventing from advanced and complicated diseases in later stage. Second, public health can also benefit from interrupting and controlling of possible transmission and re-infection of imported IDs into the general public. In addition, it can also reduce unnecessary cost of treating complicated sequel of simple and treatable IDs.

3.2 Aim

The overall aim of the Immigrant Health Study Switzerland (IHSS) is to assess selected infectious and non-communicable health conditions and their risk factors among newly arrived asymptomatic refugees and migrants from Eritrea.

3.3 Specific objectives

- To assess the prevalence of the following infectious diseases at arrival in Switzerland
 - Chronic hepatitis B and C infection,
 - HIV infection
 - *Treponema pallidum* (Syphilis) infection
 - Schistosoma infection
 - Strongyloides infection
 - Intestinal infection from helminthes
 - Intestinal infection from protozoans
 - Malaria
- To assess the following metabolic conditions at arrival and two years after arrival in Switzerland
 - Serum 25(OH) vitamin D level
 - Blood lipid panel (cholesterol, low density lipoprotein [LDL], high density lipoproteins [HDL], triglycerides)
 - Blood-sugar level (glycated hemoglobin [HbA1c])
 - Changes in blood-pressure level at arrival and two years after arrival in Switzerland.

- Changes in body mass index (BMI) within on arrival and post-migration.
- To assess general laboratory markers at arrival and two years after arrival in Switzerland
 - Hemoglobin
 - Count of eosinophilia blood cells
- To assess the prevalence of the following mental health conditions at arrival and two years after arrival in Switzerland
 - Alcohol use disorder
 - Anxiety disorder
 - Depression
 - Post-traumatic stress disorder
- To assess the resilience ability at arrival and two years after arrival in Switzerland

Chapter Three: Method

The study had encompassed three major components. First, in order to have a broader and in-depth understanding of the current trend of African and African origin migrants and refugees health situation, an extensive Systematic Reviews and Meta-analysis was conducted. The review embraced peer reviewed online published scientific articles within the last 17 years, extending from 2000 to 2017 inclusive. Second, within the IHSS study, health assessment of newly arrived Eritrean refugees and migrants was conducted using a cross-sectional study. Third, a follow-up cohort study to the IHSS study was conducted after one year from the baseline line assessment.

3.1 Systematic review and Meta-Analysis

The Systematic Review and Meta-Analysis was performed to retrieve online published articles, excluding non-article materials. Three major search engines were used for this purpose. These are EMBASE, PubMed, and ISI Web of Science. Total of 1, 577 articles published from first January 2000 till 31st July 2017 were retrieved. Out of these, 37.5% were from EMBASE, 34.4% from PubMed, and 28.1% from ISI Web of Science.

The overall detailed methodology is summarized in flow-chart below (Figure 3.1). The six major infectious diseases among African and African origin migrants and refugees reviewed systematically were syphilis, intestinal helminthes, schistosomiasis, intestinal protozoans, hepatitis B virus and hepatitis C virus. The respective schematic flow-chart for individual infectious disease is presented in the appendix 11.1. The systematic review and meta-analysis was based on the PRIMA guidelines (PRISM, 2015).

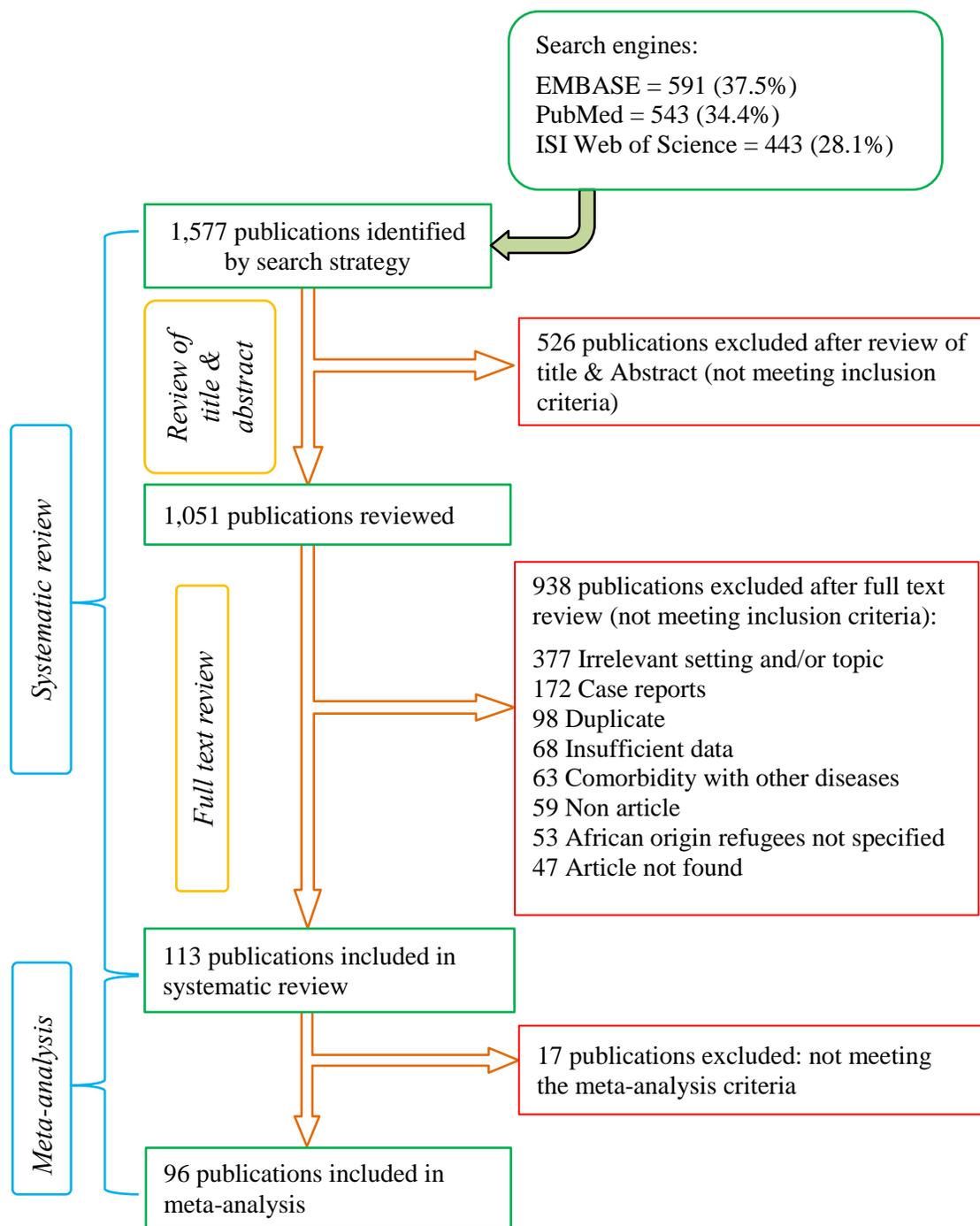


Figure 3.1: Flow-chart for the overall summary procedures followed in the Systematic Review and Meta-Analysis

3.2 Immigrant Health Study Switzerland (IHSS)

3.2.1 Study design

According to the research project proposal developed, the Immigrant Health Study Switzerland (IHSS) project, had two major screening components to investigate the health of recently arrived refugees from Eritrea in Switzerland. First, screening of commonly reported IDs among asymptomatic Eritrean refugees and migrants recently arrived in Switzerland, at baseline. Second, assessing non-communicable diseases (NCDs) including mental health condition and their risk factors among the refugees and migrants, both at the baseline and cohort follow-up of one year. In addition, pathological findings from the IDs at the baseline were further followed in the cohort study.

3.2.2 Setting

The study was conducted in two cantons (canton Basel-Stadt and canton Basel-Landschaft) in the northwest part of Switzerland. Baseline study was conducted between January 2016 and October 2016. Asymptomatic Eritrean refugees were recruited through the registries from the refugees and migrants assistant office in both cantons. The follow-up was conducted from July 2017 to January 2018. The biological sample collection and interviews were conducted at the Swiss Tropical and Public Health Institute (Swiss TPH). The detail about the recruitment process is presented in the graphical presentation in the figure 3.2.

3.2.3 Participants

The immigrant health study Switzerland (IHSS) study involved refugees and migrants who arrived recently, less than two years in the host country, Switzerland. Newly arrived refugees and migrants were approached through the social assistant offices in both

cantons, Basel-Stadt and Basel-Landschaft. The registries from the respective offices provided a list of newly arrived Eritrean refugees and migrants and their postal address. The lists were filtered out for potential IHSS project participants aged 16 years old and above for both males and females participants.

Invitation letter for participation in the IHSS was written in English and Tigrigna (local Eritrean language), and was mailed per post with contact address including telephone number from our institute, the Swiss Tropical and Public Health (Swiss TPH) Institute in Basel.

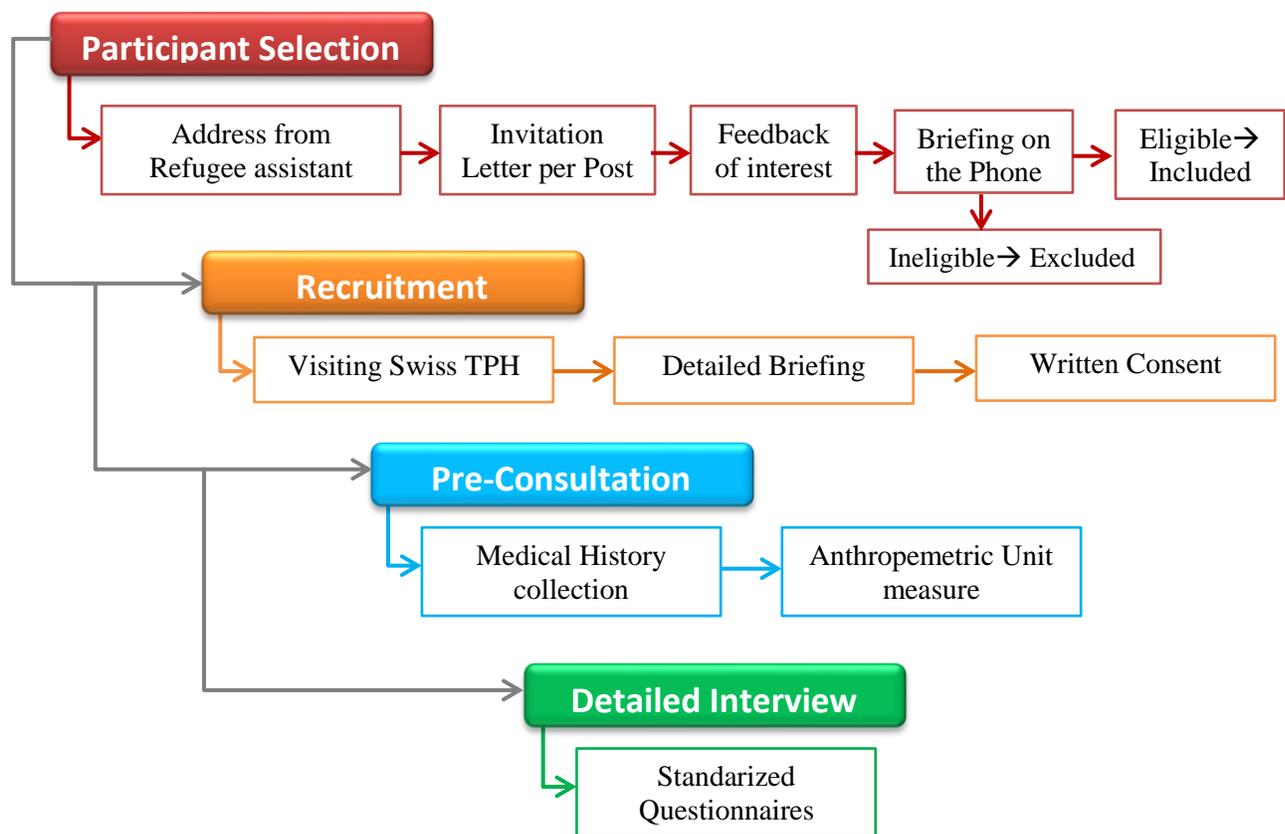


Figure 3.2: Recruitment and data collection procedure frame-work

Interested potential study participants responded to the invitation, and then they were introduced on the objective and aim of the study on the phone. Then, after the

arranged visit to our institute and briefed on the procedures and protocols of the study and the eligibility criteria for participation, eligible and asymptomatic study participants were recruited voluntary. Following the collection of written consent, participants went through medical history collection and data collection. The brief summary of the recruitment procedure is sketched on the diagram above (Figure 3.2).

3.2.4 Variables

Venous blood samples were collected for whole blood sample analysis and EDTA and serum collection for vitamin D, lipid panel, and glycated hemoglobin (glucose) analysis at the University hospital laboratory. Morning urine was collected for the rapid urine test, the point-of-care circulating cathodic antigen (POC-CCA) assay (Rapid Diagnostics, 2016a) to test schistosomiasis infection.

For the detection of intestinal parasitic helminthes and protozoans three distinctive diagnostic tools were applied. First two stool sedimentations each 10.0g from different day for microscopic egg identification was used. Second for serological assays, two enzyme-linked immunosorbent assay (ELISA) one for adult worm and another for egg identification and a confirmatory immunofluorescent test (IFAT) were used.

Anthropometrical units such the weight (kg), height (cm), waist circumference (cm), and the blood pressure (mm Hg) were collected. Moreover, using self-developed structured questionnaire, additional relevant medical information were also gathered during the visits.

To screen the mental health conditions, alcohol abuse disorder, and resilience ability of the refugees, four standardized questionnaires were applied. Alcohol Use

Disorders Identification Test (AUDIT) (Thomas F. Babor et al., 2001), Patient Health Questionnaire Somatic Anxiety and Depression Syndrome (PHQ-SADS) package (Spitzer et al., n.d.), the Post-traumatic stress disorder check list-civilian version (PTSD-CL-S) (The University of Maelbourne, 1991), and the 14-Item Resilience Scale (RS-14) (“Resilience Scale 14 Survey « Resilience Scale,” n.d.). The PHQ-SADS package was composed of three components, patient health questionnaire-15 (PHQ-15), generalized anxiety disorder-7 (GAD-7), and the patient health questionnaire-9 (PHQ-9).

Detailed procedures for respective objectives are listed on the published, submitted, and/or under review manuscripts produced from the study. Manuscripts are presented in the result section (please see chapter four through chapter nine).

An additional manuscript, one of the four nested studies within the IHSS, investigating the social resilience and mental health using an in-depth qualitative interview among the sub-group of the study participant is supplemented at the appendix section (please see chapter 11.3). This manuscript entitled as: ‘Social Resilience and Mental Health among Eritrean Asylum-Seekers in Switzerland’ is submitted to the Qualitative Health Research (QHR) journal.

3.3 Data Analysis and statistics

All data were collected on paper-forms and subsequently entered into a spread sheet and then after recorded into EpiInfo version 7 (Centers for Disease Control and Prevention, CDC, 1600 Clifton Road Atlanta, USA) using double data-entry for analysis. Statistical analysis applied is descriptive. Continuous variables are reported as median with inter-quartile range (IQR); prevalence is reported as percentage with 95%

confidence-intervals (95%CI). Linear and logistic regression analyses were performed to model the relationship in mental health disorders. In addition, correlations (r) were also computed.

Furthermore, to test the significances, relevant statistical tests such as Pearson Chi-Square test (X^2), Fischer exact test (F), Kappa test (k), and Paired t-test (t) and others were also conducted as needed. Analyses were run on Stata version 13 (Stata Corp LP, College Station, USA) and R Studio (R Studio, Inc. Boston, USA).

3.4 Ethical clearance

The study protocol was approved by the institutional research commission of the Swiss Tropical and Public Health Institute (Swiss TPH, Basel, Switzerland; reference no. FK 120; approval date: June 24, 2015) and the ethics committee of Northwest and Central Switzerland (reference no. EKNZ 2015-353; approval date: November 20, 2015). Participation was voluntary, and hence, people could withdraw from the study at any time without further obligations. Data were processed anonymously.

Chapter Four: Result part-1: Review

Prevalence rates of six selected infectious diseases among African migrants and refugees: a systematic review and meta-analysis

Afona Chernet^{1,2}, Jürg Utzinger^{1,2}, Véronique Sydow^{1,2}, Nicole Probst-Hensch^{1,2}, Daniel H. Paris^{1,2}, Niklaus D. Labhardt^{1,2,3}, Andreas Neumayr^{1,2§}

¹ Swiss Tropical and Public Health Institute, Basel, Switzerland

² University of Basel, Basel, Switzerland

³ Division of Infectious Disease and Hospital Epidemiology, University Hospital Basel, Basel, Switzerland



REVIEW

Prevalence rates of six selected infectious diseases among African migrants and refugees: a systematic review and meta-analysis

A. Chernet^{1,2} · J. Utzinger^{1,2} · V. Sydow^{1,2} · N. Probst-Hensch^{1,2} · D. H. Paris^{1,2} · N. D. Labhardt^{1,2,3} · A. Neumayr^{1,2}

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Abstract The objective of this paper was to systematically review the literature on the prevalence of selected infectious diseases among migrants/refugees of African origin and to provide policy makers and health care professionals with evidence-based information. We pursued a systematic review and meta-analysis to determine the prevalence of six selected infectious diseases (i.e., syphilis, helminthiasis, schistosomiasis, intestinal protozoa infections, hepatitis B, and hepatitis C) among migrants/refugees of African origin. Three electronic databases (i.e., PubMed, EMBASE, and ISI Web of Science) were searched without language restrictions. Relevant data were extracted and random-effects meta-analyses conducted. Only adjusted estimates were analyzed to help account for heterogeneity and potential confounding. We assessed the quality of evidence using the GRADE approach. The results were stratified by geographical region. Ninety-six studies were included. The evidence was of low quality due to the small numbers of countries, infectious diseases, and participants included. African migrants/refugees had median (with 95% confidence interval [95% CI]) prevalence for syphilis, helminthiasis, schistosomiasis, intestinal protozoa infection, hepatitis B, and hepatitis C of 6.0% [95% CI: 2.0–7.0%],

13.0% [95% CI: 9.5–14.5%], 14.0% [95% CI: 13.0–17.0%], 15.0% [95% CI: 10.5–21.0%], 10.0% [95% CI: 6.0–14.0%], and 3.0% [95% CI: 1.0–4.0%], respectively. We found high heterogeneity regardless of the disease (I^2 ; minimum 97.5%, maximum 99.7%). The relatively high prevalence of some infectious diseases among African migrants/refugees warrants for systematic screening. The large heterogeneity of the available published data does not allow for stratifying such screening programs according to the geographical origin of African migrants/refugees.

Introduction

According to the latest United Nations High Commissioner for Refugees (UNHCR) annual report, the global number of internally displaced people (refugees remaining within the borders of their home countries) and externally displaced people (refugees leaving their home countries) has steadily increased over the past several years [1]. In 2016, an estimated 65.5 million people were displaced globally and forced migrants accounted for about a third (22.5 million) of the displaced population [2]. The sub-Saharan African refugee population has increased by 16% in 2015, to reach 5,135,500 [2].

In their country of origin, throughout the course of migration, and in the host country, African migrants may be exposed to various infectious diseases, such as soil-transmitted helminthiasis [3], schistosomiasis [4], vector-borne diseases [5, 6], bacterial infection [7], and blood-borne viruses [8]. Whereas helminth infections and vector-borne diseases are usually acquired either in the country of origin or during migration, migrating populations may remain vulnerable to acquisition of blood-borne viruses on their way to and in their new host country [9, 10].

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s10096-017-3126-1>) contains supplementary material, which is available to authorized users.

✉ A. Neumayr
andreas.neumayr@swisstph.ch

¹ Swiss Tropical and Public Health Institute, P.O. Box CH-4002, Basel, Switzerland

² University of Basel, Basel, Switzerland

³ Division of Infectious Disease and Hospital Epidemiology, University Hospital Basel, Basel, Switzerland

Abstract:*Objectives:*

To systematically review the literature on the prevalence of selected infectious diseases among migrants/refugees of African origin and to provide policy makers and health care professionals with evidence-based information.

Methods:

We pursued a systematic review and meta-analysis to determine the prevalence of six selected infectious diseases (i.e. syphilis, helminthiasis, schistosomiasis, intestinal protozoa infections, hepatitis B, and hepatitis C) among migrants/refugees of African origin. Three electronic databases (i.e. PubMed, EMBASE, and ISI Web of Science) were searched without language restrictions. Relevant data were extracted and random-effects meta-analyses conducted. Only adjusted estimates were analyzed to help account for heterogeneity and potential confounding. We assessed the quality of evidence using the GRADE approach. Results were stratified by geographical region.

Results:

Ninety-six studies were included. The evidence was of low quality due to the small numbers of countries, infectious diseases, and participants included. African migrants/refugees had median (with 95% confidence interval [95%CI]) prevalence for syphilis, helminthiasis, schistosomiasis, intestinal protozoa infection, hepatitis B, and hepatitis C of 6.0% [95% CI: 2.0-7.0%], 13.0% [95% CI: 9.5-14.5%], 14.0% [95% CI: 13.0-17.0%], 15.0% [95% CI: 10.5-21.0%], 10.0% [95% CI: 6.0-14.0%] and 3.0% [95% CI: 1.0-4.0%], respectively. We found high heterogeneity regardless of the disease (I^2 ; minimum 97.5%, maximum 99.7%).

Conclusions:

The relatively high prevalence of some infectious diseases among African migrants/refugees warrants for systematic screening. The large heterogeneity of the available published data does not allow stratifying such screening programs according to the geographical origin of African migrants/refugees.

Key words

Africa, Meta-analysis, Migrants, Refugees, Screening, Systematic review

Introduction

According to the latest United Nations Higher Commission for Refugees (UNHCR) annual report, the global number of internally displaced people (refugees remaining within the borders of their home countries) and externally displaced people (refugees leaving their home countries) has steadily increased over the past several years (“UN_International Migration Report 2015,” n.d.). In 2016, an estimated 65.5 million people were displaced globally and forced migrants accounted for about a third (22.5 million) of the displaced population (UNHCR, 2017b). The sub-Saharan African refugee population has increased by 16% in 2015 to reach 5,135,500 (UNHCR, 2017b).

In their country of origin, throughout the course of migration and in the host country, African migrants may be exposed to various infectious diseases, such as soil-transmitted helminthiasis (Theuring et al., 2016b), schistosomiasis (Afontcha Chernet et al., 2017b), vector-borne diseases (Goldenberger et al., 2015a; Roggelin et al., 2016a), bacterial infection (Jaton et al., 2016a), and blood borne viruses (Daw et al., 2016a). Whereas helminthes infections and vector-borne diseases are usually acquired either in the country of origin or during migration, migrating populations may remain vulnerable to acquisition of blood borne viruses on their way to and in their new host country (Kramer et al., 2014; Tanser et al., 2015).

As many forced migrants are fleeing from conflict or war distressed regions, a high proportion is traumatized by the conditions they left behind. Additionally, due to the length of the routes they followed and the challenges they faced on their way, most of them suffer additional traumatization. Several studies assessing the post-traumatic mental health condition of migrants highlighted that mental health has become the

single most important public health issue in migration medicine (Alpak et al., 2015a; Bogic et al., 2015; Buhmann, 2014; Fu et al., 2007; Lolk et al., 2016; Schouler-Ocak et al., 2015; Slobodin and de Jong, 2015).

Infectious diseases imported by African immigrants may pose a challenge to physicians and health systems in host countries (Utzinger et al., 2012; Cuenca-Gómez et al., 2016a). Some imported infectious diseases (e.g. hepatitis B, hepatitis C, syphilis, and schistosomiasis) may remain asymptomatic for months or years, whilst early diagnosis and treatment may prevent complications in later life and keep transmission at bay in the host country. Interestingly, only 56% of EU/EFTA countries dispose of national infectious diseases screening guidelines for immigrants. All existing national guidelines include a form of tuberculosis screening. However, beyond tuberculosis screening, European guidelines for screening are very diverse; 60% include infectious diseases other than tuberculosis, such as blood borne viruses, hepatitis B and C, or parasitic infections (Kärki et al., 2014a). The diversity between national guidelines may reflect a lack of evidence on the public health importance of specific infectious diseases among migrants.

Although asymptomatic chronic infectious diseases may be relevant for the patient as well as the patient's social environment, it is important to critically review the prevalence of such diseases in different refugee and migrant populations in order to decide on and stratify screening investigations, respectively. Such data will allow drawing rational decisions on whether or not and which populations to screen for a particular infectious disease, thereby avoiding unnecessary costs and straining of the health system. To support health care policy makers compiling evidence-based

infectious diseases screening recommendations for refugee and migrant populations of African origin, we pursued a systematic review and meta-analysis on the prevalence of selected chronic infectious diseases that may remain asymptomatic over years among African immigrants into Europe.

Methods

In this systematic review and meta-analysis, records on six selected infectious diseases among African migrants/refugees were retrieved and reviewed: chronic viral hepatitis B, chronic viral hepatitis C, helminthiasis infections with soil-transmitted helminthes (*Ascaris lumbricoides*, hookworm, and *Trichuris trichiura*), schistosomiasis (infections with blood flukes of the genus *Schistosoma*), intestinal protozoa infection (e.g. *Entamoeba histolytica* and *Giardia intestinalis*), and syphilis. We intentionally did not include tuberculosis, as this disease has received considerable attention and, indeed, most countries have national screening recommendations for tuberculosis in the refugee and migrant populations in place.

Although large-scale migration from Africa to Europe is a relatively new phenomenon (observed over the past 3-4 years), we included a longer time span in an effort to document not only the most recent trends, but to generate more robust and representative data. Doing so also enhanced our statistical power for analysis. Three electronic databases (i.e. PubMed, EMBASE, and ISI Web of Science) were searched for articles, with no language restriction, published between January 1, 2000 and July 31, 2017. We used the MeSH terms 'Africa', 'African', 'migrant', 'refugee', 'immigrant', 'hepatitis', 'syphilis', 'schistosomiasis', 'parasites', and 'helminthes'.

All retrieved articles were reviewed and included in the analysis if a proportion or prevalence (in percentage or in numbers) of at least one of the aforementioned infectious diseases were reported. Review articles, editorials, letters to the editor, poster abstracts, case reports, book chapters, case series, and studies with less than 10 individuals, as well as duplicated studies, were excluded. In addition, articles addressing co-morbidity with any of the aforementioned infectious diseases (e.g. prevalence of syphilis among HIV/AIDS patients), studies dealing with internally displaced refugees due to natural disasters, and studies dealing with special groups (e.g. commercial sex workers and drug users) were excluded. Our inclusion criteria were as follows: (i) studies dealing and/or including African and African origin migrants and refugees; (ii) sample size ≥ 10 participants; (iii) studies reporting prevalence of the selected infectious diseases; and (iv) studies, published online as full text within the selected study period.

The consistency of the reviewed online published articles was measured using the heterogeneity score (I^2) from the meta-analysis (Israel and Richter, 2011; Sedgwick, 2015). Studies with $I^2 > 50\%$ are usually considered to be inconsistent.

The quality of evidence was assessed using the GRADE approach (“What is GRADE?,” n.d.). In brief, we use three criteria (C1 to C3). These are the number of African countries represented in the study (C1), number of infectious diseases covered (C2), and sample size of African and African origin migrants and refugees (C3). On a scale ranging from 1 to 4, studies including < 5 , 5-9, 10-15, and > 15 African countries, were scored as very low, low, moderate, and high quality, respectively. Similar scales were also used for the number of infectious diseases studied. In regards to the sample

size, studies involving ≤ 100 , 101-500, 501-1,000, and $>1,000$ were scored from 1 to 4, respectively.

Two authors (AC and AN) independently reviewed all articles retrieved. Discrepancies were resolved through discussion with other co-authors.

The prevalence rates of the investigated infectious diseases were summarized by calculating medians and ranges. The 95% confidence interval (CI) was computed from the median score of the upper and lower limits of the meta-analysis. For the subsequent meta-analyses, the data were stratified by northern African migrants and sub-Saharan African migrants using forest plot presentation. Data were analyzed and presented using Stata version 13 (StataCorp LP; College Station, TX, USA).

Reporting in this manuscript follows the PRISMA guideline for transparent reporting of systematic review and meta-analysis (<http://www.prisma-statement.org/>)

Results

Figure 4.1 shows the study flowchart. Our systematic review yielded 1,577 publications of which 120 articles fulfilled the pre-defined inclusion criteria. 96 of these articles were eligible, and hence, included in the subsequent meta-analyses.

Supplementary figures 1-5 depict the search and review process according to the selected infectious diseases. Tables 1-6 summarize the extracted data of the individual infectious diseases and show their prevalence rates as well as ranges, stratified by geographic origin (northern Africa and sub-Saharan African refugee/migrant populations). The blood borne viruses; syphilis, HBV, and HCV were less prevalent (median prevalence: 4.6% [range: 0.0-8.6%], 10.5% [1.1-67.6%], and 3.4% [0.4-

15.6%]), than the water-based and/or soil-transmitted parasitic infections; helminthiasis, schistosomiasis, and infection from intestinal protozoa (median prevalence: 13.2% [range: 0.4-49.1%], 13.8% [1.5-64.0%], and 17.0% [2.5-56.0%]), among African and African origin migrants and refugees.

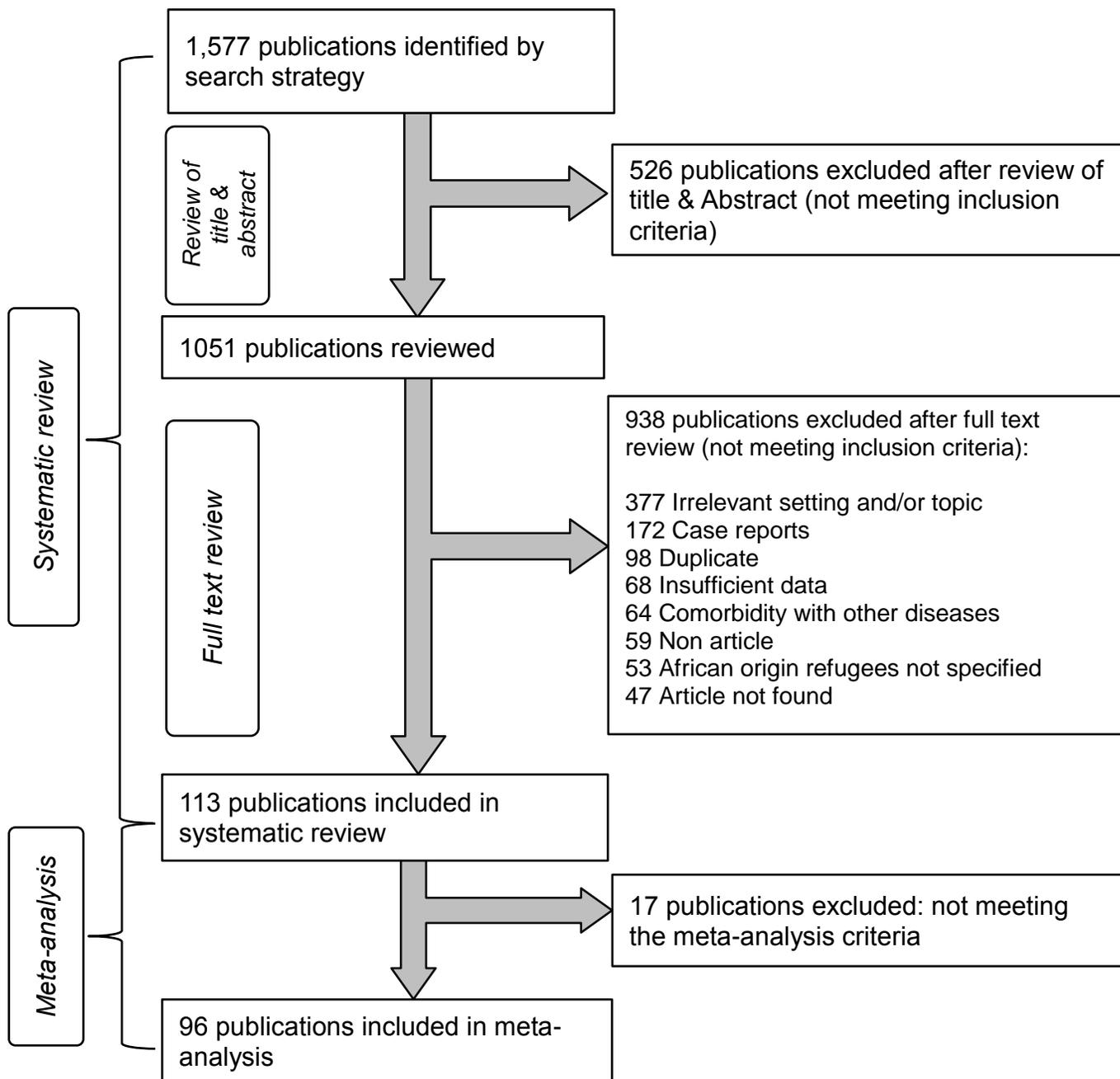


Figure 4.1: summary of literature search strategy/ flow chart

Syphilis		African refugees (irrespective of geographic origin)			sub-Saharan African refugees (SSA)			North African refugees (NA)			Ref.	
Author	Year of publication	No. of individuals tested for Syphilis	No. of individuals tested positive for Syphilis	%	No. of individuals tested for Syphilis	No. of individuals tested positive for Syphilis	%	No. of individuals tested for Syphilis	No. of individuals tested positive for Syphilis	%		
1	Cobo F. et al.	2016	2185	179	8.2	1930	162	8.4	255	17	6.7	[S1]
2	Nyangoma E. N. et al.	2016	37628	418	1.1	37628	418	1.1	–	–	–	[S2]
3	Monge-Maillo B. et al.	2015	298	7	2.3	298	7	2.3	–	–	–	[S3]
4	Belhassen-Garcia M. et al.	2015	319	5	1.5	–	–	–	–	–	–	[S4]
5	Gibson-Helm M. et al.	2014	2173	100	4.6	812	4	0.5	1361	86	7.5	[S5]
6	Olshtain-Pops K. et al.	2014	678	33	4.9	678	33	4.9	–	–	–	[S6]
7	Padovese V. et al.	2014	500	11	2.2	500	11	2.2	–	–	–	[S7]
8	Bocanerga C et al.	2014	372	32	8.6	354	31	8.7	81	1	5.5	[S8]
9	Hladun O et al.	2014	17	1	5.8	–	–	–	–	–	–	[S9]
10	Soler-Gonzalez J. et al.	2013	9488	635	6.7	3731	308	8.3	5757	327	5.7	[S10]
11	Zermiani M. et al.	2012	286	7	2.4	–	–	–	–	–	–	[S11]
12	Sampedro A. et al.	2010	4171	146	3.5	–	–	–	–	–	–	[S12]
13	Sheikh M. et al.	2009	172	0	0	172	0	0	–	–	–	[S13]
14	Manzardo C. et al.	2008	2464	158	6.4	2464	158	6.4	–	–	–	[S14]
15	Távora-Tavira L. et al.	2007	220	9	4.1	220	9	4.1	–	–	–	[S15]
16	Martin J. A. et al.	2006	1577	93	5.9	1201	82	6.8	376	11	2.9	[S16]
17	del Amo J. et al.	2005	24	2	8.3	24	2	8.3	–	–	–	[S17]
Median prevalence [range]:				4.6	[0.0 – 8.6]	4.9	[0.0 – 8.7]	5.7	[2.9-7.5]			

Table 4.1: Systematic review on syphilis

Intestinal Helminths	African refugees (irrespective of geographic origin)			sub-Saharan African refugees (SSA)			North African refugees (NA)			Ref.			
	Author	Year of publication	No. of individuals tested for Helminths	No. of individuals tested positive for Helminths	%	No. of individuals tested for Helminths	No. of individuals tested positive for Helminths	%	No. of individuals tested for Helminths		No. of individuals tested positive for Helminths	%	
1	Abu-Madi MA. et al.	2016	261	14	5.4	123	6	4.9	138	8	5.8	[S18]	
2	Serre Delcor N. et al.	2016	171	48	28.1	171	48	28.1	–	–	–	[S19]	
3	Belhassen-Gracia M et. al.	2016	231	1	0.4	164	1	0.6	64	0	0	[S20]	
4	Abdel Hamis MM. et al.	2015	171	48	32.6	171	48	32.6	–	–	–	[S21]	
5	McCathy AE. et al.	2013	2804	370	13.2	2301	256	11.1	503	114	23	[S22]	
6	Swanson SJ. et al.	2012	18666	406	2.2	18666	406	2.2	–	–	–	[S23]	
7	Abu-Madi MA. et al.	2011	424	56	13.2	220	42	19.1	204	14	6.9	[S24]	
8	Abu-Madi MA. et al.	2008	175	12	6.9	175	12	6.9	–	–	–	[S25]	
9	Posey DL. et al.	2007	562	276	49.1	562	276	49.1	–	–	–	[S26]	
10	Gbakima AA. et al.	2007	581	97	16.7	581	97	16.7	–	–	–	[S27]	
11	Mohammed AZ. et al.	2007	80	34	42.5	80	34	42.5	–	–	–	[S28]	
12	Varkey P et. al.	2007	1547	203	13.1	–	–	–	–	–	–	[S29]	
13	Caruana SR. et al.	2006	124	19	15	124	19	15	–	–	–	[S30]	
14	Garg PK. et al.	2005	142	12	8.5	–	–	–	–	–	–	[S31]	
15	Anosike JC. et al.	2005	755	66	8.7	755	66	8.7	–	–	–	[S32]	
16	Geltman PL. et al.	2003	1254	174	14	–	–	–	–	–	–	[S33]	
17	Roca C. et al	2002	1321	200	15.2	1321	200	15.2	–	–	–	[S34]	
Median prevalence [range]:					13.2	[0.4 – 49.1]				15.1	[0.6 – 49.1]	6.35	[0.0-23.0]

Table 4.2: Systematic review on infections from intestinal helminths

Schistosomiasis		African refugees (irrespective of geographic origin)			sub-Saharan African refugees (SSA)			North African refugees (NA)			Ref.	
Author	Year of publication	No. of individuals tested for Schistosoma	No. of individuals tested positive for Schistosoma	%	No. of individuals tested for Schistosoma	No. of individuals tested positive for Schistosoma	%	No. of individuals tested for Schistosoma	No. of individuals tested positive for Schistosoma	%		
1	Baltrame A. et al.	2017	373	127	34	374	127	34	–	–	–	[S73]
2	Chernet A. et al.	2017	107	63	59	107	63	59	–	–	–	[S74]
3	Martelli G. et al.	2017	393	27	6.9	323	25	7.7	70	2	2.9	[S75]
4	Serre Delcor N. et al.	2016	171	48	28.1	171	48	28.1	–	–	–	[S19]
5	Monipierre O. et al.	2016	167	12	7.2	–	–	–	–	–	–	[S35]
6	Cobo F. et al.	2016	2185	278	12.7	1930	278	14.4	255	0	0	[S1]
7	Monge-Maillo B. et al.	2015	317	19	5.9	317	19	5.9	–	–	–	[S3]
8	Bocanerga C et al.	2014	260	36	13.8	260	36	13.8	–	–	–	[S8]
9	McCathy AE. et al.	2013	2804	370	13.2	2301	256	11.1	503	114	23	[S22]
10	Norman FF. et al.	2010	1862	27	1.5	1810	26	1.4	52	1	1.9	[S36]
11	Sheikh M. et al.	2009	168	37	22	168	37	22	–	–	–	[S13]
12	Gibney KB. et al.	2009	206	84	40.8	206	84	40.8	–	–	–	[S37]
13	Brodine SK. et al.	2009	171	46	26.9	171	46	26.9	–	–	–	[S38]
14	Franco-Paredes C. et al.	2007	42	27	64	42	27	64	–	–	–	[S39]
15	Posey DL. et al.	2007	562	299	53	562	299	53	–	–	–	[S26]
16	Varkey P et al.	2007	1547	203	13.1	–	–	–	–	–	–	[S29]
17	Tiong AC. et al.	2006	217	27	12	217	27	12	–	–	–	[S40]
18	Caruana SR. et al.	2006	124	14	11	124	14	11	–	–	–	[S30]
19	Roca C. et al	2002	1321	200	15.2	1321	200	15.2	–	–	–	[S34]
Median prevalence [range]:				13.8	[1.5 – 64.0]	15.2	[1.4 – 64.0]	2.4	[0.0- 23.0]			

Table 4.3: Systematic review on schistosomiasis

Intestinal protozoa		African refugees (irrespective of geographic origin)			sub-Saharan African refugees (SSA)			North African refugees (NA)			Ref.	
Author	Year of publication	No. of individuals tested for Parasites	No. of individuals tested positive for Parasites	%	No. of individuals tested for Parasites	No. of individuals tested positive for Parasites	%	No. of individuals tested for Parasites	No. of individuals tested positive for Parasites	%		
1	Martelli G. et. al.	2017	405	21	5.2	330	20	6.1	75	1	1.3	[S75]
2	Serre Delcor N. et al.	2016	180	65	36.8	180	65	36.8	–	–	–	[S19]
3	Abu-Madi MA. et al.	2016	261	58	22.2	123	21	17.1	138	37	26.8	[S18]
4	Belhassen-Gracia M et. al.	2016	231	17	7.4	167	9	5.3	64	8	12.5	[S20]
5	Cobo F et. al.	2016	2185	102	4.7	1930	86	4.5	255	16	6.3	[S1]
6	Monge-Maillo B. et al.	2009	1564	162	10.4	1564	162	10.4	–	–	–	[S41]
7	Gibney KB. et al.	2009	145	71	49	145	71	49	–	–	–	[S37]
8	Tiong AC. et al.	2006	193	30	16	193	30	16	–	–	–	[S40]
9	Caruana SR. et al.	2006	77	17	22	77	17	22	–	–	–	[S30]
10	Martin Sánchez AM. et al.	2004	121	3	2.5	121	3	2.5	–	–	–	[S42]
11	Geltman PL. et al.	2003	1254	702	56	1254	702	56	–	–	–	[S33]
12	Rice JR et. al.	2003	133	24	18	133	24	18	–	–	–	[S43]
13	Westerhuis JB and Mark TG	2002	956	132	13.8	956	132	13.8	–	–	–	[S44]
14	Miller JM et. al.	2000	337	128	38	337	128	38	–	–	–	[S45]
Median prevalence [range]:				17.0	[2.5 – 56.0]	16.6	[2.5 – 56.0]	9.4	[1.3–26.8]			

Table 4.4: Systematic review on infections from intestinal protozoa

Table 7 presents results from a subgroup analysis of intestinal protozoa infection in the two populations. The median prevalence of amoebiasis and flagellates among sub-Saharan Africans were 5.3% [range: 1.7-11.0%] and 4.7% [2.5-9.0%] respectively.

Figures 4.2- 4.7 show the results of the meta-analyses, displayed as forest plots. Prevalence of the selected infectious diseases among African and African origin refugees and migrants was computed in median proportion. The median (with 95% confidence interval [95%CI]) prevalence for syphilis, helminthiasis, schistosomiasis, intestinal protozoa infection, hepatitis B, and hepatitis C were; 6.0% [95% CI: 2.0-7.0%], 13.0% [95% CI: 9.5-14.5%], 14.0% [95% CI: 13.0-17.0%], 15.0% [95% CI: 10.5-21.0%], 10.0% [95% CI: 6.0-14.0%], and 3.0% [95% CI: 1.0-4.0%], respectively.

Geographical stratification of the systematic review on the selected infectious diseases shows that parasitic infections (i.e. helminthiasis, schistosomiasis and intestinal protozoa) are relatively more prevalent among the sub-Saharan African compared to the North African origin refugees and migrants. For syphilis, the median prevalence and range among the North Africans and sub-Saharan Africans were 5.7% [range: 2.9-7.5%] and 4.9% [0.0-8.7%], respectively; for helminthiasis it was 6.4% [0.0-23.0%] and 15.1% [0.6-49.1%], respectively; for schistosomiasis it was 2.4% [0.0-23.0%] and 15.2% [1.4-64.0%], respectively; for intestinal protozoa infection it was 9.4% [1.3-26.8%] and 16.6% [2.5-56.0%], respectively; for HBV it was 3.3% [0.0-15.9%] and 13.6% [2.0-67.5%], respectively; and for HCV) it was 2.2% [0.0-15.6%] and 3.1% [0.1-13.6%], respectively.

Hepatitis B virus		African refugees (irrespective of geographic origin)			sub-Saharan African refugees (SSA)			North African refugees (NA)			Ref.	
Author	Year of publicatio n	No. of individual s tested for Hepatitis B	No. of individual s tested positive for Hepatitis B	%	No. of individuals tested for Hepatitis B	No. of individual s tested positive for Hepatitis B	%	No. of individua ls tested for Hepatitis B	No. of individual s tested positive for Hepatitis B	%		
1	Cella E. et al.	2017	136	16	11.7	136	16	11.7	–	–	–	[S76]
2	Coppola N. et al.	2017	752	96	12.8	665	93	14	87	3	3.5	[S77]
3	Jablonka A. et al.	2017	55	4	7.3	55	4	7.3	–	–	–	[S79]
4	Serre Delcor N. et al.	2016	180	27	14.8	180	27	14.8	–	–	–	[S19]
5	Shankar H et. al.	2016	919	88	9.6	–	–	–	–	–	–	[S46]
6	Russo Gianluca et. al.	2016	217	47	21.7	–	–	–	–	–	–	[S47]
7	Cuenca-Gomez JA et. al.	2016	2818	51	2	2209	48	2.2	309	3	1	[S48]
8	Cobo F. et. al.	2016	2185	601	27.5	1930	575	29.8	255	26	10.2	[S1]
9	Coppola N. et al.	2015	524	66	12.6	444	62	14	80	2	2	[S49]
10	Cochrane A. et al.	2015	1965	50	2.5	1884	49	2.6	81	1	1.2	[S50]
11	Monge-Maillo B. et al.	2015	317	44	14	317	44	14	–	–	–	[S3]
12	Belhassen-Garcia M. et al.	2015	304	15	4.9	239	15	6.3	65	0	0	[S20]
13	Redditte VJ et. al.	2015	320	10	3	320	10	3	–	–	–	[S51]
14	Bocanerga C. et al.	2014	367	49	13.4	349	48	13.7	18	1	5.5	[S8]
15	Mixon-Hayden T. et al.	2014	707	410	58	707	410	58	–	–	–	[S52]
16	Stornaiuolo G. et al.	2014	2198	206	7.6	2198	206	7.6	–	–	–	[S53]
17	Padovese V. et al.	2014	500	31	6.2	500	31	6.2	–	–	–	[S7]
18	Hladun O et. al.	2014	18	1	5.5	–	–	–	–	–	–	[S9]
19	Gibson-Helm M et. al.	2014	2173	106	4.9	812	16	2	1361	90	6.6	[S5]
20	Rivas P. et al.	2013	1493	126	8.4	1493	126	8.4	–	–	–	[S54]
21	Soler-Gonzalez J. et al.	2013	933	74	7.9	444	67	15.9	489	7	1.4	[S10]
22	Papadakis G et. al.	2013	333	19	5.7	–	–	–	–	–	–	[S55]
23	Zuure FR et. al.	2013	465	5	1.1	–	–	–	465	5	1.1	[S56]
24	McCarthy AE et. al.	2013	2804	371	13.2	2301	291	12.6	503	80	15.9	[S22]
25	Fasano M et. al.	2013	212	36	17	161	30	18.6	61	6	11.8	[S57]
26	Zermiani M. et al.	2012	286	11	3.85	–	–	–	–	–	–	[S11]
27	Aparicio C. et al.	2012	166	13	7.8	166	13	7.8	–	–	–	[S58]
28	Shire AM et. al.	2012	1109	151	13.6	1109	151	13.6	–	–	–	[S59]
29	Bocanerga C. et al.	2011	52	8	14.9	52	8	14.9	–	–	–	[S60]
30	Salas J et. al.	2011	510	137	26.7	510	137	26.7	–	–	–	[S61]

31	Tafari S. et al.	2010	520	44	8.3	–	–	–	–	–	–	[S62]
32	Rein DB et. al.	2010	3028	246	8.1	2964	240	8.1	531	63	11.8	[S63]
33	Monge-Maillo B. et al.	2009	1564	153	9.8	1564	153	9.8	–	–	–	[S41]
34	Museru O. et al.	2009	74	17	23	74	17	23	–	–	–	[S64]
35	Gibney KB. et al.	2009	167	32	19.2	167	32	19.2	–	–	–	[S37]
36	Majori S. et al.	2008	182	123	67.6	182	123	67.6	–	–	–	[S65]
37	Manzardo C. et al.	2008	463	137	29.6	380	134	35.3	83	3	3	[S14]
38	Pottie K. et al.	2007	100	6	6	100	6	6	–	–	–	[S66]
39	Franco-Paredes C. et al.	2007	31	10	32	31	10	32	–	–	–	[S39]
40	Tavora-Tavira L. et al.	2007	220	13	5.9	220	13	5.9	–	–	–	[S15]
41	Lopez-velez R et. al.	2003	512	47	10.5	–	–	–	–	–	–	[S67]
42	Lifson AR. et al.	2002	1869	469	25.1	1869	469	25.1	–	–	–	[S68]
43	Huerga H & Lopèz-velez R	2002	124	19	15	–	–	–	–	–	–	[S69]
44	Aweis D. et al.	2001	439	25	5.7	439	25	5.7	–	–	–	[S70]
Median prevalence [range]:					10.2	[1.1 – 67.6]		13.6	[2.0 – 67.5]		3.25	[0.0- 15.9]

Table 4.5: Systematic review on chronic hepatitis B virus (HBV) infection

Hepatitis C virus		African refugees (irrespective of geographic origin)			sub-Saharan African refugees (SSA)			North African refugees (NA)			Ref.	
Author	Year of publication	No. of individuals tested for Hepatitis C	No. of individuals tested positive for Hepatitis C	%	No. of individuals tested for Hepatitis C	No. of individuals tested positive for Hepatitis C	%	No. of individuals tested for Hepatitis C	No. of individuals tested positive for Hepatitis C	%		
1	Greenway C. et al.	2017	407	46	11.3	152	12	7.9	255	34	13.3	[S78]
2	Jablonka A. et al.	2017	55	1	1.8	55	1	1.8	–	–	–	[S79]
3	Serre Delcor N. et al.	2016	180	2	1.2	180	2	1.2	–	–	–	[S19]
4	Daw MA. et al.	2016	14205	1161	8.2	11074	847	7.6	3131	314	10	[S71]
5	Russo Gianluca et. al.	2016	214	5	2.3	–	–	–	–	–	–	[S47]
6	Cuenca-Gomez JA et. al.	2016	2814	68	2.4	2505	68	2.7	309	0	0	[S48]
7	Cobo F. et. al.	2016	2185	61	2.8	1930	61	3.2	255	0	0	[S1]
8	Coppola N. et al.	2015	524	19	3.6	444	17	4	80	2	2	[S49]
9	Monge-Maillo B. et al.	2015	317	4	1.3	317	4	1.3	–	–	–	[S3]
10	Belhassen-Garcia M. et al.	2015	301	7	2.3	235	5	2.1	66	2	3	[S20]
11	Redditte VJ et. al.	2015	311	1	3	311	1	0.3	–	–	–	[S51]
12	Bocanerga C. et al.	2014	369	27	7.3	351	27	7.6	18	0	0	[S8]
13	Stornaiuolo G. et al.	2014	2198	84	3.1	2198	84	3.1	–	–	–	[S53]
14	Padovese V. et al.	2014	500	3	0.6	500	3	0.6	–	–	–	[S7]
15	Hladun O et. al.	2014	20	1	5	–	–	–	–	–	–	[S9]
16	Perumalswami PV et. al.	2014	192	30	15.6	–	–	–	192	30	15.6	[S72]
17	Mixson-Hayden T et. al.	2014	707	6	0.9	707	6	0.9	–	–	–	[S52]
18	Gibson-Helm M et. al.	2014	2173	24	1.4	812	1	0.1	1361	23	1.7	[S5]
19	Zuure FR. et al.	2013	465	11	2.4	–	–	–	465	11	2.4	[S56]
20	Rivas P. et al.	2013	1493	141	9.4	1493	141	9.4	–	–	–	[S54]
21	Soler-Gonzalez J. et al.	2013	808	11	1.4	409	7	1.7	399	4	1	[S10]
22	Papadakis G et. al.	2013	333	14	4.2	–	–	–	–	–	–	[S55]
23	McCarthy AE et. al.	2013	2804	112	4	2301	90	3.9	503	25	5	[S22]
24	Fasano M et. al.	2013	206	9	4.4	159	3	1.9	47	6	12.8	[S57]
25	Zermiani M. et al.	2012	286	1	0.4	–	–	–	–	–	–	[S11]
26	Aparicio C. et al.	2012	166	6	3.6	166	6	3.6	–	–	–	[S58]
27	Shire AM et. al.	2012	1109	15	13.6	1109	151	13.6	–	–	–	[S59]
28	Bocanerga C. et al.	2011	52	4	7.1	52	4	7.1	–	–	–	[S60]
29	Tafuri S. et al.	2010	520	24	4.5	–	–	–	–	–	–	[S62]
30	Gibney KB. et al.	2009	233	8	3.4	233	8	3.4	–	–	–	[S37]
31	Majori S. et al.	2008	182	5	2.7	182	5	2.7	–	–	–	[S65]
32	Manzardo C. et al.	2008	1149	39	3.4	1079	38	3.5	70	1	1.1	[S14]
33	Lopez-velez R et. al.	2003	446	46	9	–	–	–	–	–	–	[S67]
Median prevalence [range]:				3.4	[0.4 – 15.6]	3.1	[0.1 – 13.6]	2.2	[0.0-15.6]			

Table 4.6: Systematic review on chronic hepatitis C virus (HCV) infection

Computation of meta-analysis revealed large heterogeneity scores. The overall measure of heterogeneity (I^2) among the selected infectious diseases was consistently above 95%. In addition, diverse distribution of intestinal protozoa infection was perceived among the migrants/refugees from sub-Saharan Africa and North Africa regions. The former had more of amoebiasis type [median: 5.3%], while the later were more flagellate type [median: 11.7%] (Table 7).

The overall median for assessing the quality of the studies using the three criteria C1, C2, and C3, was 2.0 [IQR: 1.5-2.5], indicating a low quality. Since more than half (44 out of 79) of the reviewed studies did not list the individual African countries, instead, mentioned as North African and sub-Saharan countries, the last two criteria, C2 and C3 were more relevant. Even so, the median of the quality was similar with a score of 2.0 [IQR: 1.5-2.5].

Discussion

Our systematic review and meta-analysis revealed considerably more publication coverage of blood borne viruses (e.g. syphilis) and chronic viral hepatitis B and C than water-based and/or soil-transmitted parasitic infectious diseases. Interestingly though, the prevalence of these infectious diseases showed a different picture; while the median prevalence of syphilis, hepatitis B, and hepatitis C were 4.4%, 10.5%, and 3.4%, respectively, the median prevalence of schistosomiasis, helminthiasis, and intestinal protozoa infection were 13.8%, 13.6%, and 17.0%, respectively.

Subgroup analysis	Sub-Saharan Africa (SSA)									North Africa (NA)								
	year	Amoebiasis			Flagellates			Amebae			Flagellates							
		species	N	n	%	species	N	n	%	species	N	n	%	species	N	n	%	
1	Belhassen-Gracia M. et al.	2017	<i>E. histolytica/ E. dispar</i>	167	3	1.7	<i>G. lamblia</i>	167	9	5.3	<i>E. histolytica/ E. dispar</i>	64	2	3.1	<i>G. lamblia</i>	64	8	12.5
2	Serre Delcor N. et al.	2016	<i>G. lamblia</i>	171	10	5.9												
3	Abu-Madi MA. et al.	2016	<i>E. nana</i>	123	11	8.9	<i>C. mensili</i>	123	5	4.1	<i>E. nana</i>	138	6	4.4	<i>C. mensili</i>	138	15	10.9
4	Belhassen-Gracia M et. al.	2016	<i>E. histolytica/ E. dispar</i>	167	3	1.8	<i>G. lamblia</i>	167	6	3.6	<i>E. histolytica/ E. dispar</i>	64	0	0	<i>G. lamblia</i>	64	8	12.5
5	Cobo F et. al.	2016	<i>E. histolytica/ E. dispar</i>	1,930	213	11.0	<i>G. lamblia</i>	1,930	86	4.5	<i>E. histolytica/ E. dispar</i>	255	34	13.3				
6	Monge-Maillo B. et al.	2009					<i>G. lamblia</i>	1,564	69	4.4								
7	Gibney KB. et al.	2009	<i>E. histolytica/ E. dispar</i>	145	4	2.8	<i>G. lamblia</i>	145	10	6.9								
8	Caruana SR. et al.	2006	<i>E. histolytica/ E. dispar</i>	117	4	3.4	<i>G. lamblia</i>	117	6	5.1								
9	Martin Sánchez AM. et al.	2004					<i>G. lamblia</i>	121	3	2.5								
10	Geltman PL. et al.	2003	<i>E. histolytica/ E. dispar</i>	789	42	5.3	<i>G. lamblia</i>	789	107	13.6								
11	Westerhuis JB & Mark TG	2002	<i>E. histolytica/ E. dispar</i>	956	84	8.8	<i>G. lamblia</i>	956	48	5.0								
12	Miller JM et. al.	2000	<i>E. histolytica/ E. dispar</i>	412	13	3.2	<i>G. lamblia</i>	413	37	9.0								
Total				4,810	384	51.1		6,325	377	58.6		457	40	17.7		202	23	23.4
Median						5.3				4.7				4.4				11.7
Range						[1.7-11.0]				[2.5-9.0]				[0.0-13.3]				[10.9-12.5]

Table 4.7: Subgroup analysis of intestinal protozoa

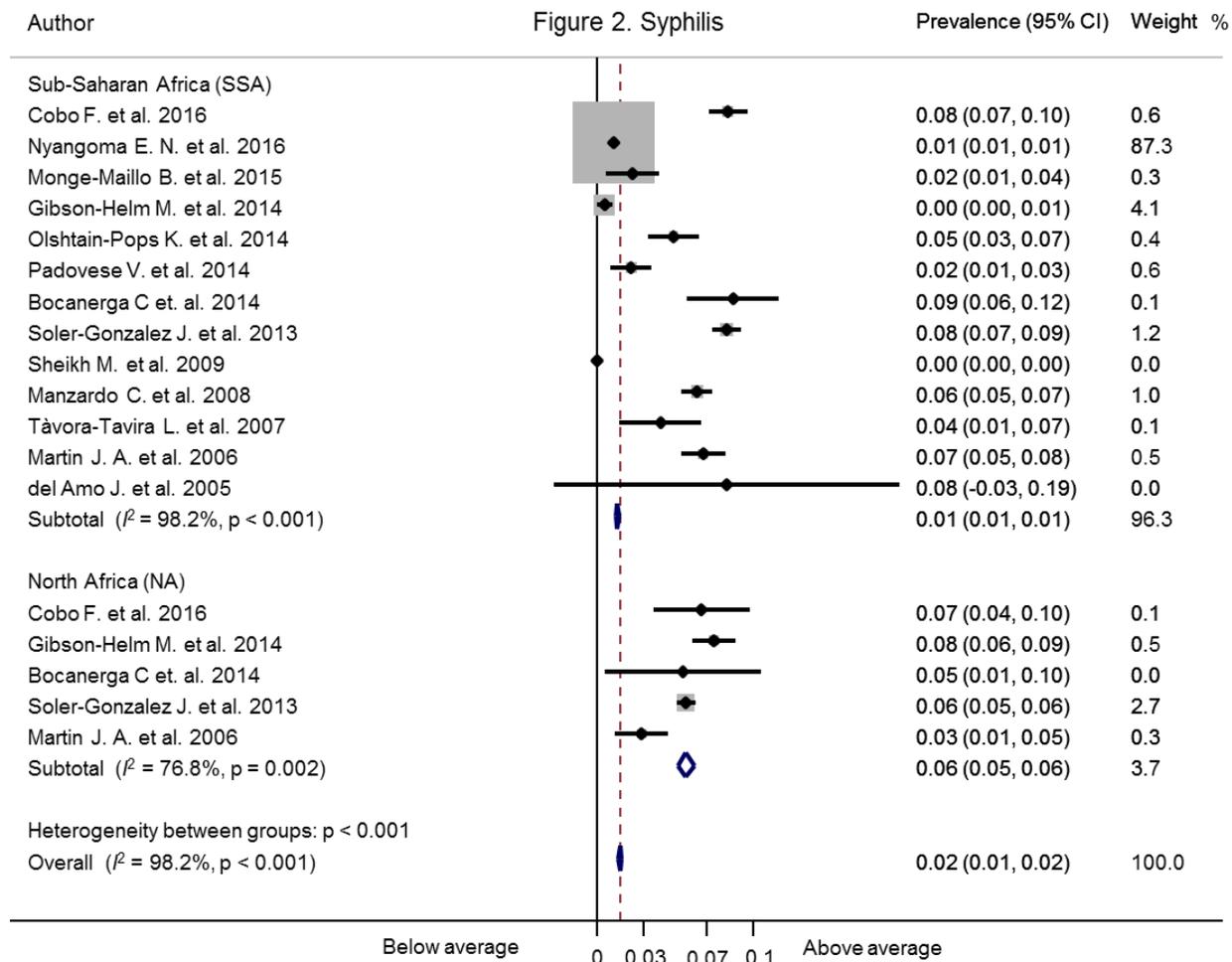


Figure 4.2: Meta-Analysis on syphilis.

Prevalence of the disease (in percentage) is presented in a Forest plot presentation according to their geographical location, as sub-Saharan (SSA) and North Africa (NA). Filled squares and the horizontal lines indicate weight (in %) and 95% CI for each individual study. Open diamond summarizes prevalence of the disease in their respective region. And the broken vertical line indicates the overall average prevalence of syphilis among African origin migrants and/or refugees.

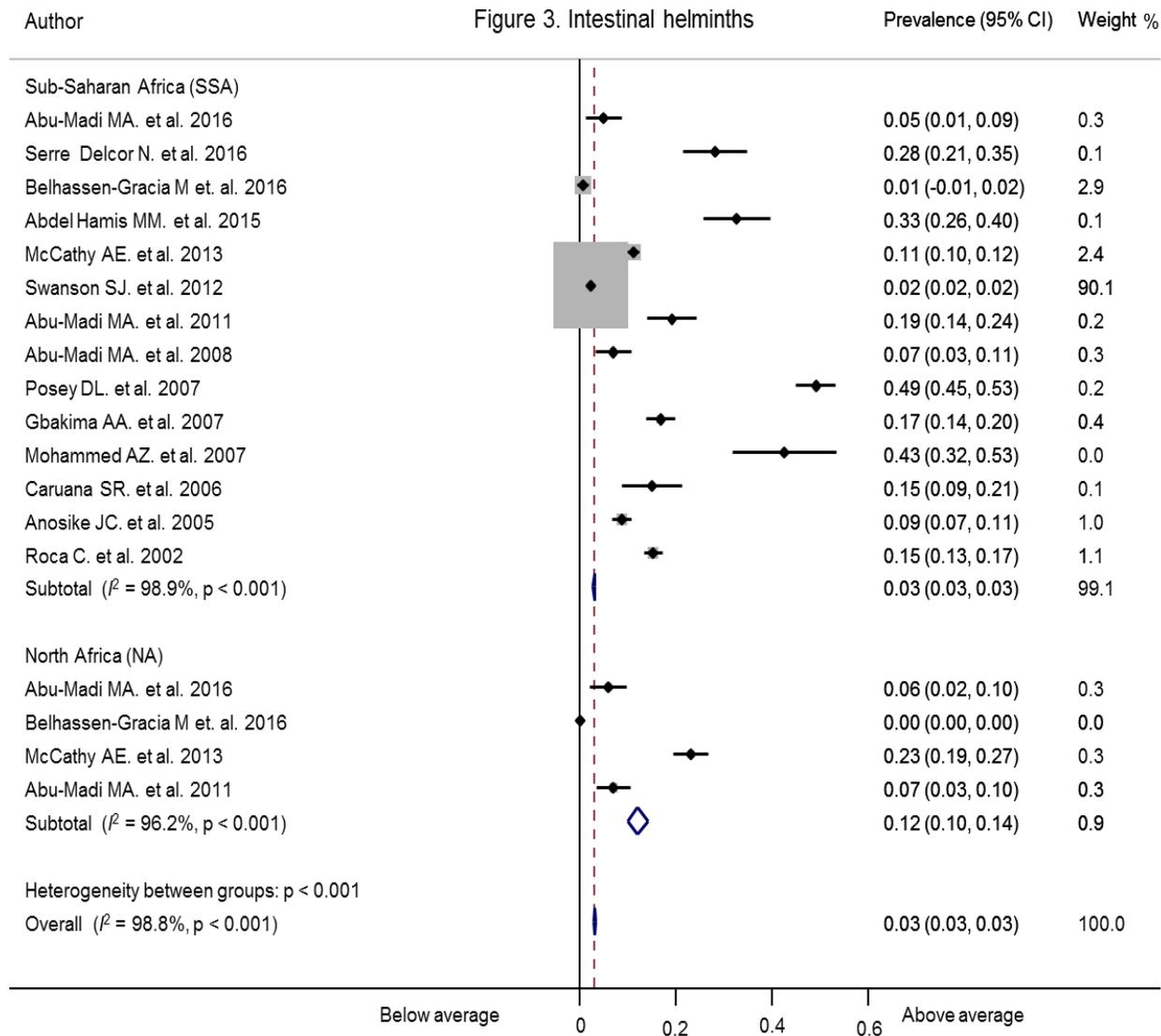


Figure 4.3: Meta-Analysis on infection from intestinal helminths.

Prevalence of the diseases (in percentage) is presented in a Forest plot presentation according to their geographical location, as sub-Saharan (SSA) and North Africa (NA). Filled squares and the horizontal lines indicate weight (in %) and 95% CI for each individual study. Open diamond summarizes prevalence of the disease in their respective region. And the broken vertical line indicates the overall average prevalence of intestinal helminthic infection among African origin migrants and/or refugees.

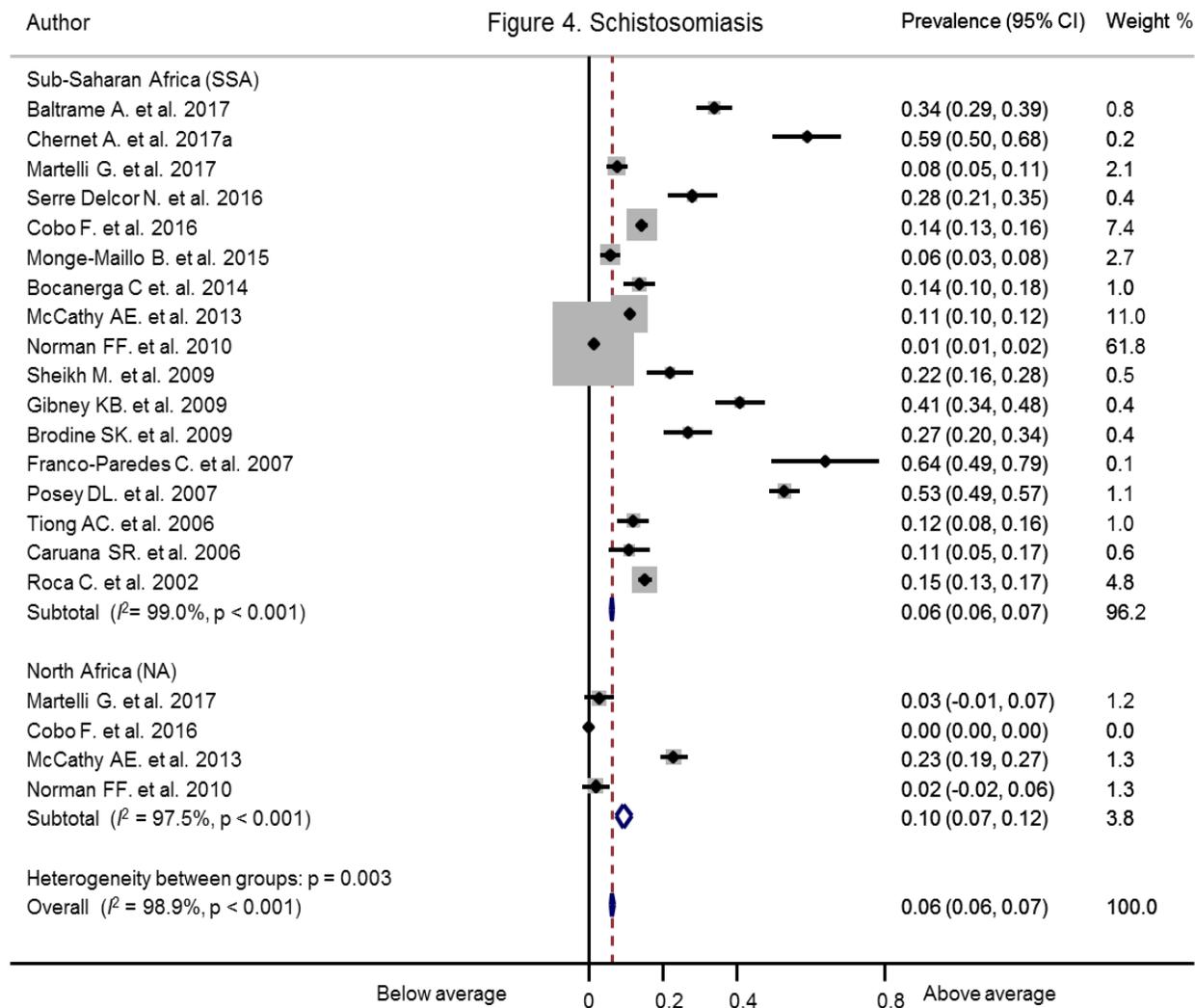


Figure 4.4: Meta-Analysis on schistosomiasis.

Prevalence of the disease (in percentage) is presented in a Forest plot presentation according to their geographical location, as sub-Saharan (SSA) and North Africa (NA). Filled squares and the horizontal lines indicate weight (in %) and 95% CI for each individual study. Open diamond summarizes prevalence of the disease in their respective region. And the broken vertical line indicates the overall average prevalence of schistosomiasis among African origin migrants and/or refugees.

The discrepancy between publication coverage and prevalence of infectious diseases in refugee and migrant populations is most likely explained by their perceived relevance for public health in the host countries. While blood borne viruses depict a risk on population level, the transmission cycle of most parasitic diseases is interrupted in the new environment of the host countries (due to better hygiene conditions and interrupted exposure risk, as well as climatic suitability such as in the case of schistosomiasis) and, thus, parasitic infections are confined to the individual patient and only pose a minimal risk for the general population (Lai et al., 2015a; Pullan and Brooker, 2012; Strunz et al., 2014). In addition, most intestinal parasitic diseases are not considered to cause relevant morbidity, which would urge physicians to screen for them. Nevertheless, some parasitic diseases, such as chronic schistosomiasis, cause substantial morbidity (Colley et al., 2014a) and might warrant screening in refugee/migrant populations stemming from endemic areas (Afonso Chernet et al., 2017b).

We found differences in the prevalence rates of the investigated infectious diseases when stratified by geographic origin: North Africa *versus* sub-Saharan Africa (Tables 1-6). However, it deserves consideration that several factors may have affected the comparability of the reported data. Examples are differences in demographic structure, diversity of study participants (migrants'/refugees' origin, differences in age and sex distributions) and study design (clinical studies enrolling symptomatic patients *versus* epidemiological studies enrolling asymptomatic individuals). Moreover, differences in diagnostic methods (e.g. type of tests, number of biological samples subjected to

laboratory examination) may also have significantly skewed the reported prevalence rates (Knopp et al., 2008a).

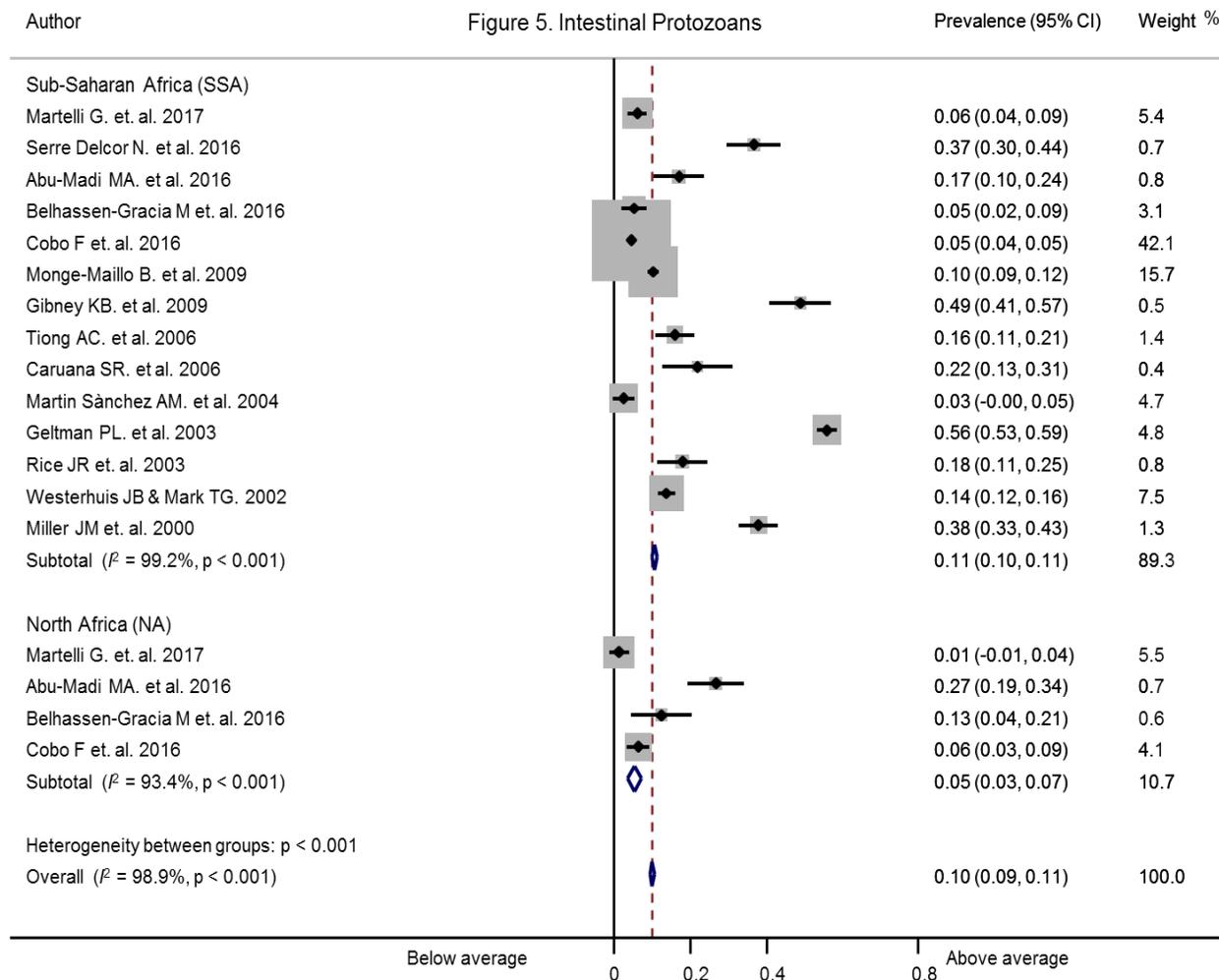


Figure 4.5: Meta-Analysis on infections from intestinal protozoans.

Prevalence of the diseases (in percentage) is presented in a Forest plot presentation according to their geographical location, as sub-Saharan (SSA) and North Africa (NA). Filled squares and the horizontal lines indicate weight (in %) and 95% CI for each individual study. Open diamond summarizes prevalence of the disease in their respective region. And the broken vertical line indicates the overall average prevalence of intestinal protozoans' infections among African origin migrants and/or refugees.

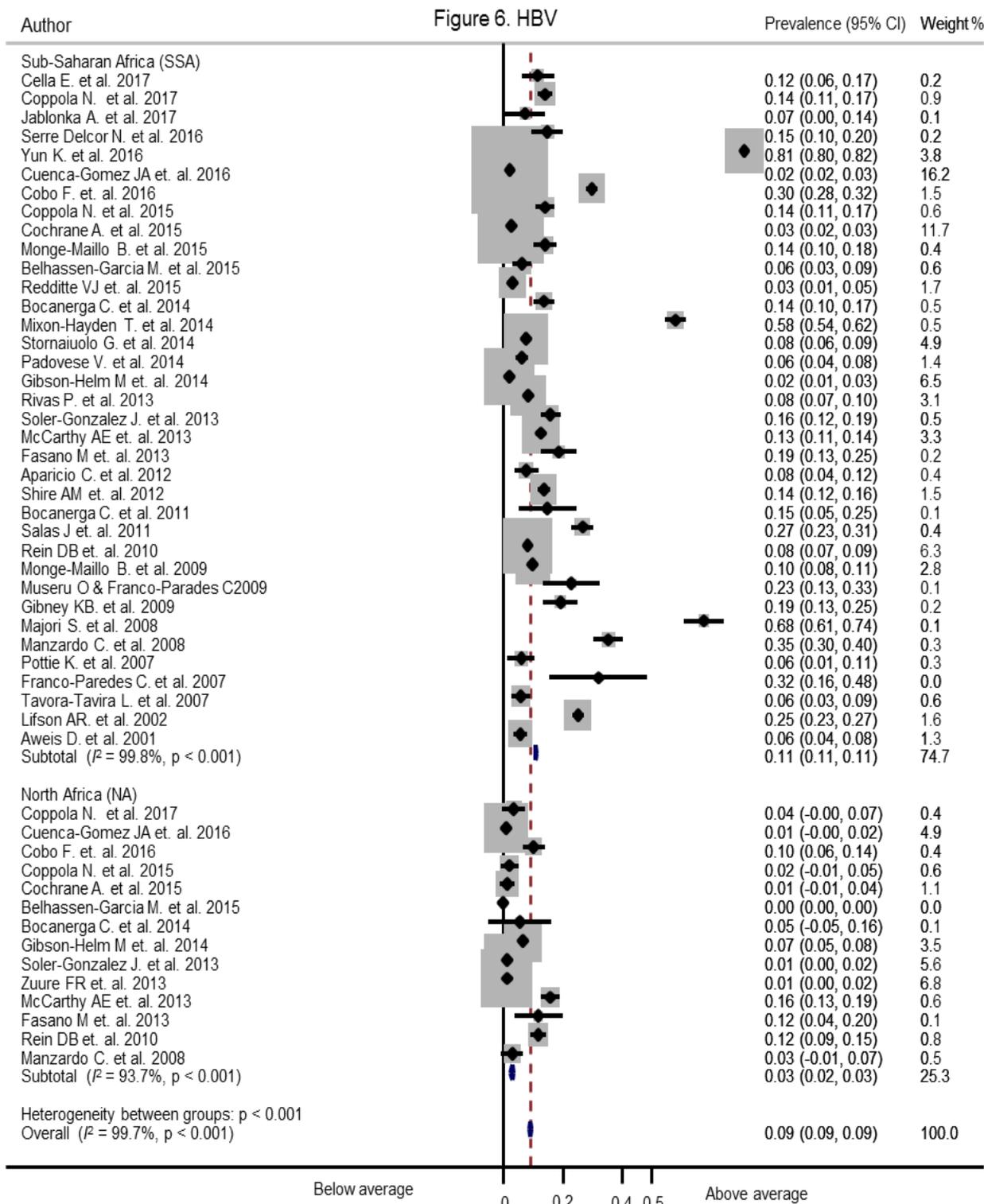


Figure 4.6: Meta-Analysis on chronic hepatitis B virus (HBV) infection.

Prevalence of the disease (in percentage) is presented in a Forest plot presentation according to their geographical location, as sub-Saharan (SSA) and North Africa (NA). Filled squares and the horizontal lines indicate weight (in %) and 95% CI for each individual study. Open diamond summarizes prevalence of the disease in their respective region. And the broken vertical line indicates the overall average prevalence of HBV infection among African origin migrants and/or refugees.

Yet, our meta-analyses do not support major differences in the prevalence rates of the investigated infectious diseases among refugees/migrants from sub-Saharan Africa and North Africa (Figures 4.2- 4.7). Added to the small number of publication on refugees/migrants from North Africa as compared to sub-Saharan Africa, the inhomogeneity of prevalence rates and discrepancies in sample size of individual studies in sub-Saharan Africa may have been annulling the anticipated differences in prevalence rates of the investigated infectious diseases with respect to the two geographical regions. Examples of such publications with significant influential weight (in percent) in the meta-analysis are: Noyangome et al. (2016) (weight=87.3%; Figure 4.2); Swanson et al. (2012) (weight=90.1%; Figure 4.3); Norman et al. (2010) (weight=61.8%; Figure 4.4); Cobo et al. (2016) (weight=42.1%; Figure 4.5); Cuenca-Gomez et al. (2016) (weight=16.2%; Figure 4.6) and Gibson-Helm et al. (2014) (weight=42.4%; Figure 4.7).

Prevalence of the disease (in percentage) is presented in a Forest plot presentation according to their geographical location, as sub-Saharan (SSA) and North Africa (NA). Filled squares and the horizontal lines indicate weight (in %) and 95% CI for each individual study. Open diamond summarizes prevalence of the disease in their respective region. And the broken vertical line indicates the

overall average prevalence of HCV infection among African origin migrants and/or refugees.

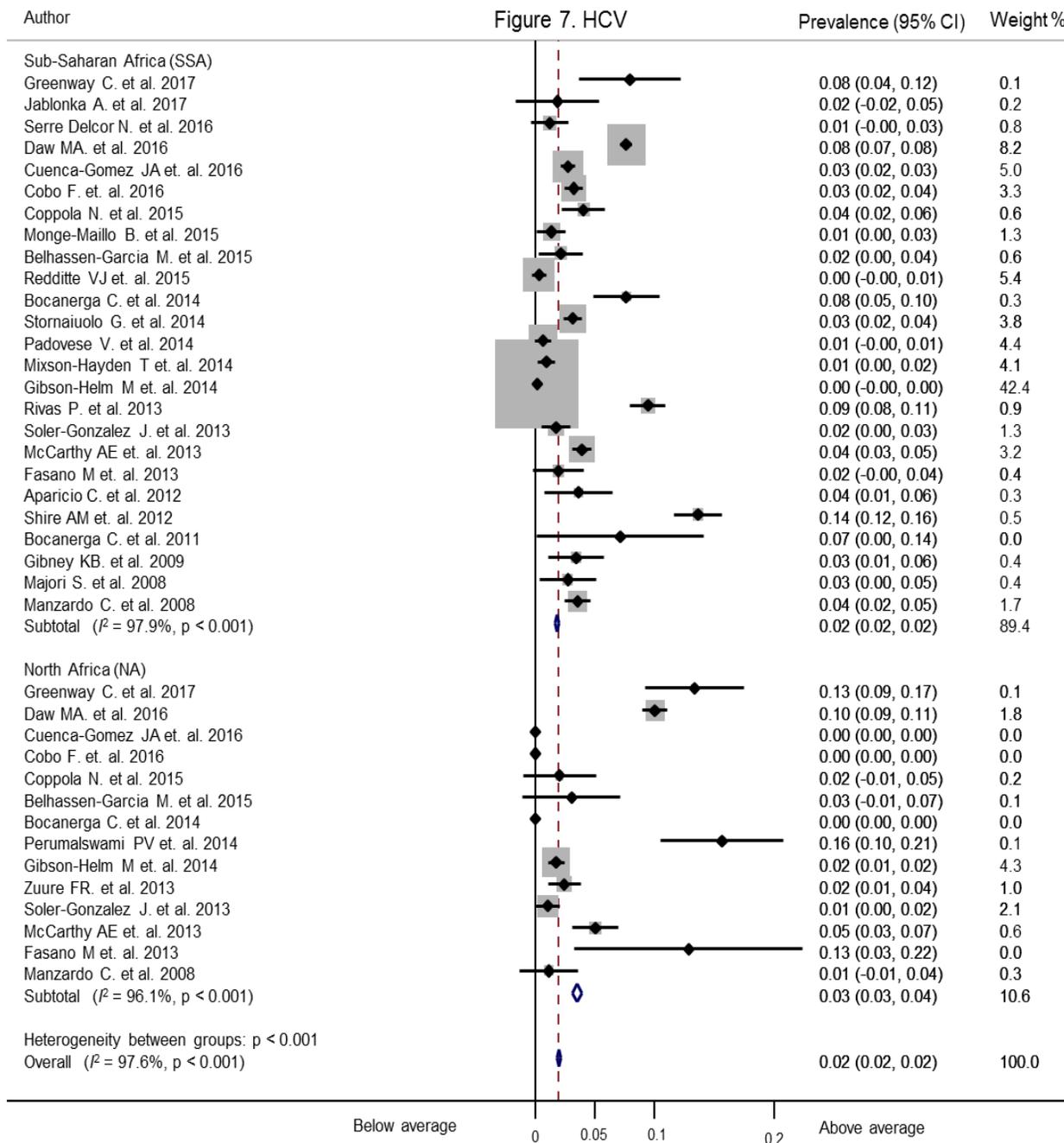


Figure 4.7: Meta-Analysis on chronic hepatitis C virus (HCV) infection.

The sample size of individual studies reviewed for the investigated infectious diseases, ranging from 17 to 37,628, are liable to heterogeneity and aggravate the comparative analysis of the studies (Gartlehner et al., 2012; Melsen et al., 2014). Moreover, the composition of the migrant/refugee study population may significantly differ among different host countries where the studies were carried out, as migrants/refugees may have different preferences for specific host countries.

Furthermore, the inconsistency observed in this systematic review is witnessed by the statistical heterogeneity measure (I^2) in the meta-analysis. The minimum and maximum I^2 score found in our study were 97.6% and 99.7%, respectively. Considering $I^2 = 75%$ as a cut-off value for high heterogeneity (Higgins et al., 2003), our meta-analyses showed extremely high levels of heterogeneity.

The major limitation of the study was the heterogeneity of the reviewed articles. To investigate the inconsistency, authors considered testing the quality of the study using a validated tool. But as it can be inferred from the meta-analysis, since the heterogeneity score was extremely high ($I^2 > 97%$), it was not possible to adapt any of the widely used assessment tools. Hence, considering previous systematic review and meta-analysis on similar topic by Ziegelbauer et al. (2012) (Ziegelbauer et al., 2012), we decided to address the quality of the study employing a tailor-made quality assessment scale, based on GRADE approach. Accordingly, the median value of 2.0 [IQR: 1.5-2.5] confirms the low quality of the majority of the reviewed articles in terms of cohesiveness and consistency in the nature and design of the studies. The score from the tailor-made quality assessment scale further confirms the so large heterogeneity observed among the included studies.

Using odds ratios (ORs) instead of proportions on the prevalence rates of the investigated infectious diseases for the meta-analysis computation may have mitigated the inhomogeneity and discrepancies discussed above. The validity of the meta-analysis, as displayed in the forest plot, is especially challenged by schistosomiasis, on which reasonably reliable WHO data are available from the continent (WHO, n.d.). Considering schistosomiasis as particularly localized in sub-Saharan Africa and almost non-existent/eliminated in North Africa, data presented in the forest plot may not represent the respective regions (Figure 4.4). Nevertheless, as most of the reviewed studies report the prevalence rates of the investigated infectious diseases in proportion only, the meta-analysis computation is solely based on proportion data.

Due to several study limitations, we are unable to draw a statistically based conclusion from the reviewed data. However, several studies have reported data which are in line with our findings: Khyattii and colleagues reported a low prevalence rate of schistosomiasis among North African migrants (Khyatti et al., 2014b). A systematic review and meta-analysis of chronic hepatitis B infection in migrants/refugees reported similar seroprevalence rates: 10.3% and 2.0% in migrants/refugees from sub-Saharan Africa and from North Africa/Middle East, respectively (Rossi et al., 2012). A study by Greenaway and colleagues reported hepatitis C seroprevalence rates of 4.4% and 1.4% in migrants/refugees from sub-Saharan Africa and North Africa/Middle East, respectively (Greenaway et al., 2015a).

Screening is a first step towards prevention and better management of infectious diseases. Of note, 59% of European countries have implemented screening programmes for newly arrived migrants/refugees (Kärki et al., 2014a). A recently

conducted survey among health care experts in non-EU countries of the Mediterranean and Black Sea revealed that 88% (N=14/20) of experts support the implementation of screening programmes for infectious diseases in migrants/refugees although, currently, only 55% (N=11/20) of their countries have adapted such programmes and policies (Napoli et al., 2015).

In countries where screening programmes are currently implemented, the focus is primarily on tuberculosis, HIV, hepatitis B, hepatitis C, and syphilis (Minodier et al., 2010; Veldhuijzen et al., 2010; Alvarez et al., 2011; Urbanus et al., 2013). Among the European countries, national policies may vary widely with some taking migrants' origin into account. In this regard, tuberculosis screening in several European countries can serve as an example (Kärki et al., 2014a).

Our review shows that due to the large heterogeneity of the currently available published work, it is not possible to provide evidence-based recommendations on whether and how to screen migrant and/or refugee populations stemming from different regions of Africa. To overcome this intricacy, the establishment of a European-wide registry, linking screening results (and possibly harmonised diagnostic methods) with data on the origin of migrant and/or refugee populations would be indispensable. A study on guidelines for screening and implementing screening programmes for migrants revealed that the EU standard guidelines for screening migrant is appreciated by 25 (92%) health experts from 28 countries of the EU and Switzerland (Kärki et al., 2014a).

Whether the prevalence rate of a specific infectious disease in migrants and/or refugees supports the implementation of a screening programme depends on an overall cost-effectiveness analysis. Nevertheless, the cost-effectiveness of introducing

screening programmes on selected infectious diseases (e.g hepatitis B, hepatitis C and tuberculosis) have been reported from several countries (Coker et al., 2006; Minodier et al., 2010; Veldhuijzen et al., 2010; Alvarez et al., 2011; Urbanus et al., 2013; Zammarchi et al., 2015).

We hope that this review provides national policy makers a useful summary of the currently available prevalence data of six selected infectious diseases among African migrants/refugees and helps them to critically decide on implementing screening tests, respectively.

Moreover, the low quality of assessment reported among the reviewed articles demonstrates the need of cohesion in designing and harmonizing study protocols and screening procedures (e.g. laboratory diagnostic methods, including quality control). The heterogeneity score reported in our study is a proof of inconsistencies of the studies. Hence, to minimize the gap between studies, we strongly believe that exchange of information and up-to-date communication would produce a more reliable and practically recommendable outcomes for screening African and African origin migrants across Europe.

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Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical Approval: The study was approved by the Swiss Tropical and Public Health Institute institutional research commission.

Informed Consent: As this research pertained to a systematic review and meta-analysis of published articles, there was no need to collected informed consent.

Chapter Five: Result part-2: Infectious Diseases (IDs)

Spectrum of infectious diseases among newly arrived Eritrean refugees in Switzerland: a cross-sectional study

Afona Chernet^{1,2}, Andreas Neumayr^{1,2}, Christoph Hatz^{1,2}, Kerstin Kling^{1,2}, Véronique Sydow^{1,2}, Katharina Rentsch^{2,3}, Jürg Utzinger^{1,2}, Nicole Probst-Hensch^{1,2}, Hanspeter Marti^{1,2}, Beatrice Nickel^{1,2}, Niklaus D. Labhardt^{1,2,4§}

¹ Swiss Tropical and Public Health Institute, Basel, Switzerland

² University of Basel, Basel, Switzerland

³ Laboratory Medicine, University Hospital Basel, Basel, Switzerland

⁴ Division of Infectious Diseases and Hospital Epidemiology, University Hospital Basel, Basel, Switzerland



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Afona Chernet^{1,2} · Andreas Neumayr^{1,2} · Christoph Hatz^{1,2} · Kerstin Kling^{1,2} ·
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Hanspeter Marti^{1,2} · Beatrice Nickel^{1,2} · Niklaus D. Labhardt^{1,2,4}

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Abstract

Objectives Our study aimed at determining the prevalence of selected infectious diseases among recently arrived Eritrean refugees in Switzerland.

Methods In this cross-sectional study, asymptomatic Eritrean migrants aged ≥ 16 years who arrived < 24 months ago were recruited at refugee centres in Switzerland. Infectious disease screening included serology for HIV, hepatitis B and C, syphilis and schistosomiasis, polymerase chain reaction (PCR) for malaria, stool microscopy for helminths and intestinal protozoa and circulating cathodic antigen (CCA) testing in urine for schistosomiasis.

Results Among 107 participating Eritrean refugees, point-of-care CCA urine test for *Schistosoma mansoni* was positive in 43 patients (40.2%; 95% CI 31.9–49.5). Stool microscopy detected eggs of *S. mansoni* in 23 (21.5%; 95% CI 13.7–29.3), *Hymenolepis nana* in 11 (10.3%; 95% CI 4.5–16.0), and cysts of *Giardia intestinalis* in 7 participants (6.5%; 95% CI 1.9–11.2). Two tested positive for hepatitis B (1.9%; 95% CI 0.0–4.4) and one for syphilis (0.9%; 95% CI 0.0–2.8), none tested positive for HIV or hepatitis C. Malaria PCR was positive in six participants (5.6%; 95% CI: 1.2–9.9).

Conclusions Given the high prevalence of *S. mansoni* infection and potentially severe long-term sequelae of untreated schistosomiasis, routine screening for schistosomiasis in refugees from *Schistosoma*-endemic regions should be recommended.

Keywords Eritrea · Infectious diseases · Migration · Parasites · Schistosomiasis · Screening · Refugees

Introduction

Large numbers of refugees arriving in Europe has put migrants' health high up on the public health agenda (Jakab et al. 2015). A review of the World Health Organization (WHO) European Regional Office on migrants' health emphasises that evidence of poor health among refugees is mostly confined to maternity and mental health issues (Bradby et al. 2015). Meanwhile, there is a paucity of data on prevalence and burden of infectious diseases among newly arriving refugees in Europe. Among the notifiable diseases in Germany, varicella, tuberculosis, hepatitis B (HBV) and C (HCV), and influenza were the top five infectious diseases among asylum seekers in 2016 (Robert Koch Institute 2016). However, this list of infectious diseases is mainly driven by a high share of asylum seekers from Syria, Afghanistan and Iraq, and to a lesser extent from Albania and Kosovo (Eurostat 2016). Of note, in some European countries, refugees from north-eastern parts of Africa (particularly Eritrea) are the dominant group of migrants. In Switzerland and the United Kingdom, Eritreans made up the largest group among refugees arriving in 2015. Moreover, Eritrea was among the top five countries of origin among migrants entering the Netherlands, Norway, Sweden, Denmark and Malta (EJPD 2016).

✉ Niklaus D. Labhardt
n.labhardt@unibas.ch

¹ Swiss Tropical and Public Health Institute, CH-4002 Basel, Switzerland

² University of Basel, Basel, Switzerland

³ Laboratory Medicine, University Hospital Basel, Basel, Switzerland

⁴ Division of Infectious Diseases and Hospital Epidemiology, University Hospital Basel, Basel, Switzerland

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Our study aimed at determining the prevalence of selected infectious diseases among recently arrived Eritrean refugees in Switzerland.

Method

In this cross-sectional study asymptomatic Eritrean migrants aged ≥ 16 years who arrived < 24 months ago were recruited at refugee centres in Switzerland. Infectious disease screening included serology for HIV, hepatitis B and C, syphilis and schistosomiasis, polymerase chain reaction (PCR) for malaria, stool microscopy for helminths and protozoans and circulating cathodic antigen (CCA) testing in urine for schistosomiasis.

Result

Among 107 participating Eritrean refugees point-of-care CCA urine test for *S. mansoni* was positive in 43 (40.2%: 95%CI; 31.9%-49.5%). Malaria PCR was positive in six participants (5.6%: 95%CI; 1.2-9.9). Stool microscopy detected eggs of *Schistosoma mansoni* in 23 (21.5%: 95%CI; 13.7-29.3), *Hymenolepis nana* in 11 (10.3%: 95%CI; 4.5-16.0), and cysts of *Giardia intestinalis* in seven participants (6.5%: 95%CI; 1.9-11.2). Two tested positive for hepatitis B (1.9%: 95%CI; 0.0-4.4) and one for syphilis (0.9%: 95%CI; 0.0-2.8), none tested positive for HIV or hepatitis C.

Conclusion

Given the high prevalence of *Schistosoma* infection and potentially severe long-term sequelae of untreated schistosomiasis, routine screening for schistosomiasis in refugees from *Schistosoma* endemic regions is recommended.

Keywords:

Eritrea; infectious diseases; migration; parasites; schistosomiasis; screening;

Introduction:

High numbers of refugees arriving in Europe has put migrants' health to the top of the public health agenda (Jakab et al., 2015). A review of the World Health Organization (WHO) European Regional Office on migrants' health emphasises that evidence of poor health among refugees is mostly confined to maternity and mental health issues (Bradby et al., 2015). Meanwhile, there is a paucity of data on prevalence and burden of infectious diseases among newly arriving refugees in Europe. Among the notifiable diseases in Germany, varicella, tuberculosis, hepatitis B (HBV) and C (HCV) and influenza were the top five infectious diseases among asylum seekers in 2016 (Robert Koch Institute, 2016). However, this list of infectious diseases is mainly driven by a high share of asylum-seekers from Syria, Afghanistan and Iraq, and to a lesser extent from Albania and Kosovo (eurostat, 2016). Of note, in some European countries, refugees from North Eastern Africa (particularly Eritrea) are the dominant group of migrants. Indeed, in Switzerland and the United Kingdom, Eritreans made up the largest group among refugees arriving in 2015. Moreover, Eritrea was among the top-five countries of origin among migrants entering the Netherlands, Norway, Sweden, Denmark and Malta (EJPD, 2016). Most Eritrean refugees travel via Ethiopia and Sudan to Libya from where they cross the Mediterranean Sea to Italy (Figure 5.1). An estimated 5,000 people, mostly young men, are leaving Eritrea every month and one-quarter of refugees arriving in Italy in 2015 were Eritreans (Laub, 2016).

Recent reports from Germany, Sweden and Israel highlight a high incidence of *Plasmodium vivax* malaria relapses among Eritrean refugees (Kopel et al., 2010b; Roggelin et al., 2016b; Saidel-Odes et al., 2011b; Sonden et al., 2014b). Moreover,

case-series and outbreak reports document high prevalence of scabies and several cases of louse-borne relapsing fever among Eritrean refugees (Goldenberger et al., 2015b; Hoch et al., 2015; Jaton et al., 2016b). Screening of migrants from Africa arriving in Italy revealed high prevalence of schistosomiasis, particularly among individuals from Mali and Ivory Coast (Beltrame et al., 2017a). Yet, to our knowledge, there is no study systematically screening presumably healthy refugees from Eritrea on potentially asymptomatic chronic infectious diseases with potentially severe long-term sequelae.

Since a decade, Eritreans represent an important group among asylum seekers in Switzerland. In 2015 alone, 9,666 Eritrean refugees entered the country, representing one quarter of all asylum-seekers (Laub, 2016). The aim of this study was to evaluate the prevalence of selected infectious diseases (HIV, HBV, HCV, syphilis, soil-transmitted helminths and schistosomiasis) among asymptomatic, recently arrived refugees of Eritrean origin. Selection of infectious diseases was based on the possibility of an easy and rapid diagnosis, assumed relevance in the study-population, and the importance to the individual's health. Eritrean refugees who arrived in Switzerland less than 24 months ago were screened using a suite of standardized, quality-controlled diagnostic approaches.

Methods:

Study population and sample collection

This cross-sectional study screened Eritrean refugees living in centres for asylum seekers in two cantons of north-western Switzerland (Basel-Stadt and Basel-

Landschaft) for the following conditions: soil-transmitted helminth and intestinal protozoa infections, schistosomiasis, malaria, syphilis, HIV, HBV and HCV.



Figure 5.1: Migration route of Eritrean asylum seekers from Eritrea to Europe (source: UNHCR, accessed December 1, 2016 at: <http://www.cfr.org/eritrea/authoritarianism-eritrea-migrant-crisis/p37239>)

Figure 5.2 displays recruitment and study-flow of participants. Using the cantonal refugee registries, all immigrants registered in these two cantons, aged 16 years and above who arrived from Eritrea within the past 24 months, were contacted through

invitation letters written in both English and Tigrigna (an Eritrean language), and followed-up by a phone-call. All consenting asymptomatic Eritrean migrants were enrolled. Asymptomatic was defined as currently not having any physical complaints that led the participant to seek medical care. Exclusion criteria were: (i) no written informed consent; (ii) age <16 years; (iii) pregnancy or lactation; and (iv) manifesting illness at the moment of recruitment. As this study looked at imported infectious diseases, immigrants who had been living in Switzerland for more than 24 months were not considered for enrolment.

At enrolment participants filled-in a questionnaire on their socio-demographic background and medical history written in Tigrigna. An investigator fluent in Tigrigna was always present to clarify questions where needed. Socio-demographic variables collected are displayed in table 5.1. After the questionnaires and a clinical assessment by the study-physician, participants underwent phlebotomy, provided a urine sample and received two stool-containers, one for a native sample and one containing sodium acetate-acetic acid-formalin (SAF) as fixative. Participants were advised to fill the containers during the next two bowel-movements, first the SAF-fixed container (approximately 2 g of stool fixed in 10 ml of SAF) and then the native container (approximately 50 g of native stool). Both samples were brought to the laboratory and processed within 24 hours. Recruitment lasted for 10 months (from February to November 2016).

Informed oral and written consent was obtained from all individual participants included in the study. In case of pathologic findings in the screening, participants received appropriate care at the Swiss Tropical and Public Health Institute (Swiss TPH) or were

referred to their general practitioner or another clinic as appropriate. Treatment of parasitic infections was provided at Swiss TPH and followed our recently published guidelines (Neumayr, 2016).

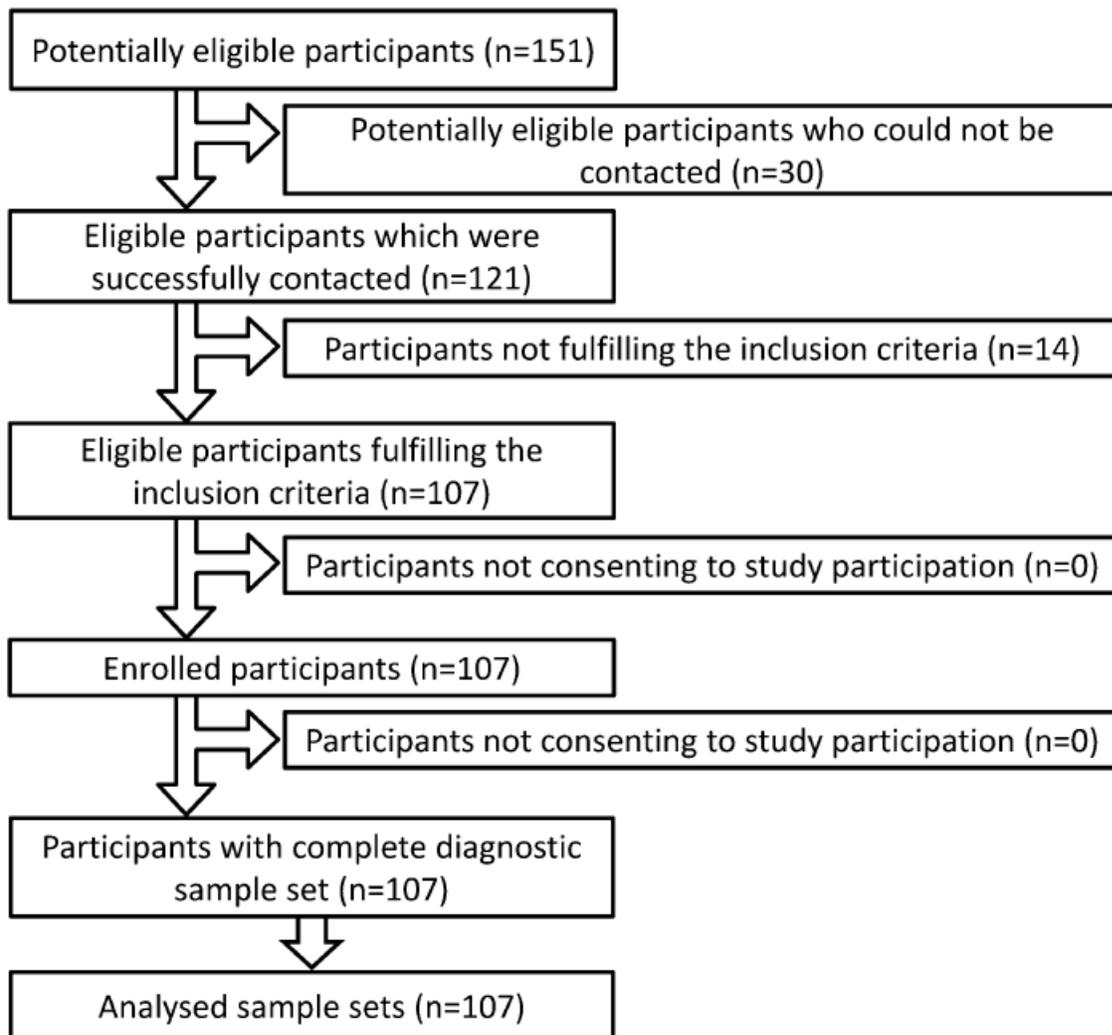


Figure 5.2: Flow of recruitment of study participants

Laboratory procedures

Serological screening for HBV (HBS antigen), HCV, HIV, and syphilis (*Treponema pallidum* haemagglutination (TPHA)) followed standardised diagnostic algorithms.

Enzyme-linked immunosorbent assay (ELISA) and immunofluorescent antibody tests (IFAT) were used for *Schistosoma* spp. serology (soluble egg-antigen and worm adult-antigen) and ELISA for *Strongyloides stercoralis* serology. Screening for schistosomiasis was complemented by detection of circulating cathodic antigen (CCA) in urine using a point-of-care test developed by Rapid Medical Diagnostics (Pretoria, South Africa) (Rapid Diagnostics, 2017). For detection of helminth ova and cysts of intestinal protozoa in the stool, the SAF-fixed stool container was centrifuged, sediment was treated with ether and centrifuged again (Utzinger et al., 2010). Stool from the native tube was filtered for sedimentation. Sediments of both samples were then assessed by experienced microscopists at Swiss TPH. Screening for malaria was performed through polymerase chain reaction (PCR) using QIAamp DNA Mini Kit (CDC, 2016).

Statistical analysis

Data were collected on paper-forms and subsequently entered in EpiInfo version 7 (Centers for Disease Control and Prevention, CDC, 1600 Clifton Road Atlanta, USA) using double data-entry. Statistical analysis is descriptive. Continuous variables are reported as median with inter-quartile range (IQR); prevalence is reported as percentage with 95% confidence-intervals (95%CI). Analyses were run on Stata version 13 (StataCorp LP, College Station, USA) and R Studio (RStudio, Inc. Boston, USA).

Reporting in this manuscript follows the STROBE guidelines for cross-sectional studies (<https://www.strobe-statement.org>).

Results:

Based on the asylum registries in Basel-Stadt and Basel-Landschaft, 151 asylum-seekers from Eritrea aged ≥ 16 years had arrived less than 24 months ago in Switzerland. Out of these, 121 responded to the invitation letter sent per post. After briefing and clarification of open questions on the phone, 107 were eligible and consented to participation. Most participants were males (89%) with a median age of 25 years (Table 5.1).

	Female N=12	Male N=95	Total N=107
Median age (IQR)	23 (19-28)	26 (19-32)	25 (21-29)
Marital status			
– Single	7 (58%)	66 (69%)	73 (68%)
– Married	4 (33%)	29 (31%)	33 (31%)
– Divorced	1 (8%)	0 (0%)	1 (1%)
Educational level			
– Primary	4 (33%)	40 (42%)	44 (41%)
– Secondary	5 (42%)	46 (48%)	52 (48%)
– Tertiary	3 (25%)	9 (10%)	12 (11%)
Months since arrival in Switzerland (IQR)	10.5 (6.3-19.3)	11 (8-22)	11 (8-22)

IQR: inter-quartile range

Table 5.1: Demographic characteristics of study participants

Findings from infectious diseases screening are summarised in Table 5.2. Clinical assessment revealed scabies in 10% (95%CI; 4.5%-16.1%). None of the participants tested positive for HIV or HCV. The two patients reactive for HBS antigen had a HBV

DNA viral load of 708 and 191 IU/mL, normal values of transaminases and unremarkable liver-function tests. One participant had a reactive TPHA and VDRL without clinical signs of syphilis. Malaria PCR was positive in six (5.6%; 95%CI; 1.2-9.9) participants; four were *P. vivax* and two *P. falciparum*. All were negative in thin blood-films.

Condition	N=107 (%; 95%CI)
Schistosomiasis	
Positive CCA in urine	43 (40.2; 31.9-49.5)
Positive serology	54 (50.5; 41.0-60.0)
Egg-detection in stool microscopy	23 (21.5; 13.7-29.3)
Combined results	63 (58.9; 49.6-68.2)
Other helminths/protozoa (stool microscopy)	
<i>Hymenolepis nana</i>	11 (10.3; 4.5-16.0)
<i>Giardia intestinalis</i>	7 (6.5; 1.9-11.2)
Malaria(PCR)	
<i>Plasmodium vivax</i>	4 (3.7; 0.1-7.3)
<i>Plasmodium falciparum</i>	2 (1.9; 0.7-4.5)
Scabies (clinical assessment)	11 (10.3; 4.5-16.1)
Syphilis (TPHA)	1 (0.9; 0.0-2.8)
HBV (HBsAg positive)	2 (1.9; 0.0-4.4)
HCV (anti-body positive)	0 (0.0%)
HIV (anti-bodies/p24 antigen positive)	0 (0.0%)

Abbreviation : HBV: hepatitis B virus; HBsAg: hepatitis B surface antigen; HCV: hepatitis C virus; HIV: human immune-deficiency virus; PCR: polymerase chain reaction; TPHA: *Treponema pallidum* haemagglutination assay.

Table 5.2: Infectious diseases among Eritrean migrants in Switzerland (February to November 2016)

Stool microscopy revealed ≥ 1 pathogenic parasite in 36 (33.6%: 95%CI; 24.7-42.5) participants: ova of *S. mansoni* in 23 (21.5%: 95%CI; 13.7-29.3), ova of *Hymenolepis nana* in 11 (10.3%: 95%CI; 4.5-16.0) and cysts of *Giardia intestinalis* in seven (6.5%: 95%CI; 1.9-11.2) participants. The POC-CCA urine cassette test revealed 43 (40.2%: 95%CI; 31.9-49.5) positive results for schistosomiasis, while serology was positive in 54 (50.5%: 95%CI; 41.0-60.0) participants. Considering egg-detection by microscopy alone, 23 (21.5%: 95%CI; 13.7-29.3) participants were identified with active *S. mansoni* infection. If the result of the CCA test is added the number of detected active schistosomiasis cases doubles to 42.1% (45/107). Only one participant had a positive Strongyloides serology. Out of the 45 participants with CCA and or stool microscopy positive, 43 attended follow-up and received Praziquantel treatment as per guidelines.

Discussion:

This cross-sectional study conducted in Switzerland, screened 107 asymptomatic Eritrean immigrants for chronic infectious diseases. We found a surprisingly high prevalence of previously undiagnosed schistosomiasis. Stool microscopy revealed a prevalence of *S. mansoni* of 21.5%. Considering the combined results from stool microscopy and the more sensitive POC-CCA urine cassette test (Colley et al., 2013; van Lieshout et al., 2000) , the prevalence of *S. mansoni* was as high as 42%. Other, less frequently diagnosed parasitic infections were giardiasis, *H. nana* infection, malaria and one case of strongyloides infection. While the prevalence of HIV and HCV was nil,

two cases of HBV, both with low viral load and normal liver enzymes, and one case of syphilis were detected. Based on our findings and given the potential serious consequences of untreated schistosomiasis, routine screening of asylum-seekers from Eritrea for schistosomiasis should be considered.

How do our data compare to previous studies? Despite high numbers of refugees arriving from Eritrea, data on their health status are scarce. There are several studies reporting on infectious diseases in refugees in general. However, most included a very small share of individuals coming from Eritrea. Most studies report higher HIV, HBV, HCV and syphilis infection rates in sub-Saharan African migrants. For example, Russo and colleagues conducted a survey among asylum-seekers in Italy including 99 immigrants originating from Africa, 60 (61%) of whom were from Eritrea. The overall prevalence of syphilis, HIV, HCV and HBV was 6.1%, 5.2%, 2.3% and 11.3%, respectively (Russo et al., 2016a). A recent review reports a pooled HCV-prevalence of 4.4% among migrants from sub-Saharan Africa (Greenaway et al., 2015b). Among serum-samples collected in Libya, HIV prevalence was 2.2% among Eritreans, 1.1% were HCV/HIV co-infected (Daw et al., 2016b). The relatively low HIV prevalence in asylum seekers from Eritrea is in line with the adult HIV prevalence in Eritrea itself, that is estimated at 0.6% (UNAIDS, 2015).

There are only few studies investigating intestinal parasitic infections among immigrants arriving in Europe. Among 1,930 immigrants from sub-Saharan Africa in Spain, 14.4% had schistosomiasis, as revealed by microscopy. However, nearly all study-participants were from West Africa (Cobo et al., 2016b). A recent study by Abu-Madi and colleagues found that 5.8% of refugees from North and sub-Saharan Africa

had helminths in Qatar (Abu-Madi et al., 2016a), none had schistosomiasis. In a screening study among children and adolescent refugees arriving in Germany in 2015, 194 individuals originated from sub-Saharan Africa. Out of these, 17.5% carried pathogenic stool parasites and 24.7% had a positive *Schistosoma* serology (Theuring et al., 2016c). However, only 16 (8.2%) of these study participants were Eritreans (S. Theuring, personal communication). Beltrame and colleagues found a *S. mansoni* prevalence of 38% among refugees from Sub-Saharan Africa arriving in Italy. This study did, however, not include Eritrean refugees (Beltrame et al., 2017a).

The last survey on schistosomiasis in Eritrea was conducted in 2002 and found an overall prevalence of 2.4% among children (GAHI, 2016). A recently published geostatistical analysis estimates the schistosomiasis prevalence in Eritrea at 8.8% (Lai et al., 2015b).

Among our study participants, considering only those with eggs detected in stool, 21.5% had schistosomiasis. The prevalence, however, doubles if all with positive CCA in urine and/or egg-detection in faeces are considered as having active schistosomiasis (42.1%). This is in line with a recently published systematic review where pooled median schistosomiasis prevalence based on CCA was 2.5 times higher than by microscopy in populations where 20-29% had *S. mansoni* eggs detected by Kato-Katz (Kittur et al., 2016). This may be partly explained by a higher sensitivity of CCA (Ochodo et al., 2015a). On the other hand, the CCA test can lead to false positive results in case of haematuria, urinary tract infections, or presence of certain glycoproteins in the urine (Polman et al., 2000; Rapid Diagnostics, 2016b). Further studies will have to determine the specificity of CCA in migrant populations, additional more sensitive and specific

tests, such as circulating anodic antigen (CAA) may be an option (van Lieshout et al., 2000). As reported elsewhere, sensitivity and specificity of CCA against stool microscopy was 91% and 74%, respectively (Afontcha Chernet et al., 2017c).

In conclusion, we found a surprisingly high prevalence of schistosomiasis in Eritrean refugees who arrived in Switzerland less than 24 months before screening. Given the well-known potentially severe long-term consequences, routine screening of immigrants from Eritrea for schistosomiasis should be recommended upon their arrival. Moreover, screening of all migrants arriving from or crossing through *Schistosoma* endemic regions may be considered. The rapid and inexpensive POC-CCA urine cassette test offers an opportunity, as already shown in a preliminary study in neighbouring Germany (Becker et al., 2015). However, additional research is needed to determine if individuals with a positive CCA but negative serology and microscopy should be treated for schistosomiasis.

Ethics statement

The study protocol was approved by the institutional research commission of the Swiss Tropical and Public Health Institute (Swiss TPH, Basel, Switzerland; reference no. FK 120; approval date: June 24, 2015) and the ethics committee of Northwest and Central Switzerland (reference no. EKNZ 2015-353; approval date: November 20, 2015). Participation was voluntary, and hence, people could withdraw from the study at any time without further obligations. Data were processed anonymously.

Ethical approval:

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Chapter Six: Result part-3: Diagnostics

**Accuracy of diagnostic tests for *Schistosoma mansoni*
infection in asymptomatic Eritrean refugees: serology and
point-of-care circulating cathodic antigen against stool
microscopy**

Afona Chernet^{1,2}, Kerstin Kling^{1,2}, Véronique Sydow^{1,2}, Esther Kuenzli^{1,2}, Christoph Hatz^{1,2}, Jürg Utzinger^{1,2}, Lisette van Lieshout³, Hanspeter Marti^{1,2}, Beatrice Nickel^{1,2}, Niklaus D. Labhardt^{1,2}, Andreas Neumayr^{1,2§}

¹ Swiss Tropical and Public Health Institute, Basel, Switzerland

² University of Basel, Basel, Switzerland

³ Department of Parasitology, Leiden University Medical Center, Leiden, the Netherlands

Accuracy of Diagnostic Tests for *Schistosoma mansoni* Infection in Asymptomatic Eritrean Refugees: Serology and Point-of-Care Circulating Cathodic Antigen Against Stool Microscopy

Afona Chernet^{1,2}, Kerstin Kling^{1,2}, Véronique Sydow^{1,2}, Esther Kuenzli^{1,2}, Christoph Hatz^{1,2}, Jürg Utzinger^{1,2}, Lisette van Lieshout³, Hanspeter Marti^{1,2}, Beatrice Nickel^{1,2}, Niklaus D. Labhardt^{1,2}, Andreas Neumayr^{1,2}

¹Swiss Tropical and Public Health Institute and ²University of Basel, Switzerland; and ³Department of Parasitology, Leiden University Medical Center, The Netherlands

Background. The unprecedented increase in number of African refugees arriving in Europe is confronting clinicians and general practitioners with the question of whether or not and how to screen migrants from endemic regions for *Schistosoma mansoni* infection.

Methods. We assessed the accuracy of 3 different diagnostic tests for *S. mansoni* infection (stool microscopy [samples prepared by sedimentation technique], serology, and point-of-care circulating cathodic antigen [POC-CCA] urine cassette test) in 107 newly arrived asymptomatic Eritrean refugees in Switzerland.

Result. Sixty-three study participants (59%) tested positive by at least 1 of the 3 methods. Thirty-seven participants (35%) were considered to have active schistosomiasis, either due to the detection of parasite eggs in stool and/or the presence of a concordant positive serology and urine POC-CCA test, which we consider to be a suitable surrogate marker of active infection. Of 23 microscopy-positive participants, 22 were positive by serology (95.7% sensitivity) and 21 were positive by the urine POC-CCA test (91.3% sensitivity). The combination of serology and urine POC-CCA testing detected all 23 microscopy-positive study participants (100% sensitivity).

Conclusions. With a sensitivity of 100% (95% confidence interval, 82.2%–100%), the combination of serology plus urine POC-CCA testing appears to be the most sensitive screening option for asymptomatic *S. mansoni* infection in Eritrean refugees, compared with stool sedimentation microscopy.

Keywords. Eritrea; POC-CCA; refugees; schistosomiasis; screening.

More than 250 million people are affected by schistosomiasis, a snail-borne parasitic disease with an estimated global burden of 2.6 million disability-adjusted life years [1, 2]. Schistosomiasis is endemic in tropical and subtropical countries with >90% of cases concentrated in Africa [3, 4]. Recently, an outbreak of urogenital schistosomiasis occurred in Corsica, France, with >120 confirmed cases among local people and tourists [5]. Although often asymptomatic, chronic long-standing infections may lead to significant morbidity and mortality.

In recent years, the unprecedented increase in number of African refugees arriving in Europe [6] is confronting

clinicians and general practitioners with the question of whether or not to screen migrants from endemic regions for schistosomiasis [7, 8], especially as early recognition and treatment of asymptomatic patients offers the opportunity to prevent progression to symptomatic disease and considerable downstream sequelae [9].

The most widely used diagnostic tests for schistosomiasis are microscopy for the detection of parasite eggs in stool or urine, serological assays for the detection of *Schistosoma*-specific antibodies in blood, and a commercially available point-of-care (POC) test for the detection of circulating cathodic antigen (CCA) in urine [10]. As CCA is produced by live developing and adult worms only, its detection is, like the detection of eggs, considered to be indicative for active infection [11].

We assessed the accuracy of the aforementioned tests for the diagnosis of *Schistosoma mansoni* among asymptomatic Eritrean refugees who had arrived in Switzerland <24 months ago. Our objective was to identify a practical and accurate way of screening this special risk group for *S. mansoni* infection.

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Correspondence: A. Neumayr, Swiss Tropical and Public Health Institute, PO Box, Socinstrasse 57, CH-4002 Basel, Switzerland (andreas.neumayr@unibas.ch).

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Main points:

Physicians in Europe are increasingly confronted with the question of whether or not and how to screen asymptomatic African refugees from endemic regions for *Schistosoma mansoni* infection. We identified the combination of serology plus circulating cathodic antigen (CCA) testing in urine as a practical and highly sensitive screening method.

Abstract

Background

The unprecedented increase in number of African refugees arriving in Europe is confronting clinicians and general practitioners with the question of whether or not and how to screen migrants from endemic regions for *Schistosoma mansoni* infection.

Methods

We assessed the accuracy of three different diagnostic tests for *S. mansoni* infection (stool microscopy [samples prepared by sedimentation technique], serology, and point-of-care circulating cathodic antigen [POC-CCA] urine cassette test) in 107 newly arrived asymptomatic Eritrean refugees in Switzerland.

Result

Sixty-three study participants (59%) were tested positive by at least one of the three methods. Thirty-seven participants (35%) were considered to have active schistosomiasis, either due to the detection of parasite eggs in stool and/or the presence of a concordant positive serology and urine POC-CCA test, which we consider to be a suitable surrogate marker of active infection. Of 23 microscopy-positive participants, 22 were positive in serology (95.7% sensitivity) and 21 were positive in the urine POC-CCA test (91.3% sensitivity). The combination of serology and urine POC-CCA testing detected all 23 microscopy-positive study participants (100% sensitivity).

Conclusion

With a sensitivity of 100% (95% confidence interval (CI): 82.2–100%), the combination of serology plus urine POC-CCA testing appears to be the most sensitive screening option for asymptomatic *S. mansoni* infection in Eritrean refugees, when compared to stool sedimentation microscopy.

Introduction

More than 250 million people are affected by schistosomiasis, a snail-borne parasitic disease with an estimated global burden of 2.6 million disability-adjusted life years (GBD 2015 DALYs and HALE Collaborators, 2016; Hotez et al., 2014). Schistosomiasis is endemic in tropical and subtropical countries with over 90% of cases concentrated in Africa (Colley et al., 2014b; Lai et al., 2015b). Recently, an outbreak of urogenital schistosomiasis occurred in Corsica, France with more than 120 confirmed cases among local people and tourists (Boissier et al., 2016). Although often asymptomatic, chronic long-standing infections may lead to significant morbidity and mortality.

In recent years, the unprecedented increase in number of African refugees arriving in Europe (“Refugee crisis in Europe.,” 2016) is confronting clinicians and general practitioners with the question of whether or not to screen migrants from endemic regions for schistosomiasis (Deniaud et al., 2010; Theuring et al., 2016c). Especially, as early recognition and treatment of asymptomatic patients offers the opportunity to prevent progression to symptomatic disease and considerable downstream sequelae (Richter et al., 2015).

The most widely used diagnostic tests for schistosomiasis are microscopy for the detection of parasite eggs in stool or urine, serological assays for the detection of *Schistosoma*-specific antibodies in blood, and a commercially available point-of-care (POC) test for the detection of circulating cathodic antigen (CCA) in urine (Rapid Diagnostics, 2016b). As CCA is produced by live developing and adult worms only, its

detection is, like the detection of eggs, considered to be indicative for active infection (van Dam et al., 1996).

We assessed the accuracy of the aforementioned tests for the diagnosis of *Schistosoma mansoni* among asymptomatic Eritrean refugees who had arrived in Switzerland <24 months ago. Our objective was to identify a practical and accurate way of screening this special risk group for *S. mansoni* infection.

Methods

This diagnostic accuracy study was conducted as part of a cross-sectional survey, screening Eritrean refugees living in centers for asylum seekers in two cantons of north-western Switzerland (Basel-Stadt and Basel-Landschaft) for the prevalence of infectious diseases (i.e., intestinal parasitic infections, schistosomiasis, malaria, syphilis, HIV, hepatitis B, and hepatitis C) and non-communicable health issues (i.e., post-traumatic stress disorder, arterial hypertension, dyslipidemia, impaired glucose tolerance, and vitamin D deficiency). Using the cantonal refugee registries, all immigrants registered in these two cantons, aged ≥ 16 years who arrived from Eritrea within the past 24 months (n=151), were contacted through invitation letters, followed-up by a phone-call (n=121). All asymptomatic Eritrean migrants fulfilling the inclusion criteria (n=107) gave written informed consent and were enrolled (Figure 6.1). Asymptomatic was defined as currently not having any health issue the participant would consider relevant enough to seek medical care.

Recruitment went from February to November 2016. After a medical interview and a clinical assessment, all participants underwent blood sampling, provided a urine sample, and received two stool-containers to be filled on two different days with at least 10 g of stool. To maximize the yield of microscopic detection of helminth eggs, the full amount of stool of each sample was processed using a sedimentation technique (note: no quantitative assessment/egg count of the positive samples was conducted).

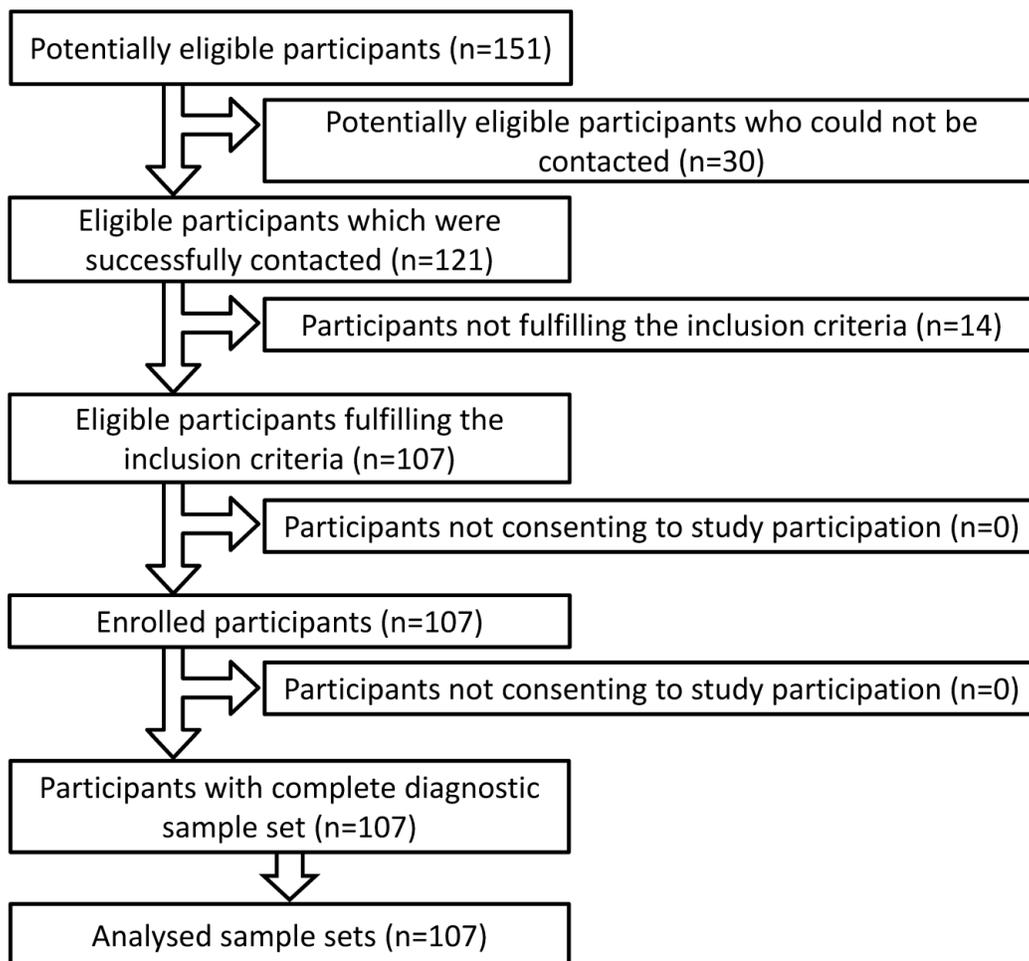


Figure 6.1: Flow of Recruitment of study participants

The samples were suspended in 0.9% saline (NaCl) and passed through a double layer of gauze into a conical sedimentation cup. The sedimentation cup was then filled with saline and left standing for an hour to let the heavier eggs settle on the bottom. After

one hour, the supernatant was poured off and one half of the sediment was examined under a microscope. With the other half, an ether concentration method was carried out (Marti and Escher, 1990; Utzinger et al., 2010). Each microscopic investigation was independently read by two senior laboratory technicians, without having knowledge of the results of the other tests. The results of the microscopic examinations were pooled for each patient. Analysis of stool sediments was performed by well trained and highly experienced staff from the Diagnostic Center of the Swiss Tropical and Public Health Institute (Swiss TPH), which serves as the national reference laboratory for human parasitic diseases in Switzerland.

Schistosoma-specific serology consisted of a panel of three in-house assays (two enzyme-linked immunosorbent assays [ELISA], for the detection of antibodies against soluble egg-antigen (SEA) and antibodies against adult worm-antigen (AWA), and one confirmatory immunofluorescent antibody test [IFAT]) with sections of adult worms used at the diagnostic center of Swiss TPH. These tests are comparable to commercial available tests using the same antigens (Hinz et al., 2017). The panel has been validated to have an overall sensitivity and specificity for *S. mansoni* infections of 98% and 96%, respectively (Ampah et al., 2016; Nickel et al., 2015). Infections by other *Schistosoma* spp. are detected as well with a slightly lower sensitivity. The results of the ELISAs and the IFAT were interpreted according to the cut offs previously determined by receiver operating characteristic (ROC) analysis with 50 sera from healthy Swiss blood donors, 20 sera from *S. mansoni*-infected patients, and 120 sera of other helminth infections (Nickel et al., 2015). The final interpretation for *Schistosoma* serology based on the results of all three tests was reported according to the following criteria:

'negative' if all tests were negative or if two tests were negative and one test was inconclusive; 'positive' if at least two out of three tests were positive; all other combinations were reported as 'inconclusive'.

Potential serological cross-reactivity among tissue parasites was assessed by parallel testing for *Echinococcus* spp., *Fasciola hepatica*, *Filaria* spp., *Strongyloides stercoralis*, *Toxocara* spp., and *Trichinella* spp. specific antibodies by routine ELISA testing at the Diagnostic Center of Swiss TPH.

Urine analysis included POC dip stick testing for protein, glucose, ketones, hemoglobin, bilirubin, urobilinogen, acetone, nitrite, leucocytes, and pH (Combur-9 test, Roche Diagnostics; Basel, Switzerland) and testing for the presence of *Schistosoma*-specific CCA by using the immune-chromatographic POC-CCA cassette test (Rapid Medical Diagnostics; Pretoria, South Africa). This test is commercially available since 2008 and has, according to the manufacturer's information, a sensitivity of 100% if infection intensity is higher than 400 eggs per 1 g of stool (EPG), decreasing to about 70% if infection intensity is low. The specificity in non-endemic populations is reported to be around 95% [10]. POC-CCA test was performed according to the manufacturer instructions. Although the POC-CCA test is primarily considered a qualitative test, we additionally assessed the test results semi-quantitatively. Any visible pink band on the POC-CCA urine cassette test was documented according to its intensity as 'weak positive' or 'clearly positive'. The absence of a band or a faint greyish background band was interpreted and documented as 'negative'. POC-CCA test results were independently read by two laboratory technicians, without having knowledge of the results of the other tests. In case of discrepancies, a third person was consulted to

obtain a majority consensus. The presence of blood eosinophilia, defined as a cell count of ≥ 400 eosinophils/mm³, was assessed by manually performed differential blood count.

The sensitivity, specificity, and negative predictive value (NPVs) of the index tests serology and POC-CCA, as well as their combination, were compared to stool microscopy as reference standard. As we consider a conservative approach reasonable when relying on indirect parasitological tests and deciding on whether or not to treat a person, all 'inconclusive' serology results were counted as 'positive' in the analysis.

The correlation between the results of the three evaluated diagnostic test methods and the presence of blood eosinophilia and concomitant intestinal helminth infection as well as the correlation between POC-CCA test intensity and the results of serology and stool microscopy and the presence of eosinophilia was assessed by χ^2 or Fisher's exact test, as appropriate, using Stata version 13 (StataCorp LLC; Texas, USA).

The study protocol was approved by the institutional research commission of Swiss TPH (reference no. FK 120; approval date: June 24, 2015) and the ethics committee of Northwest and Central Switzerland (reference no. EKNZ 2015-353; approval date: November 20, 2015).

Results

A total of 107 asymptomatic Eritrean refugees (95 males, 12 females; median age 25 years [range 19-29 years]) were enrolled into the study (Figure 6.1). Sixty-three of the 107 study participants (59%) tested positive for schistosomiasis by at least one of the three performed diagnostic tests.

The results of the three diagnostic tests are shown in Figure 6.2. The concordance and discordance of the positive test results of the three different diagnostic tests is depicted in Figure 6.3. The sensitivity, specificity, and NPV of serology, POC-CCA, and the combination of serology and POC-CCA compared to stool microscopy as the diagnostic reference standard are shown in Table 6.1. From the 23 participants where *Schistosoma* eggs were detected by microscopy, 22 were positive in serology and 21 were positive in the POC-CCA test. The calculated sensitivity was 95.7% and 91.3% for the serological test and the POC-CCA urine cassette test, respectively. The combination of both tests detected all 23 samples which were also positive in microscopy (100% sensitivity).

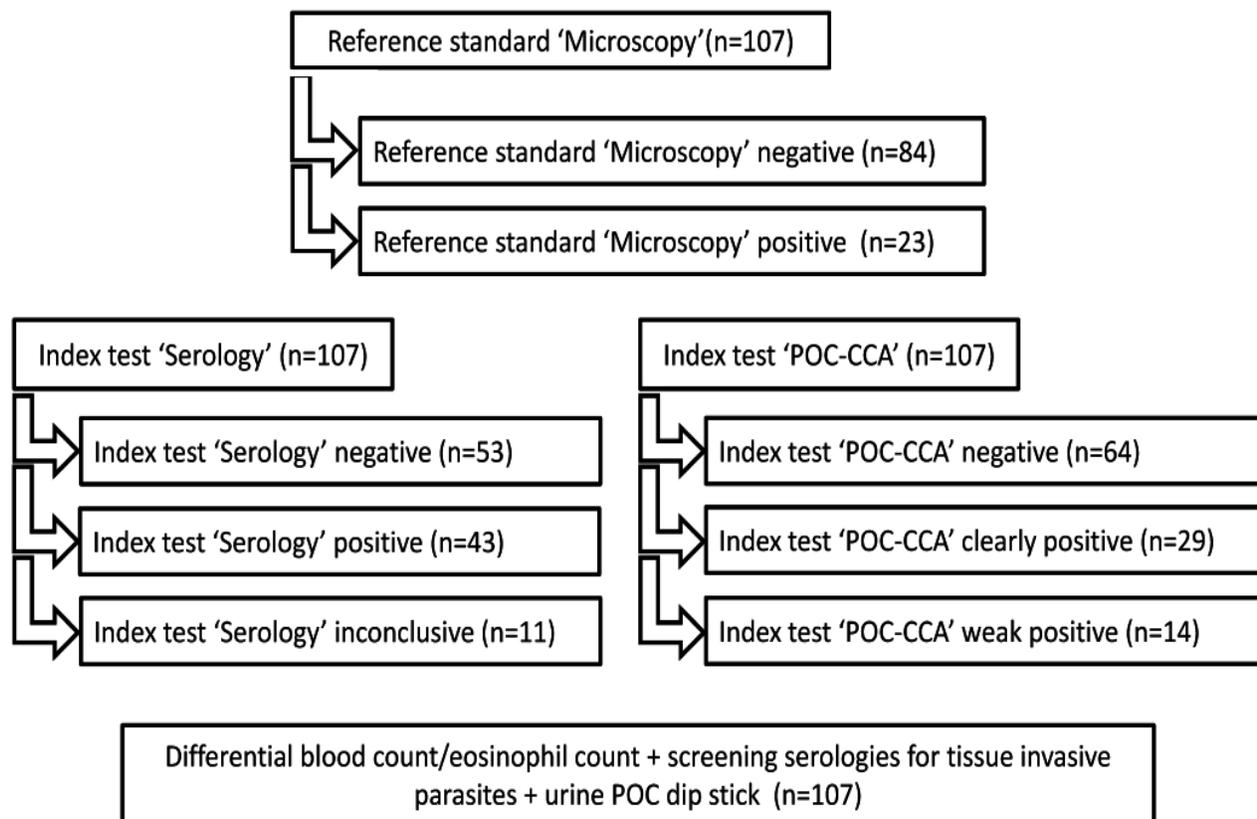


Figure 6.2: Number of complete sample sets and results of reference standard and index tests. Abbreviation: POC-CCA [Point-of-care circulating cathodic antigen]

All *Schistosoma* eggs detected by stool microscopy were *S. mansoni* eggs. The only other helminth species detected by stool microscopy was *Hymenolepis nana*, with eggs found in 11 (10%) of the 107 study participants.

Blood eosinophilia was present in 16 (15%) of the 107 participants (Table 2). In 10 of these 16 cases, at least one of the three schistosomiasis diagnostic tests was positive. In the remaining six cases no cause of blood eosinophilia was identified by any of the performed tests.

The correlation between the results of the three schistosomiasis diagnostic tests and the presence of blood eosinophilia as well as the presence of *H. nana* infection is shown in Table 6.2. The correlation between the presence of blood eosinophilia and *H. nana* infection is shown in Table 6.3. Table 6.4 shows the correlation between the intensity of POC-CCA test results and serology and microscopy results as well as the presence of blood eosinophilia. Table 6.5 shows the kappa (κ) analysis, assessing the degree of agreement among performed diagnostic tests.

The parallel testing of all 107 serum samples for potential cross-reactivity to other concomitantly or previously present tissue invasive helminth infections did not yield any positive result for the tested helminth infections (data not shown). The urine dip stick test for protein, glucose, ketones, hemoglobin, bilirubin, urobilinogen, acetone, nitrite, leucocytes, and pH was unremarkable in all 107 cases.

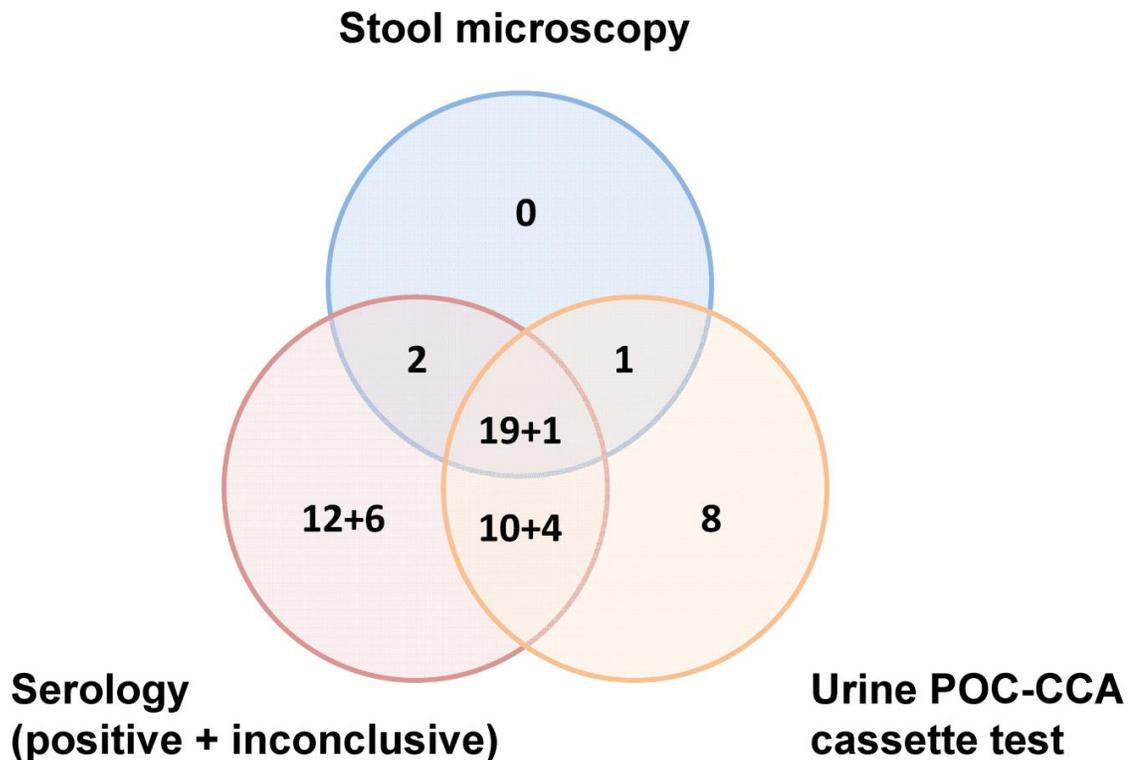


Figure 6.3: concordance and discordance of positive screening results for *Schistosoma mansoni* in 63 of 107 tested asymptomatic Eritrean refugees, stratified by 3 diagnostic tests. Abbreviation; POC-CCA [Point-of-care circulating cathodic antigen]

Discussion

Diagnosing schistosomiasis can be challenging as the validity and reliability of currently available diagnostic tests is, especially if used separately, limited (Utzing et al., 2015a). The demonstration of eggs in stool or urine by microscopy can be difficult as the day-to-day variation of egg excretion may be considerable and the detection of eggs in individuals with a low worm burden may even be impossible (de Vlas and Gryseels, 1992; Utzing et al., 2001). Although not perfect, microscopy is generally considered the 'gold' standard reference method when evaluating the accuracy of diagnostic assays for schistosomiasis. In this regard, it deserves to be highlighted that our used

stool preparation technique, using at least 10 g of stool, is considerably more sensitive than the widely used Kato-Katz technique. Indeed, a single Kato-Katz thick smear only examines 41.7 mg of stool (Katz et al., 1972), and hence, the total volume of duplicate or triplicate Kato-Katz thick smears is still two orders of magnitude lower than what has been examined in the current study.

Diagnostic test		Stool microscopy ^a	
		Positive	Negative
Serology	Positive ^b	22	32
	Negative	1	52
	Sensitivity	95.7%	(95% CI 76.0-99.8)
	Specificity	61.9%	(95% CI 50.6-72.1)
	NPV	98.1%	(95% CI 88.6-99.9)
POC-CCA	Positive	21	22
	Negative	2	62
	Sensitivity	91,3%	(95% CI 70.5-98.5)
	Specificity	73.8%	(95% CI 62.9-82.5)
	NPV	96.9%	(95% CI 88.2-99.5)
Serology and/or POC-CCA	Positive ^b	23	40
	Negative	0	44
	Sensitivity	100%	(95% CI 82.2-100)
	Specificity	52.4%	(95% CI 41.3-63.3)
	NPV	100%	(95% CI 90.0-100)

^a Microscopy of sediment of two stool samples (≥ 10 g stool/sample)

^b 'Inconclusive' serology results were counted as 'positive'.

POC-CCA: point-of-care circulating cathodic antigen

CI: confidence interval

Table 6.1: Sensitivity, specificity and negative predictive value (NPV) of serology, POC-CCA and the combination of serology and POC-CCA, compared to stool microscopy as reference standard for screening of *S. mansoni* among 107 Eritrean refugees.

Yet, multiple Kato-Katz thick smears are frequently utilized as reference standard in studies evaluating the accuracy of diagnostic tests in *S. mansoni* and soil-transmitted helminth infections (Knopp et al., 2008b; Leuenberger et al., 2016). A limitation of the applied sedimentation method compared to Kato-Katz is, that Kato-Katz allows estimating the intensity of infection, as expressed by EPG.

A limitation of serology is that, compared to microscopy and antigen detection, *Schistosoma*-specific antibodies may remain detectable for several years after successful medical treatment or the natural death of the parasite, and that such ‘serological scars’ cannot be differentiated from active infection (Hinz et al., 2017). In addition, cross-reactivity of assays in the case of previous or concomitant infection with other parasites may be a problem. Our performed serological screening for other invasive tissue helminth infections (*Echinococcus* spp., *Fasciola hepatica*, *Filaria* spp., *S. stercoralis*, *Toxocara* spp., and *Trichinella* spp.) did not reveal any evidence of false-positive *Schistosoma* serology or POC-CCA testing due to the presence of these helminth infections. There was no evidence that intestinal *H. nana* infection may lead to false-positive *Schistosoma* serology (Table 2).

Diagnostic test	Result	Eosinophilia		<i>p</i> -value ^a	<i>Hymenolepis nana</i>		<i>p</i> -value
		Present	Absent		Present	Absent	
Serology	Positive ^c	10	44	0.297	6	48	0.775 ^a
	Negative	6	47		5	48	
POC-CCA	Positive	9	34	0.155	5	37	0.657 ^a
	Negative	7	57		6	59	
Serology + POC-CCA ^d	Positive ^c	9	25	0.023	8	55	0.519 ^b
	Negative	7	66		3	41	
Stool microscopy	Positive	8	15	0.003	3	20	<i>n.a.</i>
	Negative	8	76		8	76	

^a χ^2 -test

^b 'Inconclusive' serology results were counted as 'positive'.

^c 'Serology + POC-CCA' stands for concordant positive test results with both methods.

POC-CCA: point-of-care circulating cathodic antigen

n.a.: not applicable

Table 6.2: Correlation between the results of three different *S. mansoni* screening methods and the presence of blood eosinophilia (n=16) and *Hymenolepis nana* infection (n=11) among 107 Eritrean refugees.

The downside of the POC-CCA test is that false-positive results have been described, in particular if traces in band intensity are classified as being positive (Polman et al., 2000). False-positive results also seem to be associated with urinary tract infection, hematuria, and pregnancy (Greter et al., 2016; Rapid Diagnostics, 2016b). This is primarily attributed to the fact that the polysaccharide structure of CCA contains repeating units of Lewis-X trisaccharide, a molecule which is a common epitope on human cells (especially anti-inflammatory cells like granulocytes) (Polman et

al., 2000). There was no evidence that intestinal *H. nana* infection may lead to false-positive POC-CCA results (Table 2).

Stool microscopy	Result	Eosinophilia		<i>p-value</i> ^a
		Present	Absent	
<i>Hymenolepis nana</i>	Positive	1	10	0.332
	Negative	15	81	

^a Fisher's exact test

Table 6.3: Correlation between the presence of blood eosinophilia and the detection of *Hymenolepis nana* eggs by stool microscopy in 107 Eritrean refugees.

Owing to the aforementioned limitations, a currently unresolved issue is how to interpret test results if only serology or only POC-CCA testing is positive. In this regard, the three cases in which eggs were found by microscopy although serology and POC-CCA results were discordant (Figure 6.3) warrants attention. These cases illustrate that discordant serology and POC-CCA results should not generally be discarded as false-negative. Nevertheless, it is conceivable that some of the cases which were tested positive by serology depict 'serological scars' and that some of the cases which only tested positive by POC-CCA depict false-positive results.

As we observed a considerable variability in intensity of the visible band of the POC-CCA test stripe, we performed a subgroup analysis and found that clearly positive POC-CCA test results show a statistically significant correlation to the microscopic detection of eggs (Table 4).

Diagnostic test	Result	POC-CCA		<i>p-value</i> ^a
		Clearly positive	Weak positive	
Serology	Positive	22	7	0.199
	Inconclusive	2	3	
	Negative	5	4	
Microscopy	Positive	18	3	0.022
	Negative	11	11	
Eosinophilia	Present	7	1	1.0
	Absent	11	2	

^a Fisher's exact test

POC-CCA: point-of-care circulating cathodic antigen

Table 6.4: Correlation between the intensity of POC-CCA results and serology and microscopy results as well as the presence of eosinophilia

For samples being positive in one or more than one test, the majority of samples with positive serology or microscopy are also clearly positive in POC-CCA, 76% (22/29) and 86% (18/21), respectively. In contrast, inconclusive or negative serology samples or negative microscopy samples yield in approximately 50% clearly positive and in approximately 50% weak positive POC-CCA result, most likely reflecting the lower intensity of infection. This finding suggests that weak positive POC-CCA test results largely represent infections with low egg output not readily detectable by microscopy. This observation is supported by data from a recent field study in Tanzania, where digital software-supported reading of the POC-CCA cassette test revealed an improved differentiation between weak positive 'true' bands and non-specific traces, thereby improving the correlation between test intensity and egg count (Casacuberta et al., 2016).

In our study, the ratio POC-CCA positive cases to microscopy positive cases (43 to 23) is 1.9 and thus in line with a recently published systematic review concluding that below 50% prevalence by Kato-Katz, the prevalence by POC-CCA assay is between 1.5- and up to 6-fold higher (Kittur et al., 2016). The observation that the ratio in our study is at the lower end of the reported range may reflect the comparable high sensitivity of our stool microscopy method. The ratio of serology positive and inconclusive cases to microscopy positive cases (54 to 23) is 2.4 and most likely reflects the anticipated high prevalence of ‘serological scars’ in a high endemicity population (Lai et al., 2015b).

Diagnostic test	Result	Stool microscopy		Kappa (K) κ-coefficient	SE	95% CI	Interpretation*
		Positive	Negative				
Serology	Positive	22	32	0.297	0.073	0.24–0.53	fair
	Negative	1	52				
POC-CCA	Positive	21	22	0.155	0.082	0.34–0.66	moderate
	Negative	2	62				
Serology and/ or POC-CCA	Positive	23	40	0.023	0.062	0.20–0.44	fair
	Negative	0	44				

* Interpretation of κ-coefficient, reflecting the degree of agreement among diagnostic tests: ≤0 = chance/less than chance, 0.01–0.20 = slight, 0.21–0.40 = fair, 0.41–0.60 = moderate, 0.61–0.80 = substantial, 0.81–0.99 = almost perfect.

POC-CCA: point-of-care circulating cathodic antigen; SE: standard error; CI: confidence interval

Table 6.5: Assessing the degree of agreement among performed diagnostic tests by kappa (κ) coefficient.

An interesting observation is that the presence of blood eosinophilia shows a statistically significant correlation with the detection of *Schistosoma* eggs by microscopy, whereas no correlation between blood eosinophilia and positive POC-CCA

testing is seen (Table 2). Considering that blood eosinophilia is clinically regarded as a supportive surrogate marker for the presence of an active parasite infection, the observation may be interpreted in two ways. It may suggest that blood eosinophilia is only seen in the presence of a high parasite burden, resulting in high egg excretion and thus in cases more reliably identified by microscopy. Consequently, it could be argued that POC-CCA testing may be capable of detecting cases with a low parasite burden not leading to blood eosinophilia. However, the lack of correlation between blood eosinophilia and POC-CCA could also be interpreted as an indirect surrogate marker for false-positive results and might reflect the test's limited specificity. The lack of correlation between blood eosinophilia and positive serology is anticipated in a high endemicity population due to the high prevalence of 'serological scars' (Lai et al., 2015b).

Despite the shortcomings of indirect diagnostic assays, we considered it reasonable to assume that, owing to the test assays' different operating modes, cases concordantly tested positive by serology and POC-CCA depict true cases of active infection and that concordant false-positive results are rather unlikely. This assumption is also supported by the observed statistically significant correlation between blood eosinophilia and concordant positive results of serology and POC-CCA testing (Table 2). An auxiliary finding worth mentioning is that we did not find any correlation between blood eosinophilia and the presence of *H. nana* infection, although a relationship between this intestinal cestode infection and blood eosinophilia is frequently referenced in the literature (Neumayr, 2016; Willcocks et al., 2015).

A limitation of our study worth mentioning is that we did not perform urine microscopy to rule out *S. haematobium* infection, which could have possibly led to positive serology as well as positive POC-CCA results. However, as no microhematuria has been detected in any of the urine samples and considering that a recent review concluded that in urogenital schistosomiasis CCA test performance is inferior to urine strips for detecting blood (Ochodo et al., 2015b), we do not consider this issue to possibly have impacted the POC-CCA results of our study.

In conclusion, our data suggest that the combination of serology and POC-CCA is superior to stool microscopy when screening asymptomatic Eritrean refugees for *S. mansoni* infection and that stool microscopy does not contribute to diagnostic accuracy. The presence of blood eosinophilia is supportive of active schistosomiasis but its absence does not exclude active infection. All cases having a concordant positive serology and POC-CCA test should be considered to have active *S. mansoni* infection. However, considering that untreated chronic schistosomiasis may lead to significant morbidity downstream and considering that treatment with praziquantel is generally well tolerated and inexpensive, the threshold to treat any positive test result should be very low. This conclusion holds, even though some patients may receive unnecessary treatment due to false-positive serology or POC-CCA results.

Note

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Chapter Seven: Result part-4: Non-communicable Diseases (NCDs)

Non-communicable risk factors among recently arrived Eritrean refugees in Switzerland

Afona Chernet^{1,2}, Nicole Probst-Hensch^{1,2}, Andreas Neumayr^{1,2}, Véronique Sydow^{1,2},
Daniel H. Paris^{1,2}, Niklaus D. Labhardt^{1,2,3§}

1. Swiss Tropical and Public Health Institute, Basel, Switzerland
2. University of Basel, Switzerland
3. Division of Infectious Diseases and Hospital Epidemiology, University Hospital Basel, Switzerland

Introduction:

Migrants and refugees are usually considered to be susceptible for communicable infectious diseases (IDs). Hence there is no much attention given to the prevalence of the non-communicable diseases (NCDs) and their risk factors among these particular groups. However an earlier report from the WHO has revealed that the loss of productive age from these diseases particularly in the developing countries is on the rise (WHO, 2010). Moreover, according to some studies, the co-morbidity IDs and NCDs is anticipated to shoulder heavy burden in the health systems of developing countries (Remais et al., 2013), and hence increase the rate of exposed immigrants from these countries.

After the hardships they went through, the new life style in host countries is likely to affect the risk factors for NCDs (Jen et al., 2017). At least one NCD was diagnosed in more than half of adult refugees who arrived recently in the US (Yun et al., 2012b). Some of the frequently diagnosed risk factors for NCDs are body mass index (BMI), elevated blood pressure (BP), smoking and alcohol consumption. In a study conducted in Toronto, 30% had elevated BP (Redditt et al., 2015a). Moreover, according a report from the Médecins Sans Frontières, a retrospective clinical record revealed the prevalence of cardiovascular diseases (CVDs) of 20.9% among Syrian refugees in Jordan (Collins et al., 2017).

The probability of dying during productive age (30 to70 years) from the major four NCDs (CVDs, cancer, chronic pulmonary diseases and diabetics) in Eritrea and Switzerland was 24.2% and 9.1% respectively (WHO, 2014a). Moreover, the upsurge

total deaths and risk of premature deaths from NCDs in Eritrea was recently reported to be 42% and 25% respectively as well (WHO, 2017b). Despite shortage of properly documented reports, the rising burden from NCDs and their risk factors is likely to affect the productive age like many developing countries (Brathwaite et al., 2015).

Nevertheless, to our knowledge, information about the prevalence of NCDs and their risk factors among Eritrean refugees and migrants in Switzerland is scarce. Hence, in this study we aimed to identify the NCDs risk factors at base-line and their trends of change in a one year follow-up.

Methods:

This cross-sectional and one year follow-up study was conducted in two northwest Switzerland cantons (Basel-Stadt and Basel-Land). Asymptomatic healthy Eritrean refugees aged ≥ 16 years from both males and females, who had recently arrived in Switzerland were invited to participate through invitation letters written in English and Tigrigna (an Eritrean language) and sent per post with a subsequent follow-up by telephone.

Participants underwent a cross-sectional health check at enrolment; including measurement anthropometric units such as BMI, waist circumference, and BP. Venous blood was centrifuged within 30 minutes after phlebotomy and serum samples were stored in aliquots of 50 μ L at -20°C before being analyzed for lipid panel test at the diagnostic laboratory of the University Hospital Basel, Switzerland. In addition, EDTA was prepared for the glycated hemoglobin (HbA1c) measure. Lipids screened were total

cholesterol (TC), high density lipoprotein density (HDL), low density lipoprotein (LDL), and Triglycerides (TG). In addition, vitamin D level was also measured.

Data were collected on paper and subsequently entered into EpiInfo version 7 (CDC, 1600 Clifton Road, Atlanta, USA). Statistical analyses were performed in Stata version 13 (StataCorp LP, 4905 Lakeway Drive, College Station, USA). Descriptive statistics was conducted with statistical tests. Paired samples *t*-tests were used to compare baseline and follow-up.

The study protocol was approved by the institutional research commission of the Swiss Tropical and Public Health Institute (Swiss TPH, Basel, Switzerland; reference no. FK 120; approval date: June 24, 2015) and the ethics committee of Northwest and Central Switzerland (reference no. EKNZ 2015-353; approval date: November 20, 2015). Participation was voluntary and people could withdraw from the study at any time without further obligations.

Result:

A total of 107 Eritrean refugees were enrolled from February 1, to November 30, 2016 and 12/107(11.2%) were females. The median age was 24 (Interquartile Range [IQR]: 20-28) years. Median (IQR) in mmol/L of the four lipid panel screened at the base-line of the study for TC, LDL, HDL, and TG were 3.94(3.3-4.5), 2.2(1.8-2.7), 1.2(1.0-1.4), and 0.9(0.7-1.3) respectively. Likewise, the median (IQR) for the HbA1c were 5.0% and 4.8-5.2% respectively (table 1).

Measures (unit)		categories	N (%)	Median (IQR) ¹		Mean	SD ²	SE ³	95%CI ⁴
Age	age (years)		107	24	20 - 28	25.3	7.3	0.7	23.9 - 26.7
Body mass index	BMI (kg/m ²)	<18.5	15 (14.0)	17.1	16.8 - 18.2	17.3	0.8	0.2	16.9 - 17.8
		≥18.5 & ≤24.9	83 (77.6)	21.7	20.1 - 22.9	21.5	1.6	0.2	21.2 - 21.9
		≥25	9 (8.6)	27.2	26.5 - 28.1	27.3	1.5	0.5	26.1 - 28.5
		over all	107(100.0)	21.2	19.4 - 23.1	22.5	11.5	1.1	20.3 - 24.7
Blood pressure	SBP (mmHg)	<120	67 (62.6)	112	103 - 116	108.8	9	1.1	106.6 - 111
		≥120 & ≤139	39 (36.4)	123	121 - 129	125.2	5	0.8	123.6 - 126.9
		≥140	1 (0.9)	140	NA ⁵	140	NA	NA	NA
		over all		117	109-122	115.1	11.3	1.1	112.9-117.3
	DBP (mmHg)	<80	93 (86.9)	68	63 - 73	67.8	7.3	0.8	66.3 - 69.3
		≥80 & ≤89	13 (12.1)	83	81 - 87	83.4	2.9	0.8	81.6 - 85.2
≥90		1 (0.9)	99	NA	99	NA	NA	NA	
over all		70	64-77	70	9.0	0.9	68.2-71.7		
Glycated hemoglobin	HbA1c (%)	<5.6	99 (92.5)	4.9	4.7 - 5.1	4.6	1.2	0.1	4.4 - 4.8
		≥5.6 & <6.5	7 (6.5)	5.7	5.7 - 5.9	5.8	0.2	0.1	5.6 - 6.0
		≥6.5	1 (0.9)	6.6	NA	6.6	NA	NA	NA
		over all		5	4.8-5.2	5	0.4	0	5.0-5.1
Vitamin D	25 (OH) D (nmol/L)	<25	39 (36.4)	21	16.0 - 23.0	19.5	4.3	0.7	18.1 - 20.9
		≥25 & <50	53 (49.5)	33	27.0 - 42.0	34.3	7.9	1.1	32.1 - 36.5
		<50	92 (86.0)	25	21.5 - 34.0	28.2	9.9	1	26.1 - 30.2
		≥50 & <75	12 (11.2)	58	54.5 - 62.0	58	4.2	1.2	55.3 - 60.7
		≥75	3 (2.8)	78	77.0 - 86.0	80.3	4.9	2.9	68.1 - 92.6
		over all	107(100.0)	27	23 - 42	32.8	15.6	1.5	29.9 - 35.8
Lipid Panel	TC (mmol/L)	<5.16	99 (92.5)	3.8	3.1 - 4.2	3.5	1	0.1	3.3 - 3.7
		≥5.16 & <6.20	5 (4.7)	5.6	5.4 - 5.7	5.6	0.2	0.1	5.3 - 5.9
		≥6.20	3 (2.8)	6.8	6.5 - 6.8	6.7	0.2	0.1	6.3 - 7.1
		over all		3.94	3.3-4.5	4.0	0.9	0.1	3.8-4.2
	LDL (mmol/L)	<3.35	100 (93.5)	2.1	1.5 - 2.5	2	0.6	0.1	1.9 - 2.2
		≥3.35 & <4.10	5(4.7)	3.5	3.5 - 3.7	3.6	0.1	0.1	3.4 - 3.7
		≥4.10	2(1.9)	4.6	4.4 - 4.9	4.6	0.3	0.2	1.7 - 7.6
	over all		2.2	1.8-2.7	2.3	0.7	0.1	2.1-2.4	
	HDL (mmol/L)	<3.0	107(100.0)	1.1	1.0 - 1.4	1.2	0.3	0	1.2 - 1.3
		≥3.0	0(0.0)	NA	NA	NA	NA	NA	NA
	over all		1.2	1.0-1.4	1.2	0.3	0.0	1.2-1.3	
	Triglycerides (mmol/L)	<2.26	104 (97.2)	1	0.7 - 1.2	1	0.4	0	0.9 - 1.1
≥2.26 & <4.50		3 (2.8)	2.9	2.4 - 3.1	2.8	0.4	0.2	1.6 - 3.7	
≥4.50		0 (0.0)	NA	NA	NA	NA	NA	NA	
over all			0.9	0.7-1.3	1.1	0.5	0.1	1.0-1.1	
TC to HDL ratio	<3.0	45 (42.1)	2.5	2.1 - 2.7	2.2	0.7	0.1	2.0 - 2.4	
	≥3.0	62 (57.9)	3.6	3.3 - 4.3	3.8	0.7	0.1	3.7 - 4.0	

IQR¹ = Interquartile range ; SD² = standard deviation; SE³ = standard error; 95%CI⁴ = 95% confidence interval; NA⁵ = not available

Table 7.1: Non-communicable risk factors and vitamin D among newly arrived Eritrean refugees in Switzerland

Measures (unit)	categories	Base-line (N=48)		Follow-up (N=48)		Statistics				
		N (%)	Median (IQR)	N (%)	Median (IQR)					
BMI	Body mass index [BMI] (kg/m ²)	<18.5	7 (14.6)	17.5	16.3-18.3	5 (10.4)	17.5	16.8-18.2	t(47)= -2.56; p= 0.01	
		≥18.5 & ≤24.9	34 (70.8)	21.7	20.1-22.6	36 (75.0)	22	21.0-23.1		
		≥25	7 (14.6)	27.2	26.5-28.3	7 (14.6)	27.9	25.6-28.3		
		over all	48(100.0)	21.7	19.2-23.1	48(100.0)	21.7	19.2-23.1		
Blood Pressure	Systolic blood pressure (mmHg)	<120	32 (66.7)	112	104.0-115.5	35 (72.9)	111	106-114	t(47)= 1.15; p= 0.26	
		≥120 & ≤139	16 (33.3)	125	120.5-130.5	13 (27.1)	124	123-126		
		≥140	0			0				
		over all		115	108.5-120.5		113	108.5-120.0		
Blood Pressure	Diastolic blood pressure (mmHg)	<80	46 (95.8)	70.5	64.0-76.0	45 (93.8)	66	63.0-71.0	t(47)= 1.43; p= 0.16	
		≥80 & ≤89	2 (4.2)	83.5	80.0-87.0	3 (6.2)	81	81.0-84.0		
		≥90	0			0				
		over all		71	64-77		68	63.0-72.5		
HbA1c	Glycated hemoglobin [HbA1c] (%)	<5.6	45 (93.8)	5	4.8-5.1	45 (93.8)	5	4.9-5.2	t(47)= -3.22; p= 0.002	
		≥5.6 & <6.5	3 (6.2)	5.7	5.6-5.8	3 (6.2)	5.8	5.7-6.1		
		≥6.5	0			0				
		over all		5	4.8-5.1		5	5.0-5.2		
Cholesterol	Total Cholesterol [TC] (mmol/L)	<5.16	42 (87.5)	3.9	3.2-4.4	43 (89.6)	3.9	3.3-4.3	t(47)= 0.78; p= 0.44	
		≥5.16 & <6.20	4 (8.3)	5.5	5.4-5.8	5 (10.4)	5.4	5.3-5.4		
		≥6.20	2 (4.2)	6.7	6.5-6.8	0				
		over all		4	3.3-4.6		4	3.4-4.6		
Cholesterol	Low density lipoproteins [LDL](mmol/L)	<3.35	43 (89.6)	2.1	1.7-2.5	45 (93.8)	2.1	1.6-2.4	t(47)= 1.85; p= 0.07	
		≥3.35 & <4.10	4 (8.3)	3.5	3.5-3.6	3 (6.2)	3.9	3.5-3.9		
		≥4.10	1 (2.1)	4.4	NA	0				
		over all		2.3	1.8-3.0		2.2	1.7-2.5		
Cholesterol	High density lipoproteins [HDL] (mmol/L)	<3.0	48 (100.0)	1.2	1.0-1.5	48 (100.0)	1.3	1.1-1.4	t(47)= 0.18; p=0.85	
		≥3.0	0			0				
	Triglycerides (mmol/L)	<2.26	48 (100.0)	1	0.8-1.4	43 (89.6)	0.9	0.8-1.2		t(47)= -1.54; p= 0.13
		≥2.26 & <4.50	0			4 (8.3)	2.6	3		
	≥4.50	0			1 (2.1)	5.3				
	over all		0.97	0.75-1.44		1	0.83-1.42			
Cholesterol	TC to HDL ratio	<3.0	18 (37.5)	2.6	2.4-2.9	21 (43.8)	2.8	2.5-2.9	t(47)= 1.08; p= 0.29	
		≥3.0	30 (62.5)	3.7	3.2-4.4	27 (56.2)	3.5	3.2-4.2		
		over all		3.2	2.8-3.8		3	2.8-3.7		

IQR = Interquartile range

Table 7.2: Trend of lipid panel change at base-line and one year follow-up among recently migrated Eritrean refugees to Switzerland

Other NCD risk factors, BMI and BP were also measured. The mean (\pm SD) for BMI at the base-line was 22.5(\pm 11.5), for SBP was 115.1(\pm 11.3) and for DBP was

70(\pm 9.0). Despite normal measures of the lipid panel, low vitamin D level was scored at the baseline. The mean of vitamin D was 32.8. Detailed findings of vitamin D screening and follow-up is published in the Swiss Medical Weekly (Afona Chernet et al., 2017a) and presented in the next chapter.

Among the randomly selected study participants and followed for a year (N=48), no statistical difference were found among the lipid panels screened at the base-line and in the follow-up (table 7.2 and figure 7.1). However, significant changes were observed in the BMI values (p -value= 0.01) and HbA1c measure (p -value< 0.01). Changes in BP remained low, even after a year follow up.

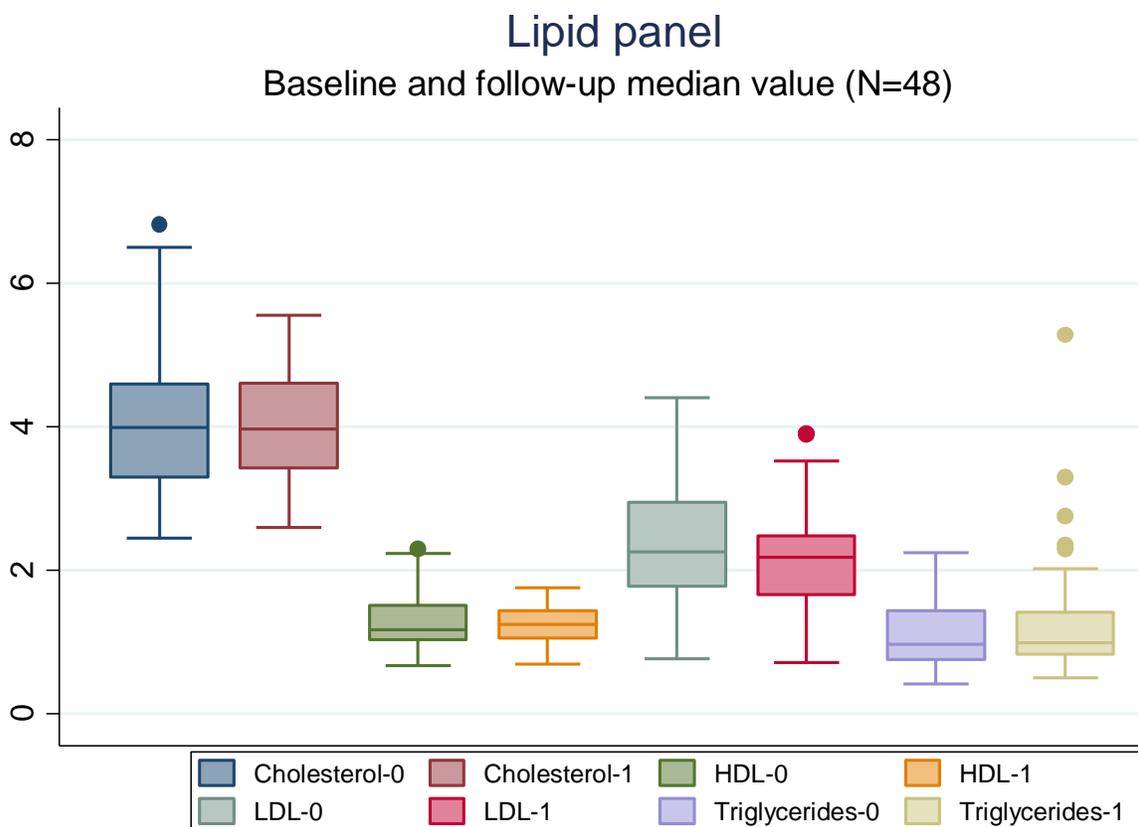


Figure 7.1: Lipid panel change in base-line (0) and one year follow-up (1) among recently migrated Eritrean refugees to Switzerland (N=48)

Moreover, change in the relationship between BMI and HbA1c at the base-line and follow-up within the sub-group was observed. The positive correlation during the two screening times were $r = 0.1$ (at base-line) and $r = 0.2$ (after one year follow-up) were reported (figure 7.2).

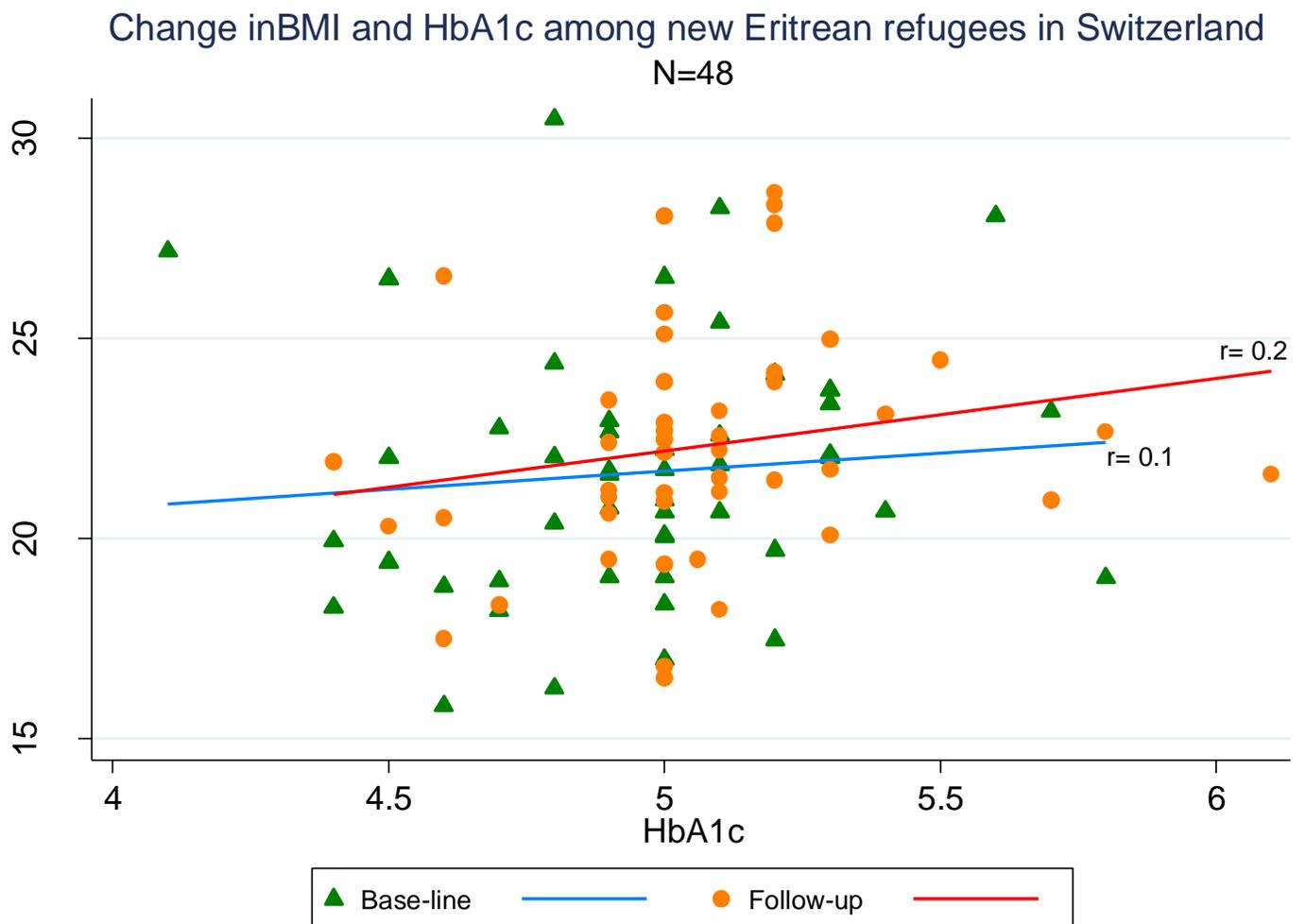


Figure 7.2: Correlation of the change of glycated hemoglobin and body mass index (BMI) among recently migrated eritrean refugees in Switzerland (N=48)

Discussion:

Since most of the study participants were in their young age, they are less likely expected to develop any of the metabolic disorders leading to the risk of developing NCDs. However, due to long journey to reach their destination, median travel period of 8.5 month (IQR: 7-16) along the Sahara desert and Mediterranean Sea, with hardship and unfavorable condition for health, they could have probably exposed to some metabolic disorder changes.

The baseline median BMI (21.2) was within normal range according to WHO classification reference of 2004 (WHO, 2004). The last survey conducted BMI study from Eritrea (2002), indicates 56.3% were within normal range (18.50-24.99), and only 3.0% were obese (≥ 30.0) (WHO, 2004). Likewise, BP was on normal range but one participant, who was referred to his family physician for treatment and follow up. Similarly, the four lipid panels mentioned above and HbA1c were within normal range apart from one participant (Table 1). But since the last 16 years, like most African countries, example in South Africa (Sartorius et al., 2017), shift of pattern is likely to occur.

The aforementioned lower and below normal ranges of metabolic parameters could be more likely due to inadequate diet intake and shortage of supply during the arduous journey they had. Hence, like other change in life style, once they are integrated and settled in their new host country, these patterns are anticipated to change in the future. This tendency has been signified among the sub-group followed. Though due to shortage of follow-up period, there is no statistical significance observed,

yet differences imply a tendency to change in the future (Table 7.2). Figure 7.1 elaborated this observation with comparison of the base-line and follow-up measures among the sub-group.

Furthermore, changing trend of these metabolic disorders has been demonstrated using the correlation between BMI and HbA1c. Despite small positive correlation figure at base-line ($r= 0.1$) and follow-up ($r= 0.2$), the change within one year has doubled (Figure 7.2). This denotes the tendency of shifting values towards the upper right corner of the figure. Particularly, this is true for those who had HbA1c $>5.0\%$.

Further study would help the limitation of the published data regarding the NCDs (Finney et al., 2013) to draw any conclusion. Nevertheless, though young newly arrived Eritrean refugees are at their most fit stage, due to disparities and life challenges they had faced, they may be exposed to potential NCDs risk factors. Despite small sample size and short follow-up time, our study has revealed the need to implore awareness of NCDs and their risk factors among Eritrean in Switzerland.

Chapter Eight: Result part-5: Vitamin D

Serum 25-hydroxyvitamin D levels and intramuscular vitamin D3 supplementation among Eritrean migrants recently arrived in Switzerland

Afona Chernet^{1,2}, Nicole Probst-Hensch^{1,2}, Kerstin Kling^{1,2}, Véronique Sydow^{1,2}, Christoph Hatz^{1,2}, Daniel H. Paris^{1,2}, Katharina Rentsch^{2,3}, Beatrice Nickel^{1,2}, Andreas Neumayr^{1,2}, Niklaus D. Labhardt^{1,2,4§}

¹ Swiss Tropical and Public Health Institute, Basel, Switzerland

² University of Basel, Basel, Switzerland

³ Laboratory Medicine, University Hospital Basel, Basel, Switzerland

⁴ Division of Infectious Disease and Hospital Epidemiology, University Hospital Basel, Basel, Switzerland

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Serum 25-hydroxyvitamin D levels and intramuscular vitamin D3 supplementation among Eritrean migrants recently arrived in Switzerland

Chemet Afona^{ab}, Hensch Nicole-Probst^{ab}, Kling Kerstin^{ab}, Sydow Véronique^{ab}, Hatz Christoph^{ab}, Paris Daniel H.^{ab}, Rentsch Katharina^{bc}, Nickel Beatrice^{ab}, Neumayr Andreas^{ab}, Labhardt Niklaus D.^{abd}

^a Swiss Tropical and Public Health Institute, Basel, Switzerland

^b University of Basel, Switzerland

^c Laboratory Medicine, University Hospital Basel, Switzerland

^d Division of Infectious Diseases and Hospital Epidemiology, University Hospital Basel, Switzerland

Summary

In a cross-sectional screening programme, we assessed serum vitamin D levels in adult Eritrean refugees recently arrived in Switzerland. Median vitamin D level among 107 participants (95 males and 12 females) was 27 nmol/l (interquartile range 23–42 nmol/l), 86% had insufficient vitamin D levels (≤ 50 nmol/l) and 36% severe deficiency (< 25 nmol/l). In 29 participants who received single-dose intramuscular vitamin D substitution (300 000 IU), median vitamin D levels increased from 25 to 35 nmol/l after 3 months ($p = 0.005$); only 11 (38%) reached sufficient vitamin D levels.

Eritrean migrants should be routinely screened for vitamin D deficiency. Single-dose intramuscular supplementation appeared to be insufficient to achieve optimal levels in the majority of participants.

Key words: Eritrea, migrants, refugees, Switzerland, vitamin D

Introduction

Vitamin D plays an important role in regulating bone metabolism [1]. The body may acquire vitamin D2 or D3 (cholecalciferol) through food or, in the case of D3, synthesise it via ultraviolet B light (UVB) exposure. Both forms are hydroxylated in the liver to 25-hydroxyvitamin D, which is further hydroxylated in the kidneys to its active form, 1,25-dihydroxyvitamin D [2].

The threshold for optimum serum vitamin D levels and definitions of sufficiency are controversial [1–3]. However, several experts agree that a level below 50 nmol/l is insufficient and vitamin D deficiency is generally defined as a serum 25(OH)-vitamin D level below 25 nmol/l [4]. The World Health Organization (WHO) considers a serum vitamin D level < 50 nmol/l as insufficient [3].

Vitamin D production is greatly affected by UVB exposure and the amount of melanin pigment in the skin [1]. Thus, serum 25(OH)-vitamin D levels vary among ethnic groups. In a study conducted in the United States, mean 25(OH)-vitamin D levels in African-Americans and Caucasians were 39 and 64.5 nmol/l, respectively [5].

Several reports indicate that migrants from sub-Saharan Africa are vulnerable to vitamin D deficiency in their host countries in Europe [6–8]. During recent years Europe has faced high numbers of immigrants arriving from sub-Saharan Africa. Some European countries (Switzerland, the Netherlands, Sweden and Germany) host high numbers of Eritrean refugees [9]. Here we report the prevalence of vitamin D deficiency among Eritrean refugees newly arrived in Switzerland and changes in vitamin D level after single-dose intramuscular supplementation.

Methods

The study was conducted in two Swiss cantons (Basel-Stadt and Basel-Land). Asymptomatic healthy Eritrean refugees aged ≥ 16 years who had arrived in Switzerland between January 2014 and December 2015 were invited to participate in the study through invitation letters in English and Tigrigna (an Eritrean language), with subsequent follow-up by telephone. Recruitment was between January and October 2016.

Participants underwent a cross-sectional health check at enrolment, including measurement of circulating 25(OH)-cholecalciferol levels in plasma. Participants with insufficient vitamin D level (< 60 nmol/l) received a single-dose intramuscular supplement of 300 000 IU (1 ml vitamin D3 Streuli). Among these, 30% were recruited on a first-come basis and followed up for reassessment of vitamin D levels after substitution. Venous blood was centrifuged within 30 minutes after phlebotomy and serum samples were stored in aliquots of 50 μ l at -20°C before being analysed at

Correspondence:
Niklaus D. Labhardt, Swiss
Tropical and Public Health
Institute, P.O. Box,
CH-4002 Basel, n.lab-
hardt[at]unibas.ch

Abstract:

In a cross-sectional screening, we assessed serum vitamin D levels in recently arrived adult Eritrean refugees in Switzerland. Median Vitamin D level among 107 participants (95 males and 12 females) was 27nmol/L (IQR: 23-42nmol/L), 86% had insufficient vitamin D levels (≤ 50 nmol/L) and 36% severe deficiency (< 25 nmol/L). In 29 participants who received single-dose intramuscular vitamin D substitution (300'000 IU), median Vitamin D levels increased from 25nmol/L to 35nmol/L after 3 months ($p=0.005$), only 11 (38%) reached sufficient vitamin D levels.

Eritrean migrants should be routinely screened for vitamin D deficiency. Single-dose intramuscular supplementation appeared to be insufficient to achieve optimal levels in majority of participants.

Key words:

Eritrea, migrants, refugees, Switzerland, Vitamin D

Introduction:

Vitamin D plays an important role in regulating bone metabolism and possibly in immune and cardiovascular systems (Holick, 2017). The body may acquire Vitamin D₂ or D₃ (Cholecalciferol) through food or, in the case of D₃, synthesized via Ultraviolet light B (UVB) exposure in the skin. Both forms are hydroxylated in the liver to 25-hydroxy vitamin D [25(OH) D], which is further hydroxylated in the kidneys, to its active form 1, 25-dihydroxy vitamin D (Institute of Medicine (US) Committee to Review Dietary Reference Intakes for Vitamin D and Calcium, 2011b).

The threshold for optimum serum vitamin D levels and definitions of sufficiency are controversial (Holick, 2017; Institute of Medicine (US) Committee to Review Dietary Reference Intakes for Vitamin D and Calcium, 2011b; WHO Scientific Group on the Prevention and Management of Osteoporosis, 2003). However, several experts agree that a level below 50 nmol/L is insufficient and Vitamin D deficiency is generally defined as a serum 25(OH) vitamin D level below 25 nmol/L (Gallagher and Sai, 2010). The World Health Organization (WHO) considers a serum vitamin D level <50nmol/L as insufficient (WHO Scientific Group on the Prevention and Management of Osteoporosis, 2003).

Vitamin D production is highly affected by UVB exposure and the amount of melanin pigment in the skin (Holick, 2017). Thus, serum 25(OH) vitamin D levels vary among ethnic groups. In a study conducted in the United States, African-Americans' and Caucasians' mean 25(OH) vitamin D levels were 39nmol/L and 64.5nmol/L, respectively (Powe et al., 2013).

Several reports indicate that migrants from Sub-Saharan Africa are vulnerable to vitamin D deficiency in their host-countries in Europe (Eggemoen et al., 2013b; Franchi et al., 2015; Granlund et al., 2015). During the last years Europe faced high numbers of immigrants arriving from Sub Saharan Africa. Some European countries, i.e. Switzerland, the Netherlands, Sweden and Germany host high numbers of Eritrean refugees (EJPD, 2016). Here we report prevalence of vitamin D deficiency among newly arrived Eritrean refugees in Switzerland and changes in vitamin D level after single-dose intramuscular supplementation.

Methods:

The study was conducted in two Swiss cantons (Basel-Stadt and Basel-Land). Asymptomatic healthy Eritrean refugees aged ≥ 16 years who had arrived in Switzerland between January 2014 and December 2015 were invited to participate in the study through invitation letters in English and Tigrigna (an Eritrean language) with subsequent follow-up by telephone. Recruitment went from January to October 2016.

Participants underwent a cross-sectional health check at enrolment; including measurement of circulating 25(OH) cholecalciferol levels in plasma. Participants with insufficient vitamin D level (< 60 nmol/L) received a single dose intramuscular substitution of 300,000 I.U. (1ml Vitamin D3 Streuli). Among those, 30% were recruited on a first-come basis and followed up for re-assessment of vitamin D levels after substitution. Venous blood was centrifuged within 30 minutes after phlebotomy and serum samples were stored in aliquots of 50 μ L at -20°C before being analyzed at the diagnostic laboratory of the University Hospital Basel, Switzerland.

Data were collected on paper and subsequently entered into EpiInfo version 7 (CDC, 1600 Clifton Road, Atlanta, USA). Statistical analyses were performed in Stata version 13 (StataCorp LP, 4905 Lakeway Drive, College Station, USA). Linear regression was used to assess for correlation between season of blood sampling and vitamin D level. Paired sample *t*-test was used to compare baseline and follow-up vitamin D levels. Linear regression was used to assess changes in baseline vitamin D levels through the recruitment period to account for changes between summer and winter months.

The study protocol was approved by the institutional research commission of the Swiss Tropical and Public Health Institute (Swiss TPH, Basel, Switzerland; reference no. FK 120; approval date: June 24, 2015) and the Ethics Committee of Northwest and Central Switzerland (reference no. EKNZ 2015-353; approval date: November 20, 2015). Participation was voluntary and people could withdraw from the study at any time without further obligations.

Results:

A total of 107 Eritrean refugees were enrolled from February 1, to November 30, 2016 and 12/107 (11.2%) were females. Participant characteristics are displayed in table 8.1. Median serum 25 (OH) vitamin D level was 27nmol/L (interquartile range [IQR]: 23-42). Applying the cut-off of <50nmol/L, 86% (n=92) participants had insufficient serum vitamin D levels (median: 25, IQR: 21.5-34). Among the 14% (n=15) without insufficiency, median vitamin D level was 61nmol/L (IQR: 55-63). Vitamin D deficiency (<25nmol/L), was present in 36% (n=39). Considering the cut-off of the Endocrine

Society of America ($<72.5\text{nmol/L}$), 97.2% ($n=104$) were below the optimal level. Figure 8.1 displays vitamin D levels by month of measurement. Levels increased significantly from January/February to September/October (coefficient 4.53 (95%CI: 2.39-6.68), $p<0.001$).

In the subgroup ($n=29$) with follow-up assessment, median Vitamin D levels increased from 25nmol/L (IQR: 20-44) to 35nmol/L (IQR: 21-67) after intramuscular supplementation of 300'000 IU Vitamin D3 ($p=0.005$). Median time between supplementation and follow-up measurement of vitamin D level was 12 weeks (IQR: 12-12). Only six and five out of the 29 individuals had sufficient ($\geq 50\text{nmol/L}$) and optimal ($\geq 72.5\text{nmol/L}$) vitamin D levels after substitution (figure 8.2).

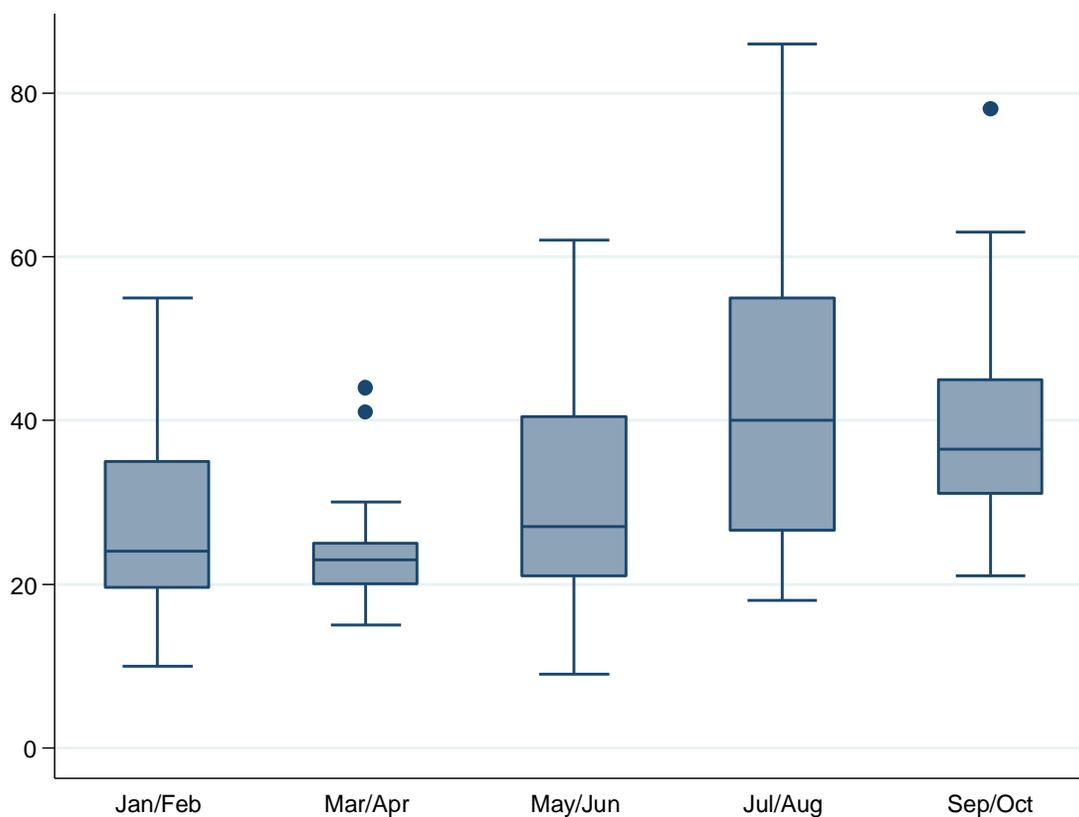


Figure 8.1: Median 25(OH) vitamin D levels among recently arrived Eritrean refugees ($n=107$) in Switzerland

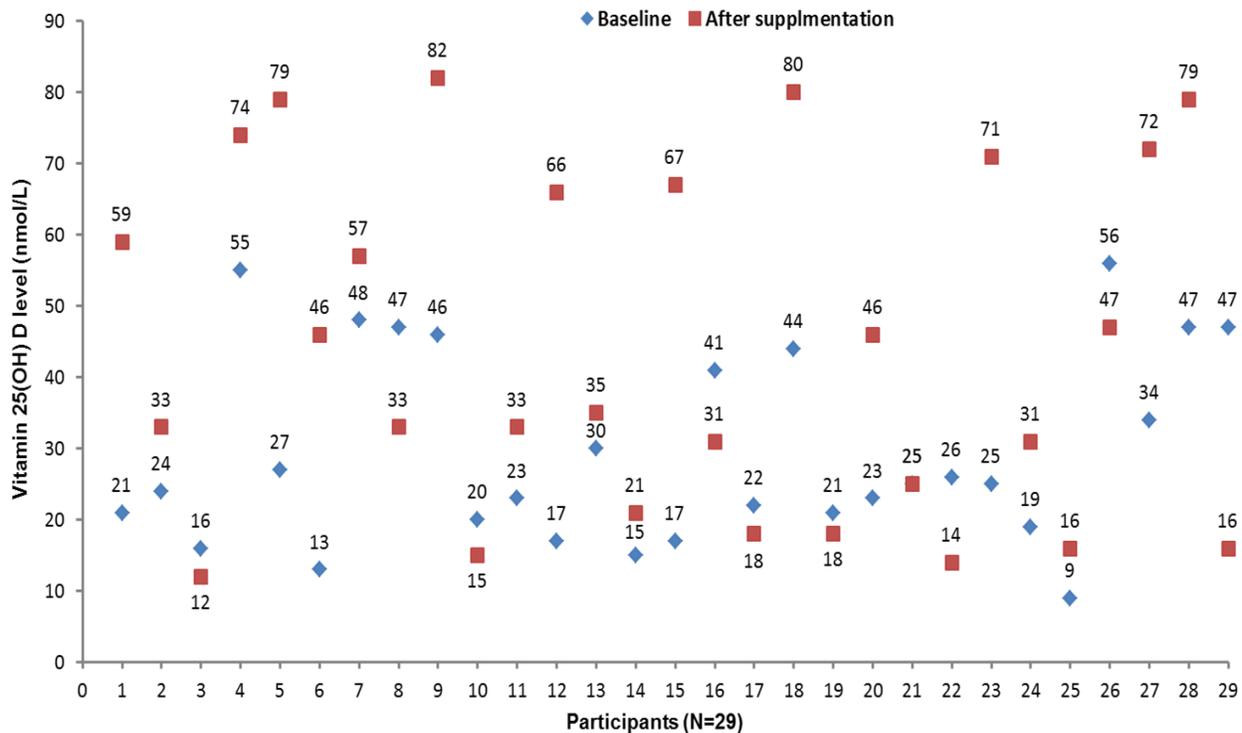


Figure 8.2: Serum vitamin 25 (OH) D level before and after onetime intramuscular supplementation of 300, 000 I.U (1ml vitamin D3 Streuli) among randomly selected sub-group (N=29)

Discussion:

Among recently arrived adult Eritrean immigrants in Switzerland, 86% had vitamin D insufficiency (<50nmol/L) and 36% deficiency (<25nmol/L) as per commonly used thresholds, and single-dose intramuscular supplementation failed to achieve optimal levels in the majority of participants.

Our results are in line with previous studies. In a study from Australia, 87% and 44% of East African migrants had insufficient and deficient serum vitamin 25(OH) D levels respectively (McGillivray et al., 2007b). Eggemoen and colleagues report a median serum vitamin 25(OH) D level of 28nmol/L among recently migrated Eritreans in Norway (Eggemoen et al., 2013b). In our study, as shown in figure 8.1, median vitamin

D levels were indeed higher during summer-time due to longer UVB exposure. However, even in July/August 50% had vitamin D levels below 40nmol/L.

	Total (N=107)
Female gender	12 (11.2%)
Marital status	
- Single	73 (68%)
- Married	33 (31%)
- Divorced	1 (1%)
Education	
- Primary	44 (41%)
- Secondary	51 (48%)
- Teriary	12 (11%)
BMI* (IQR**)	21 (20-23)
Wearing long dress/ Veil	0 (0%)
Awareness of vitamin D deficiency	
- Yes	4 (3.7%)
- No	7 (6.5%)
- Do not know	96 (89.7%)
Regular Sport activity	57 (53.3%)
Outdoor sport activity	9 (8.4%)

* Body mass index (kg/m²)
 ** Interquartile range

Table 8.1: Characteristics of study participants

A one-time intramuscular substitution increased levels significantly, but 62% of participants still continued having suboptimal vitamin D levels. Similar to our data, one-time intramuscular vitamin D supplementation in a German population led to a significant increase of serum levels at three months but more than half of participants' vitamin D level remained below 50nmol/L (Wylon et al., 2017).

Thresholds for vitamin D deficiency in African populations are still under debate and studies among African Americans failed to show correlation between low vitamin D levels and bone mineral density (Thoreson et al., 2015). The clinical significance of vitamin D deficiency in Eritrean migrants should be an aspiration for further investigations. Our study has several limitations. First, we have no detailed information on dietary habits and duration of daily sun exposure. Second, the serum calcium level of participants was not measured. Third, since half-life of vitamin D₃ is around 10 weeks, follow up 12 weeks after Vitamin D₃ substitution may slightly underestimated the effect of intramuscular single-dose supplementation.

In summary, in our study 86% of adult Eritrean refugees in Switzerland had insufficient vitamin D levels according to the definition of WHO (WHO Scientific Group on the Prevention and Management of Osteoporosis, 2003) and in the majority of participants a one-time intramuscular substitution did not result in sufficient vitamin D levels 12 weeks after supplementation. Assessing vitamin D levels and adequate substitution if indicated should be considered for routine care of migrants from Eritrea living in Europe. Further research needs to determine ideal vitamin D levels in migrants of African origin and define optimal schemes for substitution in case of deficiency.

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Conflict of interest:

No potential conflict of interest.

Chapter Nine: Result part-6: Mental Health

Mental health and Resilience, on arrival and a year after, among Eritrean refugees in Switzerland: A cohort study

Afona Chernet^{1,2}, Nicole Probst-Hensch^{1,2}, Constanze Pfeiffer^{1,2}, Andreas Neumayr^{1,2},

Véronique Sydow^{1,2}, Daniel H. Paris^{1,2}, Niklaus D. Labhardt^{1,2,3 §}

1. Swiss Tropical and Public Health Institute, Basel, Switzerland

2. University of Basel, Switzerland

3. Division of Infectious Diseases and Hospital Epidemiology, University Hospital Basel, Switzerland

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Introduction

Due to the unprecedented influx of migration in recent years, several European countries had accommodated large number of migrants and refugees from the south; including from the sub-Saharan African (SSA) countries (“Refugees and internally displaced persons - European Civil Protection and Humanitarian Aid Operations - European Commission,” n.d.; UNHCR, 2017c). In the period between second half of 2015 and first half of 2016 alone, Europe has hosted more than 1.4 million asylum seekers (Abbott, 2016). Though Germany was the highest portion recipient with 641, 535 refugees, Switzerland, the UK, and the Netherlands were among the top host countries with more than 40, 000 each following Sweden, Hungary and Italy (Abbott, 2016).

Migrants and refugees from Eritrea are among the top list of asylum seekers group in Europe (“Asylum statistics - Statistics Explained,” 2016). Particularly, in Switzerland, as compared to other nationalities, they top the table of refugees for the last decade consecutively (SEM, 2016). In the last year, 2017 alone, out of the 15, 444 refugees who sought asylum in the country, 18.5% were Eritreans, and followed by Syrians (10.9%) in the second position (Staatssekretariate für Migration, SEM, 2017).

With the length of the journey and challenges they face, both physical and mental health of refugees and migrants are anticipated to decline by the time they land foot on Europe. Several of the SSA countries, are notoriously known for being endemic to major

infectious diseases (IDs). Hence, migrants from this region are highly projected to be screened and diagnosed for anyone of the IDs on their arrival. But, in regards to the mental health, despite off it causes sever consequence in the post migration life of refugees; such as inability or difficulty to cope with the new surrounding and slow acculturation process, it has not been investigated in detail.

Compared to the residents, refugees and migrants demonstrate more mental health problems. This is in-line with the claim made that, migration is a cause to several mental health disorder among migrants (Jurado et al., 2014; Markkula et al., 2017). Some studies have proved the inevitable post migration mental disorder, particularly the commonly observed depression and post-traumatic stress conditions (Alpak et al., 2015b; Bustamante et al., 2017a; Gilliver et al., 2014; Kazour et al., 2017; Silove et al., 1998; Slewa-Younan et al., 2015a). According to the recently conducted comprehensive review on stress, trauma and post-traumatic stress disorder (PTSD), 47% of migrants and refugees were reported to have PTSD (Bustamante et al., 2017a). Even unaccompanied minors are susceptible to several mental health disorders (Vervliet et al., 2014).

The Eritrean migrants and refugees who flee their home country with the assistance of smugglers to neighboring countries Ethiopia and Sudan (“Authoritarianism in Eritrea and the Migrant Crisis,” 2016), face natural and man-made health threatening challenges on their way to Europe. Despite of the tortures, imprisonment and fear they claim to have faced in their home country; and added to this the preordained life threatening condition on their journey; the mental health condition of Eritrean refugees

is poorly understood. On this arduous journey, majority had been victims of the unavoidable crimes in their different forms or witnessed them to happen in colleagues (Nakash et al., 2015a). Some of the commonly instigated or masterminded crimes to these refugees; and might have a long lasting effect on their post migration lives are; torture, betrayal, harassment including sexual, racism, imprisonment, ransom, and hunger.

Hence, to fill the gap of the knowledge of migration mental health condition, we designed a novel approach to study and follow newly arrival asymptomatic Eritrean refugees and migrants from the baseline. The overall objective of this cross-section and a one year cohort study is, to understand the mental state of Eritrean refugees on their arrival, and their coping ability and resilience after their arrival in Switzerland.

Method

Study population

In this observational study, we applied a baseline cross-sectional baseline study and a one year follow-up cohort study approach. The study was conducted in refugees' centers of two cantons (canton Basel-Land and Basel-Stadt) in the northwest part of Switzerland. Newly arrived (arrivals within 2014 and 2015) refugees and migrants from Eritrea, who were 16 years old and above, were invited to voluntarily take part in the study. Recruitment period was from first of February 2016 to last of November 2016.

Study participants were contacted and approached through the register provided by the cantonal social assistant offices from both cantons. Invitation letters written in Tigrigna (an Eritrean local language) and English were mailed per post to potential candidates. Interested refugees were briefed on the phone and were invited to visit the Swiss TPH institute for further clarification on the aim and objective of the study. After a signed consent was collected, clinical check-up and data collection was conducted for the qualified asymptomatic and newly arrived refugees and migrants from Eritrea.

Detailed recruitment procedure of the study participants is described in earlier published manuscripts by Chernet A et al. 2017 (Afona Chernet et al., 2017d, 2017e).

Sample collection

To screen the mental health conditions, alcohol abuse symptoms, and resilience ability of the refugees, four standardized questionnaires were applied. First, Alcohol Use Disorders Identification Test (AUDIT) (Thomas F. Babor et al., 2001), ranging in a scale from 0-40 score points was used for alcohol consumption record. Second, from the Patient Health Questionnaire Somatic Anxiety and Depression Syndrome (PHQ-SADS) package (Spitzer et al., n.d.), patient health questionnaire-15 (PHQ-15), with score range 0-30 points; generalized anxiety disorder-7 (GAD-7), in a range from 0-21 score points; and patient health questionnaire-9 (PHQ-9), with score points 0-27; were used to screen the somatic symptoms, anxiety, and depression levels respectively. Third, the Post-traumatic stress disorder check list-civilian version (PTSD-CL-S) (The University of Maelbourne, 1991), in 17-85 score points was applied for post-traumatic stress measures. Finlay, the 14-Item Resilience Scale (RS-14) ("The Resilience Scale," n.d.),

also in a range of 14-98 score points was used to measure the coping and resilience of refugees in their host country. Participants were followed for a year, and similar screening tools were applied to check their mental health situation in post arrival condition.

Statistical analysis

All data were collected on paper-forms and subsequently entered spread sheet and into EpiInfo version 7 (Centers for Disease Control and Prevention, CDC, 1600 Clifton Road Atlanta, USA) using double data-entry. Statistical analysis applied is descriptive. Continuous variables are reported as median with inter-quartile range (IQR); prevalence is reported as percentage with 95% confidence-intervals (95%CI). Linear and logistic regression analyses were performed to model the relationship between the dependent variable PTSD (both at base-line and follow up) and several explanatory variables. In addition, correlation (r) between PTSD and RS-14 were also computed. Furthermore, to test the significances, statistical tests of Pearson Chi-Square test (χ^2), Fischer exact test (F) and Paired t-test (t) were also conducted. Analyses were run on Stata version 13 (StataCorp LP, College Station, USA).

Reporting in this manuscript follows the STROBE guidelines for cross-sectional studies (<https://www.strobe-statement.org>).

Ethics statement

The study protocol was approved by the institutional research commission of the Swiss Tropical and Public Health Institute (Swiss TPH, Basel, Switzerland; reference no. FK

120; approval date: June 24, 2015) and the ethics committee of Northwest and Central Switzerland (reference no. EKNZ 2015-353; approval date: November 20, 2015). Participation was voluntary, and hence, people could withdraw from the study at any time without further obligations. Data were processed anonymously.

Result

In the baseline cross-sectional screening, 107 newly arrived asymptomatic Eritrean refugees from canton Base-Stadt and canton Basel-Landschaft in Switzerland were recruited. The median and interquartile range (IQR) age of study participant for males and females was 26 (IQR: 19- 32) and 23 (IQR: 19-28) respectively. As most of them were young, majority were unmarried refugees. Hence, 68% (n=73/107) were single and the remaining 31% (n=33/107) were married. Nevertheless, the Pearson's Chi-Square (X^2) statistical test shows that, there is no statistical difference in the marital status among the male and female participants of the study (p -value = 0.017). Similarly, though a very small figure to be compared, but no significant difference (p -value = 0.033) was observed in their employment conditions in Switzerland. But, there were significant differences in several demographic comparisons in gender on their arrival. The demographic statuses of the study participants at the baseline of the study are briefly summarized in table 9.1.

In regards to mental health and alcohol use abuse screening, at the base-line, 48.6% (n=52/107) had post-trauma stress disorder (PTSD) score \geq 30, with a median score of 35 (IQR: 31-39.5). Like-wise, PHQ-SADS questionnaire package, the somatic

symptoms, anxiety disorder and depression were reported to be 10.3%, 10.3% and 15.0% respectively.

	Female (N=12)	Male (N=95)	Total (N=107)	Statistics
Median Age (IQR*)	23 (IQR: 19-28)	26 (IQR: 19-32)	25 (IQR: 21-29)	
Marital Status				X^{2***} (0.017) [¥]
– Single	7 (58%)	66 (69%)	73 (68%)	
– Married	4 (33%)	29 (31%)	33 (31%)	
– Divorced	1 (8%)	0 (0%)	1 (1%)	
Educational Background				X^2 (0.274)
– Primary	4 (33%)	40 (42%)	44 (41%)	
– Secondary	5 (42%)	46 (48%)	51 (48%)	
– Tertiary	3 (25%)	9 (10%)	12 (11%)	
Smoking history				X^2 (0.142)
– Smoker	0 (0%)	20 (21.1%)	20 (18.7%)	
– Ex-smoker	0 (0%)	4 (4.2%)	4 (3.7%)	
– Non-smoker	12 (100%)	71 (74.7%)	83 (77.6%)	
Employment				F^{***} (0.033) [¥]
– Temporary	1 (8.3%)	1 (1.1%)	2 (1.9%)	
– Unemployed	11 (91.7%)	94 (98.9%)	105 (98.1%)	

IQR*= Interquartile range; X^{2**} = Pearson Chi2 test; F^{***} = Fisher exact test; [¥] = statistically significant

Table 9.1: Demographic information of Eritrean refugees recruited for the study, at the base-line.

Despite high PTSD score majority of them (94.4%) had high resilience on RS-14 score ≥ 65 , with median score of 85 (IQR: 77-80). As to alcohol use abuse, despite most of them being young refugees, there was low rate of alcohol consumptions habit. Forty (37.4%) participants reported to as non-alcohol drinkers, and nearly half of them (44.9%) show a low risk of alcohol use with median of 3.0 (IQR: 2.0-5.0). Only one (0.9%) candidate was found to be in the high risk or harmful level of alcohol consumption according to the WHO standard using the AUDIT scale (table 9.2).

Screening for	Tests	Cut-off	Interpretation	Baseline (N=107)		One year follow-up (N=48)			
				Score (N: %)	Median (*IQR)	Score (N: %)	Median (*IQR)	Median (*IQR)	
Alcohol use	AUDIT ¹	0	No risk	40	37.4	NA	19	39.6	0
		1 to 7	Low risk	48	44.9	3 (2-5)	23	47.9	3 (2-5)
		8 to 15	Risk/ hazardous	18	16.8	11 (9-13)	4	8.3	9 (8-11)
		16-19	High risk/ harmful	1	0.9	NA	1	2.1	16
		> 20	Almost certain alcohol dependent	0	0	NA	1	2.1	21
Somatic symptoms	PHQ-15 ²	≥ 10		11	10.3	11 (11-12)	0	0	NA
Anxiety disorder	GAD-7 ³	≥ 10	** Moderate and above	11	10.3	10 (10-11)	2	4.2	12.5 (12.-13)
Depression	PHQ-9 ⁴	≥ 10		16	15	11 (11-13)	3	6.3	14 (10-16)
Post-trauma stress disorder	PTSD ⁵	≥ 30	Symptoms of PTSD	52	48.6	35 (31-39.5)	12	25	34.5 (31-41)
Resilience scale	RS-14 ⁶	< 65	Low resilience	6	5.7	59.5 (56-60)	3	6.3	61 (47-62)
		65-80	Moderate resilience	37	34.6	76 (73-78)	17	35.4	73 (70-76)
		≥ 81	High resilience	64	59.8	88 (86-92)	28	58.3	87 (84-90)

AUDIT¹= Alcohol use disorder identification test; PHQ-15²= Patient health questionnaire-15; GAD³= Generalized anxiety disorder-7; PHQ-9⁴= Patient Health questionnaire-9; PTSD⁵= Post-traumatic stress disorder; RS-14⁶= Resilience scale-14

*IQR= Interquartile range

= This applies for all three screening tools. The cut-offs for Mild, **Moderate and Sever conditions are 5, **10**, and 15 respectively.

Table 9.2: Mental health screening results comparing from the base-line and one year after follow-up

In the one year short cohort, 48 refugees were followed randomly. To compare cohort screening with the base-line cross-sectional screening, a paired (sample) *t*-test was conducted among the 48 candidates. But the mean results of the variables in the follow-up were not statistically different from the base-line. The *p-values* were ≥ 0.07 (table 9.3). The mental health and alcohol use abuse screening results at the base-line and in one year follow-up, using their respective standard questionnaire, including their cut-off points and interpretations is summarized in table 9.3. In addition, the possible factors that may play an important role in the PTSD of migrants have been analyzed using the bi-variate and multi-variate regression model in table 9.4.

The linear relationship of the post-traumatic stress disorder and resilience, at base-line and follow-up study, among the recently arrived asymptomatic Eritrean refugees living in Switzerland was analyzed using correlation (*r*). The left panel in figure 8.1 shows the overall correlation ($r = -0.18$) at base-line among the 107 participants. The right panel represents the correlation at the base-line and follow-up for the 48 randomly selected participants. The correlation value at the base-line and follow-up was $r = -0.03$ and $r = -0.65$ respectively. Moreover, the detailed correlation of the PTSD and RS-14 among male and female study participants, in relation to their education level is presented on figure 9.2.

Screening for	Tests	Cut-off	Interpretation	Baseline (N=48)					One year follow-up (N=48)					Statistics	
				Scores (N: %)		mean	SD	95%CI	Scores (N: %)		mean	SD	95%CI	Obs .	Paired t-test: t(d)
Alcohol use	AUDIT ¹	0	No risk	17	35.4	0	0	0	19	39.6	0	0	0	0	NA
		1-7	Low risk	24	50	2.8	1.6	2.026-3.620	23	47.9	3.4	1.3	2.699-4.007	17	t(16)= -1.64; p= 0.12
		8-15	Risk/ hazardous	6	12.5	10.5	2.8	-21.266 - 42.266	4	8.3	10	2.8	-15.412 - 35.412	2	t(1)=1.0; p=0.50
		16-19	High risk/ harmful	1	2.1	NA	NA	NA	1	2.1	NA	NA	NA	0	NA
		≥ 20	Almost certain alcohol dependent	0	0	NA	NA	NA	1	2.1	NA	NA	NA	0	NA
Somatic	PHQ-15 ²	≥ 10	** Moderate and above	5	10.4	NA	NA	NA	0	0	NA	NA	NA	0	NA
Anxiety	GAD-7 ³	≥ 10		4	8.3	11	NA	NA	2	4.2	13	NA	NA	1	NA
Depression	PHQ-9 ⁴	≥ 10		7	14.6	14	NA	NA	3	6.3	14	NA	NA	1	NA
Post-trauma stress	PTSD ⁵	≥ 30	Symptoms of PTSD	24	50	38.6	9.4	30.796-46.454	12	25	40.4	8.2	33.511-47.239	8	t(7)= -0.34; p=0.75
Resilience	RS-14 ⁶	< 65	Low resilience	2	4.2	NA	NA	NA	3	6.3	NA	NA	NA	0	NA
		65-80	Moderate resilience	17	35.4	75.3	3.9	72.307-78.360	17	35.4	72.2	3.9	69.201-75.243	9	t(8)=2.01; p=0.08
		≥ 81	High resilience	29	60.4	88.4	4.4	86.394-90.368	28	58.3	87	4	85.179-88.821	21	t(20)=1.40; p= 0.18

AUDIT¹= Alcohol use disorder identification test; PHQ-15²= Patient health questionnaire-15; GAD³= Generalized anxiety disorder-7; PHQ-9⁴= Patient Health questionnaire-9; PTSD⁵= Post-traumatic stress disorder; RS-14⁶= Resilience scale-14

*IQR= Interquartile range

= This applies for all three screening tools. The cut-offs for Mild, **Moderate and Sever conditions are 5, 10, and 15 respectively.

Table 9.3: Mental health screening base-line and one year follow up comparison (N=48)

	Base-line; PTSD ≥ 30 (N=24)								Follow-up; PTSD ≥ 30 (N=12)								
	Bi-variate (Crude)				Multi-variate (adjusted)				Bi-variate (Crude)				Multi-variate (adjusted)				
	Coefficient	OR	(95% CI)	p-value	Coefficient	(95% CI)	p-value	Coefficient	(95% CI)	p-value	Coefficient	(95% CI)	p-value				
Age	0.164	1.18	-0.247	0.575	0.42					-1	-2.062	0.073	0.07	-0.01	-0.13	0.107	0.83
Gender	-11.81	0	-22.671	-0.949	0.03	0.135	-2.46	2.73	0.92	5.25	-5.603	16.1	0.31				
Education	3.001	20.1	-0.847	6.858	0.12	-0.08	-0.94	0.79	0.86	0.84	-6.186	6.355	0.98				
Income	-0.001	1	-0.018	-0.016	0.9					0	-0.015	0.02	0.74				
Journey length	0.12	1.13	-0.194	0.433	0.44	0.145	0.02	0.27	0.02	0.19	-0.256	0.64	0.36	0.001	-0.07	0.068	0.98
Residence permit	1.319	3.74	-3.127	5.765	0.55					1.95	-5.171	9.071	0.56				
Work in CH	3.6	36.6	-4.326	11.523	0.36					6.26	-3.782	16.3	0.2	0.972	-0.48	2.423	0.19
Prison	6.171	479	-1.438	13.781	0.12	0.31	-1.12	1.74	0.67	5.74	-4.447	15.93	0.24	0.164	-1.1	1.731	0.84
Death of someone	1.846	6.33	-6.111	9.803	0.64	-1.69	-3.35	0.02	0.05	5.1	-8.952	19.15	0.44	1.633	-0.14	3.403	0.07
Knowledge about CH	2.622	13.8	-6.07	11.313	0.54					4.11	-8.031	16.25	0.5				
Choice of CH	-2.89	0.06	-12	6.226	0.52	1.843	0.284	3.4	0.02	-4.5	-15.52	6.52	0.4	0.078	-1.46	1.619	0.92
Relatives in CH	-3.357	0.03	-11.217	4.503	0.4					-3	-13.76	7.759	0.55				
International language	4.889	133	-4.058	13.836	0.27	1.247	-0.77	3.27	0.23	-1	-13.46	11.46	0.86	-0.32	-2.31	1.671	0.75
Meeting compatriots	0.9	2.46	-9.787	11.587	0.86					5.1	-8.952	19.15	0.44				

OR*= Odd Ratio

Table 9.4: Factors affecting the Post-traumatic stress disorder (PTSD) condition of recently arrived asymptomatic Eritrean refugees living in Switzerland.

Discussion

Due to the life treating challenges they face on their route to their destination host countries in Europe, refugees and migrants are expected to experience mental health related symptoms and disorders. The causes of all these mental health disorder could be due to several factors such; pre-migration trauma, stressors faced during the journey and during asylum process, settlements and integration into the new host countries (Li et al., 2016; Perera et al., 2013; Kinzie, 2006).

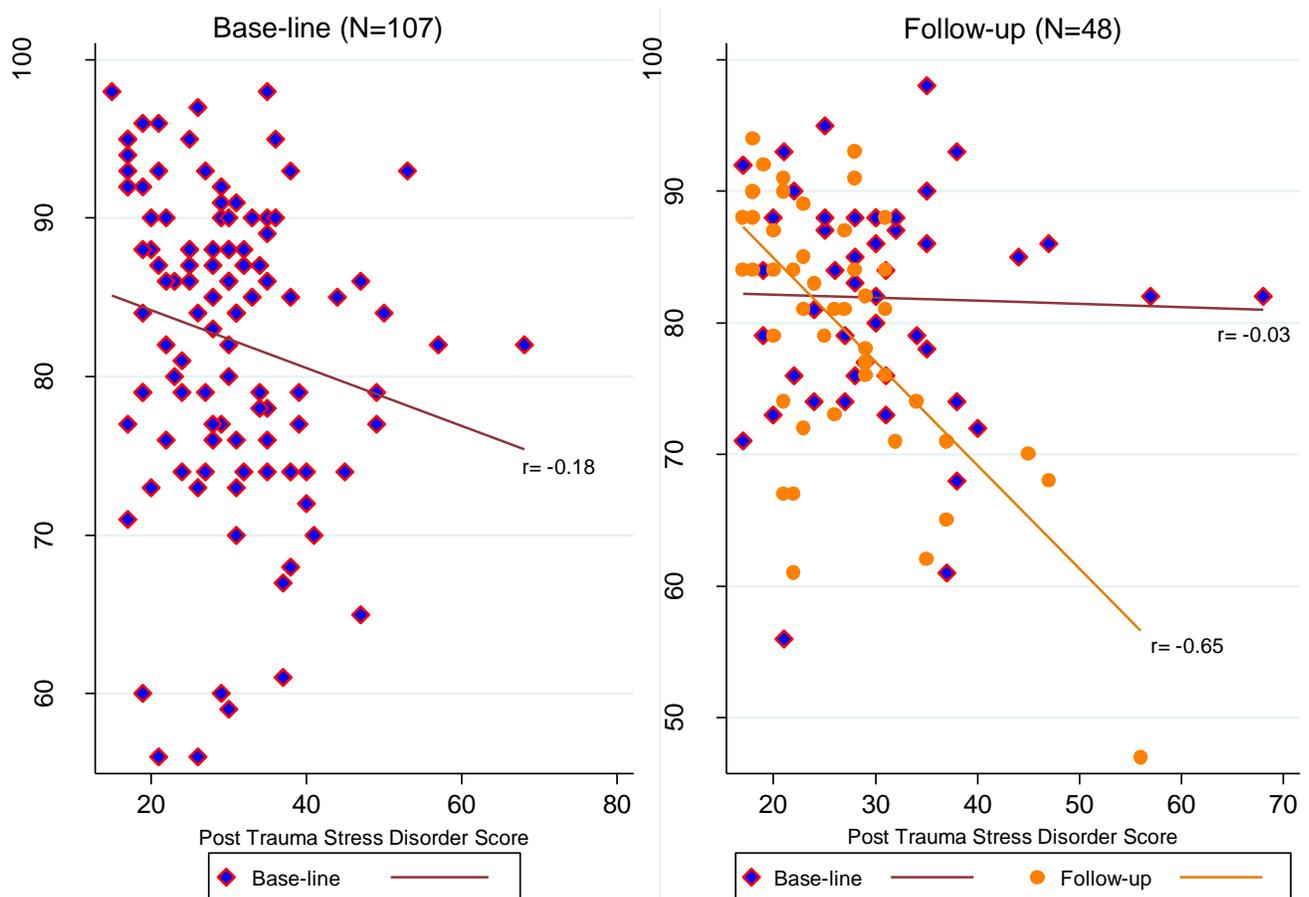


Figure 9.1: Comparison between RS-14 and PTSD at baseline (N=107) and follow-up (N=48)

During pre-migration, the torture, imprisonment, fear and other life constraining way of living such as military inscription and other, in their home counties also play a vital role for the cumulative mental statues of these migrants after their migration. In the case of newly arrived asymptomatic Eritreans, our study has revealed the high PTSD score (48.6%) above the cut-off point (score ≥ 35), among mostly young and asymptomatic Eritrean refugees. This is a line with some recently conducted studies including a review by Bustamante LHU et al, which reported 47% of PTSD among migrants and refugees (Bustamante et al., 2017a). Similar results were reported among the Syrian refugees in Turkey and Lebanon, with PTSD score of 55.2% and 35.4% respectively (Kazour et al., 2017; Tufan et al., 2013). In addition, a recent study conducted in Australia also revealed similar figures, 52% PTSD among refugees (Hocking et al., 2015).

Since the distance to cover from Eritrea all the way to Europe (Switzerland) demands quite a substantial time, and the natural and man-made challenges added, may have worsened the mental health condition of Eritrean refugees further. A study investigating on the traumatic experience of asylum seekers in Israel showed that 56.0% and 34.9% of men and women had been victims of violence respectively (Nakash et al., 2015a).

Also, due to the small sample size of participants, most of the explanatory variables listed on table 9.3 do not actually prove to be significant, but they might have considerable effect on the aggregate post traumatic mental health condition of asymptomatic Eritrean refugees. The linear regression analysis of base-line PTDS

shows that, there is no significant difference among males and females (p -value= 0.03). On the other hand, significant difference was reported between baseline PTSD and the explanatory variables anticipated to have high impact on the PTSD, prison and departure of a colleague on the journey, with p -value of 0.12 and 0.64 respectively (table 9.4). Nonetheless, high resilience score was reported among this population. This is could be mainly due to the resistance they have acquired during the hardship journey and the readiness to accept challenges and obstacles, and the high expectation for a better future.

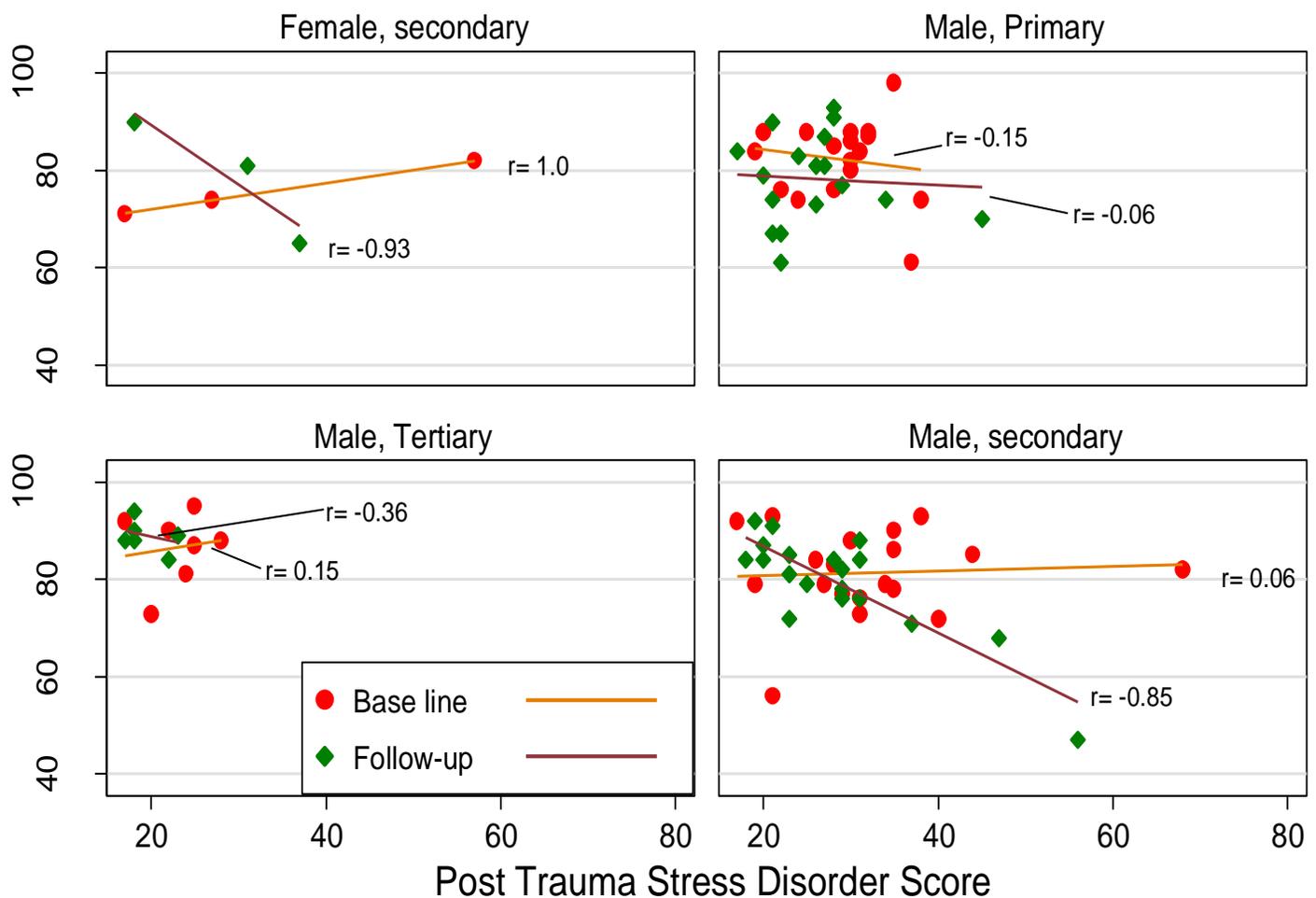


Figure 9.2: Post-traumatic stress disorder (PTSD) and Resilience (RS-14) among newly arrived Eritrean migrants on their arrival and post arrival according to their educational level

Beside to the post-traumatic stress, somatic, anxiety and depression cases were reported among this group as well. Using the PHQ-SADS standard questionnaire (cut-off score of ≥ 10), more than 10% of the participants showed a moderate and above mental health disorder in each screening. But this condition was reported to be improved in the follow-up screening after one year. Only 2.3%, 6.9% had anxiety and depressive disorder respectively, and no report on somatic disorder was reported in this follow-up (table 9.2).

However, the young generation dominated study participants, median age of 25 (IQR: 21-29), were less alcohol consumers at the baseline study. Nevertheless, in a one year follow-up, the mean of alcohol consumption has slightly surged from 4.95 at the base-line to 5.21 in the follow-up. This slender change within the short time, could be possible explained due to overall increased monthly income, either because of the additional social support or being enrolled in any income generating activities,

The relationship between the PTSD score and RS-14 score, at base-line and follow-up reflects the gradual assimilation and acculturation of the refugees in the host country. Similar to a study conducted by Arnetz J and colleagues (Arnetz et al., 2013), at the base-line, there was a weak negative relationship ($r = -0.18$). This implies that, even though it may not be a decisive factor for the strong resilience recorded, the PTSD has some effects which cannot be ignored (left panel of figure 9.1). The influence of the PTSD is more elaborated among the randomly followed sub-group ($N=48$) in which the correlation at the base line was mild negative ($r = -0.03$). During the one year follow-up, as can be inferred from the right panel of figure 9.1, apart from few exceptional cases,

the role of the PTSD on the resilience and coping among the study participants seem to be diminished with a strong negative correlation ($r = -0.65$). In addition as reported earlier by Nakash O and colleagues on the effect of integration on the depressive order of Eritrean refugees in Israel (Nakash et al., 2015c), the gradual integration might have improved the resilience of similar refugees living in Switzerland as well.

Furthermore, the correlation between PTSD and RS-14 at base-line and follow-up, among the follow-up sub-group was computed among males and females according to their educational level. As it can be inferred from the lower left corner and upper right corner panels of the figure 9.2, males educated to tertiary level showed more resilience than their compatriots in their primary school level. Furthermore, the direct linear relationship of the resilience and post-traumatic stress among female participants at the base-line ($r = 1.00$), has turned out to a reverse relationship ($r = -0.93$) during the follow-up study. Despite small sample size, this implies that, as the PTSD value decreases, the RS-14 has improved during the study period among females. Likewise, a clear improvement among the secondary school graduate males was observed from weak positive correlation ($r = 0.06$) to strong negative correlation ($r = -0.85$) at the baseline and follow-up screening respectively.

Conclusion

Despite off the limited sample size of participants, our findings suggest that Eritrean refugees may face a stressful situation in post-migration. Nevertheless, participants had high resilience score despite of low mental health conditions. Using quantitative screening procedure might have affected the details of participants adding to the taboo

of speaking about it. Hence, qualitative study design approach might contribute significant role in future studies.

In addition, as the systematic review of post-traumatic stress disorder conducted on Iraqi refugee (Slewa-Younan et al., 2015b) suggested, our findings, though in a small scale, also supported the consideration mental health in the health system of host countries.

Chapter Ten: Over all discussion

Due to the swelling number of migrants, several European countries have recently reported sudden raise of infectious diseases (IDs) among immigrants. Many of them are easily treatable IDs, such as soil and water transmitted worm infections from intestinal protozoa (amoeba and flagellates), spore forming protozoans (plasmodium), and flagellated protozoans (Leishmanial and Trypanosoma). In addition, the three major classes of helminthes, namely the nematodes (Round worms), cestodes (Tapeworms) and the trematodes (Flukes) are among the frequently diagnosed tropical diseases. For example, *Ascaris lumbricoides*, *Strongyloides stercoralis*, and *Trichuris trichiura* from nematodes, as well as *Hymenolepis nana* from Cestodes and Schistosoma species from the blood trematodes are some of the frequently diagnosed IDs. Among the bacterial and viral IDs reported at health care centers, are bacterial skin infections, tuberculosis (both latent and active), viral pulmonary infection, pneumonia, hepatitis, syphilis, HIV, and others (Serre-Delcor et al., 2018).

In addition, due to the arduous migration route, refugees and migrants may expose to various mental health disorders. The natural challenges and the man-made trials they had along the journey are likely to influence the state of wellbeing of many immigrants. Examples are, trauma, anxiety, depression, post-traumatic stress (Abbott, 2016; Bustamante et al., 2017b).

10.1 Epidemiological concept

The epidemiological study gap of the migration health is wider than it seems in the coverage and the attention it has. Of course, migration health is a complex field, which requires a multi-sectorial approaches and stakeholders to be involved. The novel

approach study design involving screening asymptomatic newly arrived Eritrean refugees and migrants in Switzerland for commonly diagnosed IDs proved there is much left to do and needs further in-depth investigation to agglomerate the overall migration health issues. Nevertheless, our two-year cohort study, designed and funded by the Swiss TPH, scrutinizes this research gap in three major fields. These are underdiagnosed chronic IDs and their migration route, incompetence in screening immigrants on their arrival, and dearth to understand and involving mental health of immigrants in host countries.

Several of the asymptomatic chronic IDs, such as helminthiasis (mainly schistosomiasis), viral infections (e.g. hepatitis), urogenital bacterial infections (such as Syphilis), and infections from intestinal worms and other easily diagnosed and treatable at a low cost are usually either underestimated or underdiagnosed. Due to the natural environment, that does not accommodate intermediate host of most IDs and the general hygiene, the rate of transmission might not seem to threaten the general public health. However, consequences of delayed treatment can cause serious sequel in the individual patient. In addition, the higher cost of expenses at a later stage also might have an overall effect on the health system.

An example of the consequence of unnecessary delay of diagnosis and treatment is the fibrotic granuloma formation around *Schistosoma* eggs in liver. Chronic schistosomiasis also can cause other complications such as urinary tract infections, kidney diseases, even rarely can lead to bladder or prostate cancers (WHO, 2017c; CDC, 2012; Jenkins-Holick and Kaul, 2013). According to the WHO liver peri-portal fibrosis for *S. mansoni* classification (Richter et al., 2016), the Ultrasound image of the

schistosomiasis patients in our study revealed that, 35% and 25% had level D and level C respectively. The former stage shows a 'central portal wall thickening', and indicates that majority of them had the infection for longer time, and the probability of being recently infected is low.

According to our systematic screening, 58.9% of the asymptomatic Eritrean migrants had schistosomiasis by at least one of the three diagnostic tool used. These are the so-called 'Golden standard' method stool microscopy (2X), serological test (Enzyme-linked immunosorbent assay [ELISA] and Immunofluorescence assay test [IFAT]), and the urine rapid test known as point-of care circulating cathodic antigen (POC-CCA). The study revealed that combination method of serological test and POC-CCA would be effective to identify *Schistosomiasis mansoni* infection among immigrants from Schistosoma endemic area. The comparison of the efficiency of these diagnostic tools has been published on the journal of Clinical Infectious Disease (Afona Chernet et al., 2017d). In line to our study, a review on diagnostic tools for schistosomiasis highlighted that POC-CCA is among the few high sensitive and specific tools similar to PCR (polymerase chain reaction), LAMP (loop-mediated isothermal amplification), and UCP-LF CAA (up-converting phosphor-lateral flow circulating anodic antigen) (Utzinger et al., 2015b). Nevertheless, only POC-CCA is commercially available, according to the report.

In addition to the limited knowledge about their prevalence rate, the history of these IDs is not clear. Even though, several of them may be rooted back to the homeland of the immigrants, where most of them are endemic to, the migration routes they follow to reach Europe are not free from these IDs either. Some of the refugees

and migrants house in those transit places for months, even for years in some instances. Hence, how these diseases are migrating along the flow, is yet to be investigated. For example, as the health system of these transit countries might not be strong enough to support and accommodate, even for primary health care service for transiting migrants, their health is likely to deteriorate further during the journey.

One of the widely prevalent IDs along the transit countries is malaria. Even though, low prevalence of malaria infection is reported from Eritrea, 2.2% (ranging from 0.4% to 6.5%) (Sintasath et al., 2005). The relatively higher prevalence of malaria reported in our study, could be a fresh infection or relapse due to lack of proper diagnosis and treatment during migration. Despite malaria roll back success story reported from Eritrea (Barat, 2006; Berhane et al., 2015; Mufunda et al., 2007), still the prevalence of the newly arriving refugees and migrants from the country in Europe (Eperon et al., 2017; Roggelin et al., 2016b; Sonden et al., 2014b) and other countries outside the continent (Kopel et al., 2010b), is on the rise. Among the intestinal parasites caused diseases (example giardiasis, hymenolepiasis, and scabies), diagnosed in our systematic screening are caused due to lack of personal hygiene and contamination. The results of the major IDs screened in our migration study Switzerland (IHSS) project are published in the International Journal of Public Health (Int J Public Health 2017) (Afonta Chernet et al., 2017e).

Up on arrival in the host country, the only access to health services is at the temporary refugee shelter or in other health centers and/or through the social assistant (curator), a person in charge. At this stage, they may have the chance to be treated for IDs that have a potential of spreading in the reception center. Moreover, other

symptomatic pathological infection may be referred to higher level for treatment. Nevertheless, the pondering question is that, is this adequate to diagnose the IDs that might be imported along with the immigrants? Especially for asymptomatic carriers, such as the latent tuberculosis (TB) patients, who have high tendency to turn into active patients during post migration phase. In our study, we had encountered a couple of refugees who were initially recruited in the study, but later excluded from the study because they were diagnosed with TB.

This implies that, some basic screening procedures, exclusively if immigrants are from endemic areas, where these IDs are causing heavy burden to the health system of those countries, need to be considered at the entry ports. During the migration route, as most refugees and migrants are obliged to live and remain in large groups, and within uncomfortable conditions, there is high probability of being contract and re-contract by any IDs. Therefore, mass screening for these notorious diseases, which can be diagnosed and treated at a lower cost, would be suggested the earlier the better after arrival. Hence, the health service accesses at the reception centers need to have a general preparation to diagnose and treat these IDs. This systematic observation and control can eventually develop into a surveillance system. The sustainable surveillance would in turn lead to/or used as a tool to understand the needs and expectations of migrants and refugees in general. Also establishing a sustainable surveillance system would be a preparatory measure to control and trace back the root causes of future out breaks.

Beside to setting diagnostic procedures and developing a surveillance system, the vital issue is to understand the transcultural sensitivity of the immigrants. Many of

the immigrants are from cultural conservative background. These vulnerable groups are hesitant to express their medical feelings, especially towards sensitive issue such as, mental health, sexually transmitted infections (STI), family planning and other taboo topics to discuss in their cultures. Furthermore, due to language barrier, most of them depend solely on the capacity and proficiency of interpreters. In some instances they are assisted by their children, and in such condition, it is less likely that they will express their feelings. In addition to the limited understanding of the medical terminologies of the translators, the eye contact of physicians and health care workers and interviewers in general is an important aspect in winning the trust of immigrants. Hence, our study methodology has to consider these barriers in the future. Even some of them may have fear of stigmatization for leaking and disseminating of medical history in the community. Hence, they are likely to be hesitant to have a translator from their own community. All these suspicion, addition on top of their mistrust and always at state of alarm and in a stand-by condition, make them defenseless to mental health syndromes.

Nevertheless, in our systematic screening for some of these cultural sensitive diseases, there was no single case of HIV or HCV (STI diseases) apart from two mild condition of HBV. This could be possibly due to the extensive vaccine coverage against HBV (HepB3) in Eritrea as compared to majority African countries (Amahazion, 2016; WHO, 2017d, 2017e), and low prevalence of HIV (<0.6%) in Eritrea, according to WHO annual report (UNAIDS, 2015). Moreover, the systematic review and meta-analysis we conducted confirm lower prevalence of STI as compared to water-born and/or soil-transmitted parasitic infections among the SSA origin refugees and migrants. The

results of this review is published in the Eur J Clin Microbiol Infect Dis (A. Chernet et al., 2017).

Their complex mix and various pre migration background is by itself a challenge to fathom. The life style they adapted to be friends with themselves only, which they may have probably cultured along the migration pathway, hinder them from expressing their feeling and tell their stories. Building confidence and establishing a trust with them would be the most important step to take in understanding their mental health and starting to offer help. In many of them the theme 'mental health' by itself, could be a taboo topic. Once again, understanding and considering the transcultural sensitivity make it fundamental in the study protocol. In addition, a quantitative study design might provide an overall picture of the mental health condition. However, for an in-depth understanding, the qualitative study protocol would be more effective.

For obvious reason, the factors leading to various types of mental health instability in the pre-migration, during and post-migration are not similar. During the pre-migration, they are related to repression, torture, imprisonment, lack of freedom, insecurity, trauma, and war experience. Once, they are out from their home countries, refugees and migrants are exposed somehow different format of stressful conditions such as, betrayal, mistrust, harassment, rape, hijacking, environmental challenges, trauma, ransom tortures, hunger and thirsty. In post-migration state, the repressive conditions are related with instability, residence permit delays, language barriers, difficulty to find jobs, family separation, climate, food and life style, culture and tradition, and even civilization by itself could challenge the unprepared expectations of some immigrants.

These exposures in turn lead to the notorious risk factors for non-communicable diseases (NCD) such as alcohol use abuse and smoking. Being away from parents and family member on their own added to their young age (median 25 years), refugees and migrants are susceptible to tempting and addicting life style. In addition, despite their age, due to the sedentary new life style, with rare mobility, and an improved dietary menu than before, they may expose to NCDs risk factors like obesity, and high blood glucose level in time.

Not alone to the age related NCDs and their risk factors, most immigrants are less aware of the IDs they may have. As there is no habit for regular check and control, they are not eager to know their health statues. From our IHSS, even though 86% had below the normal vitamin D level, no one was aware of their vitamin D status apart from a couple of people who were on a regular supplementations. Our finding about vitamin D level among newly arrived Eritrean refugees and migrants in Switzerland is published on the Swiss Medical Weekly (Afonta Chernet et al., 2017a). The one-time intramuscular supplementation of vitamin D3 (Streuli, 1ml=300,000 I.E), has significantly improved the level among the randomly followed sub-group (Figure 10.1).

In their new environment, be it for the sake of cultural, security or other reasons, immigrants do not make use of the sun shine exposure (Benson and Skull, 2007a). Tendency towards avoiding unfamiliar new menus might also further hinder/ forsake them to access of vitamin D rich nutritious food, including dairy products (Nicklas et al., 2011).

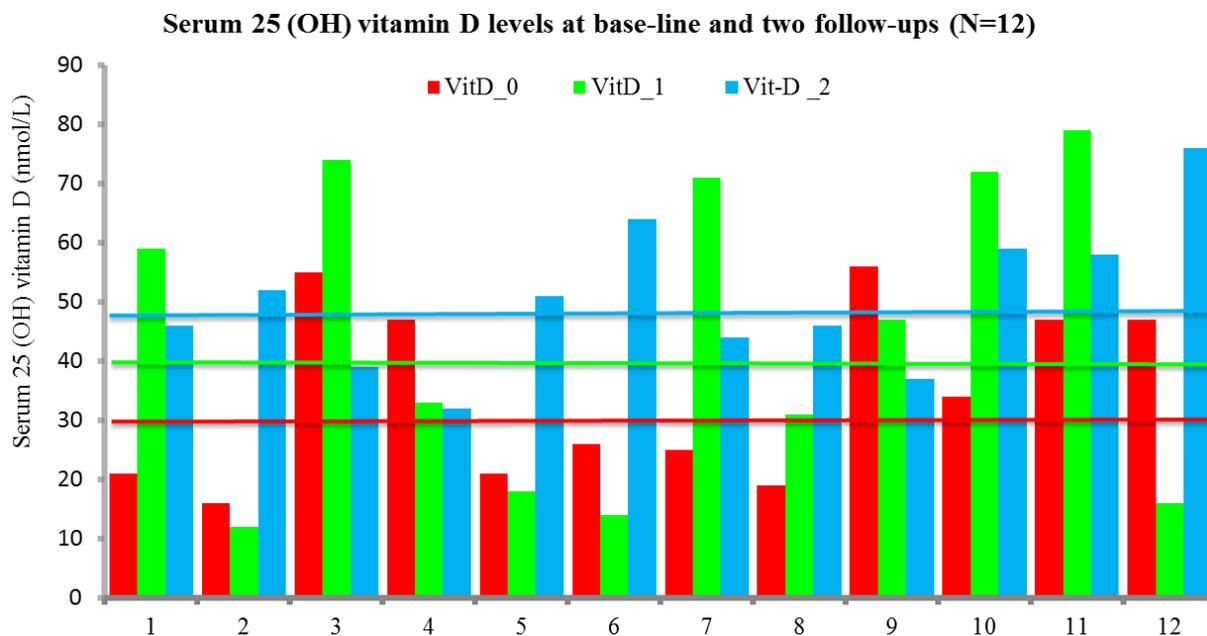


Figure 10.1 Vitamin D level at the baseline (VitD_0) and two follow-ups (VitD_1 and VitD_2) consecutively for the randomly selected 12 participants (on the horizontal axis). The three colored horizontal lines represent the median value of 30nmol/L, 40nmol/L and 48nmol/L for the three measurement times respectively.

Finally, due to the angst for instability and legal permit of stay refugees and migrants have, their health care utilization might have negatively affected. For the fear of any activity they practice before they secure their legal permit of stay may directly or indirectly have impact on the decision of issuing their permit, they try to refrain themselves from several activities, even using health care services.

10.2 Public Health Impact

The wellbeing of the immigrants in all aspects is an asset for the successful integration and acculturation into their new community. Likewise, as this success would rape into building a productive generation, healthy community, and secure society, the overall outcome would benefit the public. For a successful integration, the public health guiding principles for healthy immigrants need to be realized. Among these are questions

addressing; does the satisfaction of refugees and migrants by the health care services meet their expectations and how effective are they utilizing it, if they are making use of it? The next decisive factor would be what has to be done to understand and help their mental health problems?

The health system of the host nation plays an important role in motivating refugees to utilize and get familiarize with it. According to the Eritrean health system as an example in many low and middle income countries (LMIC), since there is no health insurance system, the term 'insurance' by itself is a new vocabulary for most refugees and migrants. In addition, the cultural influence they grew in, where there is no habit to visit and have a consultation with family doctor, make it hard for them to utilize properly utilize the opportunity opened for them. Hence, boosting awareness and know-how with update, support, motivation and consultation from guardians, curators, and assistants would be necessary.

Strengthening the health services provided at the reception centers and temporary shelters play an important role in identifying and treating any IDs, such as malaria or other fever diseases, or any intestinal parasites. Having a well-equipped health service, could reduce the complications of treatable diseases. On top of that, if family physicians assigned to look after immigrants get the awareness of transcultural sensitivity of these minority groups, would help them to win the trust and be favored in the eyes of their new patients. Similar to the primary health care services, for advanced or referral systems would be essential to have proficient translators or interpreters.

Moreover, consistent updating and guiding new arrived immigrants about the health system and insurance policies in the host country could have significant role in utilizing it effectively. Examples, the vaccination programs, information about the essential vaccines such as flue vaccination in winter, family planning and childcare could be mentioned. The very low vitamin D level discovered in our study is a prime witness about the lack of awareness of basic supplementary medication. This preventive method would reduce the rate of absenteeism from ill health and spare the cost of unnecessary expenses from complicated and advanced diseases.

The second influential factor that needs to be realized by the public health is the mental wellbeing of newly arriving refugees and migrants. Among the most pivotal factors for their stability is securing their stay or their asylum application being accepted in their host country. This has a significant effect in settling themselves and starting a new life. According to our IHSS study, among the sub-group followed for post-traumatic stress disorder (PTSD) screening, the rate of PTSD has decreased by more than 50% in the second screening time (one year after). Initially, at the baseline, 48.6% had PTSD symptoms. For the details, please see chapter nine.

Despite high prevalence of PTSD reported in our study, which is also similar to recent report (Bustamante et al., 2017b), higher resilience score was reported among Eritrean immigrants. Only 6% had scored below the cut point. These findings implies that, to save their lives from stressful conditions, they have gone through complicated life threatening both man-made and natural challenges (Daynes, 2016). Nonetheless, though the scars of the experience remain and are evident according to the score in their screening, they are struggling and managing to cope up with the new environment.

A study conducted in the southern part of Sweden reported a decreasing pattern of health on arrival, but it tends to gradually improve with time (Carlzen and Zdravkovic, 2016).

In summary, the following seven points and remarks deduced from the Immigrant Health Study Switzerland (IHSS) project.

Migrants and refugees are pre-exposed to several infectious diseases before their arrival, and still they are not aware of them.

Easily diagnosed and treated infectious diseases such as schistosomiasis might have a serious health effect among the migrants from Eritrea and other immigrants from schistosomiasis endemic countries.

Understanding the health disparities of refugees and migrants by the health professionals in the host country could possibly ease the diagnosis process among this particular group of the population.

Selecting efficient protocol to screen for schistosomiasis would increase diagnosis effectiveness. Therefore, *S. mansoni* among patients outside the endemic area is better diagnosed using a combination of both the POC-CCA and serology.

The low awareness the refugees and migrants had about importance of vitamin D on the health, is an important aspect that needs attention. Example, immigrants from Eritrea are recommended to have regular in-take of vitamin D supplementation, with consultation of their family doctors.

Generally, Eritrean immigrants showed slow trend in change of metabolic activities, namely HbA1c, total cholesterol, HDL, LDL and Triglycerides. However, regular control would be helpful for the future.

The mental health of Eritrean refugees and migrants seems to be improving after one year of post-migration period. However, the need of further in-depth qualitative study to understand the mental health of this population is unavoidable.

10.3 Implication and future perspective

Despite being a pressing and demanding topic, the migration issue is usually not given proper attention apart from setting it as a political discussion agenda and debating theme. The cumulative migration importance, which plays a vital role in the livelihood of the ordinary residence, is less considered. Particularly, the tendency of migration, which may have an important role in shaping the future of the hosting countries in different perspectives such as, socio-economic, culture and traditions, health and globalization, are usually left aside.

With intensifying migration flow, and foreseen increase in future, it is more likely that more young generation will join the current. Some economic analyses predict and argue the need of these young generation to support the aging population in developed countries by filling work force in the future, particularly in Europe (Trummer and Krasnik, 2017; IOM, 2017b; de Haas, 2017; The Economist, 2015b; Straubhaar and Weber, 1993). However, the mental and physical fitness of these refugees and migrants to cope up with the new life style and integrate to the new system had not been considered. The

question is, after all the life threatening challenges they had been through, how many among those who made it to their destination are ready for the new struggle awaiting them to deal with. Likewise, and to how extent is the new hosting system prepared to accommodate and amalgamate them into their new society. Is the health system advancing and approaching with and to the continuous upsurge of immigrant population and the unavoidable escalation of travel rates around the globe?

As health financing and research gap between the source of migration countries and hosting countries widen further, health care services and accessibilities among rich and poor nations is more likely to divert apart further. Currently, the discrepancies between the two may seem to be only regarding infectious diseases and related endemic diseases. However, projections from many peer-reviewed published scientific studies in public health and epidemiological studies, reports from international research centers, and country reports compiled by the WHO, shows a fast increase of the notorious and heavy burden NCDs in the least developing and developing countries. The diagnosis and treatment costs of most of these diseases are less likely to be afforded by people living under 1.90 USD per day, according to the new definition for line of poverty (World Bank, 2015).

Therefore, though these diseases including the NCDs may not be directly involved as causes of migration, but there could be a tendency to ignite or initiate for search of better life with a 'good health' in developed countries. Most migration routes, such as the one from South, transiting an arduous journey through Sahara desert, and traumatic corridor of Mediterranean Sea, have significant effect on both the physical and

mental health of migrants. Adding this to the previously asymptomatic and undiagnosed weak health statuses, will undeniably yield a poorer health of migrants on arrival.

In spite of their young age, this ill health condition of new refugees and migrants, will reduce their productivity age. As a result, the dependency rate is likely to increase substantially. This will have a significant public health burden as well as socio-economic effect on the host nations and the health systems. This is principally true in a condition when the diseases are ignored or left undiagnosed and untreated for a while. Therefore, early detection and caring with sustainable surveillance systems will minimize the unnecessary cost of health expenses and boost efficiency of healthy and productive part of the population.

Collaborations, including in public health sectors, through research, training and learning, may amplify the awareness of the public on health and the burden of ill health. Even though some initiatives are underway to tackle global epidemics such as eradication of malaria, neglected tropical diseases, and other contagious diseases, to enhance a sustainable equitable and affordable (SEA) health services globally, yet, much is left. The SEA is likely to be built on mutual collaboration, sharing, and exchange of updates and information. Examples, establishment of tropical health institutes, research centers for medicine in the tropics, launching travel medicine centers, exchange of intellects in both directions, and other could be mentioned. Such a collective efforts will aggregate to meet the seventeen sustainable development goals, the 17-SDGs targeted by 2030.

The well-instituted health systems and reputable health care facilities founded in countries of source of migration will not only benefit the nationalities alone, but also tourists and travelers and expatriate who seek medical attention back in their home countries upon their return. In short, in conditions where there is no access even to basic services, with the fast moving globalization, as people travel from one corner to another, the migration of the diseases, without refugees and migrants is doable. The last century and the beginning of this century have witnessed several migratory diseases such as H1N1, SARS, H5N1, Ebola, Zika and others, without direct involvement of migration.

To equip health professional with a broader perspectives, our pedagogy need to embrace relevant topics such as migration and travel medicine in its curricula. Well-acquainted personnel are more efficient to respond to any circumstances of any sudden outbreaks. Making use of advanced diagnostic tools, and designing effective chemotherapeutics would be a tool to back up effective control measures, persuasive surveillance and timely response. Especially, tools designed and adjusted for resource-constrained settings, could significantly curb the unnecessary delay to referral diagnostic centers. The lesson learned from the 2014 Ebola outbreak in the West African countries and the damage it caused due to several reasons such as delay of support, shortage of qualified personnel, misinformation at the early stage, and others, is a good example.

Moreover, in additional to their discrete origin and background, the decisive factors that potentially hinder refugees and migrants to assimilate, is the distinct integration policies of host nations. Some are favored for some reason, while others are

not, as a result they may be denied the privileges of equal opportunity, even the basic rights. This unanticipated discrepancy affects the paper work processing, which in turn directly or indirectly related to free access to health care system. Some studies in the European countries have reported such discrepancies may partially or fully constrain health care services utilization (Giannoni et al., 2016; Malmusi, 2015; Malmusi and Ortiz-Barreda, 2014). In order to curtail such discriminations and narrow the gap between immigrants in accessing health care services, a group of scholars recently shared their personal view on how the global community can react to the refugee crisis. They have drawn three key propositions (Khan et al., 2016; The Lancet Infectious Diseases, 2016). First, building inclusive health services that prevent stigmatization and persecution, and reduces cost through early screening and diagnosis; second, reduce inequality globally to curb migration flow; and third, deliver evidence based health risk information.

In addition, the window period between their arrival on the host country and the acceptance or approval of their asylum application might have a crucial role to influence the expectation they had. This unanticipated delay, extending from months to years, in turn affects the moral and wellbeing of immigrants. During this limbo state they are not legally entitled to have access to either study the local language or establish a career as well as to participate in any income generating activities. Moreover, the extended hope to re-unite with their beloved, play big role in gradually diminishing their resistance. Especially, in regards to the income generating, as most of them are not from well to do families, they are in debt to pay back the cost of their migration expenses. Not only this, but also, once they step-on foot in Europe, they are in huge family responsibilities to

support their siblings and parents back home or someone already along the migration channel. Therefore, the longer the paper work processing takes, the more they suffer from all these pressures and their endurance inversely decreases. As a result, by the time they got their acceptance to stay in the country, they are in the bottom level of readiness to start a new life afresh, including learning the language, adapting to the culture, adjusting to the system, and accepting the realities.

Therefore, for the establishment of SEA health care services for refugees and migrants, the inevitable need of holistic approach is vital (Giannoni et al., 2016; Blitz et al., 2017; Malmusi et al., 2017; Reyes-Uruena et al., 2014). Hence, migration health would be realized with the active involvement of stakeholders namely, researchers, health care professional, social workers, policy makers, non-government organizations, regional and international organization and funding agencies. A recently conducted systematic review on European frame work to monitor IDs among migrants (Riccardo et al., 2015) called for the multi-dimensional frame work implementation for successful surveillance system.

In order to curb and hinder the transmissions of IDs, European studies on the need to screen IDs (Kärki et al., 2014b), and impact of IDs on European epidemiology (Castelli and Sulis, 2017) among newly arriving refugees and migrants, have emphasized importance of EU level screening guideline, and access to health care facilities to all immigrants irrespective of their residence permit conditions, respectively. Moreover, considering the scarcity of reliable provision from the host countries, which in turn result into poor health and dependence, an Australian study on refugees and

rehabilitation underlined the importance of robust contribution from national and international organizations, including government (Khan and Amatya, 2017).

A thematic paper on refugees and access to mental health care service to asylum seekers in Ireland recommended for establishment and implementation of a national strategy on mental health care for immigrants (O'Connell et al., 2016b). As migrants and refugees have diverse background and source of stressors, the World Psychiatric Associations (WPA) advocate for proper attention from clinicians, policy makers, and service providers, (Bhugra et al., 2011). The WHO mental health atlas has been on continuous improvement since its establishment in 2000. To improve the mental health situation globally, the organization's action plan for the years 2013-2030 targets four objects. These are; strengthening effective leadership and governance; provide comprehensive, integrated and responsive community based setting services; implementing strategies for prevention and promotion; and strengthening information systems, evidences and research for mental health (WHO, 2014b).

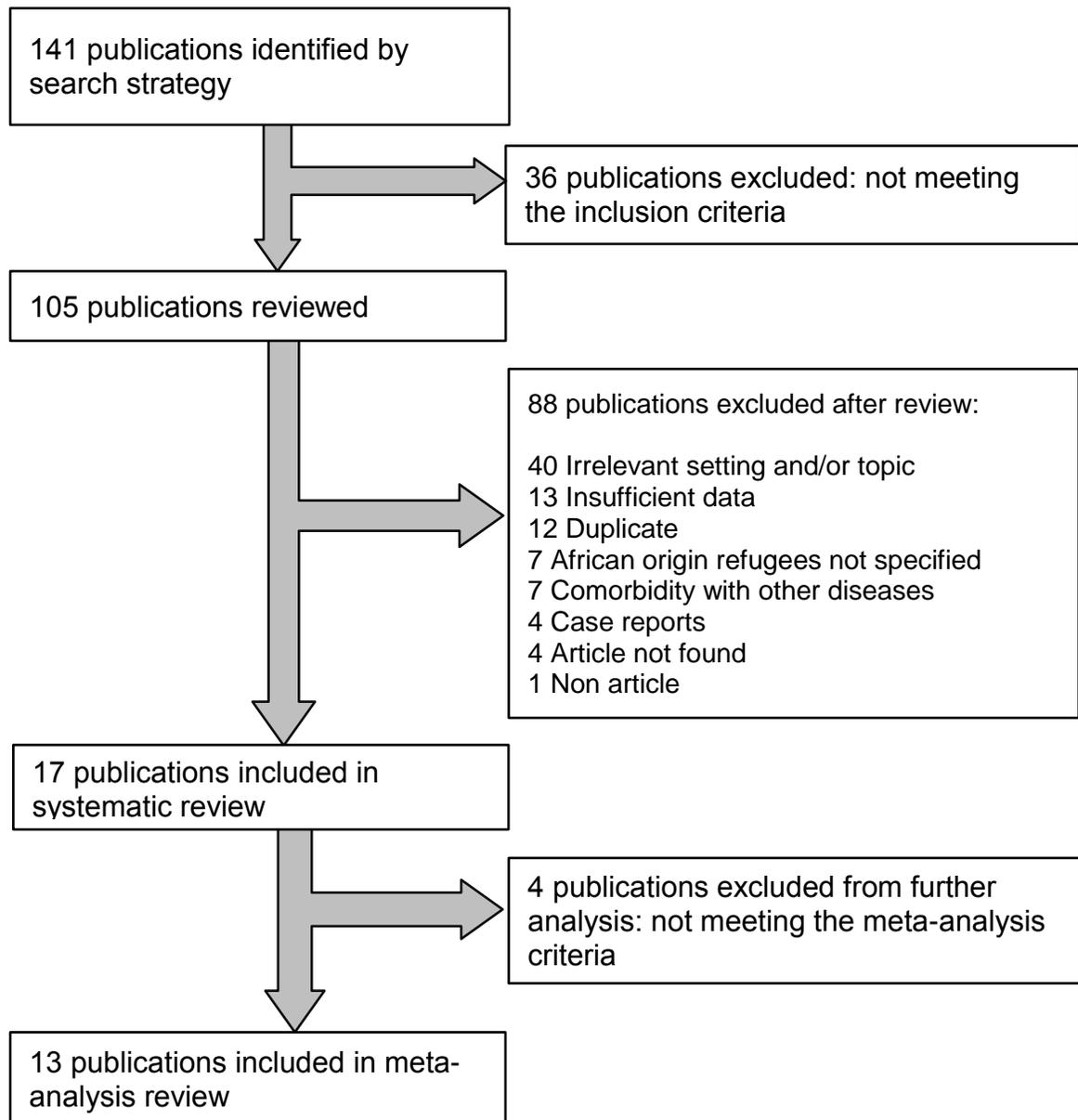
In conclusion, one of the central pillars for health 2020 of the WHO regional office for Europe is migration health, population vulnerability and human rights (WHO-Europe, 2018). To establish immigrant sensitive health policies, the regional office underlines the collaborative efforts with member countries and other stakeholders. Last, all these can be summarized with the core principle of the EU for health care. In its fundamental right, article 35, the access to health care is stated as, *'Everyone has the right of access to preventive health care and the right to benefit from medical treatment under the conditions established by national laws and practices. A high level of human health*

protection shall be ensured in the definition and implementation of all the Union's policies and activities' (EUR-Lex, 2010).

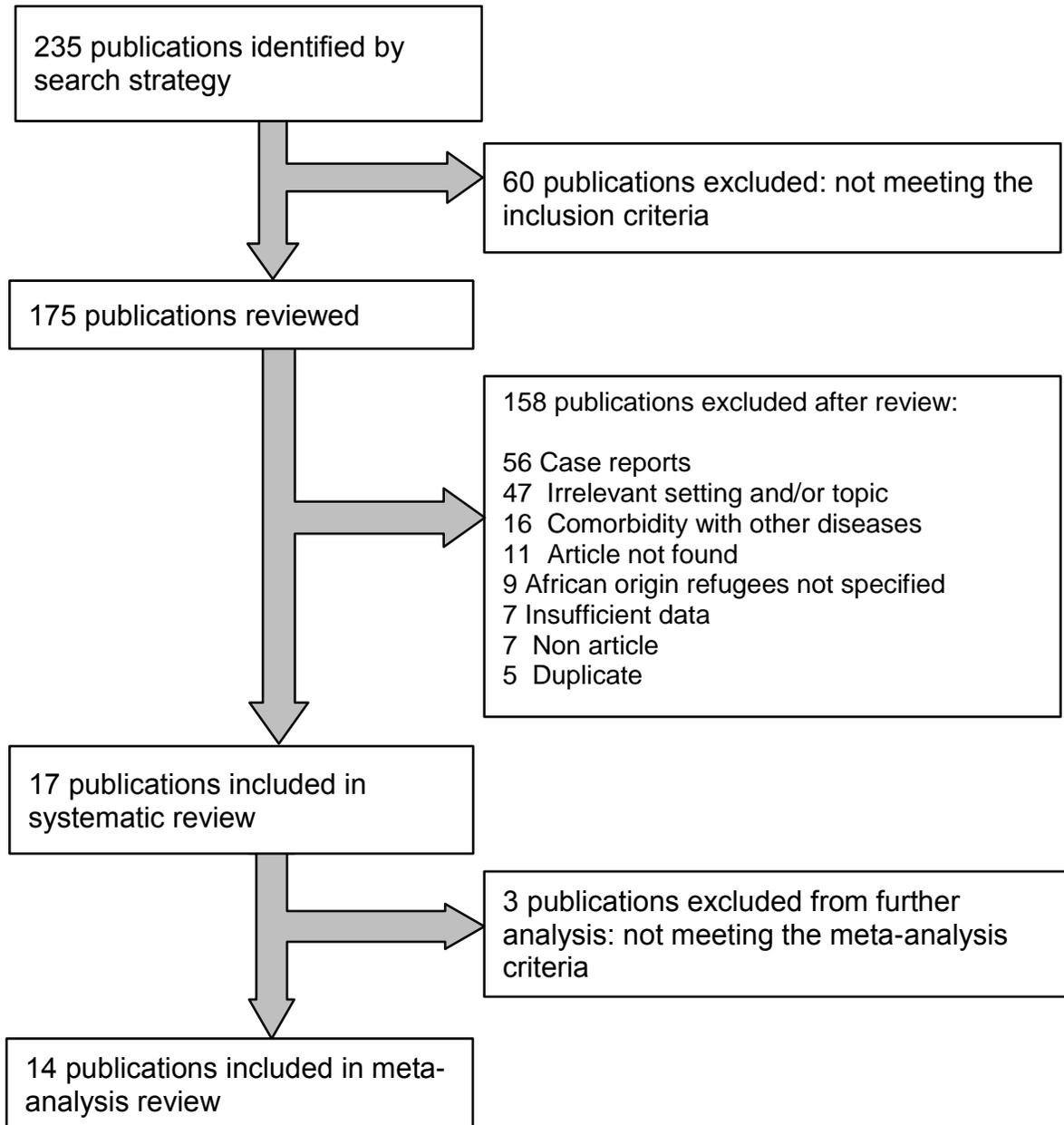
Chapter Eleven: Appendix

11.1 Additional figures for chapter 4

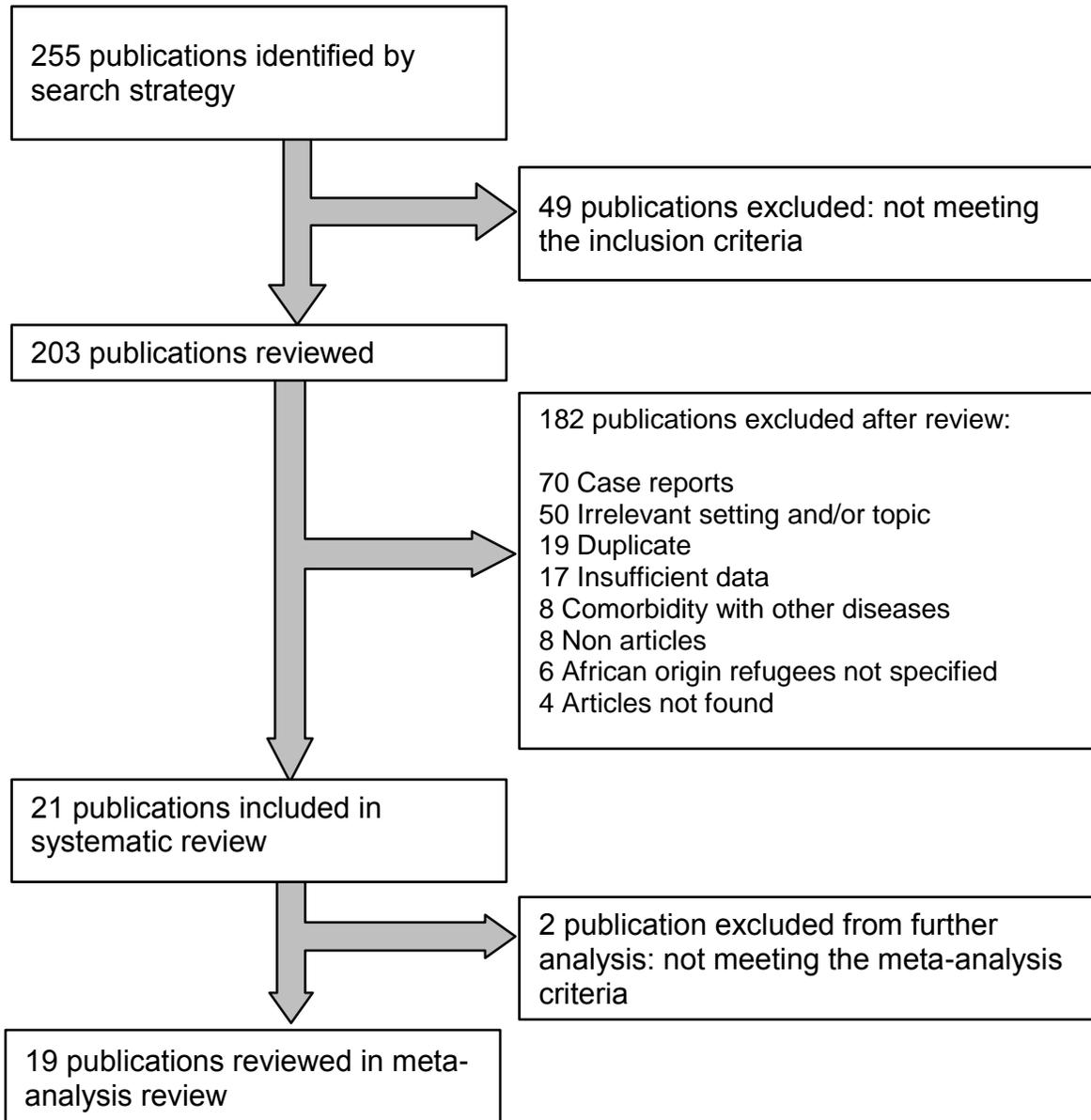
Supplementary figure 11.1.1: literature selection flow chart:



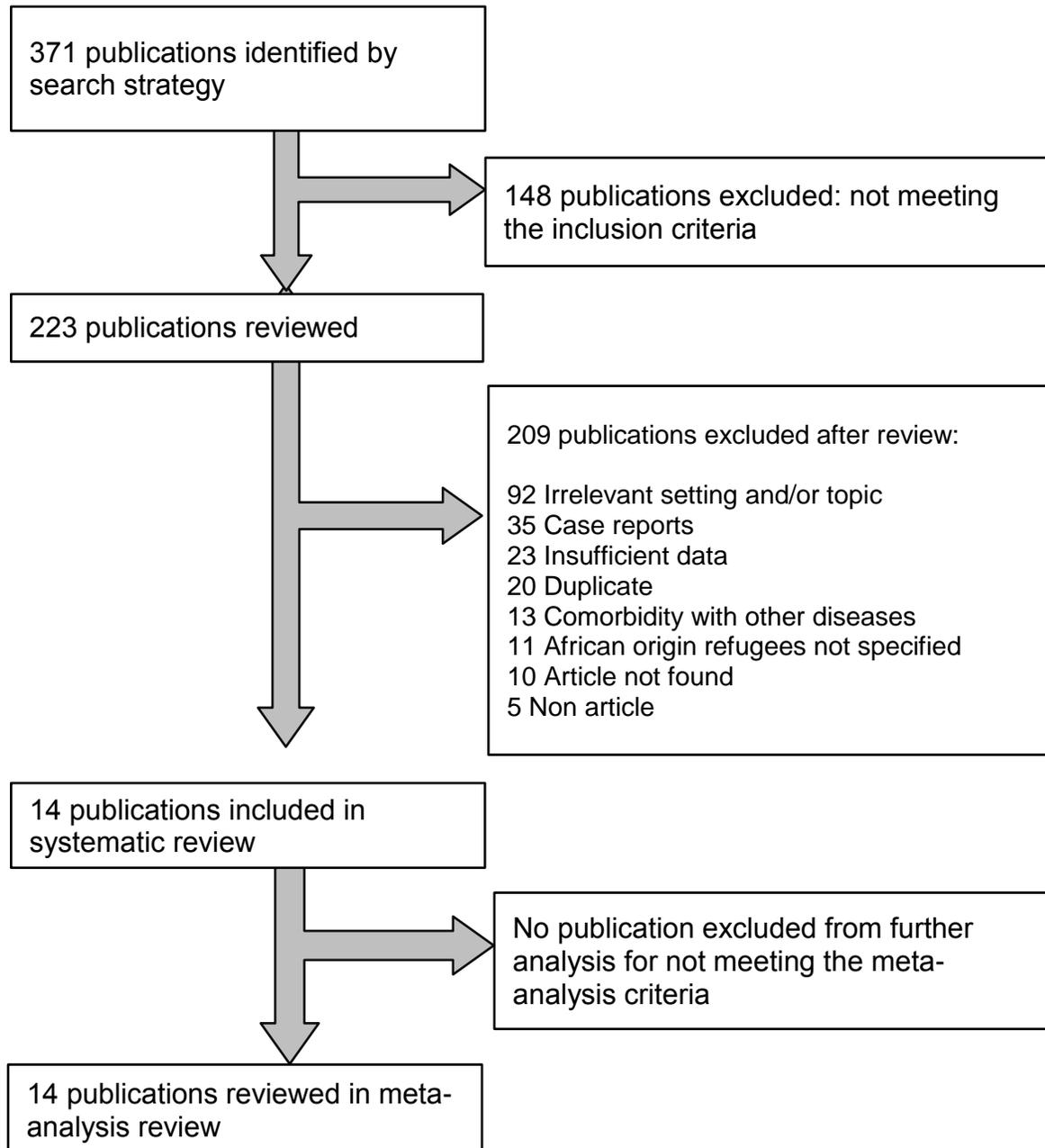
Supplementary figure 11.1.2: literature selection flow chart: intestinal helminths



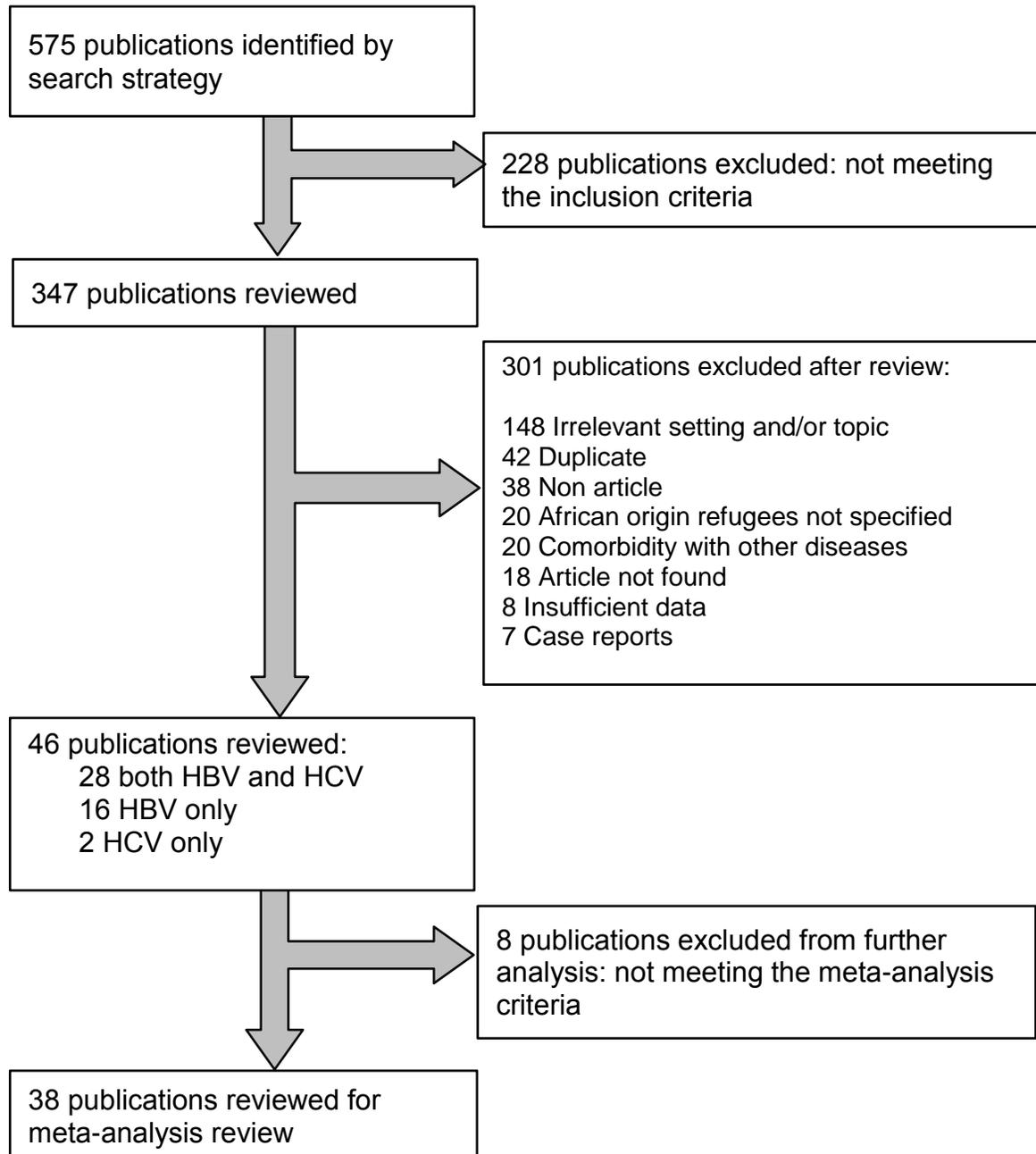
Supplementary figure 11.1.3: literature selection flow chart: schistosomiasis



Supplementary figure 11.1.4: literature selection flow chart: intestinal



Supplementary figure 11.1.5: literature selection flow chart: chronic viral hepatitis (HBV and HCV).



11.2 Supplementary reference list for chapter 4

1. S1 (Cobo et al., 2016c)
2. S2 (Nyangoma et al., 2016)
3. S3 (Monge-Maillo et al., 2015b)
4. S4 (Belhassen-García et al., 2015)
5. S5 (Gibson-Helm et al., 2014)
6. S6 (Olshtain-Pops et al., 2014)
7. S7 (Padovese et al., 2014)
8. S8 (Bocanegra et al., 2014)
9. S9 (Hladun et al., 2014b)
10. S10 (Soler-González et al., 2013c)
11. S11 (Zermiani et al., 2012)
12. S12 (Sampedro et al., 2010)
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15. S51 (Távora-Tavira et al., 2007)
16. S16 (Martin and Mak, 2006)
17. S17 (del Amo et al., 2005)
18. S18 (Abu-Madi et al., 2016b)
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20. S20 (Belhassen-García et al., 2016)
21. S21 (Abdel Hamid et al., 2015)
22. S22 (McCarthy et al., 2013)
23. S23 (Swanson et al., 2012)
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25. S25 (Abu-Madi et al., 2008)
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75. S75 (Martelli et al., 2017)
76. S76 (Cella et al., 2017)
77. S77 (Coppola et al., 2017)
78. S78 (Greenaway et al., 2017)
79. S79 (Jablonka et al., 2017)

11.3 Social Resilience and Mental Health among Eritrean Asylum-Seekers in Switzerland (nested Qualitative study)

Social Resilience and Mental Health among Eritrean Asylum-Seekers in Switzerland

Sabra Melamed^{1,2‡}, Afona Chernet^{1,2‡}, Niklaus Labhardt^{1,2}, Nicole Probst-Hensch^{1,2}, Constanze Pfeiffer^{1,2§}

¹ Swiss Tropical and Public Health Institute, Socinstr. 57, 4002 Basel, Switzerland

² University of Basel, Petersplatz 1, 4003 Basel, Switzerland

‡ Joint first authors

§ Corresponding author: constanze.pfeiffer@swisstph.ch

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Abstract

Eritreans comprise the largest group of asylum-seekers in Switzerland. Gaining recognized refugee status can take up to 36 months, during which time asylum-seekers live in a state of legal limbo, intensifying threats to their wellbeing. Resilience and mental health among this population is poorly understood. We interviewed 10 asylum-seekers residing in Switzerland using qualitative, in-depth interviews. Data were analyzed using the Framework Method. Results indicated that mental health was understood as a binary state rather than a continuum and that trusted friends and family were responsible for recognizing and attempting to treat mental health problems. Pathways to care were potentially interrupted for asylum-seekers. Capital building, considered through the lens of social resilience, consisted of language learning, establishing of new individual- and community-level social networks, and proactive symbolic capital building through volunteering. We contextualize the asylum-seeker's experience into a resilience framework and offer practical recommendations for improving mental health care access.

Introduction

Research Context: Eritrean Asylum-Seekers in Switzerland

As of 2016, there are approximately 33,000 Eritreans living in Switzerland (Bundsamt für Statistik, BFS, 2017) making Switzerland a major center of the Eritrean diaspora in Europe. Of Switzerland's approximately 50,000 recognized refugees, 40% are Eritreans (Staatssekretariat für Migration, SEM, 2017a). Eritreans also comprise the greatest percentage of asylum-seekers in Switzerland, submitting 18% to 29% of all asylum applications between 2014 and 2017 (Staatssekretariat für Migration, SEM, 2018). Although the number of asylum-seekers entering Switzerland has receded in the last year, many who came in 2015 and 2016 are still awaiting a decision about their asylum cases. According to official statistics, asylum application processes take approximately six months to complete, however reports indicate that the actual length of time is up to 30 months (Staatssekretariat für Migration, SEM, 2017b; Schweizer Radio und Fernsehen, SRF, 2014).

Asylum-seekers¹ must negotiate foreign bureaucracies as they state their case and wait for a decision. During this vulnerable time, they must also contend with their personal

¹ A note on terminology: Urquia and Gagnon (Urquia and Gagnon, 2011) propose the following definition for the term migrant: "a person who has established a (semi)permanent residence in a place other than that which they habitually lived". Following the United Nations High Commissioner for Refugees Convention Relating to the Status of Refugees (United Nations General Assembly, 2010) the definition for 'refugee' is considered in this paper to be any person, who

"owing to wellfounded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it" (p.15).

Finally, those who have arrived at their destination country but who do not yet possess official permission to reside under government protection are termed 'asylum-seekers'(Urquia and Gagnon, 2011).

histories, uncertain residence status, isolation from family and social ties, integration into a new society, and language barriers, all of which challenge the resources of newly arrived asylum-seekers (Schick et al., 2016). Health workers in Switzerland report high levels of trauma, depression, feelings of hopelessness and substance abuse among refugees and asylum-seekers, who in turn face barriers to care due to communication problems, stigma, and a lack of knowledge of how the Swiss healthcare system functions, particularly in relation to mental health (Müller et al., 2016; Schick et al., 2016; Bundesamt für Migration BFM, 2010). One study found that asylum-seekers in Switzerland “incur significantly higher healthcare costs than the comparable resident population, consult doctors more frequently, but rarely receive specific treatment for their mental health problems” (p.5), indicating a need to further understand barriers to care and possible avenues for improving access (Heeren et al., 2016; Maier et al., 2010). Migrants from non-Western countries are known to have a different understanding of mental health than Westerners (Bettmann et al., 2015; Morris et al., 2009), but to our knowledge, conceptions of mental health have never been studied among Eritreans.

Perhaps even more important than focusing on psychopathology, as many authors have noted, is understanding and leveraging the resources of migrants, asylum-seekers and refugees (Sleijpen et al., 2016; Siriwardhana et al., 2015). Research focusing on pathology alone, and ignoring capacities that migrants bring with them, has been frequently criticized in the literature (Sleijpen et al., 2013; Papadopoulos, 1999; Kleber et al., 1995). Theories of resilience have been proposed as a way to credit migrants’ strengths and resources (Ungar, 2012). For policy makers designing programs to

support migrants with integration and attempting to diagnose and address mental health problems early, it is important to account for the ecological context in which resilience happens (Reed et al., 2012).

While there is no universally agreed-upon definition of resilience, most definitions understand the term to refer to an ability to bounce back after adverse life events (Southwick et al., 2014). Obrist, Pfeiffer & Henley (Obrist et al., 2010), conceptualized social resilience for social sciences, which considers the social environment and interactions within it, and defined the concept as the “capacity of actors to access capitals in order to – not only cope with and adjust to adverse conditions (that is, reactive capacity) – but also search for and create options (that is, proactive capacity), and thus develop increased competence (that is, positive outcomes) in dealing with a threat” (p.289).

Drawing on Pierre Bourdieu’s (Bourdieu, 1986) concept of social resilience, this framework considers four types of capital (social, economic, cultural and symbolic), all enabling the holder of capital to “appropriate social energy” in pursuit of his or her goals (p.46). Social capital is considered in the context of relationships and social networks, i.e., the ability to leverage one’s family, friends and acquaintances to accomplish a goal, while economic capital entails the control of economic resources, such as fixed and liquid assets. Cultural capital is conceptualized as legitimate knowledge, i.e., skills and education, across three forms: embodied (habits and other affected physical traits), objectified (physical artifacts of tradition and knowledge) or institutionalized (officially recognized, such as degrees or religious status). Symbolic capital influences access to

these other three forms of capital, in turn influencing capacity to act, and bestowing the power to influence one's situation.

Capital is accessed across three levels: household, intermediate or community level, and (inter)national. This consideration of the social environment in which actors operate is particularly suited to the study of immigration, as migrants traverse from native culture embeddedness to integration in a host culture. Obrist, Pfeiffer & Henley argue that it is critical to be clear when considering resilience, specifying which threats are included in the consideration, the type of threat and the outcome of interest (Obrist et al., 2010). Here we consider the migratory process as an acute (although long-lasting) and multi-valent hazard profile, including but not limited to: exposure to trauma, loss of social support systems and social standing, economic threats, and insecure legal standing. Migration is understood as a pathway within a constantly-changing socio-cultural system, in which the individual is an integral, yet inter-dependent part.

The current study was nested within a larger study on the health status of recently-arrived Eritrean immigrants in Switzerland, which sought to understand the specific health needs of this population. Detailed information on the focus, methods, and results of the study have been previously published (Afonta Chernet et al., 2017f). Mental health and resilience was assessed using a quantitative approach. The Resilience Scale (RS-14) (Wagnild, 2009) a well-studied and validated tool to measure resilience, was selected and completed by 107 participants. Results did not reveal expected variances in resilience capacities among the participants. In particular, findings were clustered among the high end of the spectrum (see Table 11.3.1) (Chernet et al., 2016). Concerns were raised that the quantitative approach might not accurately capture the

mental health realities of migrants, either due to differing socio-cultural conceptions of mental health, translation problems, or a bias against speaking about mental health issues. Finally, there has been criticism of the RS-14, with some arguing that the scale provides only a snapshot of a person's self-reported capacities at one point in time (Bonanno, 2012), and others questioning the use of Western measures of resilience with non-Western populations (Ungar, 2012).

Participant scores, bottom quartile; median, range	66, 56-73
Participant scores, top quartile; median, range	86.5, 82-93

Table 11.3.1: RS-14 Scores

In the light of the above, this study used a qualitative design to explore social resilience towards migration related mental health challenges of Eritrean asylum-seekers and refugees living in Switzerland. Central to the aim of this study is to gain insights into (1) how asylum-seekers view mental health, (2) their pathways to mental health care, and (3). Whether, how and which capital are leveraged by asylum-seekers.

Methods

Participants

Participants in the initial study were recruited from cantonal registration rosters and selected on the basis of criteria outlined in (Afonta Chernet et al., 2017f). Of the 100+ participants in the larger study, 10 were randomly selected from the top and bottom quartiles of the RS-14 scores respectively (20 total) to participate in the sub-study. Participants were contacted by telephone and invited to participate. Participants were

contacted until an approximate spread between the two distributions (top quartile $n=4$; bottom quartile $n=6$) was achieved. Because most of the larger study participants were male ($n=94$), the sub-study recruited only male participants to avoid skewed results. Participants were reimbursed for their travel expenses.

The study was conducted by the first author (a female health scientist) in Basel, north-western Switzerland using semi-structured in-depth interviews from March through June 2017. All participants had been in Switzerland for less than 1 year at the time of recruitment in the initial study; by the time they were recruited into the sub-study, participants had been in Switzerland between 18-36 months.

Ethical Considerations

Ethical clearance was obtained from the Ethics Committee of North-western and Central Switzerland (EKNZ) (Ref. No. EKNZ 2015-353/PB_2017-00092). This study adhered to the consolidated criteria for reporting qualitative research (COREQ) (Tong et al., 2007).

Information about the study was given to the participants prior to the interview. We explained the objective and background of the research project and informed them of their right to leave the study any time. Anonymity and confidentiality were guaranteed. All participants signed written consent forms and agreed to be audio recorded during the interview, which averaged 70 minutes.

Measures

The interview guide was developed building on the existing body of literature looking at mental health in medical settings and with refugee populations and in consultation with an interdisciplinary research team. Interviews were conducted with the help of a Tigrinya-speaking co-first author and principle researcher on the larger study who was previously known to participants through the RS-14 screening. With the exception of two interviews conducted onsite at a refugee home outside of Basel, all other interviews were conducted in a non-clinical setting in Basel, Switzerland.

Procedure

A total of twelve interviews were conducted. The first two interviews comprised a pilot phase, during which the interview guide was refined and questions were modified to avoid potentially re-traumatizing topics. After the pilot interviews were conducted, a vignette was developed, which focused on a fictional character (Sami) who lives in a home for asylum-seekers and exhibits symptoms of PTSD in the form of recurring nightmares and anxiety. Vignettes have been shown to be of use when discussing sensitive topics (Gourlay et al., 2014; Barter and Renold, 1999). Interviews were conducted using an adaptable and iterative process; that is, each interview influenced the topics and depth of subsequent interviews. Audio recordings were taken of interviews with participant consent. Audio files were then transcribed, checked for accuracy and anonymized prior to analysis.

Data Analysis

Data were analyzed according to the framework method which outlines a 6-step process for qualitative data analysis (Gale et al., 2013). First the interview recordings were transcribed using Microsoft Office, then imported into the qualitative data analysis software MAXQDA 12. The second step, familiarization with the interview, was conducted through repeated and careful readings. Interviews were then coded according to themes and specific topics. Any comments in the transcript which dealt with health, mental health, coping, integration, social support, or stress were coded. A working analytical framework was developed, and the data charted into the framework. Finally, the data were synthesized using topical analytical memos. Codes and memos were discussed within the research team.

Results

A total of 16 participants were contacted and agreed to participate in the study. 4 did not arrive to scheduled interviews. In total, 12 participants took part in the study. The interviews were similarly rich.

Cultural understanding and treatment of health states;

Meaning of health and illness:

Participants were asked about their understanding of mental and physical health states, how they defined sickness, what was needed for health, and whether (and how) physical and mental health states were connected.

Age at interview; median, range	28.5 (20-35)
Number of years schooling; median, range	11.5 (5-16)
Length of stay in Switzerland; median, range	23 (18-36)
Permit status 'N'	80% (8 of 10)
Religious or spiritual	100% (8 of 8)
Married	44% (4 of 9)
Children	20% (2 of 10)
Have family in Switzerland	12.5% (1 of 8)

Table 11.3.2: Participants' characteristics, N=10.

Nine out of ten participants viewed physical health as an absence of physical symptoms or the ability to work and live productive lives. A typical answer was given by one participant: *"Somebody who doesn't have any sickness, internal or external, and generally can move freely, who can lead his life. I consider this to be good health"* (male, age 29, in Switzerland for 20 months). One participant, who had attended secondary school, was critical of this outlook and stated that traditionally, health was closely linked with apparent mobility but did not consider functions which might be invisible to lay people.

Mental health states such as anxiety or stress were viewed as impacting physical health, as participants listed freedom from worries and not feeling isolated as requirements for physical health. Two participants considered good health to be a gift from God, and as such, a mystery. They did not consider health states to be influenced by surroundings or actions; rather, they stated that having faith was an important part of being healthy.

Conceptions of mental health:

Like physical health states, mental health states were understood primarily in binary terms, with participants describing severely pathological states of mental illness when asked what came to their mind when they thought of mental health. One participant explained: *“When somebody is mentally ill, I imagine that he is offensive, he is always an ill-tempered person, he cannot communicate or discuss or something like that”* (male, age 20, in Switzerland for 19 months). Another participant elaborated: *“unless it’s the worst phase, that he’s going off-minded, is completely sick, like psychiatric symptoms, ... small mental health related symptoms like stress, they are usually not considered as a sickness, so priority is given to the physical sickness”* (male, age 33, in Switzerland for 36 months).

Notably more participants (6 out of 10) considered mental health to be related to faith and described spiritual or church support as a first-line treatment for mental health issues. Trips to holy waters or holy springs for mental health cures were noted by participants as a primary form of treatment in Eritrea. Participants usually stated that in order for this cure to work, one must be faithful. 7 out of 10 participants mentioned hospitals, doctors or mental health clinicians as a treatment option for mental health issues, but almost all acknowledged that access to psychologists or psychiatrists was limited outside of the capital area. However, they all felt confident that patients would receive proper medical treatment and be able to recover with hospital treatment.

A key finding is a cultural conception of mental illness in which those suffering do not realize that they are sick and, as such, cannot seek help themselves. As one

participant states, *“a sick person doesn’t know what to do, he doesn’t know that he needs help.... Because he doesn’t know to ask or not, the person, he doesn’t know if he’s sick or not”* (male, age 28, in Switzerland for 22 months).

Another participant echoed this sentiment, saying that vignette character Sami would not ask for help *“because a sick person doesn’t say ‘I’m sick’ so it will be difficult for him to ask for help. But people who know Sami would probably ask for help. He doesn’t know he’s sick”* (male, age 29, in Switzerland for 20 months).

There is a reliance on the family and community to recognize pathological mental states and take steps to treat it. Another participant notes: *“In our culture, the people are supposed to treat, to handle somebody else’s stress. Not himself. Usually the person with the stress doesn’t do much himself”* (male, age 33, in Switzerland for 36 months).

The sufferer, in other words, is largely passive. When a friend or family member is suffering mental health problems, participants described common treatments including discussing the topic, taking the person to the holy water, asking the larger community to help by spending time with the person, contributing money or food, or distracting the person from his problems by taking him to various activities.

Pathways to Care;

Social support in Eritrea:

Social support was considered extremely important by participants. Participants listed very few examples of when it would be inappropriate to ask family, friends, neighbors or the church community for support. A dependence on the community to recognize illness, mobilize and provide care for members was confirmed by almost all participants.

In this highly connected society, pathways to care are initiated by, and dependent on, relationships.

The role of other people in the mental health of someone... has a great role, basically, especially in conditions like Eritrea, we are very connected. We have a connected culture, [...of] helping each other. It's not like leaving someone alone or isolating them. So this kind of living jointly together and harmonizing culture, it helps you a lot, basically. (Male, age 33, in Switzerland for 36 months)

Another participant explained how central social support was for Eritreans, stating: *"Those who don't have somebody to care for them get worse and worse. In our culture... there is no isolation, [we] help with moral support"* (male, age 23, in Switzerland for 18 months). He continued, comparing Switzerland to Eritrea and saying, *"Here nobody comes closer to you. The culture is different maybe."*

For migrants, who often arrive in their host country alone, this raises significant questions about access to care. The capacity to recognize mental health states, identify them as abnormal, realize that they could be treated by medical professionals and proactively seek consultation requires that several conditions be in place, most importantly, a strong social network.

Mental health and migration:

Migration, and the situations surrounding the decision to migrate, very frequently indicated traumatization in this sample. In fact, nearly all participants described some kind of personal trauma in their history. Two participants remembered:

It is difficult to forget. Even though [I] knew that it would be very challenging in Libya, ... when [we] started from Sudan, all the way through the Sahara to Sudan it was challenging. People were dying on the road in front of [me]. When [we] came to Libya, [I] was in prison for three months in Libya ...people were tortured, were directly shot [sic] in front of [me]. (male, age 28, in Switzerland for 24 months)

When I first crossed the border to Sudan, the situation in Sudan was unexpected, and this created a stressful condition because there were too many unexpected things there. Plus my wife was at that time delivering my first child and I could not support her because I could not send money from Sudan. It was a very hard time, and it was very stressful. And I could not at that time remember events that just passed before two minutes. (Male, age 29, in Switzerland for 21 months)

Compounding this previous trauma for asylum-seekers is the current stress of an unknown (and uncontrollable) future, isolation, and sometimes chaotic living situations. Alone and far from family and friends, the social support net breaks down, creating a constellation of risk factors and inhibiting access to care. While waiting for a permit decision, asylum-seekers are less likely to be granted the chance to work or study in Switzerland. Aside from some access to language courses, most asylum-seekers find themselves with nothing but time while they wait for a decision. Notably, when asked what was necessary for good mental health, three participants stated that not thinking too much was important. One interviewee explained: *“If you are unemployed and sitting at [the home for refugees] it affects your health. My wellbeing improved [when I moved out of the home and into my own apartment]” (male, age 25, in Switzerland for 36 months).*

Life in an asylum home was also straining for other reasons, from the inability of residents to communicate with each other, to the presence of others who are also struggling to cope with anxiety, depression, or trauma. As one participant described:

...living in a camp, sometimes it's difficult. You live with different people, people from Somalia, Afghanistan, Arab, or different nationalities. You don't have any common language, common culture, and common tradition. But you live in the same room, use common kitchen, common toilet. So you have sometimes some disagreements, you argue sometimes and this sometimes has an effect on mental health, this instability. (Male, age 28, in Switzerland for 24 months)

Another participant observed the toll that this situation took on the mental health of his fellow asylum-seekers: *"there are also mental health problems for these people who have stress, and then they are isolated, they are away from themselves, so this is what I see. ... I see some people like they take the marijuana, cocaine"* (male, age 23, in Switzerland for 18 months).

Barriers to care:

Several participants noted that at their asylum homes, they were required to report to the manager (a social assistant) when they wanted to see a doctor. Despite being covered by Switzerland's mandatory insurance program, they had to explain their symptoms and get approval from the manager before being permitted to see a doctor. Some participants felt the managers did not take them seriously. Managers at the asylum homes are not medical professionals, nor is their relationship to asylum-seekers a confidential doctor-patient relationship. One interviewee explained:

The [manager] is the one who decides when you will see a doctor. So he can make you still for a long... he can make you wait. It's him who decides what happens. It's not that you feel sick and you see [a doctor]... but you have to present to him and then he decides. If he thinks that tablets are enough for you, then he just gives you tablets and you go back. And then if you need more, after several returns, several recourses, he might be ready to [let you] see a doctor... it is not appropriate... what he decided to do, just to give tablets from the cupboard in his office, it's not appropriate. He should send people immediately [to a doctor]. (Male, age 35, in Switzerland for 24 months)

Discussing their present situation, participants elaborated a number of reasons why they would not feel comfortable disclosing their mental health states to other asylum seekers or other countrymen they know in the host country. This discomfort could logically extend to discussing mental health issues with managers. Taken together, they comprise barriers to mental health care. Some worried that if they approached a friend to talk about their mental health states, this person might already be in a bad mental health state. They feared that they would make it worse.

There is no one in Switzerland I can talk to about my problems. I only talk with my wife. I interact with the religious community here in Switzerland but I don't think I could speak to them about my problems because I don't think it will help, telling the stories to other people. It might give you another bad feeling but it doesn't bring any solutions. So I don't feel it would help me. If I talk to a person about my problems, they might have worse problems so I prefer to be alone. (male, age 29, in Switzerland for 21 months)

Others reported being concerned that word might get back to their families. Because of the conception that mental health states are binary, they feared that if they were honest about suffering from anxiety, stress or depression, that they would be stigmatized.

It's a culture that, yeah, people talk bad about you. So, if you get sick, mentally sick, first they will say that you are not only stressed but that you are off your mind. People they say like that. And then maybe also [Sami, vignette character] is worried about his friends, maybe they will tell his family and then the family, his family back in Eritrea will hear about this somehow. (Male, age 35, in Switzerland for 24 months)

Access to mental health care:

Few participants reported accessing mental health care in Switzerland, either for themselves or for others. One participant had decided to see a psychologist while still living in Eritrea. From a divorced family and ill with polio as a child, this participant suffered from social isolation, depression, and anxiety. At his lowest point, he attempted suicide. Through his childhood and adolescence, he watched Western television shows. From these he learned about Western conceptions of mental health and treatment procedures, built the confidence to express his feelings openly despite cultural barriers, and decided to visit a psychologist if he ever had the chance.

[The psychologist] helped [me] a lot. ...with the psychologist [I feel] like sharing [my] experience without any ... judgement, freely talking. [I share] everything ... experiences, feelings, thoughts, whatever [I] had before. ... And [I] also get some kind of suggestions... how to lead [my] life and change [my] patterns. ... Still it's a taboo to discuss about visiting a psychologist, and [I don't] share it with other Eritreans who [I

don't] know in depth. [I share] it with only a few close relatives who understand. ... It's not a usual thing to hear an Eritrean person sharing his experience [of mental illness]. (Male, age 33, in Switzerland for 36 months)

This quote highlights the fear of discrimination on the basis of mental health issues, and how close relationships, such as family ties, create zones of safety in which it is possible to openly speak of mental health challenges. It is also of note that this participant's history gave him an atypical perspective on mental health. Another participant described accessing care for a friend who was suffering, in a fashion more typical of Eritrean culture:

At that time, [my friend] had friends who knew him when he was healthy. They approached him and they were more trustful for him than his family. And because he has the insurance here, and can be treated, they took him to the hospital and they followed him during his treatment. And now he's in a better condition. (Male, age 28, in Switzerland for 24 months)

In this situation, the pathway to care, based on trusting relationships, others' identification of the need for mental health care, and their subsequent outreach, is intact. But in a situation where these friendships are not as close (either in the sense of proximity or emotional closeness), this pathway is in danger of being interrupted.

Mitigating Threats, Accessing Capital

The interview next sought to contextualize social resilience from the perspective of an asylum-seeker in Switzerland. We viewed social resilience as the capacity for actors to access capital in a variety of settings and mitigate external threats. For most

participants, the major threat to their wellbeing was the asylum decision. Secondary threats included lingering difficulties with trauma and/or difficulty coping in a new environment. Notably, participants with higher RS-14 scores tended to be more adept at accessing capital and mitigating threats.

Mitigating threats:

Fully one third of participants mentioned the ability to plan for the future and be able to lead their own lives as criteria for mental health. However, most participants were still waiting for their asylum decision, a decision with profound impact on their lives, over which they have almost no control. Without official residence permits, asylum-seekers have almost no chance to involve themselves in any income-generating activities to support themselves or family members. As a result, almost all participants expressed frustration with their inability to move forward in life. They were aware of the stress caused by this situation, yet they were without power to mitigate the international-level threat of deportation. When asked about their expectations of migration and the reality, the length of the asylum application process was the most commonly reported difference.

Of course, this condition is also, can also lead to stresses. I was drinking the last three days. I was angry because my wife has finally decided that I have to divorce her or I have to take her. ... And I don't have ability because my situation is not settled here. I have N status; I can't bring my wife here. I don't know whether I will stay or whether they're going to deport me, because many people have been deported here. So, I cannot decide, I cannot support, I cannot approve my wife to go to Sudan. Because

she has to move to Sudan and then Sudan is very bad condition. (Male, age 29, in Switzerland for 21 months)

My current situation - it has been almost 2 years here in Switzerland and I don't have any official residence permit, so eventually I'm in a situation where I'm not secure in my future. This is one of the conditions where you always think and keep worrying, keeps your mind worrying. (Male, age 28, in Switzerland for 22 months)

One participant had already received a positive asylum decision. Freed from worrying about his legal status, he was now preoccupied with the community-level threat of unemployment.

I started working from early stage of my life so I grow up by myself working. And when I came here, being unemployed is a bigger unrest and I don't have any job so it's... a big stress. The language is difficult to communicate. I get worried because I don't have job. I'm so worried sometimes, even more than Sami [the vignette character]. (Male, age 25, in Switzerland for 36 months)

Accessing capital:

Key to the concept of social resilience is the actor's capacity to access social, economic, cultural and symbolic capital. Participants who scored higher on the RS-14 scale were more proactive about accessing these kinds of capital. Lower-scoring participants were more likely to report isolating themselves or meeting with friends to discuss every-day topics (including their legal situation). While these activities are beneficial for mental health states, and work to build social capital in the form of a social

network in the host country, those who actively accessed other forms of capital, such as economic, cultural, symbolic, felt more integrated into Swiss society.

Social capital:

At the household level, family ties were retained through telephone contact, but some participants expressed reluctance to share their problems with family or discussed problems they had.

... Two of them, my siblings, are in Switzerland so they give me moral support. They are working but we meet regularly. ... I was talking with my brother about not getting a job, I had some arguments but now I'm getting used to the situation so now I don't talk to anybody. ...I apologized for what I did. [We speak now] in a friendly manner. (Male, age 25, in Switzerland for 36 months)

At the community level, participants reported slowly building social networks, mainly comprised of fellow Eritreans. They frequently met and discussed various topics. These friendships provided a source of emotional support, and information from those who had lived in Switzerland for some time. *"I have contact with my friends from back in Eritrea now living in different cities in Switzerland and in church... we discuss about the permit issues, the health issues, and the conditions"* (male, age 23, in Switzerland for 18 months).

Another commonly reported help for participants was the presence of voluntary German teachers in the asylum homes. The teachers are assigned by an NGO, and do not limit themselves to teaching language. They also provide social support, lend a listening

ear, and bring information about the activities of other NGOs which might be of interest, arrange trips and facilitate contact with other locals within the community.

The [most helpful thing has been the] good relationship we have in the camp with the voluntary language teachers. ... We have very close contact, they come to the camp, to our rooms and then they help us. We share our problems and they understand our conditions. And then they try to help us forget our worries. And sometimes they invite us to dinners, some kind of social activities. (Male, age 28, in Switzerland for 24 months)

One participant explained how language teachers helped him contact another organization, providing further opportunities:

I was connected to the GGG by the voluntary teacher in my language course because she brought pamphlets about the program. Through this channel I was connected to a 'friend'.... I can talk to my friend any time I feel something, or if I have a question about Switzerland, culture, or work. We meet whenever it's convenient. And if I have problems, for example, if I get mail and I don't understand it, then my friend can help to translate it... My first friend ...works in the migration office and she tried to help me with my asylum applications. Of course, she cannot make too much difference, because the government makes that decision, but she tried to help. (Male, age 29, in Switzerland for 24 months)

Cultural capital:

Participants actively built their standing in religious communities. The majority of participants described the church as being interwoven with their social realities in

Eritrea. As one participant explained, “we, *Eritreans, at least most of us, we are attached to the church from early times. So, whenever we have a problem we are close by to the church because there we can get peace of mind*” (male, age 29, in Switzerland for 21 months). In Switzerland, there was a sense of starting over with the Eritrean church, indicating that it was not immediately a source of support for migrants. Two participants described beginning to form social and religious networks in Switzerland:

I have contact with some people I knew in Eritrea but they just arrived, they got here the same time as me... We meet in the church, we meet outside for coffee and ...we visit each other so we have a connection, we have contact...I haven't started talking with religious leaders at my church because I am a starter but I have a plan to start communicating with them. (Male, age 29, in Switzerland for 20 months)

In church, you just go for prayers and you say hi to everybody but it's not a place that you discuss and you start a relationship. But it's just at the beginning... you greet everybody, and you just pray” (male, age 28, in Switzerland for 22 months).

There is optimism in these statements, as participants worked to rebuild cultural capital at the community level through engaging in church-related activities.

Regardless of their standing in the Eritrean religious communities in Switzerland, religious faith was a key competence at the individual level, acting to allay fears and enable participants to remain positive. One man explained how he interpreted the challenges he had endured on his way to Switzerland as a sign that God had a plan for him:

For all this sacrifice [I] made in the Sahara, and through the sea, lots of people dying in front of [me] and then finally arriving in Switzerland, [I believe] that God has a plan for [me] especially. So, believing in the grace of God, [I don't] worry too much even though it's not easy to accept. (male, age 28, in Switzerland for 24 months)

Economic capital:

While not explicitly asked about in the interviews, one participant keenly felt the loss of economic capital at the household level and worried about what that would mean for the future. Asylum-seekers in Switzerland receive a small monthly stipend from the federal and local government, but this participant felt that receiving this money created a power differential:

[Switzerland] was exactly what I expected, except for the job opportunity. I'm not settled because I don't have a job yet. When you are getting money from the social assistance, it is like you are a beggar. So it is obvious that you think when I'm going to be free from this kind of begging situation, to be independent. (Male, age 25, in Switzerland for 36 months)

Another participant, who had received a residence permit and was actively engaged in building economic capital through a pathway to an apprenticeship, described his desire for career accomplishment. He yearned to see himself reflected in the faces of the businessmen he passed on his way in the city, reflecting a wish for symbolic capital through the means of economic capital accrual at the household level.

[I have a wish] from inside to reach some level, some stage. One event... it was on [my] way to school, here in [city]. ...there are people that they came, business men,

usually; they came to see some exhibitions, or some kind of, doing some business activity. And on [my] way, [I watch them and wish] that [I see] a black person, a businessman ... reaching at that level. (Male, age 33, in Switzerland for 36 months)

This participant explained that his goal included becoming educated in Switzerland and later returning to Eritrea in order to help his fellow countrymen, cultivating and sharing economic capital at the community level.

Concerns over economic capital, while clearly on the minds of many participants, overall tended to take a backseat to concerns about legal status and their asylum applications. Although prevented from working by their legal status, some participants arranged other types of work, detailed below, building social and cultural capital and laying the foundation for reentry into the workforce in Switzerland.

Symbolic capital:

Two participants, among the highest-scoring on the RS-14, described voluntary work they were performing for a community center. Through this work they actively increased symbolic capital at the household and community level, as well as found peace of mind, expanded their social networks and polished their language skills.

I asked the manager of the camp, and he organized some voluntary work. He knows people who are looking for temporary employees. It could be one day or two days. The employers, they come to the center and he arranges it with the people. They pay 9 [Swiss] Francs a day; I work like 7 hours a day. And I do any kind of work they provide. It could be working in the field, it could be working in the streets, and it could be building... whatever comes as is demanded to the social center. I spend time and

forget my worries, come home in the evening, read one hour and then get a good night's sleep. (male, age 35, in Switzerland for 24 months)

There are many organizations that you can volunteer, and you don't remain a free worker but sometimes they will consider it as a good sign that you can integrate yourself. So I took this advice, and participate in different organizations. I attend seminars, I learn German, I volunteer, and I attend meetings and share my experience.... I also work sometimes for like 10 [Swiss] Francs a day. The money is not important, what's important is that you integrate and you share ideas and you learn. I think all these things are helpful, that if you devote yourself to learning language it's very helpful... I think if you get these kinds of connections and if you have a good relationship, you can benefit from their links, and they'll connect you to other steps and you can get opportunities. (Male, age 29, in Switzerland for 24 months)

These quotes strongly highlight participants' creation of symbolic capital, through feelings of integration, acceptance, building of community level social capital through expansion of their networks, and building embodied cultural capital at the household level, such as adapting to Swiss customs and habits through volunteer work and improving their German language skills. Cultural capital has the potential to be later converted to economic capital (i.e., paid employment) by way of increasing symbolic capital (i.e. the ability to leverage cultural capital to attain their goals). In general, proactive capital building appears to increase migrants' capacities for mitigating threats to their livelihood and, in turn, their overall social resilience.

Discussion

The current study sought to better understand social resilience towards migration related mental health threats among Eritrean asylum-seekers in Switzerland. Participants shared a range of experiences and mental health states, reflecting the spread of capacities and resources they drew on throughout the migration process. Participants who scored higher on the RS-14 scale displayed more proactive seeking of capital, indicating that, while skewed, the RS-14 does capture the ability for individuals to be resilient in the face of adverse situations. However, the findings also emphasize that resilience occurs within a multi-layered and constantly-changing context and suggest that the use of a snapshot psychological measure is of limited utility. This echoes the findings of other researchers, such as Ungar (Ungar, 2012), who argues that considering the wider context in which resilience occurs allows usage of a 'heterogeneous definition (p.387)' of resilience, enabling the identification of hidden coping strategies.

Pathways to mental health care are critical and, for asylum-seekers, often poorly understood. Participants repeatedly stated that individuals do not know if they are mentally ill and instead rely on social contacts to recognize and take steps to treat the problem. In the case of asylum-seekers, who may not yet have trusting relationships with others around them, this could pose a barrier to treatment-seeking. In contrast, approximately 60% of Swiss individuals suffering from mental health problems report directly to psychiatric clinics while 30% are referred by a primary care physician (Bundamt für Gesundheit, BAG, 2015). This pathway suggests high level of self-initiated treatment-seeking (see Figure 11.3.1). Migrants, even who are aware of their mental health problems, typically seek mental health care only after settling other

priorities such as legal status, employment, and ensuring the safety of family members (Schick et al., 2016; Asgary and Segar, 2011; Morris et al., 2009) . As they age, and as time living in Western culture increases, the probability that migrants will seek mental health care rises to rates 5-7 times higher than native-born Swiss (Bundamt für Gesundheit, BAG, 2010). Helping asylum-seekers to recognize and seek treatment earlier would therefore be valuable.

Barriers to mental health care exist in both cultures, of course, primarily in the form of stigma against mental illness. As asylum-seekers, there are extra hurdles to access, ranging from transportation costs to interpreters to a lack of privacy in asylum homes. Timely access to mental health care is also hindered by lack of knowledge about mental health states. Asylum seekers would therefore benefit from trainings to normalize and recognize symptoms of mental health disorders, particularly trainings which follow a model of socially-recommended care.

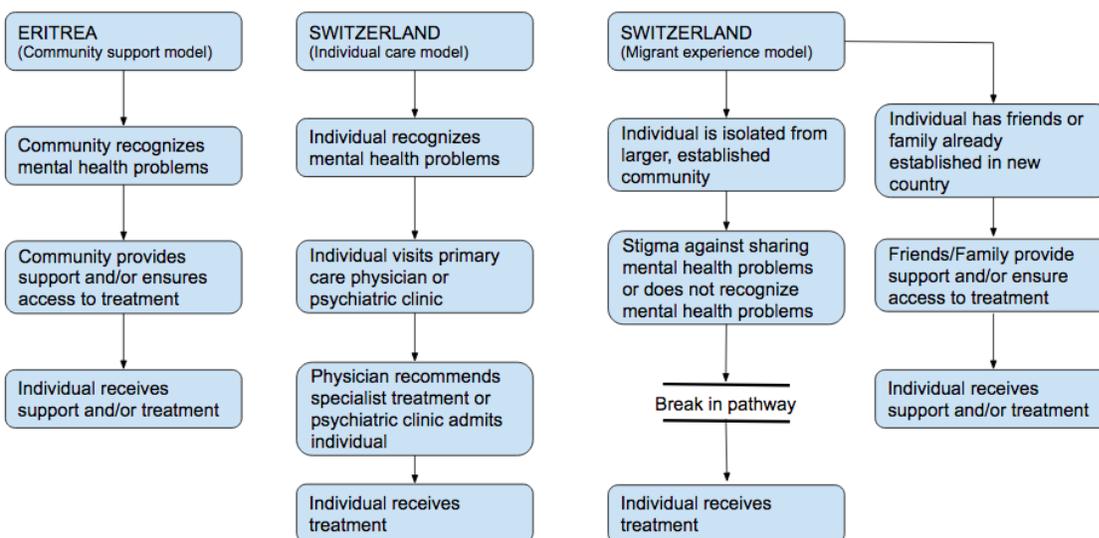


Figure 11.3.1: Pathway to Mental Health Care Model of Eritrean migrants in Switzerland

The life uncertainty and barriers to work and education that accompany the status of asylum-seeker are in themselves a threat to mental health, and multiple studies have found that asylum-seekers are especially likely to suffer more than other kinds of migrants, particularly when the asylum process is lengthy (Heeren et al., 2016; Laban et al., 2008, 2004; Silove et al., 1997). According to official reports, the asylum process in Switzerland lasts 173 days on average (Staatssekretariat für Migration, SEM, 2017b). However, this figure is an average of simple and complicated cases and do not reflect the spread in length of asylum process, nor are they reflective of the experience of participants in the current study.

Returning to the resilience framework proposed by (Obrist et al., 2010), we can contextualize the asylum-seekers' experience within the inter and intra-net of threats and capital. The ability to access capital plays a large role in resilience, indeed Bonanno argues that resilience as a stable personality trait predicts, at most, a small amount of a person's reaction to a given situation (Bonanno, 2012). The picture of resilience captured here was but a snapshot in time, and factors which influence resilience will change over time. As individuals move further away from their traumatic experiences and resolve their existential legal uncertainty, they are faced with other challenges, such as accessing employment and reunifying their families. Figure 11.3.2 presents a glimpse into the multi-layered system of protective and threatening factors from an asylum-seekers perspective. Threats occur at multiple levels within this framework, such as the threats of deportation at the (inter)national level (deeply influenced, in turn, by the situation in Eritrea, political relationships between the two countries, and Swiss migratory policies), the threats of community rejection and

stigmatization at the community level, and the threats of poor mental health (influenced by and influencing a response to past trauma, isolation, financial status, etc.) and barriers to health care at the household level.

However, each threat is counterbalanced by competencies which protect the individual; for example, the ability to navigate the asylum process, or accessing key contacts who may help by explaining the system or providing translations. Volunteer work and sharing knowledge among peers are competencies at the community level. And at the household level, personal qualities such as religious faith, persistence, family support, and a vision for the future act to mitigate threats. At every level, protective/enabling factors and constraining factors act as push/pull factors in determining the individual's capacity for resilience through access or barriers to capital. As Obrist, Pfeiffer, and Henley (Obrist et al., 2010) note, government policies are especially relevant as they structure 'political and social processes' (p.291).

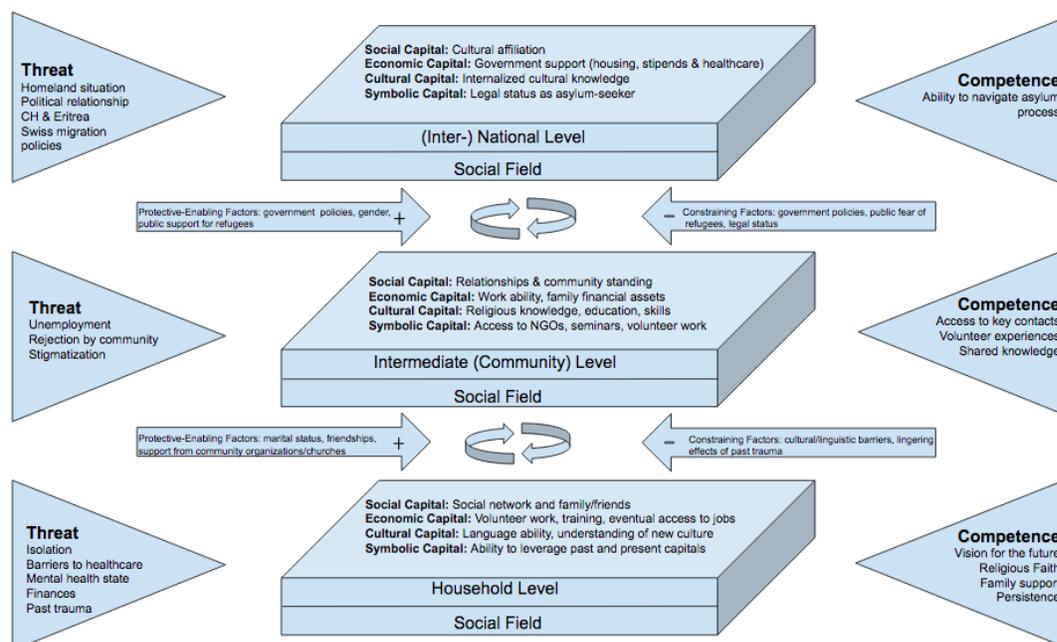


Figure 11.3.2: Multi-layered Social Resilience Framework Contextualized for Migrants

Asylum-seekers in particular are impacted by these processes on a daily and deeply personal level. Considering the relatively high acceptance rate for Eritrean asylum-seekers in Switzerland and the broad array of support provided by government policies, this acts as both a constraining as well as protective/enabling factor. Gender, public perception of refugees and immigrants, and linguistic demands also constrain and/or enable access to forms of capital. Finally, although forms of capital exist across the three levels, they are subject to recognition and valuation within the social field, i.e., the array of actors throughout all layers of society, all of whom have the ability to enhance (or reduce) the proactive and reactive capacities for dealing with threats to well-being.

Studies of migrants in Switzerland have shown that their physical and mental health is negatively influenced by the loss of their social support networks (Schick et al., 2016; Bundsamt für Gesundheit, BAG, 2010). Often, they start from scratch, forming relationships and building capital slowly as they go. Contact with family members, provides an important, yet complicated, sense of security and bolstering of the spirit. Some participants had reconnected with family members who had already expatriated to Switzerland; in this case, they received support from their local relatives. Overall, participants viewed their social networks in Switzerland to be in a beginning stage and tended not to rely on them for psychosocial support beyond casual discussions. Building new support networks takes time in any situation but is compounded in this case by the uncertainty of the asylum application decision. Participants approached this situation with varying degrees of proactivity and throughout the interviews and universally viewed social ties as very important.

Huot (Huot, 2017), in her analysis of capital among migrants in Canada and New Zealand, described the interconnectedness of capital across forms and time, and this connectedness was reflected in the current sample. This was particularly well-demonstrated by the example of participants engaging in volunteer work, which simultaneously served to build capital on multiple levels (social, cultural, and symbolic at the community level; economic, cultural, social, and at the individual level) and positioned participants to leverage these capitals on the symbolic level (with the goal of finding paid employment) in the future.

As a source of cultural capital, membership in the church plays an important role for Eritreans living in Switzerland. Religion and church membership is central in Eritrean culture, and ethnographies report that children are brought up in the religious community as an extended family (Conrad, 2010; Holt, 2001). Eritreans in the Swiss diaspora retain this strong connection to the church (Bundesamt für Migration BFM, 2010), but asylum-seekers do not carry their previous status into Swiss religious communities. On an individual level, religious faith acts as a competency, easing anxiety. Faith and health are seen as closely related, indicated for example, by the use of holy waters as cures for mental illness. Understanding more about the interplay of faith, community, mental health, and proactive treatment-seeking has the potential to uncover powerful, yet underutilized protective factors and would therefore be a valuable avenue for further exploration.

Strengths and Limitations

Among the strengths of this research is the shared cultural background of the co-author and participants. This is the first research project to approach the mental health of Eritrean asylum-seekers from a resilience-oriented perspective and as such, presents a unique glimpse into the sociocultural context of this population.

Interviews were conducted with a translator and as such, some detail and context may have been lost. While effort was made to mitigate this through back-checking translations, the researcher, as a cultural outsider, may have made assumptions based on culture which were not accurate.

As the study included only male participants, the sociocultural context provided is biased in that it explores migration from the male perspective. Women have very different experiences of migration characterized by a different threat profile (not limited to, but including vulnerability to gender-based violence, the additional burden of travel with children or while pregnant, differing societal roles between home and host countries, etc.), this research is therefore not generalizable to a female perspective.

While Switzerland has a high proportion of refugees *per capita*, in real numbers the country has relatively few. Given this, Switzerland has a relatively well-apportioned system for care of asylum-seekers, providing, for example, basic health insurance to those still awaiting their decision. The situation of asylum-seekers in Switzerland, while similar to that of those in other European countries, cannot be generalized to countries outside of this geographic region.

Research Context

Many studies have examined the psychopathology of migration, but notably few studies have examined the needs and resources of asylum-seekers or sought to establish guidelines for best practice in mental health treatment of asylum-seekers (Heeren et al., 2016). There is, however a growing body of evidence coming out of Canada and Australia which gives consideration to this topic (Queensland government, 2016; Centre for Addiction and Mental Health, 2012). Further research is needed to gain detailed insights into social resilience of asylum-seekers towards migration-related mental health challenges, to better understand when optimal periods for intervention exist.

Practical Implications

This study and others have found that asylum-seekers are particularly vulnerable to mental health distress and face increased barriers to care. A clear pathway to treatment for asylum-seekers is critical to early identification and treatment of mental health issues. We recommend ongoing education in refugee homes to teach asylum-seekers about western understandings and treatment of mental health, signs of distress, de-stigmatization workshops and/or regular visits by mental health professionals. Further leveraging the work of volunteers and language teachers to connect asylum seekers to the host culture and provide access to other forms of social, cultural and symbolic capital would comprise another, more cost-effective, form of support. The Swiss government has recently introduced an expedited application process (Staatssekretariat für Migration, SEM, 2017c), but in the minority of complicated cases, (which, despite changes, are still likely to take upwards of 12 months), facilitated

access to education or volunteer work opportunities should be considered standard practice. Actions taken to improve the mental health of asylum-seekers would see a later payoff in the form of reduced healthcare costs and improved outcomes.

Declaration of conflicting interest

The authors do not have any conflicts of interest.

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Key Points

This research sought to explore conceptions of mental health among Eritrean asylum-seekers and contextualize social resilience.

Mental health was understood as a binary state rather than a continuum and trusted friends and family were responsible for recognizing and organizing treatment for mental health problems. Pathways to care were potentially interrupted for asylum-seekers, who often arrive alone.

Capital building, considered through the lens of social resilience, consisted of language learning, establishing of new individual- and community-level social networks, and proactive symbolic capital building through volunteering and church attendance.

11.4 Questionnaires for Mental Health screening

11.4.1 Alcohol Use Disorders Identification Test (AUDIT)

The Alcohol Use Disorders Identification Test (AUDIT): Interview Version. Read questions as written. Record answers carefully. Begin the AUDIT by saying “Now I am going to ask you some questions about your use of alcoholic beverages during this past year.” Explain what is meant by “alcoholic beverages” by using local examples of beer, wine, vodka, etc. Code answers in terms of “standard drinks”. Place the correct answer number in the box at the right.

1. How often do you have a drink containing alcohol?

- (0) Never [*Skip to Qs 9-10*]
 - (1) Monthly or less
 - (2) 2 to 4 times a month
 - (3) 2 to 3 times a week
 - (4) 4 or more times a week
-

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

- (0) 1 or 2
- (1) 3 or 4
- (2) 5 or 6
- (3) 7, 8, or 9
- (4) 10 or more

3. How often do you have six or more drinks on one occasion?

- (0) Never
- (1) Less than monthly
- (2) Monthly
- (3) Weekly
- (4) Daily or almost daily

Skip to Questions 9 and 10 if Total Score for Questions 2 and 3 = 0

4. How often during the last year have you found that you were not able to stop drinking once you had started?

- (0) Never
- (1) Less than monthly
- (2) Monthly
- (3) Weekly
- (4) Daily or almost daily

5. How often during the last year have you failed to do what was normally expected from you because of drinking?

- (0) Never
- (1) Less than monthly
- (2) Monthly
- (3) Weekly
- (4) Daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

- (0) Never
- (1) Less than monthly
- (2) Monthly
- (3) Weekly
- (4) Daily or almost daily

7. How often during the last year have you had a feeling of guilt or remorse after drinking?

- (0) Never
- (1) Less than monthly
- (2) Monthly
- (3) Weekly
- (4) Daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

- (0) Never
- (1) Less than monthly
- (2) Monthly
- (3) Weekly
- (4) Daily or almost daily

9. Have you or someone else been injured as a result of your drinking?

- (0) No
- (2) Yes, but not in the last year
- (4) Yes, during the last year

10. Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down?

- (0) No
- (2) Yes, but not in the last year
- (4) Yes, during the last year

11.4.2 Patient Health Questionnaire Somatic Anxiety and Depression Syndrome (PHQ-SADS)

PATIENT HEALTH QUESTIONNAIRE (PHQ-SADS somatic, anxiety, depressive, symptoms)

This questionnaire is an important part of providing you with the best health care possible. Your answers will help in understanding problems that you may have. Please answer every question to the best of your ability

A. During the <u>last 4 weeks</u> , how much have you been bothered by any of the following problems?		Not bothered (0)	Bothered a little (1)	Bothered a lot (2)
1	Stomach pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Back pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Pain in your arms, legs, or joints (knees, hips, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Feeling tired or having little energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Trouble falling or staying asleep, or sleeping too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	For Women: Menstrual cramps or other problems with your periods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Pain or problems during sexual intercourse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Headaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Chest pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Dizziness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Fainting spells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Feeling your heart pound or race	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Shortness of breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Constipation, loose bowels, or diarrhea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Nausea, gas, or indigestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PHQ-15 Score = _____ + _____

	B. Over the <u>last 2 weeks</u>, how often have you been bothered	Not bothered (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
1	Feeling nervous anxiety or on edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Not being able to stop or control worrying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Worrying too much about different things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Trouble relaxing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Being so restless that it is hard to sit still	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Becoming easily annoyed or irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Feeling afraid as if something awful might happen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GAD-7 Score = _____ + _____ + _____

	C. Questions about anxiety attacks.	NO	YES
A	In the <u>last 4 weeks</u> , have you had an anxiety attack suddenly feeling fear or panic? If you checked “NO”, go to question E	<input type="checkbox"/>	<input type="checkbox"/>
B	Has this ever happened before?	<input type="checkbox"/>	<input type="checkbox"/>
C	Do some of these attacks come <u>suddenly out of the blue</u> that is, in situations where you don't expect to be nervous or uncomfortable?	<input type="checkbox"/>	<input type="checkbox"/>
D	Do these attacks bother you a lot or are you worried about having another attack?	<input type="checkbox"/>	<input type="checkbox"/>
E	During your last bad anxiety attack, did you have symptoms like shortness of breath, sweating, or your heart racing, pounding or skipping?	<input type="checkbox"/>	<input type="checkbox"/>

	D. Over the <u>last 2 weeks</u>, how often have you been bothered	Not bothered	Several days	More than half the days	Nearly every day

		(0)	(1)	(2)	(3)
1	Little interest or pleasure in doing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Feeling down, depressed, or hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Trouble falling or staying asleep, or sleeping too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Feeling tired or having little energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Poor appetite or overeating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Feeling bad about yourself or that you are a failure or have let yourself or your family down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Trouble concentrating on things, such as reading the newspaper or watching television	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Thoughts that you would be better off dead or hurting yourself in some way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PHQ-9 Score = _____ + _____ + _____

11.4.3 Post-traumatic stress disorder check list-civilian version (PTSD-CL-S)

Instructions: Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, put an “X” in the box to indicate how much you have been bothered by that problem in the past month.

The event you experienced was _____ on _____ (date)

	Response:	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1	Repeated, disturbing <i>memories, thoughts, or images</i> of a stressful experience from the past?	<input type="checkbox"/>				
2	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?	<input type="checkbox"/>				
3	Suddenly <i>acting or feeling</i> as if a stressful experience <i>were happening again</i> (as if you were reliving it)?	<input type="checkbox"/>				
4	Feeling <i>very upset</i> when <i>something reminded</i> you of a stressful experience from the past?	<input type="checkbox"/>				
5	Having <i>physical reactions</i> (e.g., heart pounding, trouble breathing, or sweating) when <i>something reminded</i> you of a stressful experience from the past?	<input type="checkbox"/>				
6	Avoid <i>thinking about</i> or <i>talking about</i> a stressful experience from the past or avoid <i>having feelings</i> related to it?	<input type="checkbox"/>				
7	Avoid <i>activities</i> or <i>situations</i> because <i>they remind you</i> of a stressful experience from the past?	<input type="checkbox"/>				
8	Trouble <i>remembering important parts</i> of a stressful experience from the past?	<input type="checkbox"/>				
9	Loss of interest in things that you used to enjoy?	<input type="checkbox"/>				
10	Feeling <i>distant</i> or <i>cut off</i> from other people?	<input type="checkbox"/>				

11	Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?	<input type="checkbox"/>				
12	Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?	<input type="checkbox"/>				
13	Trouble falling or staying asleep?	<input type="checkbox"/>				
14	Feeling irritable or having angry outbursts?	<input type="checkbox"/>				
15	Having difficulty concentrating?	<input type="checkbox"/>				
16	Being " <i>super alert</i> " or watchful on guard?	<input type="checkbox"/>				
17	Feeling <i>jumpy</i> or easily startled?	<input type="checkbox"/>				

11.4.4 The 14-Item Resilience Scale (RS-14)

Please read the following statements. On the right side of each you will find seven numbers, ranging from "1" (Strongly Disagree) on the left to "7" (Strongly Agree) on the right. Please mark the 'X' below the number which best indicates your feelings about that statement. For example, if you strongly disagree with a statement, click the circle to the right of "1". If you are neutral, click "4", and if you strongly agree, click "7", etc. You must answer every question to submit the test for scoring.

		1	2	3	4	5	6	7
1	I usually manage one way or another.	<input type="checkbox"/>						
2	I feel proud that I have accomplished things in life.	<input type="checkbox"/>						
3	I usually take things in stride.	<input type="checkbox"/>						
4	I am friends with myself.	<input type="checkbox"/>						
5	I feel that I can handle many things at a time.	<input type="checkbox"/>						
6	I am determined.	<input type="checkbox"/>						
7	I can get through difficult times because I've experienced difficulty before.	<input type="checkbox"/>						
8	I have self-discipline.	<input type="checkbox"/>						
9	I keep interested in things.	<input type="checkbox"/>						
10	I can usually find something to laugh about.	<input type="checkbox"/>						
11	My belief in myself gets me through hard times.	<input type="checkbox"/>						
12	In an emergency, I'm someone people can generally rely on.	<input type="checkbox"/>						
13	My life has meaning.	<input type="checkbox"/>						
14	When I'm in a difficult situation, I can usually find my way out of it.	<input type="checkbox"/>						

11.4.5 Questionnaires: in Tigrigna translation

ቃለ-መጠየቅ ቁጽሪ - 1

ንኣልኮላዊ መስተ ዝምልከት ሕቶታት (AUDIT)

ነዘም ስዲቦን ዘለው ሕቶታት ኣንብቦም/ዮም፡፡ መልስታት ብግቡእ መዝግብ/ቢ፡፡ ነዚ ሕቶታት፡ “ሕጂ ብዛዕባ ኣብ ዝሓለፈ ዓመት ዝነበረ ኣጠቓቕማኻ/ኺ ኣልኮላዊ መስተ ዝምልከት ክሓትት ኢዮ” ኢልካ/ኪ ጀምር/ሪ፡፡ ትርጉም ‘ኣልኮላዊ መስተ’ እንታይ ምዃኑ፡ ኣብነታት ቢራ፡ ነቢት፡ ቮድካ ወዘተ ኢልካ ግለጽ/ጺ፡፡ መልስታትካ/ኪ ብመሰረት ‘ንቡር መስተ’ ጌርካ መዝገብ/ቢ፡፡ እታ ቅንዕቲ መልሲ ኣብቲ ተዋሂቡ ዘሎ ሳጹን ኣመልክት/ቲ፡፡

1. ኣልኮላዊ መስተ ክሳብ ክንደይ ተዘውትር?

- (0) ፈጹም ተጠቂመ ኣይፈልጥን እየ [ናብ ሕቶ ቁ 9-10 ሰገር]
- (1) ወርሓዊ ወይ ድማ ስሕት-ስሕት ኢለ (ወርሓዊ ዘይኮነ)
- (2) 2 ክሳብ 4 ጊዜ ኣብ ወርሒ
- (3) 2 ክሳብ 3 ጊዜ ኣብ ሰሙን
- (4) ኣብ ሰሙን ካብ 4 ጊዜ ንላዕሊ

2. ኣብ ሓደ ንቡር መስተ እትሰትየሉ ኣጋጣሚ፡ ክሳብ ክንደይ ዝኣክል ኣልኮላዊ መስተ ትሰቲ?

- (0) 1 ወይ 2
- (1) 3 ወይ 4
- (2) 5 ወይ 6
- (3) 7, 8, ወይ 9
- (4) 10 ወይ ልዕሊኡ

3. ኣብ ሓደ ህምት 6 ወይ ካብ 6 ንላዕሊ መስተ እትሰትየሉ ኣጋጣሚ ክሳብ ክንደይ ይኸውን?

- (0) ፈጹም ከምኡ ሰትየ ኣይፈልጥን እየ
- (1) ኔረ ኔረ (ወርሓዊ ዘይኮነን)
- (2) ወርሓዊ
- (3) ሰሙናዊ
- (4) መዓልታዊ ወይ ዳርጋ መዓልታዊ [ድምር ናይ ቁ 2ን ቁ 3ን ባዶ እንተደኣኮይኑ ናብ ቁ 9ን 10 ሰገር]

4. ኣብ ዝሓለፈ ዓመት፡ መስተ ምስታይ ምስ ጀመረካ ምቁራጽ ዝኣበየካ ኣጋጣሚታት ክሳብ ክንደይ ይኸውን ኔሩ?

- (0) ፈጹም ኣየጋጠመንን
- (1) ኔሩ ኔሩ (ወርሓዊ ዘይኮነን)
- (2) ወርሓዊ
- (3) ሰሙናዊ
- (4) መዓልታዊ ወይ ዳርጋ መዓልታዊ

5. ኣብ ዝሓለፈ ዓመት፡ መስተ ብስንኪ ምስታይካ ብቐሊሉ ንስኻ ክትሰርሖ ትጽቢት ዝግበረልካ ስራሕ ዝፈሸለሉ ወይ ዘይተዓወተሉ ኣጋጣሚ ክሳብ ክንደይ ኔሩ?

- (0) ፈጹም ኣየጋጠመንን
- (1) ኔሩ ኔሩ (ወርሓዊ ዘይኮነን)
- (2) ወርሓዊ
- (3) ሰሙናዊ
- (4) መዓልታዊ ወይ ዳርጋ መዓልታዊ

6. ኣብ ዝሓለፈ ዓመት፡ ድሕሪ ከቢድ ናይ መስተ ኣጋጣሚ ንንግህኡ ንመነቓቓሒ ወይ ንመበራብሪ ክኾነካ ናይ መጀመርያ መስተ ዘድለየካ ኣጋጣሚ ክሳብ ክንደይ ኔሩ?

- (0) ፈጹም ኣየጋጠመንን
- (1) ስሕት-ስሕት ኢሉ (ወርሓዊ ዘይኮነን)
- (2) ወርሓዊ
- (3) ሰሙናዊ
- (4) መዓልታዊ ወይ ዳርጋ መዓልታዊ

7. ኣብ ዝሓለፈ ዓመት፡ መስተ ድሕሪ ምስታይካ ክንደይ እዋን ዝኣክል ናይ ጣዕሳ ወይ ቢደል ከም ዝበደልካ ስምዒት ተሰሚዑካ?

- (0) ፈጹም ኣየጋጠመንን
- (1) ኔሩ ኔሩ (ወርሓዊ ዘይኮነ)
- (2) ወርሓዊ
- (3) ሰሙናዊ
- (4) መዓልታዊ ወይ ዳርጋ መዓልታዊ

8. ኣብ ዝሓለፈ ዓመት፡ መስተ ትሰቲ ስለዝነበርካ ኣብታ ዝሓለፈት ምሽት እቲኣ እንታይ ከም ዘጋጠመ ክትዝክር ዘይከኣልካሉ እዋናት ክሳብ ክንደይ ኔሩ?

- (0) ፈጸሙ አየጋጠመን?
- (1) ኔሩ ኔሩ (ወርሓዊ ዘይኮነን)
- (2) ወርሓዊ
- (3) ሰሙናዊ
- (4) መዓልታዊ ወይ ዳርጋ መዓልታዊ

9. ብሰንኪ መስተ ምስታይካ ንሰኻ ይኹን ወይ ካልእ ሰብ መጉዳእቲ ዝበጽሖ ኣሎ ዶ?

- (0) ኣይፋሉን
- (2) እወ፡ ኣብ ዝሓለፈ ዓመት ግና ኣይኮነን
- (4) እወ፡ ኣብ ዝሓለፈ ዓመት ኔሩ

10. ዝኾነ ካብ መቐርብካ፡ ኣዕሩኽቱኻ፡ ሓኪም፡ ወይ ዝኾነ ናይ ሕክምና ቦዓል ሞያ መስተ ብምስታይካ ዘተሓሳሰዎ ወይ ድማ ንኸተቐርጽ ዘማኸረካ ሰብ ኣሎ ዶ?

- (0) ኣይፋሉን
- (2) እወ፡ ኣብ ዝሓለፈ ዓመት ግና ኣይኮነን
- (4) እወ፡ ኣብ ዝሓለፈ ዓመት ኔሩ

ጠቐላል ድምር ናይ ነፍሲ ወከፍ ነጥቢ ኣብዚ መዝግብ _____

ቃለ-መሕተት ቁጽሪ - 2.

ንጹጽ ግንዛቤ ስምዕናዎን ያሳያልዎት (PHQ-SADS)

ንጥዕና ሕመማት ዝርኢ ቃለ-መሕተት። እዚ ቃለ-መሕተት ብዝተኻለለ መጠን ዝበለጸ ሕክምናዊ ኣገልግሎት ንክትረከብ/ቢ ዝሕግዝ ኣገዳሲ ክፋል ኢዩ። መልስታትካ/ኪ፣ ንክህልውኻ/ኺ ተኸእሎ ናይ ዘለዎም ሕክምናዊ ጸገማት ወይ ሸግራት ኣብ ምርዳእ ሓጋዚ ኢዩ። ብዝተኻለለካ/ኪ መጠን፣ ንኩሎም ሕቶታት ንክትምልስ/ሲ ፈትን/ኒ።

	ሀ) ኣብ ዝሓለፉ 4 ሰሙናት፡ ብዝኸነ ካብ እዞም ሰዓራም ዚዝርዘሩ ነገራት ክሳብ ክንደይ ዝኣከል ተሸጊርካ/ኪ? (A. Somatic)	ፊደመ ኣይተሸገርኩ (0)	ሓደ ሓደ ጊዜ (1)	ብዙሕ ተሸጊረ (2)
1	ቃንዛ ኩብዲ፡ ቃንዛ ናይ ጨጎራ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	ናይ ሕቕ ቃንዛ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	ቃንዛ ናይ ኣእዳው፡ ኣእጋር፡ መሊጋግቦ (ብርኪ፡ ጎሎ፡ ወይ ካልእ)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	ድኻም ዝተሰመዓካ/ኪ፡ ወይ ሓይሊ ከም ዘይብልካ ረሽሽ ዝበለካ/ኪ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	ክትድቅስ ዘይምኽኣል ወይ ዘይምድቃስ ወይ ድማ ነዊሕ ሰዓታት ምድቃስ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	ንደቂ-ኣንስትዮ፡ ቃንዛ ናይ ወርሓዊ ጽግያት ወይ ካልእ ተወሳኺ ጸገማት ኣብ ናይ ወርሓዊ ጽግያትኪ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	ቃንዛ ወይ ዝኸነ ጸገማት ኣብ ጊዜ ጸታዊ ርክብ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	ሕማም ርእሲ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	ቃንዛ ኣብ ኣፍ-ልቢ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	ፈዘዝ ምባል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	ዕውልውል ምባል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	ከቢድ ህርመት ልቢ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	ሕጽረት እስትንፋስ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	ቅርጻት፡ ወይ ውጽኣት	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	ዕግርግር ወይ ስግድግድ ምባል፡ ጸገም ምሕቓቕ መግቢ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ጠቅላላ ድምር PHQ-15 Score = ____ + ____

	ለ) አብ ዝሓለፉ 2 ስምናት፡ ብዝኾነ ካብዞም ስዒቦም ዚዝርዘሩ ነገራት ክሳብ ክንደይ ዝኣክል ተሸጊርካ/ኪ? (B. Anxiety)	ፊ.ዲ.መ ኣይተሸገርኩን (0)	ንገለ መዓልታት (1)	ንልዕሊ ፍርቂ ናይተን መዓልታት (2)	ዳርጋ መዓልታዊ (3)
1	ናይ ምርባሽ ስምዒት	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	ሻቕሎት ወይ ምርባሽ ምቁጽጻር ምስኣን	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	ብዛዕባ ዝተፈላለዩ ነገራት ኣዚኻ ምሽቓል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	ምርግጋእ ምስኣን ወይ ክትረጋጋእ ዘይምኽኣል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	ዕረፍቲ ዘይምህላው፡ ረገእካ ኮፍ ዘይምባል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	ብቐሊሉ ምሕራቕ ወይ ምቕጣዕ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	ከም ሓደ ሕማቕ ነገር ዘጋጥመካ(ከጋጥመካ ከምዝኽእል) ምፍራሕ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ጠቅላላ ድምር GAD-7 Score = _____ + _____ + _____

	ሐ) ሕቶታት ብዛዕባ ናይ ሓደገኛነት ወይ ድማ ምንጽልላው ናይ ስግኣታት (C. Anxiety attack)	ኣይፋል	እወ
ሀ	ኣብዘን ዝሓለፉ 4 ስምናት ናይ ስግኣት ሓደጋ፡ ማለት ሃንደበታዊ ናይ ፍርሒ ወይ ናይ ራዕዲ ስምዒት ኣጋጢሙካ/ኪ ዶ? [መልሰኻ 'ኣይፋል' እንተደኣ ኮይኑ፡ ናብ ሕቶ 'ሰ' ስገር]	<input type="checkbox"/>	<input type="checkbox"/>
ለ	እዚ ከምዚ ዝበለ ስምዒት ቅድሚኡ ኣጋጢሙካ ይፈልጥ ዶ?	<input type="checkbox"/>	<input type="checkbox"/>
ሐ	እዚ ከምዚ ዝበለ ስምዒታት ብሃንደበት ኣብ ዘይትጽበየሉ እዋናት፡ ማለት ክትቁጣዕ ወይ ክትንድር ኣብ ዘይግበኣካ ጊዜ'ዶ የጋጥም?	<input type="checkbox"/>	<input type="checkbox"/>
መ	እዞም ከምዚኣቶም ዝኣመሰሉ ኩነታት ብዙሕ ጊዜ የሸጉሩኻ ዶ? ተመሊሶም ብድሕሪ ሕጂ ንሽየጋጥሙኻ ኽትሰግእ' ዶ?	<input type="checkbox"/>	<input type="checkbox"/>
ሰ	ኣብታ መወዳእታ ዝኸፍኣ ከምዚ ዓይነት ስምዒታት ዘጋጠመካ ህምት፡ ምልክታት ናይ ሕጽረት እስትንፋስ፡ ምርሃጽ፡ ወይ ምውሳኽ ህርመት ልቢ ኣጋጢሙካ ዶ?	<input type="checkbox"/>	<input type="checkbox"/>

	መ) አብ ዝሓለፉ 2 ሰሙናት፡ ብዝኾነ ካብ እዞም ሰዓታት ዚዝርዝሩ ነገራት ክሳብ ክንደይ ዝኣከል ተሸጊርካ/ኪ? (D. Depression)	ፊጺመ ኣይተሸገርኩን	ንገለ መዓልታት	ንልዕሊ ፍርቂ ናይተን ዕለታት	ዳርጋ መዓልታዊ
		(0)	(1)	(2)	(3)
1	ዝኾነ ንጥፊታት ኣብ እተካይደሉ/እተካዩድሉ፡ ትሑት ተገዳስነት ምርኣይ ወይ ድማ ትሑት ደረጃ ዕግበት ምህላው	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	ነብስኻ/ኺ ምውዳቕ፡ ሕዙን ጉሁይ ምዃን ወይ ድማ ተስፋ ዝቐረጸ ሰብ ምዃን	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	ድቃስ ምእባይ ወይ ክትድቅስ/ሲ ዘይምኽኣል ወይ ዘይምድቃስ ወይ ድማ በንጻሩ ነዊሕ ሰዓታት ምድቃስ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	ድኻም ዝተሰመዓካ/ኪ፡ ወይ ሓይሊ ከም ዘይብልካ/ኪ ረሸሽ ዝበለካ/ኪ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	ሸውሃት ናይ መግቢ ዘይምህላው፡ ወይ ድማ ብብዝሒ ምብላዕ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	ብዛዕባ ነብስኻ/ኺ ሕማቕ ስምዒት ምስማዕ፡ ወይ ድማ ንስኻ/ኺ ዝፈሸልካ/ኪ ዘይዕውት/ቲ ወይ ዝኸሰርካ/ኪ ዘይትረብሕ/ሒ ምዃንካ/ኪ፡ ወይ ድማ ንነብስኻ/ኺ ወይ ከኣ ንስድራቤትካ/ኪ ዘዋረድካ/ኪ ምዃንካ/ኪ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	ብዛዕባ ገለ ነገር ክተተኸር/ሪ ዘይምኽኣል፤ ንኣብነት ዜና ምንባብ ወይ ቴሌቪዥን ምርኣይ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	ካልኣት ሰባት ምእንቲ ክዩቕልቡልካ/ኪ ብትሑት ድምጺ ምዝራብ ወይ ብህድኣት ምንቅስቓስ? ወይ ድማ ብኣንጻሩ መዕለበጢ/ት ምዃን፡ ካብ ንቡር ንላዕሊ ምንቅስቓስ ምግባር	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	ብሕይወት እንተዘይህሉ ኔረ መሓሸኒ ዝብል ሓሳባት	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ጠቓላል ድምር PHQ-9 Score = _____ + _____ + _____

ቃለ-መጠይቅ ቁጽሪ - 3.

ንተዘኩሮታት ናይ ዘሰንበድ ሕሉፍ ትዝታ ወይ ተሞክሮ ዝምልከት ሕቶታት (PTSD-CL-S)

እዞም ኣብ ታሕቲ ስዒቦም ተዘርዚሮም ዘለው ነጥብታት፡ ሰባት ብሰንኪ እቲ ወጥሪ ወይ ድማ ጸቕጢ ዝነበሮ ተሞክሮ ናይ ሕይወት ዘሕለፍዎ ዝኸበቱ ሳዕቤናት ወይ ጸገማት ኢዮም። ተጠንቂቕካ/ኪ ኣንብቦም/ኣንቢብዮም እሞ፡ ኣብ ዝሓለፈት ወርሒ ክሳብ ክንደይ ዝኣክል ብሰንኪ እዞም ጸገማት ከም ዝተሸገርካ/ኪ ኣብ ጎኖም ኣብ ዘሎ ሳንዱቅ “X” ብምግባር መልስ/ሲ።

ዘጋጠመካ/ኪ ሕማቕ ተሞክሮ _____ ብዕለት/ወርሒ/ዓመት _____

	ግብረ-መልሲ	ፊደሎ- ኣየሸግረንን (1)	ቁሩብ (2)	ማእከላይ (3)	ብዙሕ (4)	ኣዝዮ ብዙሕ (5)
1	ካብቲ ዝሓለፈ ጸቕጢ(ወጥሪ) ዝነበሮ ተሞክሮ ሕይወት፡ ዝደጋገም ዝርብሽ ተዘክሮታት፣ ኣሳባት፣ ወይ ስእልታት?	<input type="checkbox"/>				
2	ካብቲ ዝሓለፈ ጸቕጢ(ወጥሪ) ዝነበሮ ተሞክሮ ሕይወት፡ ዝደጋገም ዝርብሽ ሕልምታት?	<input type="checkbox"/>				
3	ልክዕ ከምዚ ሓደ ናይ ወጥሪ ወይ ዘጨንቕ ኩነታት ከም ዘጋጥም ዘሎ ሃንደበታዊ ስምዒት ወይ ድማ ግብረ-መልሲ ምርኣይ ወይ ምሃብ?	<input type="checkbox"/>				
4	ዝኾነ ነቲ ዘሕለፍካ/ኪ ናይ ወጥሪ ኩነታት ዘዘኻኸር ኩነታት ምስ ዘጋጥመካ/ኪ ኣዚኻ/ኺ ናይ ምጉሃይ ስምዒት ምህላው?	<input type="checkbox"/>				
5	ዝኾነ ነቲ ዘሕለፍካ/ኪ ናይ ወጥሪ ኩነታት ዘዘኻኸር ኩነታት ምስ ዘጋጥመካ/ኪ፡ ኣካላዊ ለውጥታት ከም ህርመት-ልቢ ምውሳኽ፡ ሕጽረት እስትንፋስ ምህላው፡ ወይ ድማ ርሃጽ ምርሃጽ?	<input type="checkbox"/>				
6	ብዛዕባ ነቲ ዝሓለፈ ተሞክሮ ናይ ወጥሪ ኩነታት ምሕሳብ ይኹን ምዝራብ ወይ ምስኡ ዝተኣሳሰር ስምዒታት ካብ ምህላው ትርሕቕ/ቂ?	<input type="checkbox"/>				
7	ነቲ ዝሓለፈ ናይ ወጥሪ ሕሉፍ ተሞክሮ ስለ ዘዘኻኸርካ/ኺ ዝኾነ ንጥፊታት ወይ ድማ ኩነታት (ኣጋጣሚታት) ተወግድ/ዲ?	<input type="checkbox"/>				
8	ነቲ ቀንዲ ክፋል ናይቲ ዝሓለፈ ናይ ወጥሪ ናይ ጭንቂ ተሞክሮ ንክትዘክር/ሪ ምሽጋር?	<input type="checkbox"/>				
9	ኣብቶም ቅድሚ ሕጂ ባህ ዘብሉኻ/ኺ ዝነበሩ ነገራት ዘሎካ/ኪ ተገዳስነት ምጥፋእ ወይ ድማ ምጉዳል?	<input type="checkbox"/>				

10	ካብ ካልኣት ሰባት ዝረኣቕካ/ኪ ወይ ዝተነጸልካ/ኪ ኮይኑ ምስማዕ?	<input type="checkbox"/>				
11	ስምዒትካ/ኪ ከይትገልጽ ዝደንዘዝካ ምዃን፡ ማለት ምስቶም ዝቐርቡኻ/ኺ ስምዒት ናይ ፍቕሪ ክህልወካ/ኪ ዘይምኽኣል?	<input type="checkbox"/>				
12	መጻኢኻ/ኺ ከም ዝቋረጽ ወይ ተስፋ ዘይብሉ ኮይኑ ምስማዕ?	<input type="checkbox"/>				
13	ድቃስ ክወስደካ/ኪ ወይ ድማ ጽቡቕ ድቃስ ክትድቅስ/ሲ ዘይምኽኣል?	<input type="checkbox"/>				
14	ናይ ምቕጣዕ ወይ ናይ ሕርቃን ግንፋሉ ምህላው?	<input type="checkbox"/>				
15	ኣብ ሓደ ነገር ንምቕላብ፣ ኣቓልቦ ምህላው ምሽጋር?	<input type="checkbox"/>				
16	ኣዚኻ/ኺ ብፍሉይ ንቐሕ/ንቐሕቲ ወይ ኣብ ናይ ተጠንቀቕ ኩነታት ምዃን?	<input type="checkbox"/>				
17	ምዩቕ ምባል ወይ በተግ-በተግ ናይ ምባል ስምዒት?	<input type="checkbox"/>				

ቃለ-መጠኑት ቁጽሪ - 4.

ናይ ተጻዋርነት መዓቀኒ። እተን 14-ረጅሒታት ናይ ተጻዋርነት መዓቀኒ (RS-14)

ነዘም ስዒቦም ዚዘርዘሩ ምሉኣት ሓሳባት ኣንብቦም/ኣንብብዮም። ኣብ ጎኒ ነፍሲ ወከፎም ድማ ካብ 1 (ኣበርቲዓ ይቃዎም) ክሳብ 7 (ኣዝዮ ይሰማማዕ) ዚርጋሉ ዘለዎም ቁጽርታት ኣለዎ። ብዛዕባ እታ ምልእቲ ሓሳባት ንዘለካ/ኪ ስምዒት ኣብሊጻ ንእትገልጽ ቁጽሪ ኣብ ትሕቲኡ ምልክት ናይ “X” ብምግባር መልስኻ/ኺ ሃብ/ቢ። ንኣብነት፡ ንሓንቲ ምልእቲ ሓሳባት ኣበርቲዕካ/ኪ ትቃወም/ሚ እንተደኣ ኮይንካ/ኪ፣ ኣብ ትሕቲ ቁጽሪ 1 ምልክት ናይ “X” ግበር/ሪ። ማእከላይ ኣረኣኣይ እንተደኣ ሃልዩካ/ኪ ከኣ ኣብ ትሕቲ ቁጽሪ 4 ምልክት ናይ “X” ግበር/ሪ። ከምኡ-ውን ኣዚኻ ትሰማማዕ እንተደኣ ኮይንካ ኣብ ትሕቲ ቁጽሪ 7 ምልክት ናይ “X” ግበር/ሪ። ወዘተ። ንኹሎም ሕቶታት ክትምልስ ኣሎካ/ኪ።

		1	2	3	4	5	6	7
1	ዝበዝሕ እዋን እንተ በዚ-ኢሊ እንተ በቲ-ኢሊ ንነብሰይ ይኸእል ኢየ	<input type="checkbox"/>						
2	ኣብ ሕይወት ገለ ነገር ስለ ዝተዓወትኩ ወይ ስለ ዘፍሬኹ ዕጋበት ይስምዓኒ	<input type="checkbox"/>						
3	ዝበዝሕ እዋን ንነገራት ብህድኣት እየ ዝሕዞም	<input type="checkbox"/>						
4	ንነብሰይ ዝፈቱ ኢየ ወይ ከኣ ምስ ነብሰይ ንሰማማዕ ኢና	<input type="checkbox"/>						
5	ኣብ ሓደ እዋን ብዙሓት ነገራት ክዓምም ዝኸእል ኮይኑ ይስምዓኒ	<input type="checkbox"/>						
6	ክገብር ኣለኒ በሃላይ/ሊት ኢየ	<input type="checkbox"/>						
7	ቅድሚ ሕጂ ብፈተናታት ስለ ዝተመኮርኩ፣ ኣብ ፈታኒ ዝኾነ እዋን ክጻወር ይኸእል ኢየ	<input type="checkbox"/>						
8	ስነ-ምግባር ኣሎኒ	<input type="checkbox"/>						
9	ብዛዕባ ገለ ነገራት ሕጂ-ውን ተገዳስነት ኣሎኒ	<input type="checkbox"/>						
10	ዝበዝሕ እዋን ዘስሕቕኒ ወይ ድማ ዘዋዝዩኒ ነገራት ክረከብ ይኸእል እየ	<input type="checkbox"/>						
11	ኣብ ነብሰይ ምትእምማነይ፣ ንፈታኒ ዝኾነ እዋን ከም ዝጻወር ይገብረኒ	<input type="checkbox"/>						
12	ብሓፈሻ ኣብ እዋን ሓደጋ፣ ሰባት ኣባይ ክውከሉ ወይ ከኣ ክተሓማመኑ ዝኸእሉ ሰብ ኢየ	<input type="checkbox"/>						
13	ሕይወተይ ትርጉም ኣለዎ	<input type="checkbox"/>						
14	ኣብ ከቢድ ኩነታት ኣብ ዝህልወሉ ህሞት፣ ዝበዝሕ እዋን መውጽኢ ክረከብ ይኸእል ኢየ	<input type="checkbox"/>						

11.4.6 Guide for an open in-depth interview for qualitative study

For Tgrigna translationis, see below

Interview date _____

Interview number _____

Record file number _____

First Interview (Introduction, General Questions)

Thank you for coming in today. We are continuing the questionnaires that you already filled out and want to ask some in-depth questions. Can you tell me your:

1. Introductory questions

- a. Age
- b. Family details (marital status, children, grandchildren)
- c. What did you study? Which grade did you finish?
- d. How long have you been in Switzerland and what is your permit status?

2. Conception of health

I'd like to understand a little bit about health in your culture. Can you tell me:

- a. How do you define good health? (i.e. to be healthy, what is required?)
- b. When can you say you are healthy?
- c. If you are sick or hurt, how do you sort it out?
- d. When do you feel like seeing a doctor?

3. Physical vs. Mental Health

- a. In Switzerland, concepts of physical and mental health are used. Is this differentiation also made in your culture?
- b. When you think of 'mental health,' what comes to your mind?
- c. Which words do you use in Tigrinya to talk about mental health? (*Probe: Are there many terms? Just one? What does the word mean?*)
- d. When can you say you are mentally healthy?
- e. What do you need to be mentally healthy?

- f. What kinds of mental health issues do people in your society have?
- g. In your culture, what do people do if they are having mental health problems?
- h. What role does family or religion play in a person's mental health?

4. Cultural perception of psychological stressors/trauma/resilience in home country

- a. What does the term 'stress' mean to you?
- b. In your culture, how do people typically handle stress?
- c. Can you give an example of a stressful situation that happened to someone you know?
(Follow up probes: What did that person do to deal with it? Why did they do that? Is that a way that people in your culture typically handle stress? Can you explain?)
- d. How do people support one another during difficult times? Can you please give examples?
- e. Is looking for support socially acceptable? When yes, when no?
- f. If a person seeks mental health services in your home country, where do they typically go?
- g. What do you think about people who seek care for mental health in your home country? Please give examples.
- h. What about people who seek care for mental health in Switzerland? Please give examples.
- i. What would you say is the biggest source of strength for people in your culture?

Second interview (Personal Experience)

5. Journey

Do other migrants that you know ever have trouble with thoughts about their past or their journey to Switzerland/Europe? (*Probe if “Yes”*: How do they deal with those thoughts? What do you think about that?)

6. Arrival in Switzerland (Challenges and sources of support)

- a. When you left Eritrea did you plan to come to Switzerland or did you plan to live elsewhere in Europe?
- b. What did you expect from traveling to Switzerland (or Europe)? When you arrived, did you find Switzerland to be like you imagined? (*Probe: What is different? How do you deal with this?*)
- c. Once you arrived in Switzerland, what kinds of difficult situations did you face? (*Probe: How did you deal with them? Can you explain step-by-step?*)
- d. What about other migrants that you know? What kinds of difficult or stressful situations did they face? (*Probe: How did they deal with them? Can you explain step-by-step?*)
- e. Do you now face any challenges? Can you mention some?
- f. What about mental health challenges? (*Probe: Can you mention some that you face now?*)
- g. With whom do you share your problems?
- h. Have you had any experiences with physical or mental health care in Switzerland? (*Probe if ‘yes’ answer: whom did you first contact? How did you reach them? Are you receiving treatment? What is your opinion of the health care you have gotten? Could something be better?*)
- i. Do you still have contact to friends and family back in Eritrea? (*Probe: How do you feel this affects your mental health? How do you feel this move has affected your relationships with family and friends at home?*)
- j. How does your living situation influence mental health? (*Probe: Do you live in an Asylheim, or in your own apartment?*)

7. Strengths/Resilience

- a. Do you interact with the Eritrean community in Switzerland? *(If so, how?)*
- b. Does anyone you knew in Eritrea now live in Switzerland? *(Probe if “yes”: Do you have contact with them?)*
- c. Do you find that you can be open with people in from Eritrea about mental health difficulties? *(Probe: Can you give an example?)*
- d. If you are religious, how do you interact with the religious community in Switzerland? *(Probe if “Yes”: How about with religious leaders, like pastors?)*
- e. Do you feel that you, or others that you know, would be able to talk about difficult or painful situations from the past with people from the religious community? *(Probe if “yes”: Why? Who would you reach out to? What would they do? Do you think they could help you?)*
- f. What sources of strength/support have you found to be the most helpful since you moved here? *(Please give examples or explain why exactly)*

ንጥዕና ስነ-አእምሮ ዝምልከት ክፉት መወከሲ ቃለ-መጻኢት

ዕለት _____

ቁጽሪ _____

ፋይል _____

ጊዜ _____

ቀዳማይ ክፋል (ሓፈሻዊ ሕቶታት)

1. መእተዊ

- ሀ) ዕድመ
- ለ) ኮነታት ሥድራ (ኮነታት ሓዳር፣ ቆልዑት)
- ሐ) ኮነታት ሥራሕን ድጎረ-ባይታ ኮነታት ትምህርትን
- መ) ኣብ ስዊዘርላንድ ዝተጸንሐ ጊዜን ኮነታት መንበሪ ፍቓድን

2. ርድኢት ብዛዕባ ጥዕና

- ሀ) ጥዕና ኣብ ባህልኹም ወይ ሕብረተሰብኩም ከመይ ከም ዝግለጽ ቁሩብ ክፈልጥ ምደሌኹ
- ለ) ኣብ ከመይ ኮነታት ምስ እትህሉ ኢኻ ‘ጥዑይ’ ኢዩ ክትብል እትኽእል?
- ሐ) እንተደኣ ተጸሊኡካ ወይ ሓሚምካ፣ ብኸመይ ተለሊ (ተስተውዕል)?
- መ) ኣብ ከመይ ኮነታት ምስ እትህሉ ኢኻ ናብ ሓኪም ምኽያድ ከም ዘድልዩካ ኮይኑ ዝስምዓካ?

3. ኣብ ስዊዘርላንድ ብዛዕባ ጥዕና ነብስን ጥዕና ኣእምሮን ዝብል ስነ-ሓሳብ ኣሎ። ኣብ ባህልኹምክ ከምኡ ዝበለ ምፍልላይ ኣሎዶ?

- ሀ) ‘ናይ ኣእምሮ ጥዕና’ ክትሓስብ እንኮሎኻ ምስ ምንታይ ተተሓሕዞ? ወይ ብኸመይ ትቐርጽ?
- ለ) ኣብ ከመይ ኮነታት ወይ ድማ መዓስ ኢኻ ናይ ኣእምሮ ጥዕና ኣሎኒ ክትብል ትኽእል?
- ሐ) ኣብ ቋንቋ ትግርኛ፣ ብዛዕባ ጥዕና ኣእምሮ እትጥቀምሎም ቃላት ከመይ ዝበሉ እዮም?
- መ) ብኣእምሮ ጥዑይ ምእንቲ ክትከውን እንታይ የድልዩካ?
- ሠ) ጉድለት ጥዕና ኣእምሮ ዘስዕቡ ነገራት እንታይ ኢዮም ኢልካ ትሓስብ?
- ረ) ኣብ ሕብረተሰብኩም፣ ከመይ ዝበሉ ናይ ኣእምሮ ሕማማት ይረኣዩ?
- ሰ) ኣብ ባህልኹም ፣ ናይ ኣእምሮ ሕማም ምስ ዘጋጥሞም፣ እንታይ ይገብሩ?
- ሸ) ሓደ ሰብ ሕማማ ኣእምሮ ምስ ዝሓምም፣ ተራ ሥድራ-ቤት ወይ ሃይማኖት ከመይ ይመስል?

4. ኣብ ሃገርካ ብዛዕባ ስነ-አእምሮኣዊ ጸቕጢ ዘምጽኡ ነገራት፣ ስንባድን ተጻዋርነትን ዘሎ ባህላዊ ርድኢት

- ሀ) ‘ጸቕጢ’ ንዝብል ሓሳብ ከመይ ትገልጽ?
- ለ) ኣብ ባህልኹም ሰባት ንጸቕጢ ብኸመይ ይገልጽዎ? ከመይ ዝበሉ ቃላት ይጥቀሙ? ብዙሓት ቃላት ኣለኩምዶ?

- ሐ) ኣብነት ናይ ሓደ ጸቕጢ ዝነበሮ ኮነታት ዘጋጠሞ ሰብ እትፈልጦ ኣሎዶ? (እወ እንተኾይኑ፣ እቲ ሰብ ብኸመይ ገጢምዎ? ኣብ ባህልኹም ሰባት ከምኡ ድዮም ዝገብሩ? ከትገልጹዶ ትኽእል?)
- መ) ኣብ ባህልኹም፣ ኣብ ጽንኩር ኮነታት ሰባት ከመይ ጌሮም ይተሓጋዝዙ? ኣብነትዶ ከትህበኒ?
- ሠ) ሓገዝ ምሕታት ኣብ ሕብረተሰብኩም ቅቡል ዲዩ? ስለምንታይ?
- ረ) ኣብ ሃገርኩም፣ ሓደ ሰብ ኣገልግሎት ጥዕና ኣእምሮ ምስ ዝደሊ ናበይ ይኸይድ?
- ሰ) ብዛዕባ እቶም ኣብ ሃገርኩም ኣገልግሎት ጥዕና ዝሓቱ ሰባት እንታይ ትብል ወይ እንታይ ትፈልጥ? ኣብነት ከትህበኒዶ ትኽእል?
- ሸ) ብዛዕባ እቶም ኣብ ስዊዘርላንድ ኣገልግሎት ጥዕና ዝሓቱ ሰባት እንታይ ትብል ወይ እንታይ ትፈልጥ? ኣብነት ከትህበኒዶ ትኽእል?
- ቀ) ብዛዕባ ኣብ ሃገርኩም ዘለው ሰባት፣ እቲ ዝዓበየ ሓይሎም ወይ ተጻዋርነቶም እንታይ ኢዩ ትብል?

ካልኦይ ክፋል (ንውሉቃዊ ተመኩሮታት ዝምልከት)

5. ጉዕዞ

ካልኦት እትፈልጦም ሰባት፣ ብዛዕባ ዝሓለፍዎ ጉዕዞ ሰደት ናብ ስዊዘርላንድ ወይ ድማ ናብ ኤውሮጳ ዘሸግር ሓሳባት ኣለዎምዶ ትብል? እው፡፡ እንተደኣ ኮይኑ፣ ብኸመይ ነዚ ዘሸግርዎ ሓሳባት ይብድህዎ? ብዛዕባ እንታይከ እዮም ዝሓሰቡ?

6. ኣብ ስዊዘርላንድ ምምጻእ (ብድሆታትን ምንጪ ሓገዛትን ወይ ድማ ረዲኤትን)

- ሀ) ካብ ኤርትራ ምስ ወጻእካ፣ ኣብ ስዊዘርላንድ ክትነብር ዲኻ ትደሊ ኔርካ ወይስ ናብ ካልእ ሃገር ክትከይድ ትደሊ ኔርካ?
- ለ) ኣብ ስዊዘርላንድ ወይ ኤውሮጳ እንታይ ትጽብ ኔርካ? ስዊዘርላንድ ከምቲ ዝተጸቤኻዮ ኮይናዶ ጸኒሓትካ? እንታይ ፍልይ ዝበለ ነገር ረኺብካ? ብኸመይ ፈቲሕካዮ?
- ሐ) ኣብ ስዊዘርላንድ ምስ መጻእካ፣ ዝኾነ ከቢድ ሸግር ኣጋጢሙካዶ ይፈልጥ? እንታይ ዓይነት? ብኸመይ ፈቲሕካዮ? ኣስፈሕካዶ ክትገልጸለይ ትኽእል?
- መ) ብዛዕባ ካልኦት እትፈልጦም ሰባትከ እንታይ ትብል? ከመይ ዝበለ ናይ ጸቕጢ ኮነታት የጋጥሞም? ብኸመይ ይፈትሕዎ?
- ሠ) ኣብዚ እዋን እዚ ዘጋጥመካ ሸግራት ኣሎዶ? ገለ ካብኦም ክትጠቕሰለይዶ?
- ረ) ብዛዕባ ብድሆታት ጥዕና ኣእምሮኽ?
- ሰ) ብዛዕባ ሸግራትካ ምስ መን ትማኸር?
- ሸ) ኣብ ስዊዘርላንድ ዝኾነ ኣገልጉሎት ሓፊሻዊ ሕክምና ወይ ናይ ጥዕና ኣእምሮ ረኺብካዶ ትፈልጥ? መልስኻ ‘እው’ እንተደኣ ኮይኑ፣ መጀምርያ ንመን ኢኻ እትውከስ? ብድሕሪኡ እንታይ ኣጋጢሙካ? ኣብዚ ሕጂ እዋን ሕክምናዊ ምክትታል ትገብርዶ ኣሎኻ?
- ቀ) ኣብ ኤርትራ ምስ ዘለው ቤተሰብ ይኹኑ ኣዕሩኽቲ ርክብ ኣሎካዶ?
- ቆ) ህልው መነባብሮኻ፣ ንጥዕና ኣእምሮኻ ብኸመይ ይጸልዎ ትብል?

7. ኃይሊ(ብርታዕ) ወይ ተጻዋርነት

- ሀ) ምስ ኣብ ስዊዘርላንድ ዘለው ማሕበረሰብ ኤርትራውያን ብኸመይ ትዋሳእ? ንኣብነት
- ለ) ኣብ ኤርትራ እትፈልጦ ሓጂ ኣብ ስዊዘርላንድ ዝነብር ሰብ ኣሎዶ? ርክብ ኣሎካዶ?
- ሐ) ብዛዕባ ሕማም ኣእምሮ ዘምጸኦም ጸገማት ምስ ሕብረተሰብካ ብኸፉት ክትዛተ ቀሊል ኮይኑዶ ትረኽቦ? ገለ ኣብነት ሃበኒ በጃኻ?
- መ) ሰዓቢ ሃይማኖት እንተደኣ ኮይንካ፣ ምስ ኣብ ስዊዘርላንድ ዘለው ማሕበረሰብ ብኸመይ ትዋሳእ? ምስ መራሕቲ ሃይማኖትከ?
- ሠ) ንስኻ ይኹን ካልኦት ሰባት ብዛዕባ ዘሕለፍኩም ከቢድ ኮነታት ምስ መራሕቲ ሃይማኖት ክትዛረቡ ትኽእሉዶ ኮይኑ ይስመዓካ?
- ረ) እቲ ዝዓበዩ ሓገዝካ (ደገፍ) ካብ መን ትረኽቦ ወይ መን ኢዩ ዝያዳ ሓጋዚኻ? ገለ ኣብነት ክትህበኒዶ ትኽእል?

11.4.7 Vignette for qualitative mental health

For Tgrigna translationis, see below

Last time we talked about your understanding of health, mental health and stress. Now I'd like to tell you a story and ask some questions about what you imagine this person is thinking and feeling.

Vignette introduction: (if two parts: Last time we talked about your understanding of health, mental health and stress.) Now I'd like to tell you a story and ask some questions about what you imagine this person is thinking and feeling.

Sammy is 27 years old and he migrated to Switzerland one year ago. He had a tough journey getting here and left many of his friends and family back at home. Although he feels very thankful to be in Switzerland, he feels frustrated that he has not gotten his residence permit yet, because he wants to find a job. He also worries that he might not be allowed to stay in Switzerland. Sometimes he thinks about things that happened on his journey to Europe, and about difficult and frightening things that happened in the past, at home. He often feels powerless, alone and sad. He also feels that it is not as easy to make close friends here as it was back home. One night he wakes up from a very bad dream, where he thinks the police are entering his home and are going to arrest him.

- a. Please think as if you were Sammy. What do you think he is thinking and feeling right now?
- b. What do you think happens next?

The next day Sammy still feels unsettled by his dream. He has had this dream many times before, and now he has gotten a very bad headache but he doesn't know why. He meets his friends for tea but when they ask him how he is doing, he gets angry and leaves without saying goodbye.

- c. Where do you think Sammy is going? Why do you think that might be? What will he do there?
- d. Do you think that Sammy could ask someone else for help with his situation?
(Probe: If "yes": who could he talk to? Partner, Family members, Friends,

religious leader, Swiss social workers? If “no”: why not? Could they help Sammy? If so, how?)

Two days later, Sammy still has a very bad headache. And he keeps thinking about his dream, and worrying about police entering his apartment. His friends mention that he seemed to be upset the other day and ask if he is feeling alright.

- e. What does Sammy tell them? Why?
- f. What will Sammy do now? (*Probe: Will Sammy go to see a doctor, talk to someone from his church, or go to a prayer session, talk to someone else? Who? Why/Why not?*)
- g. Do you think this story could reflect a situation in real life? (*Probe: Can you tell me why you think that?*)
- h. Do you know anyone who has had these kinds of problems? (*Probe if “yes”: What did they do? Would you have done the same?*)
- i. What advice or help would you give to Sammy, if he was your friend?

ሓጺር ኣብነታዊ ፈጠራዊ ዛንታ።

ኣብ ዝሓለፈ እዋን ብዛዕባ ኣፍልጦኻ ኣብ ጥዕና ብሓፈሻ፣ ጥዕና ኣእምሮን ጸቕጥን ተዝራራሪብና ኔርና። ሕጂ ድማ ብዛዕባ ሓደ ፈጠራዊ ሰብ ዝሓሰቦን ዝሰምዕን እንታይ ከም እትብል ከንዘራረብ ኢና።

ሳሚ ወዲ 27 ዓመት ኮይኑ፣ ቅድሚ ሓደ ዓመት ኢዩ ናብ ስዊዘርላንድ ተሰዲዱ። ናብዚ ክበጽሕ ጽንኩር ጉዕዞ ኢዩ ኣሕሊፉ፣ ከምኡውን ብዙሓት ኣዕሩኽቱን ቤተሰብን ኣብ ኣገሩ ገዲፉ ኢዩ ተሰዲዱ። ዋላኳ ኣብ ስዊዘርላንድ ምህላው ደስ ዘበሎ እንተኾነ፣ መንበሪ ፍቓድ ብዘይምህላው ግና ዕጉብ ኣይኮነን። ምኽንያቱ ድማ ስራሕ ክረክብ ስለዝደሊ ኢዩ። ከምኡውን ኣብ ስዊዘርላንድ ንኽከብር ፍቓድ ንኸረክብ ድዩ ኣይረከብን እውን የሻቕሎ ኢዩ። ሓደ ሓደ ጊዜ ብዛዕባ እቲ ናብ ስዊዘርላንድ ንኸመጽእ ዘሕለፎ ጉዕዞ የስተንትንን ይሓሰብን፣ ከምኡውን ብዛዕባ እቲ በዳህን ዘፍርሕን ኣብ ዝሓለፈ እዋናት ኣብ ዓዱ እንከሎ ዘጋጠመ ነገራት ይሓሰብ። ብዙሕ ጊዜ ሓይሊ ከምዘይብሉ ድኹምን ንበይኑን ጉሁይን ኮይኑ ይሰምዖ። ከምኡውን ከምቲ ናይ ዓዱ ኣብዚ ኣብ ስደት ቀረብቲ ወይ ኣዕሩኽ ንኸትረክብ ኣጸጋሚ ኮይኑ ይሰምዖ። ሓደ ለይቲ ብሕማቕ ሕልሚ ይብህርር እሞ ካብ ድቃሱ ይበራብር። ኣብ ሕልሙ ፖሊስ ናብ ገዝኡ ክኣትውሞ ካስርዎ ከለው ይረኣዮ።

ሀ) እስከ ንነብስኻ ባ ቦታ ሳሚ እሞ ግበራ፣ ሕጂ ሳሚ እንታይ ዝሓሰብ ወይ እንታይ ይሰምዖ ኣሎ ትብል?

ለ) ግሕሪ ሕጂኽ እንታይ ከጋጥሞ ኢዩ ትብል?

ኣብታ ቀጺላ ዘላ መዓልቲ ሳሚ በቲ ዝረእዮ ሕልሚ ቅሳነት ክሰምዖ ኣይከኣለን። እዚ ከምዚ ዝበለ ሕልምታት ቅድሚኡ ብዙሕ ጊዜ ኣጋጢምዎ ኢዩ፣ ከምኡውን መኽንያቱ ብዘይፈልጦ ከቢድ ሕማም ርእሲ ይሰምዖ ኣሎ። ምስ ኣዕሩኽቱ ሻሂ ክሰቲ ይራኹብ፣ ከመይ ከም ዘሎ ምስ ሓተትዎ ግና፣ ይሓርቕ እሞ ድሓን ኩኑ ከይበሎም ገዲፍዎም ይኸይድ።

ሐ) ሳሚ ናበይ ዝኸይድ ኮይኑ ይሰምዓካ? ሰለምታይ? ኣብኡ እንታይ ክገብር ኢዩ ትብል?

መ) ሳሚ ንኹነታቱ ዝሕግዞ ሰብ ሓገዝ ዝሓትትዶ ይመስለካ? እወ እንተኾይኑ፣ ንመን ዝዛረብ ይመስለካ ?

መጻምድቱ፣ ስድራቤት፣ ኣዕርኽ፣ መራሕቲ ሃይማኖት፣ ወይ ናይ ሶሻል ሰራሕተኛ? ሰለምንታይ? ንሳሚ ክሕግዝዎዶ ይኸእሉ? እወ እንተኾይኑ ብኸመይ?

ድሕሪ ክልተ መዓልቲ፣ ሳሚ ሕጂውን ቡርቱዕ ሕማም ርእሲ ኣለዎ። ከምኡውን ብዛዕባ ዝረኣዮ ሕልምን፣ ብዛዕባ ፖሊስ ናብ ገዝኡ ምእታውን ምሕሳብ ኣየቋረጸን። ኣዕሩኽቱ ዝጓየ ይመስል ከምዝነበረ እሞ ድሓን እንተሎ ተወከሰዎ።

ሠ) ሳሚ እንታይ ይብሎም?

ሰ) ሕጂ ሳሚ እንታይ ዝገብር ኮይኑ ይሰምዓካ? ካብ ቤተክርስቲያን ምስ ዝኾነ ሰብ ይዛረብ ወይ ኣብ ናይ ጸሎት መደብ ዝሳተፍዶ ኮይኑ ይሰምዓካ? ናብ ሓኪም ዝኸይድዶ ኮይኑ ይሰምዓካ? ምስ መን? ሰለምንታይ?

ሸ) ከምዚ ዛንታ ብሓቂ ዘጋጠመ ኮይኑ ይሰምዓካ? ሰለምታይ?

- ቀ) ከምዚ ዓይነት ጸገም ዝነበሮ ሰብ ትፈልጥዎ? ድሕሪኡ እንታይ ጌሩ? ንስኻኽ ከምኡዶ ምገባርካ?
- ቆ) ሳሚ ዓርክኻ እንተዝኸውን፣ እንታይ ዓይነት ምኽሪ ወይ ርኢቶ ምሃብካዮ?

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