

# Rapid health evaluation in migrant peoples in transit through Darien, Panama: protocol for a multimethod qualitative and quantitative study

Amanda Gabster , Monica Jhangimal , Jennifer Toller Erasquin , José Antonio Suárez , Justo Pinzón-Espinosa , Madeline Baird , Jennifer Katz , Davis Beltran-Henríquez , Gonzalo Cabezas-Talavero , Andrés F. Henao-Martínez , Carlos Franco-Paredes , Nelson I. Agudelo-Higuaita , Mónica Pachar , José Anel González , Fátima Rodríguez , Juan Miguel Pascale  and Migrant Peoples in Transit Study Group

## Abstract

**Background:** The world is currently unprepared to deal with the drastic increase in global migration. There is an urgent need to develop programs to protect the well-being and health of migrant peoples. Increased population movement is already evident throughout the Americas as exemplified by the rising number of migrant peoples who pass through the Darien neotropical moist broadleaf forest along the border region between Panama and Colombia. The transit of migrant peoples through this area has an increase in the last years. In 2021, an average of 9400 people entered the region per month compared with 2000–3500 people monthly in 2019. Along this trail, there is no access to health care, food provision, potable water, or housing. To date, much of what is known about health needs and barriers to health care within this population is based on journalistic reports and anecdotes. There is a need for a comprehensive approach to assess the health care needs of migrant peoples in transit. This study aims to describe demographic characteristics, mental and physical health status and needs, and experiences of host communities, and to identify opportunities to improve health care provision to migrant peoples in transit in Panama.

**Study design and methods:** This multimethod study will include qualitative ( $n=70$ ) and quantitative ( $n=520$ ) components. The qualitative component includes interviews with migrant peoples in transit, national and international nongovernmental organizations and agencies based in Panama. The quantitative component is a rapid epidemiological study which includes a questionnaire and four clinical screenings: mental health, sexual and reproductive health, general and tropical medicine, and nutrition.

**Conclusion:** This study will contribute to a better understanding of the health status and needs of migrant peoples in transit through the region. Findings will be used to allocate resources and provide targeted health care interventions for migrant peoples in transit through Darien, Panama.

**Keywords:** Darien, health equity, Latin America, migrant peoples, tropical medicine

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## Introduction

Currently, there are 281 million international migrant peoples worldwide, which is three times greater than the number of migrant peoples

estimated in 1970.<sup>1</sup> In addition, the number of forcibly displaced people worldwide has risen dramatically in the past decade.<sup>2</sup> The world is currently unprepared to deal with population

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Correspondence to:  
**Amanda Gabster**  
Instituto Conmemorativo  
Gorgas de Estudios  
de la Salud, Ave Justo  
Arosemena, Calle 36  
Ciudad de Panamá,  
Panama City, Panamá  
[agabster@gorgas.gob.pa](mailto:agabster@gorgas.gob.pa)

**Monica Jhangimal**  
**Davis Beltran-Henríquez**  
**Fátima Rodríguez**  
**Juan Miguel Pascale**  
Instituto Conmemorativo  
Gorgas de Estudios de  
la Salud, Panama City,  
Panamá

**Jennifer Toller Erasquin**  
University of North  
Carolina at Greensboro,  
Greensboro, NC, USA

**José Antonio Suárez**  
Instituto Conmemorativo  
Gorgas de Estudios de  
la Salud, Panama City,  
Panamá

National Research System,  
Secretariat of Science,  
Technology and Innovation,  
Panama City, Panama

**Justo Pinzón-Espinosa**  
Department of Mental  
Health, Parc Tauli  
University Hospital,  
Sabadell, Barcelona, Spain

Department of Medicine,  
School of Medicine,  
University of Barcelona,  
Spain

Department of Clinical  
Psychiatry, School of  
Medicine, University of  
Panama, Panama

**Madeline Baird**  
University of Connecticut,  
Storrs, CT, USA

**Jennifer Katz**  
**Gonzalo Cabezas-  
Talavero**  
Community Development  
Network of the Americas,  
Panama City, Panamá

**Andrés F. Henao-Martínez**  
University of Colorado  
Anschutz Medical Campus,  
Aurora, CO, USA

**Carlos Franco-Paredes**  
University of Colorado  
Anschutz Medical Campus,  
Aurora, CO, USA

Hospital Infantil de Mexico,  
Federico Gomez, Mexico  
City, Mexico

**Nelson I. Agudelo-Higuaita**  
The University of  
Oklahoma Health Sciences  
Center, Oklahoma City,  
OK, USA

**Mónica Pachar**  
Hospital Santo Tomás,  
Panama City, Panamá

**José Anel González**  
Hospital Irma De Lourdes  
Tzanetatos, Panama City,  
Panamá

**Migrant Peoples in  
Transit Study Group**  
Joanne Sánchez, Nathan  
Gundacker, Candy Nakad,  
Yamitzel Zaldívar, Fátima  
Rodríguez, Grace Vística,  
Daniel Owen, Thomas  
Rincón, Máximo Gonzalez,  
Miliza Peralta, Florence  
JN Pierre, Stevenson  
Pierre, Miliza Peralta,  
Nelsón Cabezón, Eugenia  
Millender, Daniel Viquez,  
Anyi Yu Pon

movement of this scale, and there is an urgent need to develop programs to protect the well-being and health of migrant peoples. A dramatic increase in population movement is evident through the Americas, where migrant peoples from Africa, Asia, South America, and the Caribbean travel through South and Central America en route to North America. Although other portions of the route may involve travel by air, train, or bus, migrants who arrive in South America headed north must travel on foot through the Darien National Forest along the border region between Panama and Colombia.

The Darien Forest (DF), commonly called the ‘Darien Gap’, is a roadless, dense, 106-km long neotropical moist broadleaf forest that interrupts the Pan-American Highway and serves as a natural barrier between Colombia and Panama. The crossing – through what is known to be ‘the most dangerous and inhospitable’ jungle in the world – is a treacherous journey, often taking between 7 and 14 days depending on the route taken, the amount of food carried, and travel group members’ abilities.<sup>3</sup>

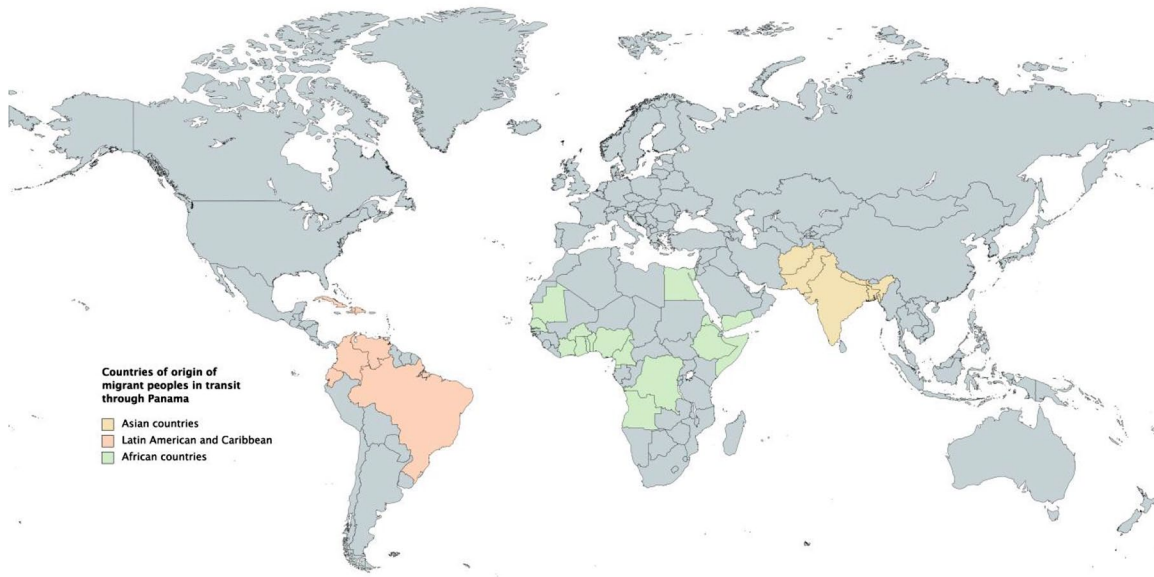
Migrant peoples who travel this route have no access to potable water or food and must face deadly river crossings, scorching high temperatures, and poisonous animals. Some indigenous communities situated along the dense forest’s outskirts provide a temporary resting place for migrant peoples in transit. Drug traffickers also share the trails, and people who have made the journey have commonly reported human trafficking, smuggling, and violence. Moreover, from May to September 2021, 180 cases of rape were reported to Doctors Without Borders.<sup>4</sup>

The National Border Police (SENAFRONT) guides migrant peoples who emerge from the Gap to ‘Migrant Reception Stations’ (MRS), organized by the National Migrant Services. All individuals who enter by foot into Panama, with very few exceptions, pass through these MRS. These posts are part of the international ‘controlled flow’ of migrant peoples in a coordinated effort between the United States and Panama, where biometric measurements are taken of all individuals entering the country to screen for terrorism and keep a document trail of individuals.<sup>5,6</sup> Time spent at the MRS depends on several factors including the individual’s nationality, health

needs, and demographics. Citizens of some countries are allowed to pass quickly, while others may need to wait months for their migration process in Panama. Individuals from South America and the Caribbean (except Haiti and Cuba) are among those who have nonexpedited processes and these nationals who arrive in Darien must go through lengthy months-long visa processes before continuing. Citizens from other countries often stay in the Darien MRSs for approximately 3–14 days before being transported to another MRS near the Panama–Costa Rica border, where they will remain until initiating their travels north.

From 2015 to 2021, there has been a steady increase in the number of migrant peoples in transit that pass through the DF at the Colombia–Panama border en route to North America.<sup>7–9</sup> Prior to 2020, there were between 2000 and 3000 individuals who crossed into Panama monthly through the DF. These trails have been used for centuries to cross between the two countries; however, from 2016 onward the number of people using this route has increased annually. From January to September 2021, more than 91,000 migrant peoples entered Panama through the DF.<sup>10</sup> This recent increase follows a period early in the COVID-19 pandemic where a large number of people were unable to cross international borders.<sup>8,11</sup> In addition, perceptions of the United States’ changes in immigration policies with the Biden administration has been identified as impacting the number of migrant peoples through these routes.<sup>12</sup> Individuals who make this journey come from different countries (Map 1). According to official records from Panama’s National Migration Service, over 70% are Haitian citizens, 20% Cuban citizens, and the remaining 10% originate from sub-Saharan Africa, Asia, and South America.<sup>8</sup> Furthermore, from 2018, there has been an increase in children, families, and pregnant women entering Panama on foot through the DF.<sup>8,13</sup> Individuals from outside the continent arrive in South America by land or sea, often arriving in Ecuador or Brazil, beginning their journey by land up to the Panama–Colombia border.<sup>7–9</sup>

There is no access to health care along the route through the DF and very limited access to needed health services while in the MRSs. During the DF crossing, migrant peoples are exposed to dangerous elements from the days spent in the tropical



**Map 1.** Countries of origin of migrant peoples in transit, after crossing the Darien Forest, Migrant Reception Stations in Darien, Panama (documented from data collected by Migration System, Panama, March 2021).

forest and people encountered during their route. These elements are coupled with increased prevalence of diseases and health conditions common in their countries of origin prior to beginning their route through Darien. In recent years, Panama's Ministry of Health (MINSa) and some international organizations have provided resources to begin to address the health needs and offer health care to migrant peoples in transit at the MRS. However, the COVID-19 pandemic has reoriented health care service provision, where health care is focused on SARS-CoV-2 diagnosis and quarantine; however, other services such as general health, sexual health, mental health, reproductive medicine, and fever management have been left aside.<sup>14,15</sup> Pan American Health Organization has recommended in their priority actions a need to strengthen surveillance and monitoring of the prevalence of health conditions through: (1) the development of comprehensive profiles of the health status of migrants, and (2) strengthening of national and decentralized health surveillance systems, especially in the border-transit areas that can capture the health status and needs of migrants.<sup>16</sup> In accordance with these recommendations, this study protocol is intended to be a rapid assessment of migrant peoples' health status, needs, impact on surrounding communities, and opportunities for improved service

provision to this population. Results from the study will inform future health care for migrants in transit in Darien and the region.

## Methods

### *Study design and population*

This study will use both qualitative and quantitative cross-sectional methods. We will use qualitative research methods to capture the perspectives and experiences of migrant peoples in transit and stakeholders (Table 1). In addition, we will use qualitative research to learn from the experiences of a variety of stakeholders, including those who provide services, design and allocate resources to programming, and individuals that live in the communities where migrants pass while crossing the DF. Participants within the study's qualitative component include government health and migration personnel, representatives from international organizations working with migrant populations, community members from surrounding host communities, and migrant peoples.

The qualitative component (Component A) will use purposive sampling and undertake semi-structured interviews, focus groups, and select participant observation to assess health needs and

**Table 1.** Study components and activities to be undertaken.

	Qualitative (Component A)	Quantitative (Component B)				
	Qualitative data collection	Quantitative questionnaire	Mental health	Sexual and reproductive health	General and tropical medicine	Nutrition
Target population	Community officials, governmental, and nongovernmental personnel who work with the target population, migrant peoples in transit, people who live in the communities where migrant peoples travel through or live	Migrant peoples in transit	Migrant peoples in transit	Migrant peoples in transit	Migrant peoples in transit	Migrant peoples in transit
Activities	Semi-structured interviews, focus groups, and participant observation	Self-administered quantitative questionnaire	Clinical evaluation and screening	Clinical evaluation and screening	Clinical evaluation and screening	Clinical evaluation and screening

service provision to migrant peoples (Table 2). Qualitative data collection tools (i.e. semi-structured interview guides for each stakeholder group) will be designed to capture data to describe divergent health priorities and available health services, evaluate patient barriers for accessing health services, and document needed resources for improving health care provision according to stakeholder perspectives. Through coding and thematic analysis of interviews, results of the qualitative component will allow our research team to contextualize prevalence data from the quantitative study component. The qualitative component will provide insights from key stakeholder groups, in their own words. Interviews will provide rich descriptions of the migrant experience and health needs of migrants in transit through Darien, as well as challenges to health services provision. We will use this information to prioritize needs and identify targets and strategies for future intervention.

The quantitative component (Component B, Table 1) includes a rapid epidemiological study among migrant peoples in transit. This component will include a self-administered questionnaire, and four clinical screenings: mental health, sexual and reproductive health, general and tropical medicine, and nutrition. Age of inclusion for each subcomponent can be found in Table 2. The self-administered questionnaire (Supplementary material A) includes demographics, migration

routes, sexual and reproductive health and behaviors, and self-reported health. This questionnaire was developed from existing instruments (some modified for this population).<sup>17–26</sup> For the clinical laboratory components, participants will be asked to provide a mid-stream urine sample and a peripheral blood sample for laboratory point-of-care screenings for the following infections/conditions: hepatitis A, B, C, and E; Chagas disease; malaria; dengue; chikungunya; HIV; syphilis; and pregnancy (Table 3). Further rapid testing will be applied, according to clinical presentations, as indicated in Table 4. Clinical screening will include a review of the present and past medical history, vital signs, body measurements, and a physical examination. On-site treatment (Table 5) and/or referral to primary, secondary, or tertiary centers will be organized (supplementary material B) according to clinical and laboratory findings.

#### Sample size calculations

To determine the required sample size for (1) participants aged  $\geq 18$  years, and (2) participants aged  $< 18$  years in this cross-sectional, observational study, we used  $n = \frac{Z^2 P(1-P)}{d^2}$  where  $n$  is

the sample size,  $Z$  the confidence statistic,  $P$  is expected prevalence and  $d$  is the precision.<sup>27</sup> Based on a past survey by the International Migration Organization, we expect 16% of

**Table 2.** Inclusion and exclusion criteria for the study in the rapid evaluation of health among migrant peoples in transit in Migrant Reception Stations (MRS), Darién, Panama.

	Inclusion criteria	Exclusion criterion
Qualitative study	<ol style="list-style-type: none"> <li>1. Aged &gt;17 years</li> <li>2. Speak and write at least basic level one of these languages: Spanish, English, Haitian Creole, French, or Portuguese</li> </ol>	Have a planned exit from an MRS the same day the study team has reached the person
Quantitative questionnaire	<ol style="list-style-type: none"> <li>1. Aged &gt;17 years</li> <li>2. Speak and write at least basic level one of these languages: Spanish, English, Haitian Creole, French, or Portuguese</li> </ol>	
Mental health	<ol style="list-style-type: none"> <li>1. Aged &gt;12 years</li> <li>2. Speak and write at least basic level one of these languages: Spanish, English, Haitian Creole, French, or Portuguese</li> </ol>	
Sexual and reproductive health	<ol style="list-style-type: none"> <li>1. Aged &gt;12 years</li> <li>2. Speak and write at least basic level one of these languages: Spanish, English, Haitian Creole, French, or Portuguese</li> </ol>	
General and tropical medicine	<ol style="list-style-type: none"> <li>1. Speak and write at least basic level one of these languages: Spanish, English, Haitian Creole, French, or Portuguese</li> </ol>	
Nutrition	<ol style="list-style-type: none"> <li>1. Speak and write, or have a guardian if under 12 who speaks and writes at least basic level one of these languages: Spanish, English, Haitian Creole, French, or Portuguese</li> </ol>	

MRS, migrant reception stations.

migrant peoples in transit in Panama with gastrointestinal diseases; this prevalence was used for sample size calculation.<sup>28</sup> The sampling frame composed of a total population expected to enter the MRS (2500; 20% of those are <18 years). In total, 120 participants <18 years and 160 participants ≥18 years will be included. We have a larger planned sample for the questionnaire, as we expect over half of these individuals will consent to filling out the questionnaire but not be willing to participate in the more time-consuming clinical components.

### *Ethical considerations*

This study has approval from the Comité de Bioética de la Investigación del Instituto Conmemorativo Gorgas de Estudios de la Salud (260/CBI/ICGES/21). Participants 18 years and older will be asked to read a study information sheet and sign the informed consent form. Participants 12–17 years will have their guardian read and sign the guardian information sheet and informed consent form, and the participant will

be required to read and sign the informed assent form. Participants <12 years will be required to have a guardian read and sign the informed guardian consent form. Participants will not be offered monetary compensation for their participation. However, a small snack (valued at less than \$3.00) will be provided. All participants will be given educational sheets that cover the syndromes and infections tested for, and these sheets will be posted publicly at the MRSs. The consent forms, assent forms, questionnaire, and educational materials will be available in Spanish, English, French, Haitian Creole, and Portuguese languages.

### *Participant selection*

In Component A, we will use purposive sampling. Community leaders will be asked to attend *focus group interviews*, and institutional, national, and organization leaders will share their perspectives through *individual semi-structured interviews*. A group of migrant peoples will also be selected to



**Table 3.** Study activity, target population, and primary outcomes in the rapid evaluation of health among migrant peoples in transit in Migrant Reception Stations (MRS), Darién, Panamá.

Activity	Target population	Site	Primary outcomes
Focus groups	Host communities	Host communities	Effects of migrant presence on communities, health priorities, and needs.
Semi-structured interviews and participant observation	Migrant peoples in transit	MRS	Migration experience, barriers to health access and existing programs, health needs
Semi-structured interviews and participant observation	Public institution and nonprofit national/international organization leaders who work with migrant populations in transit	MRS, health centers, institutional and organization offices	Health services available, barriers to access, needs of institutions and organizations
Quantitative component	Migrant peoples in transit	MRS	<ul style="list-style-type: none"> <li>• Sociodemographic and journey information</li> <li>• Human smuggling and trafficking</li> <li>• Education and employment</li> <li>• Self-rated health status</li> <li>• Sexual biography and sexual experience</li> <li>• Female genital cutting (for some countries)</li> <li>• Pregnancy and fertility</li> <li>• Self-reported Sexually transmitted infections/human immunodeficiency virus (STI/HIV) current and past</li> <li>• Nonconsensual sex</li> <li>• Whereabouts of family members and communication with family</li> <li>• Felt social support</li> </ul>
Mental health	Migrant peoples in transit	MRS	<ul style="list-style-type: none"> <li>• Use of Refugee Health Screener to do an initial screen of Post-traumatic stress disorder (PTSD), depression, anxiety, and somatization.</li> <li>• Mini International Neuropsychiatric Interview (MINI) Neuropsychiatric International Interview: Diagnosis by Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and International Classification of Diseases, Tenth Revision (ICD-10) criteria</li> <li>• 8-item version of WHO Quality of Life Survey (EUROHIS): subjective quality of life</li> </ul>

(Continued)

Table 3. (Continued)

Activity	Target population	Site	Primary outcomes
Sexual and reproductive health	Migrant peoples in transit	MRS	<ul style="list-style-type: none"> <li>• Screening for vaginal and urethral discharge disease</li> <li>• Screening for genital ulcer disease</li> <li>• Urine dipstick test (leukocyte esterase and nitrite)</li> <li>• HIV rapid test (4th generation)</li> <li>• Syphilis rapid test, rapid plasma reagin (RPR) titer confirmatory</li> </ul>
General and tropical medicine	Migrant peoples in transit	MRS	<ul style="list-style-type: none"> <li>• Rapid point-of-care tests for: <ul style="list-style-type: none"> <li>○ Hepatitis A virus (HAV)</li> <li>○ Hepatitis B virus (HBV)</li> <li>○ Hepatitis C virus (HCV)</li> <li>○ Hepatitis E virus (HEV)</li> <li>○ Chagas</li> <li>○ Malaria</li> <li>○ Dengue</li> <li>○ Chikungunya</li> <li>○ Pregnancy</li> <li>○ Further screening based on clinical presentation (Table 4)</li> </ul> </li> <li>• Clinical screening: <ul style="list-style-type: none"> <li>○ Review of present and past medical history</li> <li>○ Vital signs: Blood pressure, heart rate, respiratory frequency, temperature, blood oxygen saturation</li> </ul> </li> <li>• Physical examination based on systems: neurological, cardiovascular, respiratory, gastrointestinal, hepato-splenic, skin, and genitourinary</li> </ul>
Nutrition		MRS	<ul style="list-style-type: none"> <li>• Screening for malnutrition and undernourishment <ul style="list-style-type: none"> <li>○ Height-weight</li> <li>○ Body mass index (BMI)</li> <li>○ Mid-upper arm circumference (MUAC)</li> <li>○ Marasmus and Kwashiorkor screening</li> <li>○ Malnutrition Universal Screening Tool (MUST)</li> <li>○ Skinfold test</li> <li>○ WHO growth charts</li> </ul> </li> </ul>
MRS, migrant reception stations.			

**Table 4.** Further test based on clinical criteria for inclusion.

Test	Clinical criteria for inclusion
COVID-19 (antigen or polymerase chain reaction test (PCR))	Fever or clinical suspicion
Crypto-Giardia-Entamoeba (antigen)	Diarrhea
Cytomegalovirus (antibody)	HIV positive, pregnant women with clinical suspicion
Yellow fever (PCR)	Fever or clinical suspicion
Amsel criteria	Vaginal secretion and suspicion of candidiasis
<i>Trypanosoma cruzi</i> detection (blood smear)	Chagas positive test result, presence of acute symptoms, and suspicion based on country of origin
Leishmaniasis (tissue Giemsa stain)	Suggestive ulcer and clinical suspicion
<i>Mycobacterium leprae</i> (Ziehl-Nielsen stain or Fite-Faraco stain)	Clinical suspicion of hypochromic anesthetic lesion or nodule
Leptospira (serum IgG/IgM antibody)	Fever or clinical suspicion
Malaria (thick blood smear)	Clinical suspicion and based on country of origin (if endemic)
Rota/adenovirus (Stool antigen)	Pediatric age with diarrhea or gastroenteritis, in adults: fever and symptomatic respiratory
Measles (antibody)	Fever, malaise rash, cough, coryza, conjunctivitis, enanthem, and morbilliform exanthem
Toxoplasmosis, Rubeola, cytomegalovirus, Herpes Simplex Types 1 and 2 (TORCH [antibody])	Pregnant and in 1-month-old babies
Toxoplasmosis (antibody IgG)	HIV positive, pregnancy, and clinical suspicion
Tuberculosis (sputum bacilloscopy)	Fever, cough, nocturnal sweat, HIV+
Typhus/para-typhus (blood antigen)	Fever and clinical suspicion

participate in *individual semi-structured interviews*. Select migrants accessing health services may be accompanied to observe their experiences within available health care providers. A total of 70 participant interviews and focus group discussions are anticipated within the qualitative study component, as this number is expected to allow us to reach saturation in capturing stakeholder perspectives and experiences.

In Component B, participants will be included systematically, where groups of 40–50 individuals arrive at the MRS where the sampling will be undertaken. When lined up to be registered with the Migration Service, small invitation cards will be given to every 1:n person from each stratum. The *n* will be calculated at the start of each day

and depends on the number of expected strata to arrive each day, to include between 30 and 50 participants daily. After the person finalizes the migration registration process, they will be asked to join the study group at the respective study tents. Inclusion and exclusion criteria are dependent on the study component, as outlined in Table 2. As potential participants may be at the MRS for an undetermined amount of time, this study will only include participants who do not have a planned exit from the MRS within 8 h.

#### Data capture

Data capture will differ by study component and methods employed. Component A will include participant observation, semi-structured interviews, and



**Table 5.** On-site treatment by study subcomponent.

Study subcomponent	Treatment given on-site for diagnosed etiology or based on clinical and syndromic suspicions
Mental health	Distress, psychosis, and/or risk of self or heteroaggressive outburst: Management with verbal containment and, if needed, pharmacologic management with 5 mg of diazepam, repeated up to two times; if not, olanzapine 5 mg PO or haloperidol 5 mg IM.
Sexual and reproductive health	<ol style="list-style-type: none"> <li>1. Genital Herpes simplex: Acyclovir 400 mg per os (PO) ter in die (TID) for 7 days.</li> <li>2. Recurrent genital Herpes Simplex: Acyclovir 800 mg PO TID for 2 days or 400 mg PO TID for 5 days.</li> <li>3. Syphilis: Benzathine Penicillin 2.4 million international units (IU) single-dose intramuscular injection (IM), once or each consecutive week for 3 weeks depending on patient history/ rapid plasma reagin (RPR)</li> <li>4. Syphilis in pregnant women: 2.4 million IU IM each week for 3 weeks</li> <li>5. Chancroid: Azithromycin 1 g PO single dose or Ceftriaxone 250 mg single dose IM or Ciprofloxacin 500 mg bid for 3 days</li> <li>6. Chancroid in pregnant/lactating women: Erythromycin 500 mg PO QID for 15 days</li> <li>7. <i>Lymphogranuloma venereum</i>: Doxycycline 100 mg PO daily for 21 days or Erythromycin 500 mg PO QID for 21 days OR Azithromycin 1 g PO each week for 3 weeks</li> <li>8. <i>Neisseria gonorrhoeae</i>: Ceftriaxone 500 mg IM single dose</li> <li>9. <i>Chlamydia trachomatis</i>: Azithromycin 1 g PO single dose or Doxycycline 100 mg PO bis in die (bid) for 7 days.</li> <li>10. <i>Trichomonas vaginalis</i>: Metronidazole 2 g PO single dose</li> <li>11. <i>Candida albicans</i>: Fluconazole 150 mg PO single dose or Clotrimazole ovules 100 mg intravaginal for 7 days</li> <li>12. Bacterial vaginosis: Metronidazole 2 g PO single dose</li> </ol>
General and tropical medicine	<ol style="list-style-type: none"> <li>1. Cardiovascular system: Symptoms associated with myocarditis, endocarditis, pericarditis with clinical suspicion of: <ol style="list-style-type: none"> <li>1.1 Mild leptospirosis: Doxycycline 100 mg PO bid for 7 days or Azithromycin 500 mg PO each day for 3 days</li> <li>1.2 <i>Trypanosoma cruzi</i>: Benznidazole 5–7 mg/kg/day PO divided in two doses: bid for 60 days</li> <li>1.3 <i>Taenia solium</i>: Praziquantel 10 mg/kg PO single dose</li> <li>1.4 <i>Ascaris lumbricoides</i>: 400 mg PO single dose</li> <li>1.5 <i>Strongyloides stercoralis</i>: Ivermectin 200 µg/kg/day PO for 1–2 days</li> <li>1.6 <i>Paragonimus westermanii</i>: Praziquantel 25 mg/kg PO tid for 2 days</li> <li>1.7 <i>Mansonella perstans</i>: Doxycycline 200 mg PO each day or 100 mg PO bid for 6 weeks</li> </ol> </li> <li>2. Congestive Heart Failure symptoms that might be due to: <ol style="list-style-type: none"> <li>2.1 <i>Schistosoma mansonii</i>: Praziquantel 40 mg/kg PO single dose</li> </ol> </li> <li>3. Loeffler Syndrome that might be due to: <ol style="list-style-type: none"> <li>3.1 <i>Ascaris lumbricoides</i>: Albendazole 400 mg PO single Dose</li> <li>3.2 <i>Strongyloides stercoralis</i>: Ivermectin 200 µg/kg/day PO for 1–2 days</li> <li>3.3 <i>Ancylostoma duodenale</i>: Albendazole 400 mg PO for 1–3 days</li> <li>3.4 <i>Necator americanus</i>: Albendazole 400 mg PO for 1–3 days</li> </ol> </li> <li>4. Dyspnea or Pneumonia suspicion due to: <ol style="list-style-type: none"> <li>4.1 <i>Streptococcus pneumoniae</i>:  With recent use of antibiotics and comorbidities: Amoxicillin-Clavulanate 875/125 mg 1 tablet PO bid + Clarithromycin 500 mg PO bid for 7 days OR Azithromycin 500 mg PO in the first dose and then 250 mg PO each day for 4 days  With recent use of antibiotics and no comorbidities: Amoxicillin 1 g PO bid for 7 days  No recent use of antibiotics: Clarithromycin 500 mg PO bid for 7 days or Azithromycin 500 mg PO in the first dose and then 250 mg PO each day for 4 days. </li> <li>4.2 <i>Mycoplasma pneumoniae</i> / <i>Chlamydia pneumoniae</i> / <i>Chlamydia psittaci</i>: Doxycycline 100 mg PO bid for 7 days</li> <li>4.3 <i>Haemophilus influenzae</i>: Amoxicillin/Clavulanate 875/125 mg tab one tablet PO bid for 7 days.</li> <li>4.4 Legionellosis: Levofloxacin 750 mg PO each day for 10 days</li> <li>4.5 Coccidioidomycosis: Fluconazole 400 mg PO each day for 3–12 months</li> <li>4.6 Blastomycosis: Itraconazole 200 mg PO tid for 3 days and then each day for 6–12 months</li> <li>4.7 <i>Schistosoma mansonii</i>: Praziquantel 40 mg/kg PO single dose</li> <li>4.8 Filariasis: Doxycycline 100 mg PO each day for 6–8 weeks</li> </ol> </li> </ol>

(Continued)

Table 5. (Continued)

Study subcomponent	Treatment given on-site for diagnosed etiology or based on clinical and syndromic suspicions
	<p>5. Gastrointestinal symptoms – Hepato-splenomegaly by clinical diagnosis or suspicion of the following etiologies:</p> <p>5.1 <i>Schistosoma mansoni / japonicum</i>: Praziquantel 40 mg/kg–60 mg/kg PO single dose (without previous treatment, dependent on country of origin) Suspiacian of acute toxemic shistosomiasis: short course high-dose prednisone + 40 mg/kg–60 mg/kg Praziquantel PO in single dose, repeat Praziquantel in 4–6 weeks.</p> <p>5.2 Toxocariosis: Albendazole 400 mg PO bid for 5 days + Prednisone (optional) 60 mg each day for 5 days Jaundice (pre-hepatic-post) by clinical diagnosis or suspicion of the following etiologies:</p> <p>5.3 <i>Bartonella bacilliformis</i>: Doxycycline 100 mg PO each day for 6–8 weeks</p> <p>5.4 <i>Coxiella burnetti</i>: Doxycycline 100 mg PO each day for 2 weeks</p> <p>5.5 <i>Chlamydia psittaci</i>: Doxycycline 100 mg PO each day for 7 days</p> <p>5.6 <i>Salmonella typhi</i>: Levofloxacin 750 mg PO each day for 7 days</p> <p>5.7 <i>Ascaris lumbricoides</i>: Albendazole 400 mg PO single dose (may also be related to malabsorption syndrome)</p> <p>5.8 <i>Cryptosporidium parvum/hominis</i>: Nitazoxanide 500 mg PO bid for 3 days</p> <p>5.9 <i>Giardia lamblia</i>: Tinidazole 2 g PO single dose (may also be related to malabsorption syndrome)</p> <p>5.10 <i>Strongyloides stercoralis</i>: Ivermectin 200 µg/kg/day for 1–2 days</p> <p>5.11 Trichinellosis: Albendazole 400 mg bid for 8–14 days + Prednisone 60 mg PO each day</p>
	<p>6. Cutaneous – by papule / macule (vascular or not painful)</p> <p>6.1 <i>Bartonella henselae/bacilliformis</i>: Doxycycline 100 mg PO each day for 7 days</p> <p>6.2 Human Papillomavirus: Podofilox gel or solution at 0.5% – apply tid for 30 days</p> <p>6.3 <i>Molluscum contagiosum</i>: Amphotericin B 0.6 mg/kg/day PO for 2 weeks OR Itraconazole 400 mg/day PO for 10 weeks and then 200 mg/day PO till the CD4 count in HIV patients is &gt;100 cells /µL for &gt;6 months responding to RVT</p> <p>By papule/macule (painful)</p> <p>6.4 <i>Dermatobia hominis / Cordylobia anthropophaga / Tunga penetrans</i>: Petroleum jelly or an occlusive agent so when the larva moves, a manual extraction is done.</p> <p>By papule/macule that causes itch</p> <p>6.5 <i>Schistosoma</i> spp: Praziquantel 40 mg/kg single dose PO</p> <p>6.6 <i>Pediculus humanus corporis/capitis</i>: Ivermectin 12 mg PO each day for 14 days</p> <p>6.7 <i>Sarcoptes scabiei</i>: Permethrin cream 5% apply on skin for 8–14 h and repeat in 1–2 weeks</p> <p>Vesicles</p> <p>6.8 Herpes simplex virus 1 and 2: Acyclovir 400 mg PO tid for 7–10 days</p> <p>6.9 Sporotrichosis: Itraconazole 200 mg PO each day for 2–4 weeks</p> <p>6.10 <i>Rickettsia akari/prowazekii/typhi</i> / Leptospirosis: Doxycycline 100 mg PO bid for 7 days</p> <p>6.11 <i>Borrelia burgdorferi</i>: Doxycycline 100 mg PO bid for 2 weeks</p> <p>Morbilliform exanthem</p> <p>6.12 <i>Mycoplasma pneumoniae</i>: Doxycycline 100 mg PO bid for 7 days</p> <p>6.13 <i>Ehrlichia chafeensis / Anaplasma phagocytophilum</i> 100 mg PO bid for 2 weeks</p> <p>6.14 <i>Histoplasma capsulatum</i>: Itraconazole 200 mg TID for 3 days, then 200 mg bid for 12 months</p> <p>6.15 <i>Coccidioides posadasii</i>: Fluconazole 400 mg PO each day for 3–12 months</p> <p>6.16 <i>Sporothrix</i> spp.: Itraconazole 200 mg PO each day for 2–4 weeks</p> <p>6.17 Actinomycetoma: Itraconazole 200 mg PO each day for 2–4 weeks</p> <p>6.18 Chromoblastomycosis (<i>Fonsecaea pedrosoi</i>): Itraconazole 300 mg PO each day for 3–9 months</p>
Nutrition	Mild-moderate acute malnutrition in: Children from 0 to 6 months Children from 6 months to 5 years Children 6–17 years old 18 years or above: Men and women Pregnant women

focus groups captured *via* ethnographic fieldnotes and recorded on a digital recorder. Interviews and focus groups will be conducted in Spanish and, if needed, interviews with migrant persons will be undertaken in English and through real-time interpreters of French, Portuguese, or Haitian Creole. Component B will include a self-administered questionnaire on a tablet using *Kobo Toolbox Software* (Harvard Humanitarian Initiative, Cambridge, MA) and will be stored on the device under the

participant's code until Wi-Fi is available. Clinical and laboratory information will be inputted into *Kobo Toolbox* with a separate entry for each participant.

### Pharmacological and psychological treatment and referral

On-site treatment by study subcomponent is found in Table 5. If the participant needs to be

referred to primary, secondary, or tertiary facilities for further care (Supplementary Table B), this will be organized by the study team and the participant will be transported with no cost to them.

#### *Pharmacological treatment*

On-site pharmacological treatment will be given according to the severity of the affectation. A higher level of care will be arranged if needed to on-site or referral to the nearest health center in the town of Meteti or to the secondary and tertiary hospitals, in Chepo and Panama City, respectively. The field clinic where the study is undertaken is rudimentary and will not attend to all needs. Therefore, some cases will be referred to health centers and hospitals where (a) the condition requires further testing or specialized care, or (b) treatment is intravenous or daily injections, as described in Table 5.

#### *Psychiatric care and treatment*

Following the Refugee Health Screener-15 item survey (RHS-15) screening and meeting with the psychiatrist, individuals who would like to participate in group-oriented therapy are welcome to attend language-based sessions. In addition, at any time, if the participant seems in distress, presents with acute psychosis or self/heteroaggression, immediate consultation with an on-site psychiatrist will be done. Treatment protocol is summarized in Table 5 according to syndromic presentations.

#### *On-site management of distress*

At any time during the study, if a participant is anxious, depressed, or distressed, the 'Distress Protocol' will be activated (Supplementary material C). The 'Violence Protocol' will be implemented for individuals who report sexual violence during the qualitative component, questionnaire, or clinical exam (Supplementary material D). These are based on the Ministry of Health procedure for sexual violence, rape, incest, and a previously published protocol for children who report violence that has been used in previous studies in Panama and worldwide.<sup>23,29</sup>

#### *Lab and clinical results*

The laboratory point-of-care (POC) tests and clinical results will be given to every participant in

paper format the day they are included in the studies. All results will be explained to the participants at the time results are offered. The results will also be found in a password-protected location on the Gorgas Memorial Institute for Health Studies' webpage. Each participant will have access to a secure portal for 1 year, which will house their study results and educational sheets. The portal will be accessible from a phone or computer. The participants' access information and password will be clipped into their passports.

#### *Data analysis plan*

Data analysis will depend on the study component.

For Component A, recordings and fieldnotes will be transcribed; all identifying information will be deleted. The recorded files will be destroyed after the transcription. Transcripts will be coded by MB and AG using NVivo software (QSR International Pty, Melbourne, Australia). Both coders will work independently and codes will be compared, discussed, and discrepancies will be resolved. Transcripts will be saved on an encrypted external hard drive. The data will be analyzed with a thematic analysis method and in an essentialist manner, meaning the participant experiences will be revealed. Transcripts will then be coded at a manifestation level to include the main themes. It is also possible that some codes emerge inductively from the data. This hybrid method of analysis from the data has been previously described and demonstrated to be rigorous.<sup>30</sup> A thematic map will be constructed, revised, and altered based on team discussions; contradictions and negative cases will be identified and presented.

For Component B, descriptive and analytical methods will be used to describe the findings of the quantitative questionnaire, including sociodemographic factors, sexual and reproductive biography, sexual behaviors, nonconsensual sexual relations, self-reported health, family whereabouts, and social well-being. In addition, the prevalence of laboratory and clinical diagnoses will be presented for the sample as a whole, as well as for key subgroups, including men, women, adults, and young persons. Quantitative questionnaire responses will be used to describe the epidemiology of test positivity and diagnoses.

Sociodemographic and behavioral variables that are significantly associated with health outcomes of interest in bivariable analyses will be included in multivariable regression models to estimate strength of adjusted associations and test their significance.

### Discussion

By 2050, the United Nations (UN) estimates that over 1 billion people could be displaced due to climate change alone.<sup>1,31</sup> Many others are leaving their country of origin for work, family, conflict, persecution, and natural disasters.<sup>1</sup> This increase in population movement is already evident throughout the Americas, especially in Panama, where migrants from different Caribbean regions, South America, Africa, and Asia, travel through South and Central America en route to North America. Unfortunately, the world and Latin America are not prepared to provide medical care for mass migration.

PAHO has highlighted a need to strengthen both health surveillance and the monitoring of existing programs targeted toward migrant peoples in the region.<sup>16</sup> This rapid evaluation of health status and service provision among migrant peoples in transit aims to respond to this evidence gap. Employing a mixed qualitative and quantitative approach, the study will investigate the health status and needs among migrant peoples in transit passing through the Darien MRSs. Currently, individuals with acute illness or emergency health conditions, such as pregnancy, may be transferred to nearby MINSA health centers. However, the occurrence of other health conditions, such as anxiety, post-traumatic stress disorder, depression, genitourinary syndromes, and tropical diseases, as well as mal/under-nutrition, remain largely undetected and ignored; information related to their prevalence among migrant peoples in transit through the region remain widely unknown.

As the demographics of migrants who opt for this perilous route shift, information related to the health needs of this population and opportunities for strengthening service provision at the MRS and regionally for migrant peoples in transit is essential. This study is critical to understand health priorities, especially with infectious and tropical disease, nutrition, mental health, and

sexual and reproductive health of those who pass through the DF. In addition, findings could be used to optimize scarce resources targeted toward improving the well-being of migrant peoples who pass through this region. Previous research among people in transit in Central America and Mexico has led to recommendations to decriminalize irregular migration;<sup>32</sup> identify and stop human trafficking, particularly of women and children;<sup>32</sup> and expand the number of migrants' shelters as a way to meet basic needs.<sup>33</sup> Furthermore, studies recommend better coordination and collaboration among governmental and nongovernmental organizations – and across borders – to prevent and control health problems faced by migrant people in transit.<sup>33</sup> Furthermore, researchers recommend improving access to primary health care, including sexually transmitted disease and HIV testing, among this population.<sup>33,34</sup> To ensure that the results of this project inform programs and policies for migrants in transit, results and targeted intervention recommendations that will have emerged from the qualitative and quantitative studies will be presented locally to MINSA and international nongovernmental organizations that focus on service provision to migrant peoples.

Access to health care is a human right – increasing migrant health and health literacy translate into future social engagement, citizenship, and productivity.<sup>35</sup> The overarching goal of this project is to document the health needs of migrant peoples in transit who pass through Panama in order to provide initial surveillance information and recommendations for targeted interventions for this mobile population. To do this, the project will use POC testing and a comprehensive, easily deployable package of health services. Strengthening POC diagnosis and service delivery will be essential to address barriers to quality health care for migrant peoples who frequently have insufficient time to receive provider follow-up and continuity of care. The literature from other contexts of migration indicates that strategies to screen and treat migrant populations for transmissible diseases, including tuberculosis, hepatitis B, hepatitis C, HIV infection, enteric bacteria, and helminths, can be both impactful and cost-effective<sup>36</sup> in the control of infectious disease. Addressing these unmet health needs and improving service provision can help alleviate the incredibly marked inequities migrant

peoples have experienced and sustained in their journey.

The challenges to deploy and deliver a point of health care for migrant peoples in transit are enormous – facing barriers including discrimination, violence, communication, and insufficient access to health care.<sup>4,37</sup> Such issues have described a perceived idea of ‘deservingness’ that categorizes patients, particularly migrant peoples, as more or less deserving of access to quality health care.<sup>38</sup> There are few published data on health care needs of migrant peoples in transit through Latin America en route to the United States. Gray literature from UN and other international nongovernmental organizations suggest the greatest health needs include treatment of fever, skin problems, diarrhea and prenatal care. The successful implementation of a health screening protocol like our proposed study may become a platform to scale up in different migratory routes in the Americas and in other regions. Furthermore, the successful conduction of this study may provide crucial information to increase awareness and lead to effective targeted health care services for migrant peoples in transit.

### Conclusion

The results of the qualitative and quantitative studies answer the PAHO call to contribute to a better understanding of the health status and health needs of migrant peoples in transit through Panama. It will also serve to strengthen interventions of national and decentralized health and surveillance systems nationally and regionally. Most importantly, the results from this study can be used to develop targeted interventions of health care provision for migrant peoples in transit through the DF and the Americas.

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### Author contributions

Conceptualization: AG, MJ, JTE, JAS, JMP; funding acquisition: AG, FR, JMP, CFP, NAH; methodology: AG, MJ, JTE, JAS, JP, MB, JS, JK, CN, DB, CGT; project administration: AG, FR; supervision: JMP; validation: PM; visualization: AG; writing – original draft preparation: AG, MJ, JTE, AHM, JMP; writing – review & editing: AG, MJ, JTE, JAS, JP, MB, JS, JK, CN, DB, YZ, AHM, CFP, NAH, MP, FR, NG, JAG, GV, GCT, JMP.

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### ORCID iDs

Amanda Gabster  <https://orcid.org/0000-0002-7712-0444>

Monica Jhangimal  <https://orcid.org/0000-0002-2470-055X>

Jennifer Toller Erausquin  <https://orcid.org/0000-0003-4271-6077>


José Antonio Suárez  <https://orcid.org/0000-0001-9407-1624>


Justo Pinzón-Espinosa  <https://orcid.org/0000-0002-3084-7793>

Madeline Baird  <https://orcid.org/0000-0003-3490-8722>



Jennifer Katz  <https://orcid.org/0000-0003-2686-1071>

Davis Beltran-Henríquez  <https://orcid.org/0000-0003-3183-3753>

Gonzalo Cabezas-Talavero  <https://orcid.org/0000-0003-0401-4621>

Andrés F. Henao-Martínez  <https://orcid.org/0000-0001-7363-8652>

Carlos Franco-Paredes  <https://orcid.org/0000-0001-8757-643X>

Nelson I. Agudelo-Higueta  <https://orcid.org/0000-0002-9363-6280>

Mónica Pachar  <https://orcid.org/0000-0003-4400-4209>

José Anel González  <https://orcid.org/0000-0003-4285-2298>

Fátima Rodríguez  <https://orcid.org/0000-0002-3470-5258>

Juan Miguel Pascale  <https://orcid.org/0000-0003-3258-1359>

### Supplemental material

Supplemental material for this article is available online.

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