

# Caribbean Women's Health and Transnational Ethnobotany

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**Caribbean Women's Health and Transnational Ethnobotany.** Immigrants from the Dominican Republic (DR) and Haiti are among the top foreign-born communities in New York City (NYC). As people migrate to new countries, they bring their ethnomedical beliefs and practices, and adapt their plant pharmacopeias. Haiti and the DR share a flora on the island of Hispaniola. In NYC, the flora is limited to what is available in the city. We selected plants for future laboratory research based on ethnobotanical data from two surveys among Dominicans in the DR and NYC, and a Haitian literature review. In both Dominican datasets, gynecological infections were the top women's health condition treated with plants. We identified 10 species for this purpose reported by Dominicans that are also known medicines in Haitian culture, although not yet documented for women's health. Plants for gynecological infections potentially cause dysbiosis of the vaginal microbiota, and may increase rather than prevent disease. There is a public health need to assess traditional medicines for their ability to inhibit pathogenic bacteria, while causing minimal disruption to the vaginal flora. Several species are known antibacterials, but remain to be tested for their efficacy. These results also provide a foundation for a planned ethnobotanical survey among NYC Haitian women.

**Keywords:** Urban ethnobotany, Ethnomedicine, Traditional knowledge, Gynecological infections, New York City, Haiti, Dominican Republic, Medicinal plants

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## Introduction

There are over 3.1 million immigrants living in New York City (NYC), the largest number in the city's history (New York City Mayor's Office of Immigrant Affairs 2020). As people migrate to other countries, they bring and adapt their plant pharmacopeias to new environments even if previously known plant species are unavailable (Vandebroek and Balick 2012). Over 500,000 foreign-born immigrants in NYC are from the island of Hispaniola, consisting of the nations of Haiti and the Dominican Republic (DR) (New York City Mayor's Office of Immigrant Affairs 2020). There exists a rich history of traditional herbal medicine (hereafter referred to as ethnomedicine or traditional medicine, abbreviated TM) in both cultures within the Caribbean and the diaspora (Osofski et al. 2002; Quinlan 2010; Vandebroek et al. 2010; Volpato et al. 2009a, b; Weniger et al. 1986). Medicinal

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plants sold in *botánicas* (Latino and Caribbean healing shops) and prescribed by *curanderos* (healers) provide Caribbean and Latino immigrant communities in NYC sources of culturally significant remedies (Balick et al. 2000; Pieroni and Vandebroek 2007). Previous collaborations with the Dominican community in NYC have established how plant knowledge changes and adapts to urban environments (Vandebroek and Balick 2012). For example, food plants that are readily available in cities play an increased role in medicinal plant knowledge in NYC compared to in the DR (Vandebroek and Balick 2014). There have also been studies comparing and documenting medicinal plants for a select group of women's health conditions (uterine fibroids, menorrhagia, endometriosis, and hot flashes) in Dominican TM literature and in practice in NYC (Ososki et al. 2002). Public health research indicates that TM involving medicinal plants is one of the primary healthcare options for women's health in Haiti and continues to be a significant mode of healthcare delivery after migration to the United States (US) (Pan American Health Organization 2020; Seay et al. 2017a; TRAMIL 2020). On the island of Hispaniola, both Haiti and the DR have a shared flora and therefore a shared repository of medicinal plants (Carmona et al. 2010). In NYC, herbs are limited to what is available in grocery stores, *botánicas*, and markets. However, there has yet to be an ethnobotanical survey to document Haitian ethnomedicine in the United States.

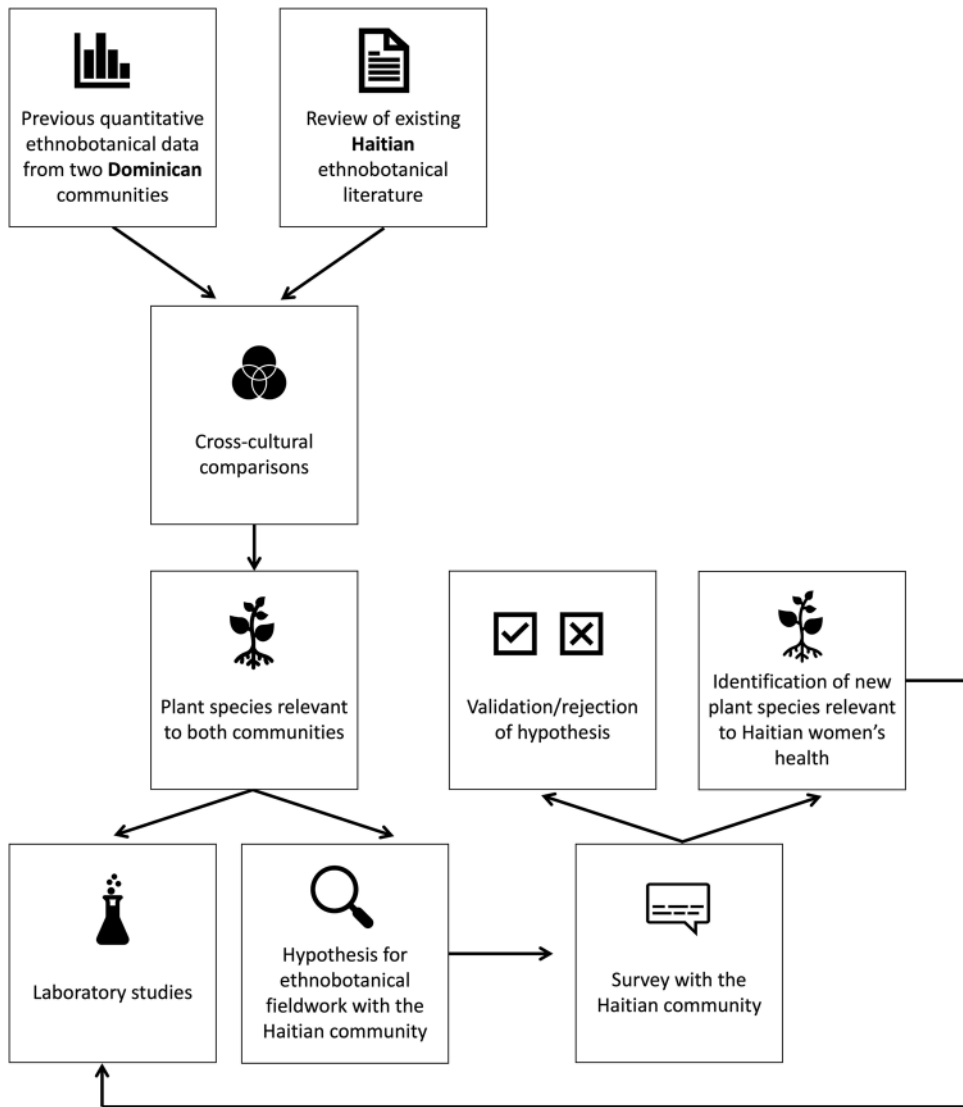
In the literature, studies have used ethnobotany research to compare and demonstrate how two cultural groups living in close proximity with a shared flora can maintain their own unique TM practices reflective of their distinct histories and cultures (Jiang and Quave 2013; Pieroni et al. 2011). In urban environments, factors such as knowledge exchange with other communities, availability of plant species, or pressures to maintain a distinct cultural identity can shape cultural adaptation after migration (Ceuterick et al. 2008). Intracultural comparisons of TM practices within a cultural group, for example by comparing first generation immigrants with their peers living in the country of origin, can be used to study the resilience of TM (Ceuterick et al. 2011; Vandebroek and Balick 2012). On the other hand, intercultural (cross-cultural) comparisons can identify what is shared between

different cultural groups in terms of plant species used, but also address health disparities that influence the use of these plants (Vandebroek 2016). Observing how two distinct cultures adapt their plant knowledge in shared environments can provide insights into specific community health needs. This is especially relevant for immigrants as politically and culturally distinct communities are often indiscriminately lumped together by census and public health records (Ceuterick et al. 2011). Comparative urban ethnobotany research in Atlanta, Georgia, evaluated differences in TM knowledge between Taiwanese and Chinese immigrants, two groups that are often considered broadly Chinese by census data (Jiang and Quave 2013). The authors of this study argued that intercultural comparisons can be applied to inform public health policy and improve access to healthcare for underserved populations by providing cultural sensitivity training for healthcare professionals.

In this paper, we set out to select plant species for laboratory analysis and to lay the groundwork for a future ethnobotanical survey with Haitian women in NYC. First, using two existing datasets (Vandebroek and Balick 2012), we made an intracultural comparison (between Dominicans living in the DR and NYC) of medicinal plants used to treat women's health concerns. Next, we compared these plant species with those recorded as medicines in Haitian ethnobotanical literature, adding an intercultural perspective. Our hypothesis was three-fold: (1) since both groups are island-born, there likely exist similarities in women's health concerns of Dominicans in both locations; but (2) we expect that different plant species are used in the DR and NYC for women's health, based upon their availability in both locations; and (3) plant species important to Dominicans for women's health will also have records as traditional medicines in Haitian ethnobotanical literature.

## Methods

Two of the datasets used in this analysis originated as part of a larger ethnomedicine survey conducted in NYC and the DR between 2005–2006 (NIH grant #R21 AT001889; PI Michael J. Balick). Our methodological approach is highlighted in Fig. 1. Intracultural



**Fig. 1.** Flipped (reverse) methodology for medical ethnobotany research in response to the COVID–19 pandemic based upon the three datasets described in this paper: Two ethnobotanical Dominican datasets from New York City (NYC) and the Dominican Republic (DR), and a Haitian ethnobotanical literature review. Comparisons of these three datasets resulted in a list of species hypothesized to be relevant in both Dominican and Haitian traditional medicine (TM) for the main women's health condition treated with medicinal plants. These plants will be prioritized in future laboratory studies investigating their bioactivity. Future ethnobotanical fieldwork with the Haitian community in NYC will further explore the role of these species, and will either disprove or confirm their relevance in urban Haitian TM. Fieldwork will likely also record new species not previously identified by our cross-cultural data comparison, and thus additional candidate species for laboratory studies

comparison of these two datasets aimed to identify the most salient women's health conditions treated with medicinal plants before and after migration. For these conditions, we assumed that plant species that were used in NYC by the Dominican community must have cultural importance for other Caribbean diaspora communities and are therefore the best candidate species for future ethnopharmacology studies. We further narrowed down the selection of candidate species for laboratory analysis through a cross-cultural (Dominican-Haitian) comparison. A review of the Haitian ethnobotanical literature generated a list of overlapping species used in both Dominican and Haitian cultures as medicines. These shared species were next reviewed in the biomedical literature for existing evidence of overall antimicrobial activity (Fig. 1).

For the ethnomedicine survey, participants were recruited through convenience sampling, including snowball sampling (Tongco 2007). All participants in both survey locations met the following criteria: They were 18 years or older, born in the DR, had self-reported familiarity with medicinal plants, and confirmed a willingness to be interviewed. In NYC, 174 participants (110 women and 64 men) were surveyed in primarily Dominican communities in Washington Heights and the Bronx. In the DR, 145 participants (87 women and 58 men) were interviewed from four provinces: 1) Distrito Nacional (Santo Domingo); 2) San Pedro de Macoris; 3) Santiago; and 4) La Vega. Study areas selected in the DR corresponded to regions where a majority of Dominicans living in NYC originated (Fig. 2). More than half of all participants (60% in the DR and 63% in NYC) were female in both locations. The City University of New York (CUNY) Institutional Review Board (IRB) granted permission for this study (IRB #04-06-94 0599).

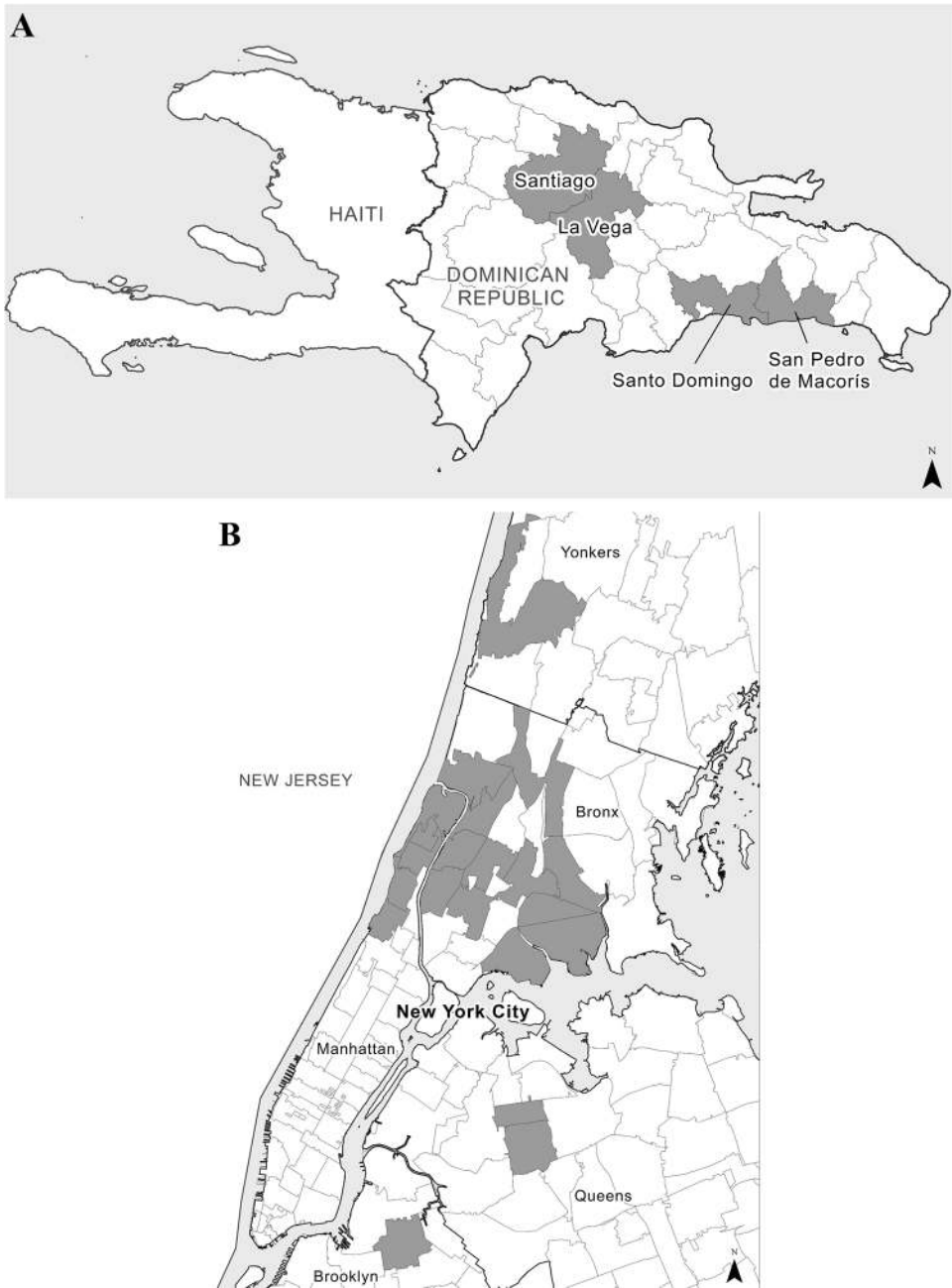
Study participants were lay persons who had a general knowledge of medicinal plants for self-care at home, except for 9 (NYC) and 17 (DR) persons who were specialists or healers. The average age of participants reporting women's health conditions was  $52 \pm 12.5$  years in NYC and  $52 \pm 16.4$  years in the DR. The majority of participants in both locations received health insurance through government-funded programs, although significantly more Dominican participants living in NYC (83%) had government-funded healthcare compared to their peers

in the DR (65%) ( $z$ -test with Yates correction;  $z = 3.02$ ;  $p = 0.003$ ) (Table 1).

Each participant received an ID to maintain anonymity. Questionnaires were administered verbally in Spanish, and responses were recorded on printed forms. Interviews were also tape-recorded with participant permission. The questionnaire included quantitative and qualitative elements to assess plant knowledge for 30 pre-selected common health conditions chosen based on estimated prevalence in both populations. Plants used for each condition were recorded as their common Spanish names. At the end of the questionnaire, participants were asked to freelist any other conditions not named as part of the survey that they had familiarity with treating with medicinal plants.

Reported plants were collected and vouchered through field collections in the DR and by purchasing plant material in *botánicas* in NYC, then identified through reference works and taxonomists at the New York Botanical Garden (NYBG). Voucher specimens were deposited at the NY Steere Herbarium and the Jardín Botánico Nacional in Santo Domingo, DR. Scientific plant names followed the Catalogue of Life (<https://www.catalogueoflife.org>) and plant family names followed APG IV (<http://www.mobot.org/MOBOT/research/APweb/>).

Interview data from both survey locations were stored in separate Microsoft Access databases. Databases were exported to Microsoft Excel for further analysis. Each record represented a plant-use report that included the health condition, the common name of the plant used, and information on preparation and administration in Spanish and English. Information on the reporting participant (including ID, age, and sex) for each plant-use report was also listed. For this analysis, plant-use reports were screened for relevance to women's health conditions. This reduced the number of participants for this paper to 126 and 121 for NYC and the DR, respectively. Male participants contributed a significant share of plant knowledge related to women's health (88 use reports in NYC and 135 in the DR, representing 20% and 31% of all use-reports, respectively) and therefore their data were included in the analysis. No obvious gender differences were found in the number or kind of plants, or specific women's health conditions, and



**Fig. 2. A.** Study areas highlighted in grey in the Dominican Republic (provinces where surveys were conducted); **B.** New York City (zip codes where participants lived)

**TABLE 1.** HEALTH INSURANCE COVERAGE OF PARTICIPANTS IN NEW YORK CITY (NYC) AND THE DOMINICAN REPUBLIC (DR)

Type of Insurance	NYC Participants	DR Participants
Government-funded	104	72
Private	10	18
Combination	0	6
No insurance	11	15

the data were subsequently pooled. Reports that could apply to reproductive health in men and women (STDs) were also included. Popular plant species and health conditions were defined as those reported five times or more by participants.

The third dataset in this analysis was derived from Haitian ethnomedicine literature searches conducted in 2020 using Web of Science and Google Scholar to locate primary literature. Combinations of search terms included: [Haiti, ethnobotany], [Haiti, ethnopharmacology], [Haiti, medicinal plants], [Haiti, ethnobotany, women], and [Haiti, women's health, plants]. Titles and abstracts were screened for relevance. Due to the lack of ethnobotanical research in Haiti, articles relating to plant use in Haitian diaspora were also included. Additionally, the TRAMILibrary database from the "Program of Applied Research to Popular Medicine in the Caribbean" was queried using the search term "Haiti" to collect additional information on common names and uses of plants with cultural significance (TRAMIL 2020). As one of the primary literature papers (Weniger et al. 1986) was supported by TRAMIL, there were some duplicate entries that were eliminated before analysis. Only 15 primary literature articles were located, demonstrating the need for further documentation of Haitian ethnomedicine practices.

A preliminary biomedical literature search related to the use of plants for gynecological infections was conducted using the Web of Science database. Search terms for each plant included the species Latin name (including all synonyms listed on the Catalogue of Life) and combinations of [microbiome], [vagina], [vaginal infection], [antibacterial], [lactobacillus], [women's health], and [STI]/[STD]. Titles and

**Table 2.** Total plant-use reports (for all illnesses) in the Dominican Republic (DR) and New York City (NYC) compared to plant-use reports for women's health

	Women's health reports	Reports for all illnesses
NYC	438	4,179
DR	432	3,324

abstracts were screened for relevance and 162 were retained for full reading.

## Results

Of all plant-use reports in NYC, 11% were for women's health conditions compared to 13% in the DR (Table 2).

In both the DR and NYC, the top three women's health conditions treated with medicinal plants coincided. These were gynecological infections (including vaginal and sexually transmitted infections), dysmenorrhea, and conditions related to birth and aftercare (puerperium) (Table 3). There were also similar numbers of popular species in NYC and the DR (50 versus 67 species). Of the top species, there were 15 species in NYC and 32 in the DR that were uniquely mentioned in each location. *Caesalpinia coriaria* (Jacq.) Willd. (guatapanán), *Bixa orellana* L. (bija), *Pinus occidentalis* Morelet (cuaba), and *Beta vulgaris* L. (remolacha or beets) were all reported at least 10 times by participants in NYC, but never or rarely mentioned in DR interviews. Similarly, *Ambrosia artemisiifolia* L. (altamisa) and *Senna italica* Mill. (sen) were reported 10 times or more in DR interviews but rarely by participants in NYC (Electronic Supplementary Material [ESM] Appendix 1).

The method of administration was also analyzed for plant-use reports of gynecological infections and feminine cleansing. Approximately one-fourth (26%) of preparations used for these purposes in NYC were applied externally (Table 4). *Botellas* are a popular Dominican preparation and consist of multiple plant and non-plant ingredients. Previous work evaluating *botellas* in NYC has established that one of the main uses for *botellas* in Dominican ethnomedicine is to treat reproductive and genitourinary health conditions (Vandebroek et al. 2010).

Comparison of plant species reported by Dominicans in NYC and the DR showed that

**Table 3.** Top reported women's health conditions by 121 participants in the Dominican Republic (DR) and 126 participants in New York City (NYC). Only health conditions reported five times or more are listed

Top Conditions	Number of plant-use reports in NYC	Number of plant-use reports in the DR
Gynecological infections	87	103
Dysmenorrhea (menstrual cramps)	62	65
Birth/puerperium	58	54
Infertility	46	36
Contraception	32	30
Abortion	26	39
Feminine Cleansing	13	6
Menstruation	9	8
AIDS	5	0
Gynecological cysts	5	7
Pregnancy	0	5

**Table 4.** METHOD OF ADMINISTRATION OF PLANT PREPARATIONS FOR GYNECOLOGICAL INFECTIONS AND FEMININE CLEANSING BY DOMINICANS IN NEW YORK CITY (NYC) (N = 76) AND THE DOMINICAN REPUBLIC (DR) (N = 89)

Method of administration	Number of plant-use reports in NYC	Number of plant-use reports in the DR
Applied	6	18
Bath/Wash	20	6
Botella	21	30
Intravaginal douche	6	3
Drink	30	9
Steam bath	2	0
Tea	45	64
Unspecified	5	1

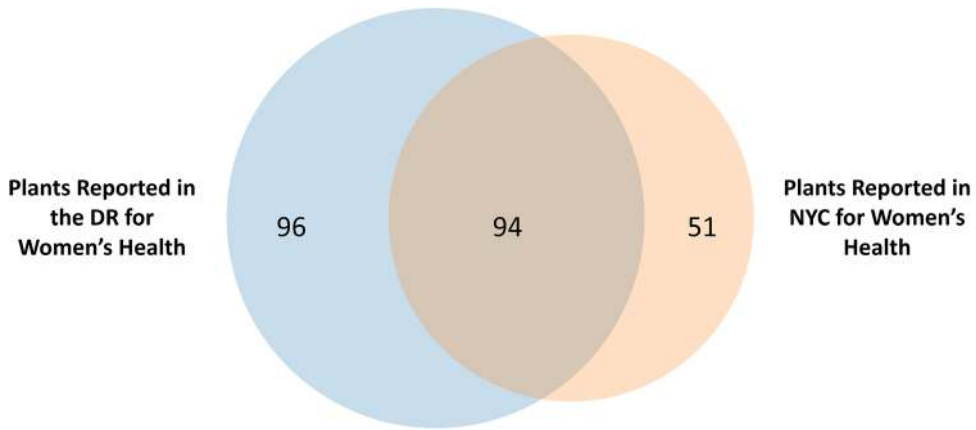
almost twice as many unique species were recorded in the DR (96 species vs. 51 unique species in NYC) (Fig. 3). An approximate 40% overlap existed in species used for women's health conditions in both locations. Plants used for women's health in NYC included a larger number of reports for well-known food plants (e.g., *Beta vulgaris* and *Zea mays* L.) than in the DR.

A cross-cultural comparison of plants used to treat women's health conditions in NYC by Dominicans and those recorded in Haitian ethnomedicine literature identified 58 overlapping

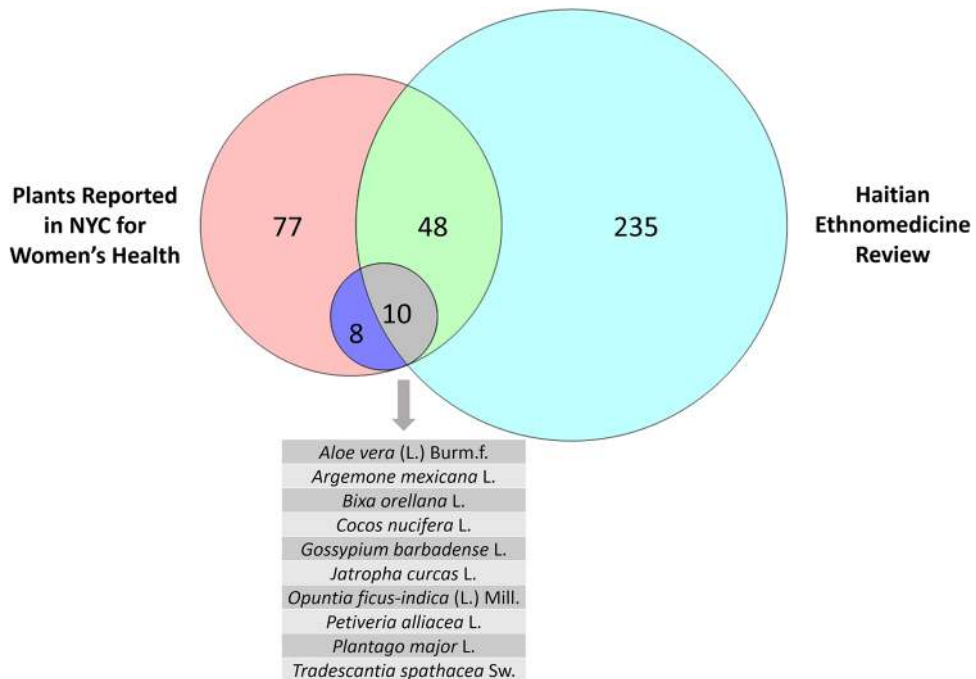
species. Of the 18 species used to treat gynecological infections, which was the top-reported women's health concern for Dominicans in both populations, 10 species were shared with Haitian ethnomedicine according to the literature (Fig. 4).

We reviewed overlapping species selected from this cross-cultural comparison in the biomedical literature (ESM Appendix 2). *Aloe vera* (L.) Burm.f., a well-known medicinal plant globally, had well-documented antibacterial activity. However, other species such as *Tradescantia spathacea* Sw. or *Petiveria alliacea* L. had little representation in the biomedical literature. Species with reported antibacterial properties had been evaluated against bacteria such as *Staphylococcus aureus* and *Escherichia coli* that are associated with gynecological infections amongst other diseases (Blando et al. 2019; Kargaran et al. 2017; Saddiq and Al-Ghamdi 2018; Samsudin et al. 2018). However, this search did not identify a study where these species had been tested against specific gynecological pathogens or the vaginal microbiota. There were studies indicating that plants, such as *Aloe vera*, *Plantago major* L., and *Opuntia ficus-indica* (L.) Mill., have prebiotic activity for gut *Lactobacilli* (Guevara-Arauz et al. 2012; Lukova et al. 2018; Paz Quezada et al. 2017). This may also be relevant to the treatment of gynecological infections.





**Fig. 3.** Intracultural comparison of plant species reported for women's health by Dominicans in NYC and DR



**Fig. 4.** Cross-cultural comparison of plant species for women's health. Colored circles represent the following data: Number of plant species reported by Dominicans in NYC for **any women's health condition** (red, green, purple, and gray colors; total of 143 species); subset of plant species only reported for **gynecological infections** in NYC (purple and gray, 18 species); and plant species identified as medicines by Haitian literature review for treating **any kind of illness** (blue, green, and gray; total of 293 species). The purple intersection represents eight species reported for gynecological infections in NYC that did not intersect with the Haitian ethnobotany literature review. The gray intersection represents 10 species that were shared by overlapping circles and these plants are listed by their scientific names in the in-lay table. These species are of high priority for future ethnopharmacological research



## Discussion

We acknowledge the limitations of making cross-cultural comparisons between our ethnobotanical fieldwork data and a review of the Haitian literature, since these comparisons are based on very different methodologies. We developed this approach in response to fieldwork restrictions during the COVID-19 pandemic. The main objective was to generate hypotheses for forthcoming laboratory (ethnopharmacology) and field (ethnobotany) studies. As opposed to the typical approach followed in ethnopharmacology research (original field surveys followed by laboratory studies), we used a flipped (reverse) methodology (analysis of data from previous fieldwork with a related community to select women's health conditions and plants to study in the laboratory, followed by a future ethnobotanical field survey). This approach generated our next hypothesis, namely that the plant species selected here will likely be mentioned during forthcoming interviews with the Haitian community in NYC, given their previously established importance as Caribbean herbal medicines (Fig. 1).

The difference in the number of plant-use reports between Dominicans in NYC and the DR suggests a loss in plant knowledge associated with migration (Fig. 3). The lower number of unique plant species recorded in NYC was consistent with previous observations in the Dominican diaspora community since many medicinal plants are replaced by more accessible options in the city available in grocery stores and markets (Vandebroek and Balick 2014). Our current research and previous studies in the Dominican community in NYC have focused on ethnomedicine practices of first-generation immigrants. Subsequent generations may experience further loss of plant knowledge as the result of acculturation. Future ethnobotanical studies evaluating plant knowledge across generations would continue to shed light on long-term trends in medicinal plant use after migration. However, despite this observed change in plant knowledge after migration, the greatest women's health concerns treated with medicinal plants remained consistent in both locations (Table 3)—reinforcing the need to focus laboratory and fieldwork to address these concerns.

Gynecological infections were identified as the top reported health condition in both Dominican populations. Although we grouped vaginal infections and STIs into one category, it is important to note the diversity of terms used to describe individual conditions in the plant-use reports. Gonorrhea and syphilis were specifically recorded as individual health conditions, while “*enfermedades venéreas*” (venereal diseases) or “*enfermedades de la calle*” (street diseases) referred to STIs generally. These were grouped together broadly as STIs. Vaginal infections were most frequently reported as symptoms such as “*flujo vaginal*” (vaginal discharge) and “*comezón de vagina*” (vaginal itching), rather than specific infections. This aligns with the nature of common infections, such as bacterial vaginosis, that share many of the same symptoms with other infections and cannot be self-diagnosed accurately (Amabebe and Anumba 2018). Although we grouped these conditions together for analysis, medical professionals treating Dominican women need to become familiar with these specific terms, in Spanish, in order to provide the best care. Along with plants used for feminine cleansing, preparations for gynecological infections are often applied directly to the vagina for treatment. Intravaginal cleansing practices are standard across the broader Caribbean region to tighten, clean, and dry the vagina (van Andel et al. 2008). Women's healthcare research in Miami supports that medicinal plants used for vaginal infections and intravaginal cleansing are also significant in the Haitian community in the United States (Seay et al. 2017a). In NYC, research focused on women's health concerns and products sold for women's health in *botánicas* showed that douching, among other methods that involve applying herbs to the vagina, are used for more than intravaginal cleansing and gynecological infections. Preparations applied vaginally are also used to address other issues such as infertility, menopause, abortion, as well as social and spiritual issues (Anderson et al. 2008). Since preparations of these plants are applied directly to the vagina, they can potentially disrupt the protective vaginal microbiota (Seay et al. 2017a).

The vaginal microbiota is primarily composed of *Lactobacillus* species and promotes a naturally acidic environment that aids in the prevention of infections (Amabebe and Anumba 2018).

Vaginal infections and STIs, while generally considered treatable, can also increase the likelihood of more severe outcomes, such as human papillomavirus (HPV), pelvic inflammatory disease (PID), reduced fertility, pre-term birth, spontaneous abortion, and cervical cancer (Seay et al. 2017b). The likelihood of these negative outcomes increases with recurrent infections that are directly linked to disruption of the vaginal microbiota. Women treated with over-the-counter medications for bacterial vaginosis, the most common vaginal infection in women of reproductive age globally, experience a 50% rate of recurrent infection as result of the disruption of the vaginal microbiota by broad-spectrum antibiotics (Huang et al. 2014). There is also evidence that medicinal plants used for intravaginal cleansing and gynecological infections may negatively impact the vaginal microbiota and cause disease (Halperin 1999; Seay et al. 2017a; van Andel et al. 2008).

However, none of the plants selected from our cross-cultural comparison for gynecological infections had literature documenting their bioactivity related to women's health. It is crucial for women's health that the plants used for these purposes inhibit pathogenic bacteria, while causing minimal disruption to the vaginal microbiota. Previous studies documenting the effects of natural products on vaginal bacteria have accomplished this in a laboratory setting by comparing minimal inhibitory concentrations (MIC) in microbiological assays to determine whether extracts had higher antibacterial effects (lower MIC values) for pathogenic bacteria than beneficial microbes (higher MIC values) (Machado et al. 2017; Mandim et al. 2019). However, these studies did not focus on medicinal plants prepared according to their traditional methods of preparation. Different plant parts and extraction methods can alter the chemistry and medicinal properties (Gu et al. 2019; Kulakowski et al. 2015). Plant-use reports for gynecological infections in the Dominican community in NYC included different forms of preparations of each species used for the same purpose. For example, the leaves of *Bixa orellana* are prepared either as a tea or *botella* for gynecological infections. In order to provide relevant information about the biomedical effectiveness of these species to women who use these plants, there needs to be laboratory research on the antibacterial effects

and chemistry of the plant as it is traditionally prepared.

Our cross-cultural comparison and literature review also revealed the need to further document Haitian TM through fieldwork. Our search only found 15 scientific articles focused on different aspects of Haitian ethnobotany (Albuquerque et al. 2012; Albuquerque et al. 2013; Farmer 1988; Paul and Akers 2000; Paul and Cox 1995; Pawlus and Kinghorn 2007; Quinlan 2010; Safford 1916; Tarter 2015; Weniger et al. 1982; Weniger et al. 1986). Several of these articles were not based in Haiti, but in Cuba or Miami and focused on the Haitian diaspora (Hodges and Bennett 2006; Volpato and Godínez 2004; Volpato et al. 2009a,b). The most comprehensive ethnobotanical survey was conducted several decades ago in 1986 as part of TRAMIL-funded ethnobotany research (Weniger et al. 1986). This author also published the only article that focused on medicinal plants used for women's health in Haiti (Weniger et al. 1982), which documented plants used as antifertility agents. Although this work also provided a review of biomedical literature to support the use of several species and further laboratory studies, this review is several decades old and would benefit from updating. Lack of documentation of traditional plant use for women's health is not unique to Haitian ethnobotany. Other authors have noted that many ethnobotanical studies aggregate all women's health conditions together under vague terms such as "reproductive disorders" or they omit plants used for women's health altogether, especially those used as abortifacients and other controversial uses (van Andel et al. 2014). The consequences of overlooking TM for women's health in ethnobotanical research is far reaching globally. Without proper documentation of the preparations used, there cannot be further research on the efficacy and safety of use for the women who use these plants.

There is a significant need to document current Haitian ethnobotany with a focus on women's health to identify further species for laboratory study. Haitian women, living in Haiti and abroad, have the highest incidence of cervical cancer in the Western Hemisphere (Seay et al. 2017b). Women in Haiti also suffer from one of the highest rates of maternal mortality (521 deaths/100,000 births) in the New World (WHO et al. 2019). These high numbers can be

linked, in part, to the prevalence of gynecological, including puerperal, infections (Gibson et al. 2013; Seay et al. 2017b). In Haiti, this is primarily due to lack of access to medical services and clean water. Public health research indicates that traditional medicine is not only culturally important, but one of the only options available for the treatment of women's health conditions in Haiti (Pan American Health Organization 2020). As Haitian women migrate to the United States, these plants remain an important part of their cultural tradition as well as a way to deal with continued health disparities that contribute to illness (Menard et al. 2010). Haitian immigrants in NYC are one of the foreign-born immigrant groups least likely to receive necessary Medicaid assistance although they are also considered one of the lowest income immigrant groups (New York City Mayor's Office of Immigrant Affairs 2020). According to public health research, language barriers, lack of acculturation, limited duration of residence in the United States, unfamiliarity with the health care system, and undocumented immigration status correlate with lower access to Medicaid in the U.S. Haitian community (Saint-Jean and Crandall 2005). Evaluation of medicinal plants for women's health, especially those used for gynecological infections, will provide scientific information to support culturally competent women's health-care through outreach to community members and medical professionals alike (Vandebroek 2013).

## Conclusion

Medicinal plants can provide low-cost and effective healthcare when other means are not readily available within a population. The World Health Organization recommends that medicinal plants are assessed in laboratory studies. However, we would like to acknowledge that this view can be controversial among ethnobiologists and that the call for scientific validation of TM and medicinal plants is not universally accepted. There is a significant research gap in Haitian ethnomedicine both in Haiti and abroad, especially for women's health conditions. Intra- and intercultural comparisons, as we made using ethnobotanical fieldwork data from the transnational Dominican community and a Haitian literature

review, has provided preliminary data to begin to fill this gap in knowledge. Gynecological infections were the greatest women's health concern for Dominican women, but plants used for these conditions were understudied in the biomedical literature in the context of women's health. Cross-cultural comparisons with existing Haitian literature have identified plant species that will be prioritized for laboratory analysis to provide evidence-based feedback to Caribbean women who use these plants. Future ethnobotanical fieldwork will expand the scope of laboratory studies and provide further cross-cultural comparisons. These approaches will generate information that will be returned to the Haitian community through outreach and help promote culturally competent community health.

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