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## Barriers to Colorectal Cancer Screening in US Immigrants: A Scoping Review

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### Abstract

**Introduction:** Timely colorectal cancer (CRC) screening has been shown to improve CRC-related morbidity and mortality rates. However, even with this preventative care tool, CRC screening rates remain below 70% among eligible United States (US) adults, with even lower rates among US immigrants. The aim of this scoping review is to describe the barriers to CRC screening faced by this unique and growing immigrant population and discuss possible interventions to improve screening.

**Methods:** Four electronic databases were systematically searched for all original research articles related to CRC screening in US immigrants published after 2010. Following a full-text review of articles for inclusion in the final analysis, data extraction was conducted while coding descriptive themes. Thematic analysis led to the organization of this data into five themes.

**Results:** Of the 4637 articles initially identified, 55 met inclusion criteria. Thematic analysis of the barriers to CRC screening identified five unique themes: access, knowledge, culture, trust, health perception, and beliefs. The most cited barriers were in access (financial burden and limited primary care access) and knowledge (CRC/screening knowledge).

**Conclusions:** US immigrants face several barriers to the receipt of CRC screening. When designing interventions to increase screening uptake among immigrants, gaps in physician and

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#### Author Contributions

Dr Lussiez and Dr Kwakye came up with the study idea and design. The paper search and collection was performed by Mark MacEachern. Paper reviewing was done by Dr Lussiez, Laura Hayward, Dr Dualeh, Caroline Richburg, and Anshul Puli. Data collection and analysis was completed by Anshul Puli. Emily Capellari advised and reviewed our data collection and analysis process. Anshul Puli drafted the manuscript. This was revised by Dr Kwakye and Dr Lussiez.

#### Disclosure

Dr. Kwakye is a member of the Editorial Board of the *Journal of Surgical Research*; as such, she was excluded from the entire peer-review and editorial process for this manuscript.

#### Supplementary Materials

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screening education, access to care, and trust need to be addressed through culturally sensitive supports. These interventions should be tailored to the specific immigrant group, since a one-size-fits approach fails to consider the heterogeneity within this population.

## Keywords

Colorectal cancer screening; Healthcare access; Immigrant healthcare; Immigrant; Screening barriers

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## Introduction

Colorectal cancer (CRC) is the second leading cause of cancer-related death and the third most commonly diagnosed malignancy around the world.<sup>1,2</sup> In the United States (US), localized CRC has 5-year survival rates of 90%, but only 38% of people present with this early stage of disease.<sup>3</sup> As such, the overall 5-year CRC survival rate is 65% and it is projected that over 50,000 people will die of CRC this year.<sup>3,4</sup> With improved screening rates, however, it is estimated that 68% of these deaths could be prevented.<sup>5</sup>

Despite the benefits of screening in reducing the incidence, morbidity, and mortality associated with CRC, screening rates remain below 70% among US adults aged 50–75 y old.<sup>6–9</sup> These suboptimal rates of screening are especially prominent in immigrants who now make up almost 14% of the US population.<sup>10–13</sup> By 2030, immigration is expected to become the primary driver of US population growth, and by 2060, over 17% of the US population will be foreign-born.<sup>14</sup> Often, immigrant and nonimmigrant populations face similar barriers. However, these barriers are often exacerbated in immigrant populations. For example, although obtaining insurance to cover CRC screening can be a universal challenge, some immigrant populations are excluded from purchasing insurance plans from the Affordable Care Act altogether or have to wait 5 y before qualifying for Medicaid.<sup>15</sup> Therefore, as efforts to increase rates of CRC screening become more widespread, it is critical that they address the unique barriers faced by US immigrants. This scoping review summarizes the literature evaluating the barriers to CRC screening among US immigrants. Through this analysis, the authors aim to guide future interventions specifically designed to support this vulnerable population.

## Materials and Methods

This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews framework.<sup>16</sup>

### Data sources and search strategy

The initial literature search was conducted on January 15, 2020 with an updated, follow-up second search on January 14, 2022 by an information specialist using the following online databases: Ovid MEDLINE, EBSCOhost CINAHL, Elsevier Embase, and Clarivate Web of Science. Each search consisted of two concepts: CRC screening and immigrant populations. These concepts were defined in the search by both controlled vocabulary terms (such as Medical Subject Headings) and title and abstract keywords. The complete search strategies

are available in Supplementary file 1. Citations were imported into EndNote 20 (Clarivate, Philadelphia, PA) and exported into an Excel spreadsheet once the duplicates were removed.

### Study selection

All original research with a focus on CRC screening among immigrant populations in the US were eligible for inclusion. For the purposes of this review, an immigrant was defined as a person residing in the US who was born in a different country. Articles were excluded if they were not peer-reviewed, published before 2010, included study populations who had been diagnosed with early-onset CRC (before age 50), or if the study population had an identifiable inherited genetic predisposition to CRC.

Studies were selected using a two-stage process. In the first stage, each article's study title and abstract was reviewed by two independent reviewers from the research team (A.V.P., A.L., S.D., L.H., C.E.R.). Articles that did not meet inclusion criteria were excluded. If there was any uncertainty or if the two independent reviewers disagreed in their assessment, the study was included for full-text review. In the second stage, two independent reviewers (A.V.P., L.H.) performed a full-text assessment to ensure the study met inclusion criteria. Studies were additionally excluded if they were only an abstract or report, did not study barriers to CRC screening, or did not clearly indicate an immigrant population was studied.

### Data extraction

Data extraction was performed on papers included through the study selection process using a standardized chart consisting of 56 rows and 13 columns. Nine percent of the articles were reviewed by two authors (A.V.P., A.L.) to ensure reliability and consistency of data abstraction. The remaining articles were reviewed by a single author (A.V.P.).

### Thematic analysis

Thematic analysis was modeled after the synthesis conducted by Thomas and Harden.<sup>17</sup> Through the data extraction and thematic analysis processes, codes were generated for the qualitative data in the source texts and initial descriptive themes were identified by two reviewers (A.V.P., L.H.). In the final data review after extraction was completed, the themes were consolidated into the final set of five analytical themes presented in this paper (Access, Knowledge, Culture, Trust, Health Perception, and Beliefs).

## Results

### Evidence source

We identified 4637 articles using our database search. Of these papers, 250 met our inclusion criteria for full-text review and 55 of those were ultimately included in our study (Fig.). The study designs varied in both quantitative and qualitative analyses of aggregate patient data, coded interviews, and community interventions, as well as a few research reviews. Most papers implemented a cross-sectional approach to analyzing data. The most common CRC screening approach was Fecal Occult Blood Test (FOBT), but some studies evaluated the use of sigmoidoscopy and colonoscopy as well. Immigrant populations included South Asians, Filipinos, Vietnamese, Koreans, Bangladeshi, Hispanics, Latino(x),

Somali, Jamaicans, Chinese, and many more. A majority of papers focused on immigrants from East and Southeast Asia. Commonly, studies were conducted in metro/city centers. A summary of study details can be found in Table 1.

### Thematic categorization of barriers to colorectal cancer screening

Five common themes associated with barriers to CRC screening among US immigrant populations were identified: Access, Knowledge, Culture, Trust, Health Perception, and Beliefs. Table 2 shows the relevant studies under each theme.

#### Access

Barriers to access included a lack of healthcare resources and prohibitory financial burden. In regard to the lack of resources, one of the most commonly cited barriers was lacking access to a primary care physician or usual source of care.<sup>11,18–30</sup> Beyond the point of initial care access, several studies highlighted language barriers, a lack of translated resources, and a critical gap in interpreter services which collectively limited CRC screening recommendation from the healthcare provider.<sup>18,26,31–34</sup> Patel *et al.*<sup>33</sup> found the difficulty in preparing for a colonoscopy to limit screening. Additionally, lack of transportation to healthcare facilities was suggested by Samuel *et al.*<sup>35</sup> as a barrier. On a broader scale, some studies suggested that the complexity of the healthcare system led to problems in navigating and accessing CRC screening.<sup>36,37</sup> Ellison *et al.*<sup>21</sup> found that access and adherence to other testing, specifically mammography, increased CRC screening utilization. Access to home-based FOBT screening was found by Fang and Ragin<sup>38</sup> to increase screening uptake.

Multiple studies also often reported cost-associated barriers, particularly pointing to a lack of insurance, ability to pay for healthcare (visits, routine medical tests, serious illness), and lower income.<sup>10,19,24,25,28,29,33,35–37,39–48</sup> Additionally, unemployment was associated with limited access to CRC testing.<sup>22,41</sup> Lack of citizenship status, crucially linked to health insurance attainment, was found by Yao *et al.*<sup>46</sup> to restrict access as well. Given the costs, Portillo *et al.*<sup>49</sup> found administering screening vouchers via community health workers (CHWs) to help with uptake. High costs associated with screening reduced CRC test utilization for both FOBT and colonoscopy. A couple of studies showed that lower test costs in South Korea prompted medical tourism, where immigrants traveled outside the US for more affordable CRC testing in South Korea.<sup>25,50</sup> The ability to travel out of country for care was associated with higher screening rates.<sup>25,37</sup>

#### Knowledge

Many studies found low levels of CRC knowledge and screening tests as a barrier to timely CRC screening among immigrants, with many studies reporting that patients were generally unfamiliar with or had never heard of either the screening tests or CRC itself.<sup>11,18,24,31–33,36,37,40,47,50–59</sup> The majority of papers underscored the importance of a physician recommendation in influencing people to get screened.<sup>18,21,22,30–33,36,37,39,50,55,57,60–63</sup> The studies emphasized how a lack of coordination and communication among physicians, public health workers, CHWs, and others in disseminating healthcare information related to CRC limited access to screening tests. Nakajima *et al.*<sup>58</sup> explored this further, finding the immigrants studied were reluctant

to screen due to not knowing the risks of cancer and how insurance could be used to cover screening. Additionally, physicians did not always follow guidelines regarding age and risk-appropriate screening.<sup>44,53</sup> Outside of physician recommendation and CRC screening test knowledge, immigrants' lack of awareness regarding the availability of CRC treatment options has also been shown to limit receipt of testing.<sup>51</sup> Finally, aside from knowledge particular to CRC, a couple of groups interestingly found that having more than a high school level of education correlated with a lower chance of screening.<sup>40,46</sup> They hypothesized that those with more than a high school level education might not have time to screen.

## Culture

Several studies found that hesitancy to screen was associated with low levels of acculturation to the US, which was measured based on time spent in the US, language proficiency, and attitudes about healthcare and screening. Specifically, many papers found that longer residencies in the US were associated with increased screening rates.<sup>18–21,28,29,35,39,41,45,51,54,64,65</sup> In contrast, Lee and Lee<sup>22</sup> found that a shorter residency facilitated willingness to undergo screening. This discrepancy was reasoned to be due to higher uptake of FOBT among new immigrants, a test covered by most US insurance companies unlike other more invasive methods of CRC screening. Morey *et al.*<sup>66</sup> found the degree of westernization to influence whether family or providers could influence screening receipt. Aside from length of residency and acculturation, a lack of English proficiency posed an additional barrier for immigrants.<sup>24,33,34,36,42,66</sup> South Korean immigrants who reported less acculturation to the US were less likely to have a usual source of care in the US and more likely to engage in medical tourism to access CRC screening.<sup>25</sup> A couple of groups found that the immigrants they studied had preferred traditional approaches to care over screening.<sup>37,59</sup>

## Trust

Many immigrant groups reported a general mistrust in the healthcare system that was associated with a reduced receipt of screening.<sup>36,51,65</sup> Several elements of the physician-patient relationship acted as a barrier for immigrants such as low physician-patient rapport, lack of communication, and unclear screening explanations.<sup>32,51,67</sup> Conversely, immigrants having linguistic or gender concordance with their physician helped facilitate screening.<sup>31,32,37</sup> In another study, both male and female immigrants indicated a dislike in male physicians performing the screening.<sup>35</sup> Shapiro<sup>47</sup> interestingly found a nonauthoritative physician-patient relationship to dissuade screening uptake. Outside direct interactions with healthcare workers, a lack of family support to receive screening was associated with reduced CRC screening.<sup>32,33,61</sup> Additionally, Le *et al.* found that immigrants with friends who had received screening were more likely to receive it themselves.<sup>57</sup> Rogers *et al.*<sup>51</sup> found a suspicion of pharmaceutical companies to be a barrier for an immigrant community.

## Health perception and beliefs

The decision to pursue screening was influenced by immigrants' perceived control over their health. A perception of health fatalism (i.e., believing screening would not help

with adverse health outcomes) was found by a few immigrant populations to lead to reduced screening.<sup>22,33,36,37,47,50</sup> In this line, Rogers *et al.*<sup>51</sup> found that some immigrants, due to religious beliefs, believed there should not be any intervention after a cancer diagnosis, limiting their likelihood to screen. Faith-based beliefs around health combined with the perception that cancer could not be treated, as it was in the hands of God, led some to not pursue screening.<sup>33,39,51</sup> Additionally, many studies reported a lack of emphasis on preventative care among many immigrant populations as well as a tradition of only seeing a doctor when symptoms are present, both of which were barriers to CRC screening.<sup>36,37,47,50,61,68</sup> Oh *et al.*<sup>37</sup> found that some immigrants were reluctant to screen as they believed they had a lower than typical CRC risk compared to Americans. On the other hand, Lee and Lee<sup>22</sup> found a preventive or future health temporal orientation, where people placed an importance on being healthy in the future and detecting adverse health outcomes, to be a facilitator for screening. When people knew about the severity of CRC they were found to have an increased openness to screen.<sup>37</sup> An additional facilitator came from immigrants' self-efficacy, where higher levels were related to an increased likelihood to screen.<sup>50,51,69</sup>

Another pattern common among immigrant populations was concern for a cancer diagnosis. For example, some groups discussed how the perceived seriousness, fear, shame, and accompanying sense of helplessness related to a cancer diagnosis stood as a barrier to getting screened.<sup>32,33,36,37,43,51</sup> From a similar but more general perspective, Francois *et al.*<sup>31</sup> found an association with the fear of finding a health problem as limiting CRC screening receipt. This group also reported immigrants' concerns about the lack of quality healthcare for those without insurance. Particular to the screening process, a few studies found screening-related fecal/rectal embarrassment to result in a reluctance to screen.<sup>30,35,37,47,70</sup> Other groups additionally reported the screening process to be too uncomfortable, risky, or even dehumanizing for some immigrant groups.<sup>32,35,37,47,67</sup>

## Discussion

The results from this scoping review reveal a wide range of barriers to CRC screening for US immigrants. Frequently cited barriers to screening fell into five themes including access, knowledge, culture, trust, and health perception and beliefs. Commonly cited knowledge barriers included an unfamiliarity with CRC and screening, and a lack of physician recommendation—all of which restrict the ability of immigrants to navigate the healthcare system and learn about resources available to them. Access-related barriers included financial burden and lack of primary care. Collectively, these identified barriers help explain the low rates of CRC screening in immigrant population.

The barriers to CRC screening we identified in this study are similar to barriers immigrants face when seeking other forms of oncologic screening. For example, Ferdous *et al.*<sup>71</sup> evaluated barriers to breast cancer screening faced by immigrant groups in Canada and highlighted a lack of physician recommendation and lack of education on screening to be major barriers, concordant with our findings. However, gender discordance between physicians and patients was cited as a barrier to seeking mammography screening, while this was not a commonly reported barrier with CRC screening—owing, as Ferdous *et*

*al.*<sup>71</sup> particularly points out, to the uncomfortable nature of having breast cancer screening conducted by a male physician. Separately, in a systematic review of cancer screening among African immigrants (breast, cervical, prostate, uterine, colorectal), limited cancer knowledge, fear of diagnosis, recency of immigration, shame and embarrassment related to testing, and difficulties in healthcare access were all cited as screening barriers—all of which were identified as barriers to CRC screening in this review.<sup>72</sup> Interestingly, no studies in our review mentioned distrust in interpreters as a barrier to CRC screening which has been cited as a major barrier to cervical cancer screening among immigrant women in Europe.<sup>73</sup> This is an important area of future study given the frequent use of interpreters in breaking down the patient-physician language barrier present during consultation.

The barriers we identified in this scoping review help explain the substantially lower rates of CRC screening among US immigrants—68% of people born in the US were up to date with screening compared to 26% of immigrants in the US who had been here fewer than 10 y.<sup>74</sup> This discrepancy suggests that there are certainly barriers faced by both immigrant and nonimmigrant populations, but that many barriers may be exacerbated in immigrant populations. Interventions at the national and state level have been created to address general gaps in screening uptake. For example, at the national level, the Centers for Disease Control and Prevention and National Institutes of Health have created guidelines for CRC screening research and outreach goals while also funding primary care clinics to encourage screening education and community engagement.<sup>75,76</sup> Although these programs have been shown to increase screening rates among US-born adults, there are still considerable challenges in translating similar benefits for immigrants. A summary review of studies evaluating the Centers for Disease Control and Prevention's 2009–2015 Colorectal Cancer Control Program found challenges associated with high costs of program infrastructure, limited scope of program coverage, and lack of employing evidence-based interventions—reflecting considerable areas for improvement.<sup>77</sup> These programs lacked a focus on health perception and belief-related barriers, with a lack of disaggregated population data to help better identify differences in CRC screening uptake between groups of people. Separately, Gupta *et al.*<sup>78</sup> report on the difficulty in identifying unscreened individuals, as uninsured people cannot access healthcare and do not show up in insurance-based systems for identifying unscreened individuals. Considering the high rates of uninsured immigrant populations, this poses an additional challenge in identifying unscreened immigrants for screening recruitment programs. Furthermore, efforts in place from New York City and Delaware focus on colonoscopy uptake but do not address immigrants' embarrassment with the screening process (i.e., need for anal insertion of an instrument) or inability to pay for colonoscopy, limiting uptake of this form of screening for some communities.<sup>78</sup> When developing CRC screening uptake interventions, it is necessary to create culturally sensitive screening recommendations that consider screening costs and immigrant preferences for broader accessibility.

In evaluating interventions that would be most promising for targeting these barriers, we looked through current programs implemented at the national level. These focused on the impact of CHWs using a variety of interventions (group and one-on-one education, patient reminders, and appointment scheduling assistance), finding this increased screening demand and reduced out-of-pocket costs.<sup>79</sup> This scoping review found education and access-

related barriers to be significant in barring CRC receipt, which solidifies the importance of integrating CHWs into care teams—as indicated by the >1 benefit-cost ratio for urban public hospitals that utilized CHWs for education and appointment scheduling assistance.<sup>79</sup> The incorporation of CHWs has many benefits in screening uptake, yet there remains a need to further research into the effectiveness of screening interventions and follow-up care. Interventions have varied from the use of language-concordant patient navigators to mitigate language barriers to mailing fecal immunochemical test kits for easier screening access.<sup>80,81</sup> Research specific to the effect of culturally tailored interventions in facilitating screening within different immigrant groups can be helpful in accounting for differences in healthcare perceptions and beliefs. Supporting immigrants' initial access to care is important, but research also needs to take a more longitudinal focus on the follow-up of care. The studies focused on in this review covered immigrant's initial access to care with some discussion on meeting habitual screening guidelines, but research needs to also focus on how immigrants are supported in further care following test results. Interventions implemented for immigrants need to be culturally adaptable—available in multiple different languages relevant to immigrant communities served, with CHWs from these communities, interpreters in clinic, and immigrant recruitment into research/intervention development and implementation itself. Although there are no blanket solutions, progress could be made by leveraging preexisting interventions designed for nonimmigrants. For example, Frerichs *et al.*<sup>82</sup> describe a culturally sensitive intervention that specifically considers the CRC screening beliefs of Native Americans. This intervention resulted in positive screening perceptions, self-efficacy, and increased intent to screen and could serve as an effective launch point in the design of interventions targeting immigrant populations. Liss *et al.* conducted a retrospective study on FOBT screening adherence among an uninsured Spanish-speaking population in an urban community health network. They concluded that systems-based interventions that increase adherence without requiring in-person clinic visits were essential.<sup>83</sup> A couple of studies with low income, uninsured populations receiving care at 13 federal healthcare centers found that FOBT completion rates significantly improve when combined with enhanced care, literacy appropriate education tools, or education tools in addition to nurse support ( $P = 0.012$ ).<sup>84,85</sup> These studies emphasize the need for community-based screening programs paired with patient-centered health literacy, especially in under-resourced communities.

There are several limitations to this study. First, this work only included studies that were written in the English language. In doing so, perspectives from within immigrant communities, which could point to more culturally sensitive and accurate depictions of barriers faced, may have been missed. However, multiple studies included in this review centered data collection around direct interviews with immigrants—allowing for a more complete, holistic picture of their experiences. Second, many studies aggregated patient populations into general immigrant categories that lacked a distinction on immigrant group differences. To understand the distinct barriers specific populations of immigrants face, it is important to disaggregate demographic data as different groups vary in acculturation, immigration status and reason, and perceptions of healthcare. Third, we acknowledge the predominance of East Asians in the studied populations of the papers we reviewed. Given the majority of US immigrants are Hispanic, this can impact the generalizability of



our results. However, prior work has shown substantial overlap in barriers faced by both populations.<sup>86,87</sup> Finally, in our review methodology, we initially had two reviewers go through each paper in the set of 3027 papers (5 reviewers going through these in total) and two reviewers screen the full-text articles, but had one reviewer for data abstraction due to restricted personnel resources. To account for this, we compared our abstraction methodology with 10 different scoping reviews and consulted with an information specialist to create a consistent paper review process concordant with similarly structured scoping reviews. With one reviewer (A.V.P.) for most of the papers in the data extraction process, there is potential for bias with the barriers identified and chance of missing barriers through the review process. To try to mitigate this effect, we had 9% of the papers fully reviewed by another reviewer (A.L.) to ensure consistency in themes extracted.

## Conclusions

This scoping review comprehensively summarizes the barriers to receipt of CRC in immigrant groups. Immigrants faced numerous barriers which fell into five themes: Access, Knowledge, Culture, Trust, Health Perception, and Beliefs. Unfortunately, there is a paucity of studies on interventions to address these barriers for immigrant populations. As the US immigrant population continues to grow, it will be critical that any intervention has at its core partnerships with immigrant communities in order to identify specific barriers, develop culturally sensitive interventions, and improve long-term adherence to proposed solutions.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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## Availability of Data

Data not publicly available but can be accessed upon request.

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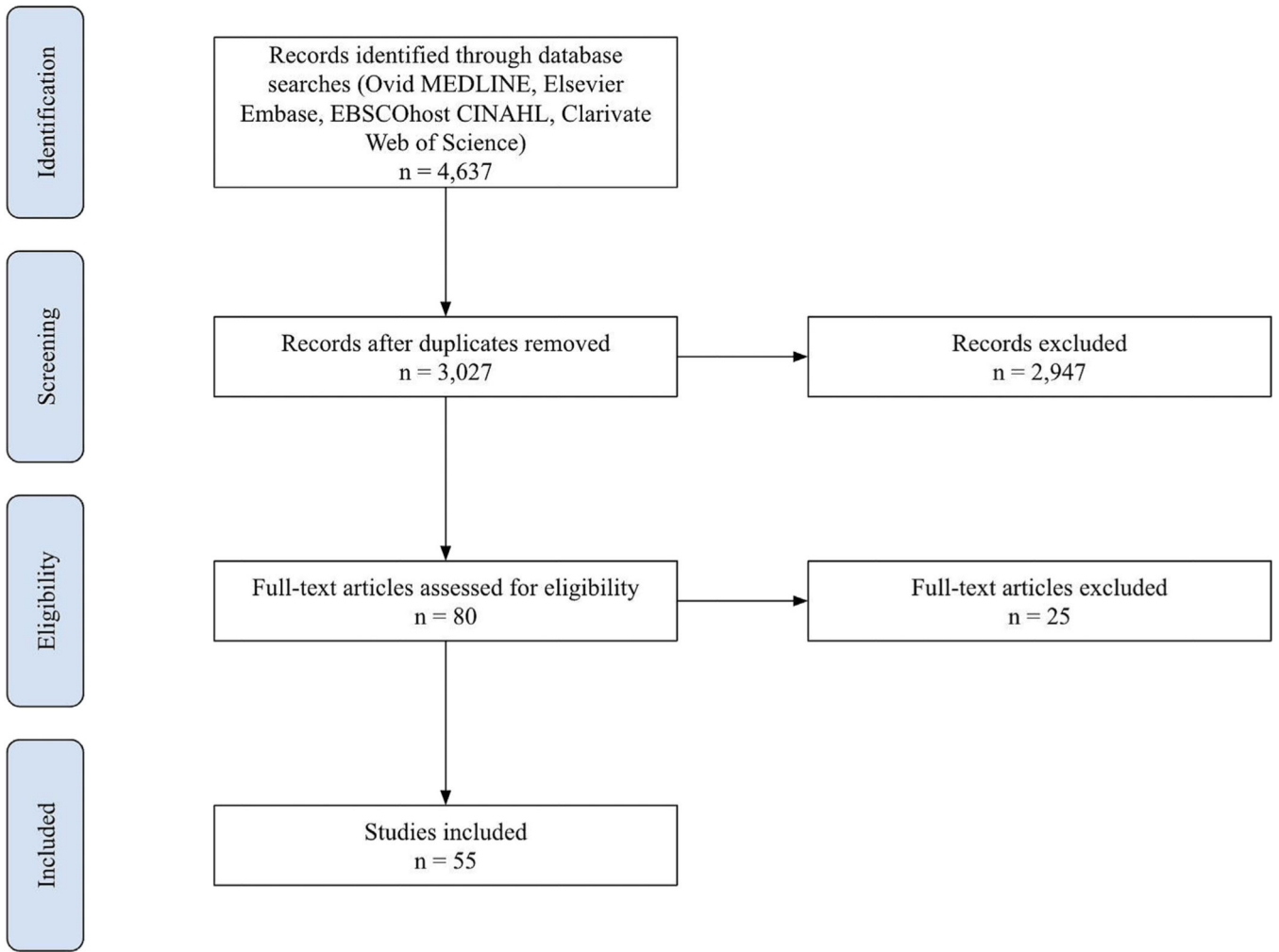
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**Fig. -.** Scoping review literature screening flowchart.

Table 1 –

Study characteristics.

Title	Year	Study type	Participants	Location	Screening test
Shahidi <i>et al.</i> <sup>10</sup>	2013	Quantitative analysis of survey	25,439 immigrants, 50 y or older	California	FOBT, sigmoidoscopy, colonoscopy
Rogers <i>et al.</i> <sup>11</sup>	2020	Quantitative analysis of survey	118 Lao immigrants, 50–75 y	Minnesota	FOBT, FIT, sigmoidoscopy, colonoscopy
Siddiq <i>et al.</i> <sup>18</sup>	2020	Systematic review	-	-	-
Cofie <i>et al.</i> <sup>19</sup>	2020	Quantitative analysis of surveys	5529 immigrants, 50–75 y	United States	FOBT, sigmoidoscopy, colonoscopy
Maxwell <i>et al.</i> <sup>20</sup>	2000	Quantitative analysis of surveys	218 Filipino and 229 Korean female immigrants, 50 y or older	Los Angeles, CA	FOBT, sigmoidoscopy, colonoscopy
Ellison <i>et al.</i> <sup>21</sup>	2011	Quantitative analysis of interviews	225 Hispanic female immigrants, 50 y or older	Harlem, New York City, NY	FOBT, colonoscopy
Lee <i>et al.</i> <sup>22</sup>	2018	Quantitative and qualitative analyses of surveys	202 Korean immigrants, 50 y or older	Chicago Metropolitan Area, IL	FOBT
Lee <i>et al.</i> <sup>23</sup>	2018	Quantitative and qualitative analyses of surveys	210 Korean immigrants, 50 y or older	Chicago Metropolitan Area, IL	FOBT, sigmoidoscopy, colonoscopy
Tong <i>et al.</i> <sup>24</sup>	2017	Randomized controlled trial of educational intervention	329 Hmong immigrants, 50–75 y	Sacramento, CA	FOBT, sigmoidoscopy, colonoscopy
Ko <i>et al.</i> <sup>25</sup>	2016	Quantitative analysis of survey	193 Korean immigrants, 50–75 y	Seattle Metropolitan Area, WA	FOBT, FIT, colonoscopy
Ben Morrison <i>et al.</i> <sup>26</sup>	2012	Quantitative patient chart review	810 Somali immigrants, 18 y or older	Rochester, MN	FOBT, sigmoidoscopy, colonoscopy
Kim <i>et al.</i> <sup>27</sup>	2012	Quantitative analysis of health intervention and survey	113 Chinese immigrants, 50 y or older	Chicago, IL	FOBT
Shih <i>et al.</i> <sup>28</sup>	2008	Quantitative analysis of survey	1440 immigrants, 50 y or older	United States	FOBT, sigmoidoscopy, colonoscopy, proctoscopy
Breen <i>et al.</i> <sup>29</sup>	2010	Quantitative analysis of survey	5265 Mexican immigrants, 18 y or older	California	FOBT, endoscopy
Consedine <i>et al.</i> <sup>30</sup>	2011	Quantitative analysis of survey	Jamaican immigrants, 45–75 y	Brooklyn, NY	-
Francois <i>et al.</i> <sup>31</sup>	2009	Qualitative analysis of interviews	45 Haitian immigrants, 40 y or older	New York City, NY	FOBT, colonoscopy
Siddiq <i>et al.</i> <sup>32</sup>	2020	Qualitative analysis of interviews	19 Afghan female immigrants, 50 y or older	San Diego, CA	Colonoscopy
Patel <i>et al.</i> <sup>33</sup>	2021	Qualitative analysis of interviews and surveys	51 Indian, Pakistani, Bangladeshi, and Nepali immigrants, 50–75 y	New York City, NY	FOBT, colonoscopy
Ly Van Manh <i>et al.</i> <sup>34</sup>	2020	Quantitative analysis of survey	701 African and 311 Asian immigrants, 50 y or older	New York City, NY	Colonoscopy
Samuel <i>et al.</i> <sup>35</sup>	2009	Quantitative patient chart review; qualitative analysis of survey	100 female Cambodian, Somali, and Vietnamese immigrants, 50–75 y	Maine	FOBT, sigmoidoscopy, colonoscopy
Ivey <i>et al.</i> <sup>36</sup>	2018	Qualitative interviews	22 Bangladeshi and 31 Indian immigrants, 50 y or older	California	FOBT, endoscopy



Title	Year	Study type	Participants	Location	Screening test
Oh <i>et al.</i> <sup>37</sup>	2019	Qualitative analysis of interviews	51 Korean immigrants, 40 y or older	Washington, DC	FOBT, sigmoidoscopy, colonoscopy
Fang and Raquin <sup>38</sup>	2020	Research review	-	-	-
Ayash <i>et al.</i> <sup>39</sup>	2020	Quantitative analysis of survey	100 Arab immigrants, 50–75 y	New York City, NY	FOBT, FIT, colonoscopy
Juon <i>et al.</i> <sup>40</sup>	2018	Quantitative analysis of survey	274 Chinese, Korean, and Vietnamese immigrants, 50–75 y	Baltimore-Washington Metropolitan Area, MD	FOBT, colonoscopy
Kim <i>et al.</i> <sup>41</sup>	2015	Qualitative and quantitative analyses of interviews	237 Chinese, 69 Cambodian, and 168 Vietnamese immigrants, 50 y or older	Chicago, IL	Sigmoidoscopy, colonoscopy
Reyes and Miranda <sup>42</sup>	2015	Quantitative analysis of surveys	73,475 female immigrants, 40 y or older; 91,711 female immigrants, 21–65 y; and 80,811 male immigrants, 50–80 y	United States	FOBT, sigmoidoscopy, colonoscopy
Lee and Im <sup>43</sup>	2013	Quantitative analysis of survey	281 Korean immigrants, 50–88 y	New York Metropolitan Area	FOBT, sigmoidoscopy, colonoscopy
Gwede <i>et al.</i> <sup>44</sup>	2011	Qualitative and quantitative analyses of interviews	20 Caribbean and 20 Haitian immigrants, 50 y or older	Hillsborough County, FL	-
Maxwell <i>et al.</i> <sup>45</sup>	2008	Quantitative analysis of survey	487 Filipino immigrants, 50–75 y	Los Angeles, CA	FOBT, endoscopy
Yao <i>et al.</i> <sup>46</sup>	2022	Quantitative analysis of survey	3660 immigrants, 50 y or older	United States	FOBT, FIT, sigmoidoscopy, colonoscopy
Shapiro <sup>47</sup>	2021	Qualitative analysis of interviews	81 Russian, Ukrainian, Uzbekistani, Kazakhstani, Kyrgyzstani, Turkmenistani, and Tajikistani immigrants, 50–75 y	New York City, NY	Colonoscopy
Li <i>et al.</i> <sup>48</sup>	2021	Quantitative analysis of surveys	7220 immigrants	United States	FOBT, sigmoidoscopy, colonoscopy
Portillo <i>et al.</i> <sup>49</sup>	2020	Health intervention	Hispanic and Latinx immigrants	El Paso, TX	-
Lee <sup>50</sup>	2011	Survey/Health scale validation	26 Korean immigrants, 50 y or older	Chicago Metropolitan Area, IL	FOBT
Rogers <i>et al.</i> <sup>51</sup>	2021	Qualitative analysis of interview	27 Somali males, 50–75 y	Minnesota	FOBT, FIT, sigmoidoscopy, colonoscopy
Manne <i>et al.</i> <sup>52</sup>	2018	Behavioral intervention	93 South Asians, 50–75 y	New Jersey	FOBT, sigmoidoscopy, colonoscopy
Coughlin <i>et al.</i> <sup>53</sup>	2015	Research summary	Haitian immigrants	Hillsborough County, FL; Little Haiti, Miami-Dade County, FL; New York City, NY	Colonoscopy
Manne <i>et al.</i> <sup>54</sup>	2015	Quantitative analysis of survey	208 South Asian (Pakistan, India, Nepal, Bangladesh, Sri Lanka) immigrants, 50–75 y	New York/New Jersey Metropolitan Area	FOBT, sigmoidoscopy, colonoscopy
Gwede <i>et al.</i> <sup>55</sup>	2010	Quantitative analysis of interview	20 Caribbean and 20 Haitian immigrants, 50 y or older	Hillsborough County, FL	-
Walsh <i>et al.</i> <sup>56</sup>	2009	Quantitative analyses of interviews	808 Vietnamese immigrants, 50–79 y	Santa Clara, CA	FOBT, sigmoidoscopy, colonoscopy

Title	Year	Study type	Participants	Location	Screening test
Le et al. <sup>57</sup>	2014	Quantitative analysis of survey	238 Chinese, 217 Korean, and 199 Vietnamese immigrants, 50–75 y	Portland Metropolitan Area, OR	FOBT, sigmoidoscopy, colonoscopy
Nakajima et al. <sup>58</sup>	2021	Quantitative analysis of educational intervention and surveys	31 Somali male immigrants	Minneapolis, MN	-
Wang et al. <sup>59</sup>	2014	Health education intervention	14 Chinese immigrants, 50–68 y	San Francisco, CA	FOBT, colonoscopy
Lopez-Class et al. <sup>60</sup>	2012	Quantitative patient chart review	840 South/Central American immigrants, 50 y or older	District of Columbia, MD	FOBT, sigmoidoscopy, colonoscopy
Lee et al. <sup>61</sup>	2013	Qualitative analysis of interviews	26 Korean immigrants, 50 y or older	Chicago Metropolitan Area, IL	FOBT, endoscopy
Maxwell et al. <sup>62</sup>	2011	Quantitative analysis of health intervention	548 Filipino immigrants, 50–70 y	Southern California	FOBT, sigmoidoscopy, colonoscopy
Aragones et al. <sup>63</sup>	2010	Randomized controlled trial of health intervention	65 Latino immigrants, 50 y or older	New York City, NY	-
Miranda et al. <sup>64</sup>	2017	Quantitative analyses of surveys	14,968 female immigrants, 50 y or older (for CRC)	United States	FOBT, sigmoidoscopy, colonoscopy
Menon et al. <sup>65</sup>	2014	Quantitative analysis of interview	275 South Asian immigrants, 50 y or older	Chicago, IL	FOBT, sigmoidoscopy, colonoscopy
Morey et al. <sup>66</sup>	2021	Quantitative analysis of survey	400 Chinese and Korean immigrants, 50–75 y	Baltimore-Washington DC Metro Area	-
Alsayid et al. <sup>67</sup>	2019	Qualitative analysis of interviews	11 Arab male immigrants, 50–75 y	San Francisco Bay Area, CA; Worcester, MA	FIT, colonoscopy
Nakajima et al. <sup>68</sup>	2021	Quantitative analysis of survey	111 East African male immigrants, 45–75 y	Twin Cities Metro Area, MN	FOBT, sigmoidoscopy, colonoscopy
Li et al. <sup>69</sup>	2019	Health intervention	Chinese immigrants, 56–75 y	Texas	FOBT
Consedine et al. <sup>70</sup>	2011	Quantitative analysis of survey	69 Jamaican immigrants, 45–70 y	Brooklyn, NY	-

FOBT = fecal occult blood test; FIT = fecal immunochemical test.

Data synthesis table.

Table 2 –

Theme	Barrier	Study reference
Access	Not having a PCP/usual source of care	11,18–30
	No access to interpreter	18,26,31–34
Difficulty with colonoscopy prepping	Difficulty with colonoscopy prepping	33
	Lacking transportation	35
	Difficulty navigating complexity of healthcare system	36,37
Adherence to other screening tests	Adherence to other screening tests	21
	Home-based screening	38
Lack of insurance or ability to pay	Lack of insurance or ability to pay	10,19,24,25,28,29,33,35–37,39–48
	Unemployed	22,41
	Lack of citizenship	46
Screening costs	Screening costs	25,49,50
	Ability to travel abroad for care	25,37
Knowledge	Unfamiliarity with/lack of knowledge of CRC and CRC screening	11,18,24,31–33,36,37,40,47,50–59
	Lack of physician recommendation	18,21,22,30–33,36,37,39,50,55,57,60–63
Unaware of cancer risks and insurance coverage	Unaware of cancer risks and insurance coverage	58
	Physician did not follow screening guidelines	44,53
Unaware of medications	Unaware of medications	51
	High school education only	40,46
Sociocultural barriers	Length of US residency	18–22,28,29,35,39,41,45,51,54,64,65
	Degree of westernization	66
English language use	English language use	24,33,34,36,42,66
	Acculturation level	25
Traditional care preference	Traditional care preference	37,59
	Health system mistrust	36,51,65
Trust	Lack of patient-provider rapport	32,51,67
	Patient-physician linguistic or gender concordance/preference	31,32,35,37

Theme	Barrier	Study reference
Health perception and beliefs	Nonauthoritative patient-physician relationship	47
	Family encouragement	32,33,61
	Friends who screened	57
	Suspicion of pharmaceutical companies	51
	Health fatalism	22,33,33,63,7,47,50
	Intervention averse for cancer diagnosis	51
	Faith influence over health	33,39,51
	Preventative health orientation (or lack thereof)	22,36,37,47,50,61,68
	Perception of CRC risk	37
	Perception of CRC severity	37
Fear, shame, perceived helplessness related to cancer diagnosis	Self-efficacy	50,51,69
	Fear, shame, perceived helplessness related to cancer diagnosis	32,33,33,63,7,43,51
	Fear of finding a health problem	31
	Concern of low-quality healthcare when uninsured	31
	Screening-related embarrassment	30,35,37,47,70
Uncomfortable, risk, dehumanizing screening process	Uncomfortable, risk, dehumanizing screening process	32,35,37,47,67

PCP = primary care provider.