

RESEARCH ARTICLE

Modes of administering sexual health and blood-borne virus surveys in migrant populations: A scoping review

Daniel Vujcich^{1*}, Sonam Wangda², Meagan Roberts¹, Roanna Lobo¹, Bruce Maycock³, Chanaka Kulappu Thanthirige¹, Alison Reid¹

1 School of Public Health, Curtin University, Perth, Australia, **2** Ministry of Health, Thimphu, Bhutan, **3** College of Medicine & Health, University of Exeter, Exeter, United Kingdom

* daniel.vujcich@curtin.edu.au



OPEN ACCESS

Citation: Vujcich D, Wangda S, Roberts M, Lobo R, Maycock B, Kulappu Thanthirige C, et al. (2020) Modes of administering sexual health and blood-borne virus surveys in migrant populations: A scoping review. *PLoS ONE* 15(8): e0236821. <https://doi.org/10.1371/journal.pone.0236821>

Editor: Chaisiri Angkurawaranon, Chiang Mai University Faculty of Medicine, THAILAND

Received: February 18, 2020

Accepted: July 14, 2020

Published: August 3, 2020

Peer Review History: PLOS recognizes the benefits of transparency in the peer review process; therefore, we enable the publication of all of the content of peer review and author responses alongside final, published articles. The editorial history of this article is available here: <https://doi.org/10.1371/journal.pone.0236821>

Copyright: © 2020 Vujcich et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Abstract

There has been a growing number of sexual health and blood-borne virus (SHBBV) surveys specifically administered to migrant populations. The purpose of this scoping review is to collate available information about how SHBBV surveys have been administered in migrant populations and the effect that mode of administration has on data quality, reliability and other practical considerations, e.g. response rates (RR) and social desirability bias. A methodological framework for scoping reviews was applied. SHBBV survey studies administered to international migrants published since 2000 were included if they contained some description of mode of administration. Ninety one studies were identified for inclusion from Embase, Medline, Web of Science, Google Scholar and supplementary grey literature. 'Interview only' was the most common mode of administration ($n = 48$), predominately comprising face-to-face interviews. Thirty six studies reported data from 'self-completed' surveys only, with pen-and-paper being most common ($n = 17$). Few studies ($n = 7$) combined interview and self-completed methods of survey administration. Sixty one studies did not report (or only partially reported) RR or the data necessary to calculate RR. Of the studies that reported RR, most were missing other key information including method of recruitment, consent procedures and whether incentives were offered. Strengths and limitations of all administration modes are summarised. Guidelines to inform future SHBBV survey research in migrant populations are presented.

Introduction

Migrants are a priority group for the prevention and control of HIV/AIDS [1]. Between 2007 and 2012, 42% of HIV diagnoses in Western Europe were in migrant populations [2]. Elsewhere such as in United States of America and Australia, migrants accounted for 19% and 38% of HIV diagnoses respectively [3, 4]. Existing research suggests that migrants may encounter legal, social, economic and cultural barriers to healthcare access in relation to HIV and other sexually transmissible infections and blood-borne viruses [5–7].

Funding: AR, BM, RL, DV and MR received funding from the Australia Research Council: <https://www.arc.gov.au/>. Additional project funding was provided by the Department of Health Western Australia (<https://www2.health.wa.gov.au/>), the Department of Health South Australia (<https://www.sahealth.sa.gov.au/>), the Department of Health and Human Services Victoria (<https://www.sahealth.sa.gov.au/>) and SHine SA (<https://www.shinesa.org.au/>). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing interests: The authors have declared that no competing interests exist.

In spite of the priority for this population, migrants are often under-represented in research, including in the context of general population sexual health and blood-borne virus (SHBBV) surveys [8–10]. High quality data are needed to monitor whether strategic objectives relating to this population group are being met or need to be adjusted in response to changing circumstances. As such, there has been a growing number of SHBBV surveys specifically developed for migrant populations, including the African Health and Sex Survey in England, the Advancing Migrant Access to Health Services in Europe (aMASE) study and the HIV community survey in people from culturally and linguistically diverse backgrounds in New South Wales, Australia [11–13]. Additionally, the World Health Organisation is in the process of developing a standard instrument for measuring sexual health knowledge, practices and outcomes worldwide, and has sought submissions on implementation factors including survey administration channels [14, 15].

While there are a range of factors which can affect the quality of survey data (e.g. validity of survey constructs, sampling and recruitment methods), the focus of this article is the mode of survey administration. As a recent literature review shows, the manner of survey administration can greatly affect the quality of the data collected by influencing response rates, completion rates, respondent cognition and social desirability bias [16]. However, this review did not seek to determine whether certain modes of administration were more appropriate for specific topic areas, especially those of a sensitive nature. For instance, an Italian study on sexual behaviour in the general population compared results obtained via computer assisted telephone interviews (CATI) with self-answered questionnaires following interviews (SAQ-FI) and found that the SAQ-FI sample reported higher levels of early intercourse and same-sex attraction and had lower item non-response rates than the CATI sample [17].

How these differing modes of survey administration affect data quality can be even more complicated with respect to research in migrant populations. In culturally and linguistically diverse settings, self-administered questionnaires (SAQ) (which tend to be written) may be problematic because “languages spoken may not have a standard written form, or respondent literacy rates may be vastly different” [18]. Likely reflective of such concerns, a recent review of 550 empirical surveys of asylum seekers and minority groups found that over half ($n = 293$) were administered through face-to-face interviews, compared to 11% ($n = 55$) SAQ [19].

When collecting sensitive data from potentially vulnerable populations, researchers have an ethical imperative to ensure that any foreseeable harms are proportionate to the benefits that can flow from valid and reliable research outputs. However, there is still no strong/empirical guidance to determine appropriate modes of SHBBV survey administration among migrant populations. Therefore, we aimed to perform a scoping review of SHBBV surveys administered to international migrant populations in receiver countries to understand the effect that mode of administration has on key indicators of data quality and reliability, including response rates and social desirability bias. Practical and logistical considerations associated with the different modes of administration were also considered. The PRISMA extension for scoping reviews has been followed in the reporting of this study [20].

Materials and methods

An unregistered protocol was developed and is available on request from the corresponding author. The methodological framework for scoping reviews developed by Arksey and O’Malley [21] (set out in Table 1) was applied. The broad research objective was to determine what modes of survey administration have been used to conduct SHBBV surveys in migrant populations and to ascertain the strengths and limitations associated with each mode. The following sub-questions were set to meet the stated objective:

Table 1. Methodological framework for scoping studies, based on Arksey and O'Malley [21].

STAGE	SUMMARY
1. A research question is identified	Facets of the question (e.g. population, interventions, outcomes) are identified and defined.
2. Potentially relevant studies are identified	A search strategy for a range of resources and databases is developed. The search is conducted within predefined parameters relating to factors such as language and date of publication/reporting.
3. Relevant studies are selected	Studies identified in Stage Two are assessed against inclusion and exclusion criteria based on either a review of abstracts or the full study (if relevance cannot be established from the abstract). All studies which 'pass' this first screen are reviewed and assessed in full.
4. Data are charted	Information relevant to the aims of the scoping review are extracted from each included study.
5. Results are collated, summarized and reported	Data extracted in Stage Four are analyzed and findings are reported.

<https://doi.org/10.1371/journal.pone.0236821.t001>

1. With what frequency have different modes of administration been used to administer SHBBV surveys to migrants?
2. Is the mode of survey administration statistically associated with response rates, controlling for factors such as provision of recruitment incentives/gratuities and survey length?
3. What are the reported strengths and limitations of the different modes of survey administration, in terms of social desirability bias, project resources and other factors?

The review focussed on English-language papers published or released after 2000 (in light of the technological developments in survey administration). In order to be included, papers needed to contain: (a) primary analyses of data from SHBBV surveys administered to international migrants (i.e. people living in a country other than their birth country); and (b) some description of the mode of survey administration. General population surveys were excluded unless migrant and non-migrant responses were explicitly compared in the paper. Other exclusion criteria are set out in [Table 2](#).

Searches were run in March and April 2019. The search strategy combined terms relating to three concepts—surveys, migrants and modes of survey administration. The terms were entered into the databases Embase, Medline and Web of Science (Core Collection) using database-specific subject headings and search syntax as set out in the Supplementary table ([S1](#)

Table 2. Inclusion and exclusion criteria.

	Criteria
Include if:	<ul style="list-style-type: none"> • Study is primary analysis of survey data • Survey is aimed at or includes first-generation (externally-born) international migrants • Survey relates to the prevention, transmission or management of sexually transmissible infections and/or blood-borne viruses • Study contains some description of mode of survey administration
Exclude if:	<ul style="list-style-type: none"> • Survey is aimed at migrant health professionals only • Survey sample frame is the general population (unless the stated objective is to compare migrant and non-migrant responses) • Study relates to tourists / recreational travellers • Study seeks only to validate screening and diagnostic tools or tests used in clinical settings • Study is not in English language (although survey may be in another language)

<https://doi.org/10.1371/journal.pone.0236821.t002>

Table). Supplementary searches were conducted in Google, Google Scholar, and ProQuest Theses and Dissertations with a view to locating grey literature and unindexed publications. These supplementary searches were more focussed given the search limitations of those platforms (Survey AND (Migrant OR Refugee OR Displaced OR Emigrant OR Immigrant OR "Foreign born" OR "Culturally and Linguistically diverse") AND (STI OR STD OR BBV OR Sexual OR HIV OR "Hepatitis B" OR "Hepatitis C")). Only the first 20 pages of results in Google and Google Scholar were reviewed, consistent with accepted practice [22].

Results were imported into Endnote and de-duplicated using the process developed by Bramer, Giustini et al. [23] for this purpose (e.g. tailored use of field settings and filters). One researcher screened the title and abstract of each identified study against the inclusion and exclusion criteria set out in Table 2 and categorised each study as 'Potential Include' or 'Exclude'. The full text of all studies marked 'Potential Include' were then independently screened by two researchers and either marked for inclusion or exclusion with reasons. If the researchers reached different decisions, each researcher explained their rationale and, if consensus could not be reached, a third member of the research team assessed the item against the inclusion and exclusion criteria.

A charting form was developed in Excel by the second-named author and tested on the included studies identified through searches in Medline, Embase and Web of Science (see S2 Table). The form was revised for charting data in the remaining studies (i.e. those identified through Google, Google Scholar and ProQuest). The revisions involved reducing the number of charting categories and introducing fixed drop-down options into the Excel table (see S3 Table). Data were extracted by one researcher and cross-checked by a second researcher. Differences in coding decisions were resolved in the same manner as for screening (described above). The extracted data included information about the studies, including study setting, recruitment methods, sample size and characteristics, response rates, mode of survey administration, and reported information about the strengths and weaknesses of survey administration methods.

Following data extraction, it became apparent that different response rate calculation methods were being used in the included studies. As such, a decision was made to collect more detailed information relevant to response rate reporting. To that end, any studies in which a response rate was reported (or capable of being calculated) were reviewed and data extracted directly into Table 4 below, with a second researcher cross-checking for accuracy. Information on instrument validation was also collected *post facto* in response to a suggestion from one reviewer.

Results

Ninety one studies were identified for inclusion following the search-and-screen process represented in Fig 1.

Key characteristics of the studies are set out in Table 3. The majority of studies ($n = 51$) were conducted in North America, followed by Europe/Eurasia ($n = 22$), Australia ($n = 8$), Asia ($n = 6$), Africa ($n = 2$) and Latin America and the Caribbean (LAC) ($n = 2$). Globally, the majority of SHBBV surveys were administered to migrants born in Asia ($n = 40$), LAC ($n = 31$) or Africa ($n = 28$). Only four included studies reported data from SHBBV surveys administered to migrants from Middle Eastern countries. Sample sizes ranged from six migrant participants [25] to 11,484 participants [26].

In 44 studies, existing SHBBV instruments were adapted or used. These instruments included the Brief HIV Screener [116], the Perceived Susceptibility to HIV Scale [117], the AIDS Health Belief Scale [118], the National Survey of Australian Secondary Students and Sexual Health [119], the Survey of Latino Adults [120, 121], the African Health and Sex Survey

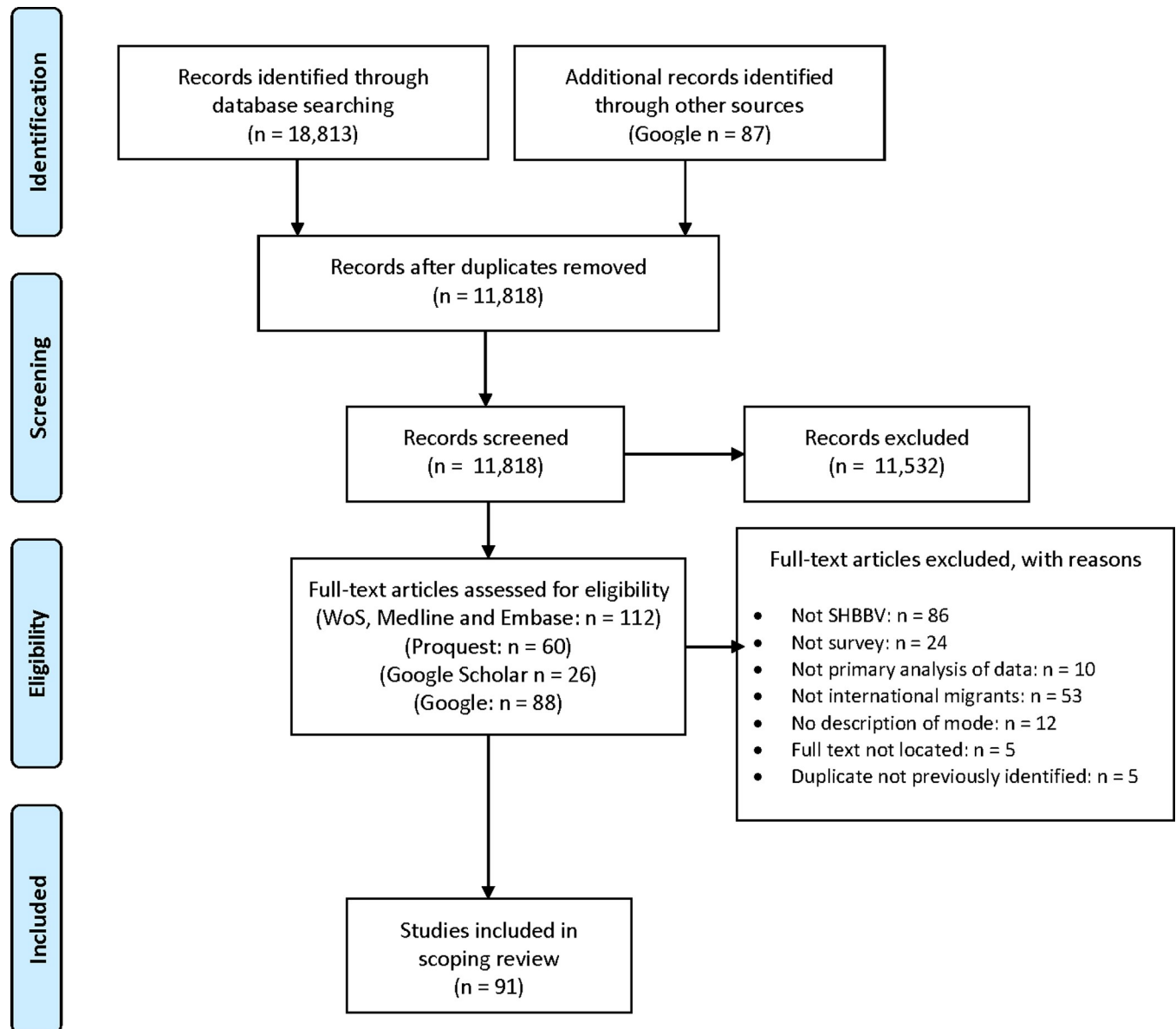


Fig 1. PRISMA flow diagram of scoping review stages [24].

<https://doi.org/10.1371/journal.pone.0236821.g001>

[12], the Bass Line Survey [122], UN Behavioral Surveillance Surveys [123] and the National Health Interview Survey Supplement on AIDS Knowledge and Attitudes [124]. For the remaining studies, either the origin of the survey items was not reported ($n = 23$) or new survey instruments were developed ($n = 24$). Of the studies in which new survey instruments were developed, half ($n = 12$) did not explicitly report whether the instrument had been pre-tested or piloted.

As shown in Fig 2, ‘interview only’ was the most common mode of survey administration ($n = 48$), with face-to-face ($n = 37$) being the most common interview technique. Of the thirty six studies reporting data from ‘self-completed’ surveys only, pen-and-paper was the most common method of self-completion ($n = 17$). Few studies ($n = 7$) combined interview and self-completed methods of survey administration.

Table 3. Included studies (n = 91), by key characteristics.

#	Author(s) and year	Country of study	Migrant region of origin	Mode of administration	SHBBV instrument used	Sample size
1	Agbemenu, Terry et al. [27]	USA	Africa	Paper Online	New instrument developed (not clear if tested)	15
2	Ahmed [28]	USA	Africa	F2F interview	New instrument developed (not clear if tested)	201
3	Alber, Cohen et al. [29]	USA	Asia	Online	Based on / used an existing instrument	418
4	Alvarez-del Arco, Fakoya et al. [30]	Europe(9 countries)	Africa LAC Europe	Device	Based partly on / used an existing instrument	2,209
5	Amadi [31]	USA	Africa	Paper	Based partly on / used an existing instrument	395
6	Arevalo [32]	USA	LAC	Paper F2F interview	Based on / used existing instrument	80
7	Asante, Körner et al. [33]	Australia	Africa Asia	Paper	New instrument developed (not clear if tested)	286
8	Bastani, Glenn et al. [34]	USA	Asia	Paper Phone interview	Based on / used existing instruments	1,123
9	Beltran, Simms et al. [35]	USA	Asia	Online Paper	Based on / used existing instruments	192
10	Burns, Fenton et al. [36]	UK	Africa	F2F interview Device	Based partly on / used existing instruments	385 (incl. ~25% UK born)
11	Chamrathirong, Boonchalaksi et al. [37]	Thailand	Asia	F2F interview	New instrument developed + pretested	3,426
12	Chen, Guthrie et al. [38]	USA	Asia	Device	Based on / used existing instruments	50
13	Cohen [39]	USA	Asia	Paper F2F interview	New instrument developed + pilot tested	2,004 (excl. US born)
14	Coronado, Taylor et al. [40]	USA	Asia	F2F interview	New instrument developed + pretested	430 (may include US-born)
15	Dean, Mitchell et al. [41]	Australia	Africa	Paper	Based on / used existing instruments	229
16	Delgado, Lundgren et al. [42]	USA	LAC	F2F interview	NR	200
17	Demeke [43]	USA	Africa	F2F interview	Based on / used existing instruments	37 (excl. US born)
18	Dennis, Wheeler et al. [44]	USA	LAC	F2F interview	NR	127
19	Dias, Gama et al. [45]	Portugal	Africa Asia Europe LAC	F2F interview	NR	1,513
20	Duan, Ding et al. [26]	China	Asia	F2F interview	Based on / used existing instruments	11,484
21	Elford, Doerner et al. [46]	UK	Africa Asia Europe LAC	Online	NR	1,334
22	Elford, McKeown et al. [47]	UK	Africa Asia Europe LAC	Online	Based on / used existing instruments	1,241

(Continued)

Table 3. (Continued)

#	Author(s) and year	Country of study	Migrant region of origin	Mode of administration	SHBBV instrument used	Sample size
23	Evans, Hart et al. [48]	UK	Europe	Online	NR	206
24	Evans, Suggs et al. [49]	UK	Africa	Paper	New instrument developed + pilot tested	169
				Online		
				Phone		
				Device (SMS)		
25	Fakoya, Alvarez-Del Arco et al. [50]	Europe (multiple)	Africa	Online	Based partly on / used existing instruments	1,637
			LAC			
26	Fenton, Chinouya et al. [51]	UK	Africa	Paper	New instrument developed (not clear if tested)	720 (excl. UK born)
27	Fernandez-Esquer, Atkinson et al. [52]	USA	LAC	F2F interview	Based partly on / used an existing instrument	152
28	Fitzgerald, Chakraborty et al. [53]	USA	LAC	F2F interview	New instrument developed (not clear if tested)	19 (excl. US born)
29	Ford and Chamrathirithong [54]	Thailand	Asia	F2F interview	New instrument developed + pretested	3,426
30	Foster, McCormack et al. [55]	Australia	Asia	Paper	Based on / used instruments	435
31	Getrich, Broidy et al. [56]	USA	LAC	F2F interview	NR	6 (excl. US-born)
32	Goldade and Nichter [57]	Costa Rica	LAC	F2F interview	NR	33
33	Gray, Crawford et al. [58]	Australia	Africa	Paper	Based on / used existing instruments	209
			Asia	Device		
				Online		
34	Grieb, Flores-Miller et al. [59]	USA	LAC	Paper	NR	104
35	Hamdiui, Stein et al. [60]	Netherlands	Africa	Paper	New instrument developed + pretested	193 (excl. Dutch born)
				Online		
36	Hislop, Teh et al. [61]	Canada	Asia	F2F interview	New instrument developed + pretested	503
37	Hwang, Huang et al. [62]	USA	Asia	Paper	Based on / used existing instruments	128 (excl. US born)
38	Jenkins, McPhee et al. [63]	USA	Asia	Phone interview	New instrument developed + pretested	1508
39	Johnston [64]	Armenia	Europe	F2F interview	New instrument developed + piloted	945
		Azerbaijan				
		Georgia				
40	Joseph, Belizaire et al. [65]	USA	LAC	F2F interview	New instrument developed (not clear if tested)	20 (excl. US born)
41	Juon, Strong et al. [66]	USA	Asia	Paper	NR	232
42	Juon, Lee et al. [67]	USA	Asia	Paper	NR	877
43	Kara [68]	USA	Africa	Paper	Based on / used existing instruments	164
				Online		
44	Kuehne, Koschollek et al. [69]	Germany	Africa	Paper	Based on / used existing instruments	2,720
				F2F interview		
45	Leite, Buresh et al. [70]	USA	LAC	F2F interview	New instrument developed (not clear if tested)	200 (excl. US born)
46	Lessard, Lebouche et al. [71]	Canada	Africa	Phone interview	Based on / used existing instruments	40
			Asia			
			Europe			
			LAC			
			Middle East			

(Continued)

Table 3. (Continued)

#	Author(s) and year	Country of study	Migrant region of origin	Mode of administration	SHBBV instrument used	Sample size
47	Lin, Simoni et al. [72]	USA	Asia	Online	Based partly on / used existing instruments	144
48	Lofers, Vahabi et al. [73]	Canada	Asia	Paper	NR	30
49	Loos, Manirankunda et al [74]	Belgium	Africa LAC	Paper	NR	139
50	McGregor, Mlambo et al. [13]	Australia	Africa Asia	Paper	Based on / used existing instruments + pilot tested	1,406
51	Manoyos, Tangmunkongvorakul et al. [75]	Thailand	Asia	F2F interview	Based on / used existing instruments	442
52	Maxwell, Bastani et al. [76]	USA	LAC	F2F interview Phone interview	Based partly on / used existing instruments	106
53	Miller, Guarnaccia et al. [77]	USA	LAC	Phone interview	Based on / used existing instruments	85 (excl. US born)
54	Montealegre [78]	USA	LAC	F2F interview	NR	210
55	Montealegre, Risser et al. [79]	USA	LAC	F2F interview	NR	210
56	O'Connor, Shaw et al. [80]	Australia	Asia	Phone interview	Based on / used existing instruments	499
57	Ogungbade [81]	USA	Africa	Paper	Based on / used existing instruments	167
58	Organista and Kubo [82]	USA	LAC	F2F interview	Based on / used existing instruments	102
59	Pannetier, Ravalihasy et al. [83]	France	Africa	F2F interview	Based on / used existing instruments	980
60	Platt, Grenfell et al. [84]	UK	Europe	Device	NR	268
61	Plewes, Lee et al. [85]	Thailand	Asia	F2F interview	NR	109
62	Ramanathan and Sitharthan [86]	Australia	Asia	Online	Based on / used existing instruments	184
63	Rangel, Martinez-Donate et al. [87]	Mexico	LAC	Paper	New instrument developed (not clear if tested)	1,429
64	Saenz [88]	USA	LAC	F2F interview	Based on / used existing instruments	141
65	Salabarria-Pena, Lee et al. [89]	USA	LAC	F2F interview	New instrument developed (not clear if tested)	175
66	Salehi [90]	Canada	Various (unspecified)	Paper	Based on / used existing instruments	141
67	Santos-Hovener, Marcus et al. [91]	Germany	Africa	Paper F2F interview Phone interview	Based on / used existing instruments + pretested	596
68	Selvey, Lobo et al. [92]	Australia	Asia	Paper Online	Based on / used existing instruments	94 (excl. non-Asian born)
69	Shiau, Bove et al. [93]	USA	Asia	F2F interview Phone interview	New instrument developed (not clear if pretested)	270 (excl. US born)
70	Şimşek, Yentur Doni et al. [94]	Turkey	Middle East	F2F interview	Based on / used existing instruments	458
71	Spadafino, Martinez et al. [95]	USA	LAC	F2F interview Phone interview	NR	176
72	Srithanaviboonchai, Choi et al. [96]	Thailand	Asia	F2F interview	NR	429

(Continued)

Table 3. (Continued)

#	Author(s) and year	Country of study	Migrant region of origin	Mode of administration	SHBBV instrument used	Sample size
73	Stromdahl, Liljeros et al. [97]	Sweden	Africa Asia Europe LAC	Online	New instrument developed + piloted	244
74	Sumari-de Boer, Sprangers et al. [98]	Netherlands	Africa Europe	F2F interview	Based on / used existing instruments	112
75	Taylor, Jackson et al. [99]	USA	Asia	Phone interview	Based on / used existing instruments	75
76	Taylor, Jackson et al. [100]	USA	Asia	F2F interview	Based on / used existing instruments	413
77	Taylor, Choe et al. [101]	USA	Asia	F2F interview	Based on / used existing instruments	715
78	Taylor, Tu et al. [102]	USA	Asia	F2F interview	New instrument developed + pretested	395
79	Taylor, Seng et al. [103]	USA	Asia	Phone interview	NR	111
80	Thompson, Taylor et al. [104]	USA	Asia	F2F interview	Based on / used existing instruments	116 (excl. North American born)
81	Tu, Li et al. [105]	USA Canada	Asia	F2F interview	New instrument developed (not clear if pretested)	945 (excl. USA and Can. born)
82	UNHCR [106]	Zambia	Africa	F2F interview	Based on / used existing instruments	822
83	UNHCR [107]	Kenya	Africa	F2F interview	Based on / used existing instruments	1,646
84	Uribe, Darrow et al. [108]	USA	LAC	Phone	NR	1,266 (excl. US born)
85	van der Veen, Voeten et al. [109]	Netherlands	Middle East	Paper	Based partly on / used existing instruments	174 (excl. Dutch born)
86	Viadro and Earp [110]	USA	LAC	F2F interview	NR	43
87	Villarreal, Wiley et al. [111]	USA	LAC	Paper	New instrument developed + piloted	24 (excl. US born)
88	Westmaas, Kok et al. [112]	Netherlands	Europe	Paper Online	Based on / used existing instruments	753
89	Yau, Ford et al. [113]	Canada	Asia	Phone interview	New instrument developed (not clear if tested)	1,013 overall (may include Canadian born)
90	Zellner, Martínez-Donate et al. [114]	USA	LAC	Device	NR	647, excl. US born
91	Zhussupov, McNutt et al. [115]	Kazakhstan	Middle East	F2F interview	NR	422

F2F = face-to-face

NR = not reported

LAC = Latin America and the Caribbean

NR = Not reported

<https://doi.org/10.1371/journal.pone.0236821.t003>

Fig 3 shows that some modes of SHBBV survey administration have been implemented more in some populations, compared to others. For instance, face-to-face only interviews were more commonly administered to LAC (n = 16) and Asian (n = 13) migrants; by contrast, pen-and-paper only surveys were used less frequently in LAC communities (n = 4). The small number of ‘online only’ and ‘device only’ surveys were relatively evenly distributed across LAC, Asian, African and European migrant populations.

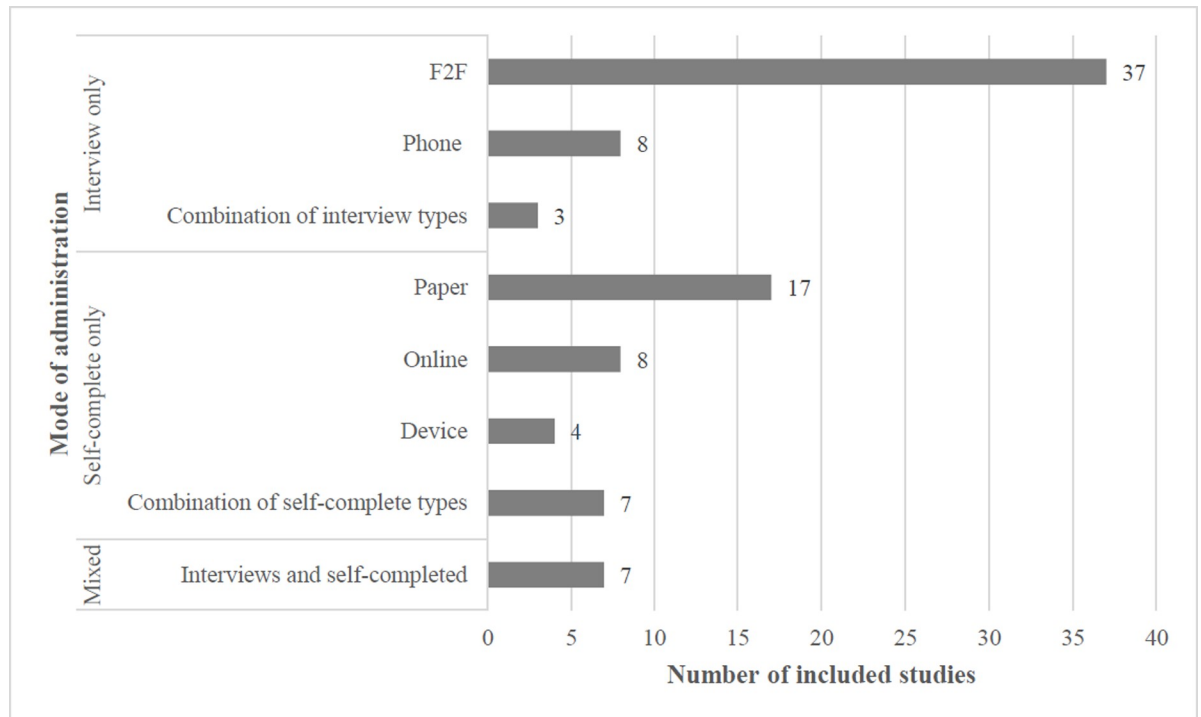


Fig 2. Included studies (n = 91), by mode of survey administration.

<https://doi.org/10.1371/journal.pone.0236821.g002>

Given the level of reporting in the included studies, it was not possible to determine whether certain modes of administration were associated with higher response rates,

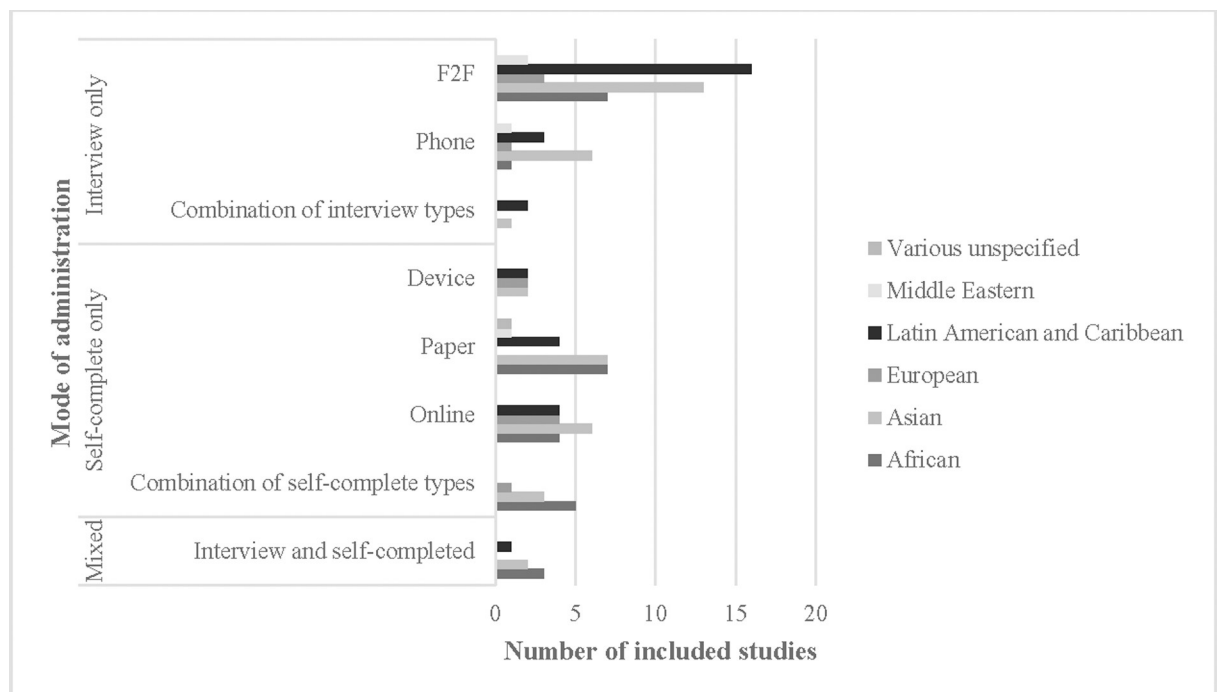


Fig 3. Included studies (n = 91), by mode of administration and migrants' region of origin.

<https://doi.org/10.1371/journal.pone.0236821.g003>

controlling for other factors. Sixty one studies (67%) either: (a) did not report response rates or the data necessary to calculate response rates; or (b) partially reported them (e.g. did not specifically report for overseas-born sample members or did not report response rates for all modes of administration).

Of the 30 studies where response rates were reported or able to be calculated (Table 4), the most common mode of administration was face-to-face interview only ($n = 12$), followed by pen-and-paper only ($n = 6$). By contrast, online administration was only used in four studies and was used in combination with other modes in three of those cases. Several studies noted the difficulties associated with determining the denominator required to calculate response rates when administering surveys online (e.g. Elford, Doerner et al. [46], Fakoya, Alvarez-Del Arco et al. [50], Gray, Crawford et al. [58]). Additionally, Ramanathan and Sitharthan [86] noted that noneligible persons could participate in online surveys and that the same respondent could complete the survey multiple times unless identifying data (e.g. IP addresses) were collected and stored.

The majority of the 30 studies reported response rates exceeding 50 percent, although the methods for calculating response rates varied. Generally, response rates were calculated by dividing the number of complete (and, in some cases, partial) eligible surveys by the sum of the number of ineligible cases, refusals, unsuccessful contact attempts and all cases of unknown eligibility. However, in other studies, attempts were made to estimate the number of cases of unknown eligibility which were ineligible and those cases were excluded from the denominator. For instance, Taylor, Choe et al. [101] reported “the overall estimated response rate was 80% among men and 82% among women (assuming the same proportions of eligible men and women among those who could and could not be contacted)”.

Additionally, there was a general lack of reporting on data relevant to assessing the quality of the response rates. For instance, 14 studies (47%) did not report whether incentives to participation were offered, 14 studies (47%) did not report on the method for obtaining informed consent, and 27 studies (90%) did not provide data to enable the characteristics of participants to be compared to non-responders.

The strengths and limitations of the various methods were discussed in the examined literature. Face-to-face interviews were considered useful when surveying populations with low levels of literacy [52, 89]. However, this method of administration was often human resource intensive and associated with logistical issues, including the need to find accessible and sufficiently private interview sites at mutually convenient times for multiple researchers and participants [64, 78, 79, 106].

While one study considered face-to-face interaction to be an important element of building trust [70], several noted the potentially increased risk of social desirability bias when disclosing sensitive information in-person [32, 35, 44, 51, 52, 83, 89, 110], and it was noted that consideration should be given to the characteristics of the interviewer. For instance, in a study of the health knowledge, attitudes and behaviours of U.S. Latino men who have sex with men, Arevalo [32] warned that “[s]ocial desirability may have been magnified by the interviewer, given that he was relatively more verbal, educated and overall healthier than the average participant.” A study of the sexual behaviour of male Mexican migrants to the United States observed that extramarital sex may have been underreported to female interviewers who lived in the respondents’ community or were casually known to the respondents’ wives [110].

Although telephone interviews have the potential to increase respondents’ sense of ‘anonymity’, the risk of social desirability bias may still remain because telephone respondents might be unable to answer questions in a private location away from other household residents [108]. The included studies also report that telephone interviews may result in selection bias [40, 63, 77, 100, 113]. For instance, Miller, Guarnaccia et al. [77] observed that recent Latino

Table 4. Included studies with response rates reported or able to be calculated (n = 30), by other reported characteristics.

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects?*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
Ahmed [28]	F2F interview	48	Number invited: 425 Number consented: 205	NR	NR	Mosques, local cafes, restaurants	Verbal	NR	60	No
Alvarez-del Arco, Fakoya et al. [30]	Device	70	Number invited: 3251 Number eligible: 3152 Number consented: 2209	NR	Researcher or member of clinical care team	Clinic	NR	Participation higher in men, decreased with age and was higher in migrants from Latin America and Eastern Europe and lower in those from Sub-Saharan Africa	NR	NR
Asante, Körner et al. [33]	Paper	>95 in Thai, Ethiopian and Sudanese communities Less in Cambodian community	Only reported for Cambodian community Number invited: 104 Number consented: 86	NR	Co-workers from the relevant language backgrounds, as well as some members of the reference groups, would lead the recruitment and assist participants to complete the questionnaires	Mainly at places of worship, community events and other social gatherings	NR	NR	20–25	NR
Bastani, Glenn et al. [34]	Paper Phone interview	94 (B) 86 (F)	Number screened: 1,866 Number eligible: 1,196 Number enrolled at baseline: 1,123	In-person on a single day	Staff members	Church	NR	NR	NR	NR
Coronado, Taylor et al. [40]	F2F interview	Figure not reported but relevant data presented (see next column)	Number screened: 1,902 Number enrolled: 436 (6 later excluded due to ineligibility) Number refused: 314 Number ineligible at screening: 628 households + 105 (non-residential) Number unable to be contacted: 419	Households received an introductory letter (traditional Chinese, simplified Chinese, and English versions). Called 2 weeks later. Up to 5 contact attempts made.	Chinese interviewer of same gender	Home	NR	NR	30	Calendar and \$20

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects?*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
Duan, Ding et al. [26]	F2F interview	Figure not reported but relevant data presented (see next column)	Among the total of 7656 mixed couples, 6269 Chinese spouses and 7092 Burmese immigrant spouses gave informed consent to participate including both spouses of 5742 couples. Only the 5742 couples with both spouses participating in the survey were included.	NR	Trained public health worker (or, where necessary, village or community clinical doctors who were able to speak and understand Burmese)	NR (but interviews principally conducted in homes)	NR	NR	NR	\$10
Evans, Suggs et al. [49]	Paper Online Phone Device (SMS)	61	Number invited: 281 Number consented: 172 (3 later excluded)	Not reported for baseline	Community researchers	Voluntary sector groups and community venues	Written	NR	NR	GBP 5 shopping voucher
Foster, McCormack et al. [55]	Paper	94	Number distributed: 488 Number returned: 460	NR	Sexual health clinic staff and health education officers	Sexual health clinic and sex work parlours	Implied (consent form prefaced survey)	NR	NR	NR
Grieb, Flores-Miller et al. [59]	Paper	Figure not reported but relevant data presented (see next column)	Number screened: 135 Number eligible: 113 Number consented: 104	NR	Trained research assistants	Street- and community-based venues	Verbal	NR for non-response/refusals but noted that no differences in age, country of origin, education, time in the United States, or time in Baltimore were observed between those who were eligible and those who were not.	10–15	\$10

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects?*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
Hamdiui, Stein et al. [60]	Paper Online	69.1	Number invited: 350 Number participated: 242 (excluding 165 people recruited by participants who accepted the invitation—no RR reported for the total sample which included respondent-driven sampling methods)	Number of attempts NR Online-recruited respondents were enrolled through advertisements on Moroccan-Dutch forums, Facebook, Instagram, websites. Recruiting peers online was enabled through indirect email, WhatsApp, Facebook, or by sharing a hyperlink.	Peer (respondent-driven sampling)	Online and at community venues, such as community centres, day care centres, mosques, interest groups, and civil support foundations.	NR	NR	NR	Gift coupon when recruited at least three other respondents (value increased in three steps to enhance peer recruitment: €5, €10, and €25).
Hislop, Teh et al. [61]	F2F interview	59	Households selected: 1500 Number of non-residential: 41 Number unable to contact: 149 Number ineligible: 375 Number refused: 384 Number of interviews completed: 551 (504 when non-migrants excluded)	Five door-to-door attempts	Trilingual Chinese interviewer	Home	NR	NR	45	\$20
Jenkins, McPhee et al. [63]	Phone interview	93	Call attempts: 12,094 Call attempts that reached eligible respondents: 1624 Number consented: 1508	Up to five attempts by phone	NR	Phone	NR	NR	NR	NR

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects?*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
Juon, Lee et al. [67]	Paper	98 (B) 78 (F)	Eligible program participants: 940 Number of no-shows: 47 Number who did not complete baseline or did not participate: 13 Number who participated in program in past year: 3 Number who completed baseline: 877 Number who completed follow-up: 688	NR	NR	Community based organisations, college cultural organisations, Asian grocery stores, restaurants, nail salons	NR	NR for baseline Differences at follow-up described	NR	NR
Kara [68]	Paper Online	35	Number of surveys distributed: 525 Number of surveys returned: 186	NR	Partners from member organisations made initial contact	Online	Electronic (for online survey) Implied (for written survey)	NR	10–30	NR
Lessard, Lebouche et al. [71]	Phone interview	54	Number eligible: 74 Number refused: 4 Number unable to be contacted: 30 Number participants: 40	NR	Service staff member made initial contact, followed up by researcher	Phone	Written	NR	10–15	None
Maxwell, Bastani et al. [76]	F2F interview Phone interview	51 (B) 68 (F)	Number recruited at clinic: 98 Number who attended workshop: 46 (+ 8 peer recruits) Number who completed baseline survey: 54 Number who completed follow-up survey: 44 workshop attenders and 28 non-attenders	NR	Clinical phlebotomist briefly described study, researcher followed up with those interested	Clinic	Written	Participants who completed post-test reported significantly more years of schooling than those who did not complete.	NR	\$5 for initial interview, \$10 for workshop participation, \$15 for post-test

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects?*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participating offered?
Montealegre, Risser et al. [79]	F2F interview	Figure not reported but relevant data presented (see next column)	Number screened: 230 Number eligible: 222 Number consented: 221 (one did not complete interview and data from ten excluded from analysis or lost)	Number of attempts NR Seeds and eligible participants were given three serially numbered study coupons to recruit peers. Study coupons provided recruits with the name and a short description of the study, project phone number, name and address of the interview sites, hours of operation, and the coupon's expiration date.	Peer (respondent-driven sampling)	NR	Verbal	NR	60	Seeds and participants were given \$20 for completing the interview and \$5 for each of up to three peers they recruited into the survey.
O'Connor, Shaw et al. [80]	Phone interview	66	Number invited: 761 Number consented: 506 (seven later excluded from analysis)	NR	Men were telephoned by a Vietnamese speaking woman	Phone	NR	NR	NR	NR
Ogungbade [81]	Paper	86	Number of surveys distributed: 194 Number of surveys returned: 167	Flyers distributed. Researcher addressed potential participants at an event. Returned one week later to conduct survey.	Researcher (Nigerian migrant)	Faith-based organisations	Implied consent given explaining that completion of survey was considered consent	NR	NR	NR
Organista and Kubo [82]	F2F interview	>90	Notes from outreach workers indicate that less than 10% of men approached refused participation.	NR	Spanish-speaking project team members who introduced themselves as local public health outreach workers	Street corner	NR	NR	45	\$20 fast food voucher

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
Ramanathan and Siharthan [86]	Online	42	Number surveys attempted: 438 Number of surveys completed: 278 Number of completed surveys in which SHBBV section also completed: 184	Advertisements on Indian specific websites and social networking websites (e.g. Google, Facebook).	N/A (internet advertising)	Indian specific websites and social networking websites	NR	NR	NR	NR
Rangel, Martinez-Donate et al. [87]	Paper	90	Number invited: 1,606 Number consented: 1,429	NR	Trained Mexican interviewers	International airport, bus stations, deportation stations	Verbal	NR	NR	NR
Salabarría-Pena, Lee et al. [89]	F2F interview	97	Number invited: 222 Number ineligible: 42 Number refused: 5	In-person (quantity unclear)	NR	Clinic waiting room	Verbal	NR	60	NR
Santos-Hovener, Marcus et al. [91]	Paper F2F interview Phone interview	Figure not reported but relevant data presented (see next column)	Surveys distributed: 950 Number returned: 649 Number eligible: 569	NR	Peer researchers	NR	Verbal	NR	NR	Key chain, shopping cart chip, referral to health promotion information sessions, condom, informational flyers and free testing services
Şimşek, Yentur Doni et al. [94]	F2F interview	100	A total of 961 married women were identified in 458 houses. One eligible woman from each selected house was randomly selected. A total of 458 women provided written and signed informed consent; the response rate among eligible women was 100.0 percent.	12 attempts made to contact	Trained Syrian midwife research assistant, lab technician and a translator from the area	Home	Written and verbal	NA	NR	NR

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects*	Who approached potential subjects*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
Taylor, Jackson et al. [99]	Phone interview	70	Initial sampling frame: 161 Number unable to contact/ phone disconnected: 42 Number ineligible: 12 Number consented: 75	Number of attempts NR Introductory letter followed by telephone call	Bilingual, bicultural Vietnamese survey workers	Home	NR	NR	NR	\$10 voucher
Taylor, Jackson et al. [100]	F2F interview	73 (B) 56 (F)	NR for baseline Three hundred and twenty (77 percent) of the 413 women who participated in the baseline survey also completed the follow-up survey. Therefore, the estimated overall response rate with respect to the hepatitis B questions was 56 percent (i.e., 77 percent of 73 percent).	NR	Bilingual, bicultural Cambodian women	Home	NR	NR	NR	Calendar at baseline, \$5 at follow up
Taylor, Choe et al. [101]	F2F interview	80-82	Details obtained from related papers cited. Number of unsuccessful contact attempts: 41 (women); 47 (men) Number ineligible: 116 (women); 131 (men) Number eligible but refused: 66 (women); 70 (men) Number completed: 370 (women); 345 (men)	Five door-to-door attempts	Bilingual, bicultural interviewers (gender matched)	Home	NR	NR	45	Posters

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects?*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
Taylor, Tu et al. [102]	F2F interview	Figure not reported but relevant data presented (see next column)	Estimated proportion of eligible where eligibility was not established: 79% (women); assume proportion of eligible same as those not contactable (men) Interviews completed: 436 Number of households refused: 314 Number of households ineligible: 628 Number of uncontactable households: 419 (plus 105 non-residential addresses)	Introductory letter followed by five door-to-door attempts	Chinese interviewer of same gender	Home	NR	NR	NR	\$20
UNHCR [106]	F2F interview	Figure not reported but relevant data presented (see next column)	<u>Kala camp</u> Number of forms completed: 828 Number of refusals: 34 Number unable to contact: 224 <u>Kala communities</u> Number of forms completed: 880 Number of refusals: 17 Number unable to contact: 169	In-person 1–3 times	Research assistants	Home	Oral (with interviewer's signature)	NR	NR	NR

(Continued)

Table 4. (Continued)

Study	Survey mode	Reported response rate (%)	Reported information relevant to RR	How many and what type of attempts were made to contact subjects?*	Who approached potential subjects?*	Where were potential subjects approached?*	How was informed consent obtained?*	How did those who agreed differ from those who did not agree?*	What was the average time taken to complete survey (minutes)?	Was an incentive to participation offered?
			<p>Mwange camp Number of forms completed: 916 Number of refusals: 20 Number unable to contact: 389</p> <p>Mwange communities Number of forms completed: 854 Number of refusals: 16 Number unable to contact: 349</p>							

<https://doi.org/10.1371/journal.pone.0236821.t004>

migrants to New Jersey were less likely to have residential telephones or may have “rapid turn-over of telephone numbers” due to high residential mobility.

The risk of selection bias was also reported in the studies which utilised online surveys [29, 49, 92, 97]. Online surveys have the potential to exclude respondents who lack internet access or technological proficiency, or who are wary of disclosing sensitive information online. Selvey, Lobo, et al. [92] found that only a minority of Asian sex workers in Australia completed online versions of a survey, with most preferring pen-and-paper (although the difference may have been attributable to the recruitment methods associated with each). A study of HIV testing among African migrants living in the UK found that none of the 169 respondents completed an online follow-up survey, although 60 subsequently agreed to participate in a telephone interview; this led the authors to conclude that online data collection “was not feasible in this population group” [49]. However, online recruitment and administration was considered advantageous in studies of migrant men who have sex with men (MSM) in Britain [46, 47]. According to Elford, McKeown, et al. [47], “[u]sing an online survey we were able to survey MSM across Britain from a diverse range of backgrounds.”

One study recommended the use of computer-assisted self-interviews (CASI) in future research as a means of “address[ing] the need for privacy and the low literacy levels” in some migrant populations [52]. Empirical data on the strengths and limitations of this mode of survey administration were not presented in any of the included studies.

Discussion

The primary objective of this scoping review was to determine best practices from the published literature to ensure that future SHBBV surveys are conducted both effectively and efficiently in migrant populations. However, the widespread lack of reporting on key survey characteristics made it difficult to appraise which mode of survey administration is likely to collect the most reliable data to inform future migrant SHBBV service provision and planning. Researchers are thus limited in their ability to avoid past missteps and replicate successes in study design, creating the risk of both resources and participants’ time being wasted.

Only a minority of studies in this scoping review reported response rates and, of those, few provided a comprehensive description of other key survey characteristics. The findings are consistent with a recent review of empirical surveys of asylum-related migrants and minority groups which found that “information on methodological aspects, such as response/cooperation/participation rate, sampling frames, sampling strategies . . . are often missing or are not specified and discussed” [19]. These findings emphasise the need for greater adherence to (or awareness of) reporting standards [125]. For instance, the STROBE checklist for observational studies requires details about setting (e.g. recruitment sites and sources), eligibility criteria, method of recruitment, and numbers of individuals at each stage of the study, and reasons for non-participation at each stage [126]. Survey-specific checklists also recommend reporting additional details including description of the survey instrument and its development, pretesting processes, instrument reliability and validity, sample representativeness, mode of administration, number of attempts made to contact subjects, whether incentives were offered, methods for analysis of nonresponse error and descriptions of consent procedures (see data extraction tool published by Bennett, Khangura, et al. [127]).

There are also ethical implications associated with the lack of transparency. The principles of beneficence and non-maleficence require researchers “to seek the greatest benefit for research participants while minimizing harm” [128]. When examining a sensitive subject matter (e.g. sexual knowledge and behaviours) with potentially vulnerable participants (e.g. migrants), researchers must feel confident that any *potential discomfort* to participants is

outweighed by the *expected benefits* which, at the very least, should take the form of valid and reliable findings. In order to weigh the potential harms against the potential benefits, researchers need to understand how SHBBV information has been collected from migrant populations in the past, and whether those methods produced valid and reliable data (and, if not, why not). This ethical arithmetic is not easily performed based on the information reported in the studies included in this review.

The information that we have about the use of online SHBBV surveys in migrant populations offers a case in point. There has been an increase in the use of online surveys for SHBBV research in migrant populations since 2010, as is evident in [Table 3](#); this reflects increased general access to the internet and the development of a number of affordable and accessible survey software development tools [129, 130]. However, the included studies in this scoping review broach some important considerations about the appropriateness of online SHBBV surveys in migrant settings. For instance, Selvey, Lobo et al. [92] and Evans, Suggs et al. [49] had limited success in using online surveys to obtain data from Asian Australian sex workers and African migrants living in the UK respectively. By contrast, Elford et al. [46, 47] considered SHBBV online surveys a useful tool. Based on the available information, future researchers are faced with a dilemma as to whether they can reasonably expect valid and reliable SHBBV data from online surveys in migrant populations. More data are needed to provide guidance to researchers considering the use of this mode of survey administration. As Poynton, DeFouw, et al. [131] note, online survey methods “will continue to be poorly understood until researchers plan for and more thoroughly report information related to response rates.” Their specific recommendations for the conduct and reporting of online survey research should be heeded (e.g. create separate links to the survey for each mode of invitation or dissemination; document undeliverable emails; keep records of the number of people on electronic mailing lists and in online discussion boards) [131].

Despite the dearth of data reported in the included studies, the following principles are suggested to guide the administration of SHBBV surveys in migrant contexts:

1. SHBBV survey researchers should begin the survey design process with a clear profile of their sample population. The profile can either be created by drawing upon existing data or in consultation with informed community stakeholders. Where possible, the profile should include information about: (a) languages spoken; (b) written literacy; (c) access to relevant technology (e.g. internet, phones) and technological proficiency; (d) social customs governing researcher/participant interactions (e.g. gender/class considerations); and (e) perceived attitudes to the subject areas that are the focus of the survey.
2. The sample profile should inform the choice of survey administration mode, based on mode-specific considerations which include those set out in [Table 5](#).
3. Where possible, consideration should be given to mixed-modes of survey data collection to overcome the limitations associated with using each mode in isolation [19]. However, mixed-mode survey administration is not, in itself, a magic bullet and care still needs to be taken to avoid measurement (and other) errors that may affect the validity and reliability of the findings [132, 133].
4. In the absence of clear guidance on best practice in the administration of SHBV surveys in specific migrant populations, pre-testing and pilot testing are essential. Pre-testing will enable “the capabilities of the selected mode[s] of data collection” to be evaluated, while pilot testing can be used to estimate response rates and ascertain whether a proposed mode of administration is appropriate for meeting research objectives [134]. Where issues are identified through pre-testing and piloting, appropriate revisions should be made in line

Table 5. Advantages, disadvantages and considerations, by mode survey administration.

Mode	Possible advantages	Possible disadvantages	Considerations and significance	
Self-completed	<ul style="list-style-type: none"> • Versions of the survey can be prepared in multiple languages • Allows for greater anonymity which can reduce social desirability response bias, especially when asking sensitive questions • Can be completed at participants' own convenience and does not have to be completed in full in one sitting 	<ul style="list-style-type: none"> • Less control over manner in which survey is completed (e.g. missing data, external assistance) • Requires literacy (unless innovative audio-visual techniques used) • If delivered online/via device, requires access to technology and user proficiency 	Are instructions for completion clear?	If no, may result in response or non-response errors
			Are measures in place to minimise number of missed questions?	If no, may result in item non-response error
			Is the survey available in places that are convenient for / accessible to the target population?	If no, may result in sampling error
			Are there sufficient resources to ensure the survey is translated in languages required to obtain a representative of the target population?	If no, may result in sampling error
Interviewer-led	<ul style="list-style-type: none"> • Can facilitate rapport- and trust-building • Enables greater control over the manner in which the survey is completed by participants Quality of responses is not dependent on participant literacy 	<ul style="list-style-type: none"> • Lack of anonymity may increase social desirability response bias, especially when asking sensitive questions • Requires participants to be present / available at the time the interviewers are able to collect data If delivered by telephone, requires eligible participants to have access Personnel costs May limit ability to collect data from places if interviewers need to travel long distances • Limited to languages spoken by interviewers 	Is the interview able to be offered at times that are convenient to the eligible population?	If no, may result in sampling error
			Are the interviewers appropriately trained?	If no, may result in interviewer error or processing error
			Are the characteristics of the available interviewers (e.g. gender) suitable given the characteristics of the participant and survey subject matter?	If no, may result in response error (social desirability), sampling error, interviewer error
			Are the interviews able to be conducted/offered in a private place?	If no, may result in response error (social desirability bias), sampling error

<https://doi.org/10.1371/journal.pone.0236821.t005>

with relevant guidelines (e.g. the *Guidelines for Best Practice in Cross-Cultural Surveys* [135]).

The main limitation of this scoping review is that it relied solely on information reported in the included studies. It is possible that a larger number of studies and data may have been included if authors had been approached to provide more information about the way in which their surveys were administered. Better reporting in the form of adherence to checklists such as STROBE [136] for observational studies and survey-specific guidelines (see Bennett, Khangura et al. [127]) will assist future researchers to undertake more comprehensive reviews into this subject area and facilitate their ability to produce rigorous meta-syntheses. Future reviews of survey research in migrant populations would also benefit from using appropriate tools to critically appraise the quality of included studies (e.g. checklists developed by the Joanna Briggs Institute or the Critical Appraisal Skills Program) [137, 138].

As Méndez and Font [139] note, “[t]he demand for more data about immigrants and ethnic minorities from national and supra-national bodies makes us confident that the number of surveys addressed to these populations will increase in the future.” The challenge for

researchers is to ensure that future SHBBV surveys are designed with reference to, and with a view to building on, the evidence base about which mode of survey administration is best suited to collecting valid and reliable evidence about migrants' knowledge, behaviours and practices. Additionally, other factors influencing quality should also be examined, including sampling methods, survey translation and instrument validation. Research in this area is particularly salient, given the World Health Organizations current project to develop a "standard, globally-recognized instrument to measure sexual practices, behaviours and sexual health related outcomes" [15] which would facilitate comparisons across populations.

Supporting information

S1 Checklist. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist.

(PDF)

S1 Table. Search strategy for scoping review, by concept and database.

(DOCX)

S2 Table. Architecture for excel data charting table.

(DOCX)

S3 Table. Architecture for excel data charting table.

(DOCX)

Author Contributions

Conceptualization: Daniel Vujcich, Roanna Lobo, Bruce Maycock, Alison Reid.

Data curation: Daniel Vujcich, Sonam Wangda, Meagan Roberts, Chanaka Kulappu Thanthirige.

Formal analysis: Daniel Vujcich, Sonam Wangda.

Funding acquisition: Roanna Lobo, Bruce Maycock, Alison Reid.

Methodology: Daniel Vujcich, Sonam Wangda, Roanna Lobo, Bruce Maycock, Alison Reid.

Project administration: Daniel Vujcich, Meagan Roberts.

Supervision: Daniel Vujcich, Roanna Lobo, Bruce Maycock, Alison Reid.

Validation: Meagan Roberts, Roanna Lobo, Chanaka Kulappu Thanthirige.

Writing – original draft: Daniel Vujcich, Sonam Wangda.

Writing – review & editing: Daniel Vujcich, Sonam Wangda, Meagan Roberts, Roanna Lobo, Bruce Maycock, Chanaka Kulappu Thanthirige, Alison Reid.

References

1. UNAIDS. UNAIDS 2016–2021 Strategy: On the fast-track to end AIDS. Geneva: 2015.
2. Hernando V, Alvarez-del Arco D, Alejos B, Monge S, Amato-Gauci A, Noori T, et al. HIV infection in migrant populations in the European Union and European Economic Area in 2007–2012: an epidemic on the move. *Journal of Acquired Immune Deficiency Syndrome*. 2015; 70(2):204–11.
3. Gunaratnam P, Heywood A, McGregor S, Jamil MS, McManus H, Mao L, et al. HIV diagnoses in migrant populations in Australia—a changing epidemiology. *PLoS ONE*. 2019; 14(2):e0212268. <https://doi.org/10.1371/journal.pone.0212268> PMID: 30763366

4. Prosser AT, Tang T, Hall H. HIV in persons born outside the United States, 2007–2010. *Journal of the American Medical Association*. 2012; 308(6):601–7. <https://doi.org/10.1001/jama.2012.9046> PMID: 22820630
5. Suphanchaimat R, Sommanustweechai A, Khitdee C, Thaichinda C, Kantamaturapoj K, Leelahavaron P, et al. HIV/AIDS health care challenges for cross-country migrants in low- and middle-income countries: a scoping review. *HIV/AIDS—Research and Palliative Care*. 2014; 6:19–38.
6. UNAIDS. *The Gap Report*. Geneva: 2014.
7. Agu J, Lobo R, Crawford G, Chigwada B. Migrant sexual health help-seeking and experiences of stigmatization and discrimination in Perth, Western Australia: exploring barriers and enablers. *International Journal of Environmental Research and Public Health*. 2016; 13(5).
8. Richters J, Badcock P, Simpson J, Shellard D, Rissel C, Visser Rd, et al. Design and methods of the second Australian study of health and relationships. *Sexual Health*. 2014; 11:383–96. <https://doi.org/10.1071/SH14115> PMID: 25376992
9. Erens B, Phelps A, Clifton S, Mercer CH, Tanton C, Hussey D, et al. Methodology of the third British national survey of sexual attitudes and lifestyles (Natsal-3). 2014; 90(2):84–9.
10. Rogers W, Lange MM. Rethinking the vulnerability of minority populations in research. *American Journal of Public Health*. 2013; 103(12):2141–6. <https://doi.org/10.2105/AJPH.2012.301200> PMID: 24134375
11. Fakoya I, Álvarez-del Arco D, Monge S, Copas AJ, Gennotte A-F, Volny-Anne A, et al. Advancing migrant access to health services in Europe (AMASE): Protocol for a cross-sectional study. *JMIR Research Protocols*. 2016; 5(2):e74. <https://doi.org/10.2196/resprot.5085> PMID: 27185491.
12. Bourne A, Reid D, Weatherburn P. *African health and sex survey 2013–2014: headline findings*. London: 2014.
13. McGregor S, Mlambo E, Gunaratnam P, Wilson D, Guy R. *HIV knowledge, risk behaviour and testing: a community survey in people from culturally and linguistically diverse (CALD) backgrounds in NSW, Australia*. Sydney: 2016.
14. World Health Organization. Seeking feedback to develop a population-representative sexual health survey instrument 2019 [Available from: <https://www.who.int/news-room/detail/21-10-2019-seeking-feedback-to-develop-a-population-representative-sexual-health-survey-instrument>].
15. World Health Organization. Seeking feedback to develop a population-representative sexual health survey instrument: An open call from the WHO—Additional information for participation 2019 [Available from: https://drive.google.com/file/d/1f33Eustjgoqq4cY34knc9UMvww_NIP3c/view].
16. Bowling A. Mode of questionnaire administration can have serious effects on data quality. *Journal of Public Health*. 2005; 27:281–91 <https://doi.org/10.1093/pubmed/fdi031> PMID: 15870099
17. Caltabiano M, Dalla-Zuanna G. A comparison of survey techniques on sensitive sexual behavior in Italy. *The Journal of Sex Research*. 2013; 50(6):537–47. <https://doi.org/10.1080/00224499.2012.674573> PMID: 22816489
18. De Jong J. Data collection: Self-administered surveys. In: Survey Research Center, editor. *Guidelines for best practice in cross-cultural surveys*. Ann Arbor: Survey Research Center 2016. p. 550–75.
19. European Asylum Support Office. *A review of empirical surveys of asylum-related migrants*. EASO; 2018.
20. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Annals of Internal Medicine*. 2018; 169(7):467–473. <https://doi.org/10.7326/M18-0850> PMID: 30178033
21. Arksey H, O'Malley L. Scoping studies: towards a methodological framework *International Journal of Social Research Methodology* 2005; 8(1):19–32.
22. Haddaway NR, Collins AM, Coughlin D, Kirk S. The role of Google Scholar in evidence reviews and its applicability to grey literature searching. *PLOS ONE*. 2015; 10(9):e0138237. <https://doi.org/10.1371/journal.pone.0138237> PMID: 26379270
23. Bramer WM, Giustini D, de Jonge GB, Holland L, Bekhuis T. De-duplication of database search results for systematic reviews in EndNote. *Journal of the Medical Library Association* 2016; 104(3):240–3. <https://doi.org/10.3163/1536-5050.104.3.014> PMID: 27366130
24. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine*. 2009; 6(7):e1000097-e. <https://doi.org/10.1371/journal.pmed.1000097> PMID: 19621072
25. Getrich CM, Broidy LM, Kleymann E, Helitzer DL, Kong AS, Sussman AL, et al. Different models of HPV vaccine decision-making among adolescent girls, parents, and health-care clinicians in New Mexico. *Ethnicity and Health*. 2014; 19(1):47–63. <https://doi.org/10.1080/13557858.2013.857767> PMID: 24261842

26. Duan S, Ding Y, Yang Y, Lu L, Sun J, Wang N, et al. Prevalence and correlates of HIV discordance and concordance among Chinese-Burmese mixed couples in the Dehong prefecture of Yunnan province, China. *Sexual Health*. 2012; 9(5):481–7. <https://doi.org/10.1071/SH12065> PMID: 23380199
27. Agbemenu K, Terry MA, Hannan M, Kitutu J, Doswell W. Attitudes and beliefs of African immigrant mothers living in the US towards providing comprehensive sex education to daughters aged 12–17 Years: a Pilot Study. *Journal of Immigrant Minority Health*. 2016; 18:1053–9. <https://doi.org/10.1007/s10903-015-0292-z> PMID: 26438661
28. Ahmed M. Determinants of condom use and HIV prevention among East African immigrants in Minnesota. PhD [dissertation]. El Paso: University of Texas; 2013.
29. Alber JM, Cohen C, Nguyen GT, Ghazvini SF, Tolentino BT. Exploring communication strategies for promoting hepatitis B prevention among young Asian American adults. *Journal of Health Communication*. 2018; 23(12):977–83. <https://doi.org/10.1080/10810730.2018.1534904> PMID: 30325705
30. Alvarez-del Arco D, Fakoya I, Thomadakis C, Pantazis N, Touloumi G, Gennotte AF, et al. High levels of postmigration HIV acquisition within nine European countries. *AIDS*. 2017; 31(14):1979–88. <https://doi.org/10.1097/QAD.0000000000001571> PMID: 28857779
31. Amadi RN. Perceptions, attitudes, and acceptability of HIV testing among sub-Saharan African immigrants in Chicago. PhD [dissertation]. Chicago: Loyola University; 2012.
32. Arevalo IA. The influence of discrimination, substance use, acculturation, and mental health on HIV-related sexual behaviors: The case of immigrant Latino men who have sex with men. PhD [dissertation]. Washington DC: Howard University; 2016.
33. Asante A, Körner H, McMahon T, Sabri We, Kippax S. Periodic survey of HIV knowledge and use of health services among people from culturally and linguistically diverse backgrounds, 2006–2008. Sydney: National Centre in HIV Social Research, 2009.
34. Bastani R, Glenn BA, Maxwell AE, Jo AM, Herrmann AK, Crespi CM, et al. Cluster-randomized trial to increase hepatitis B testing among Koreans in Los Angeles. *Cancer Epidemiology Biomarkers and Prevention*. 2015; 24(9):1341–9. <https://doi.org/10.1158/1055-9965.EPI-14-1396> PMID: 26104909
35. Beltran R, Simms T, Lee HY, Kwon M. HPV literacy and associated factors among Hmong American immigrants: Implications for reducing cervical cancer disparity. *Journal of Community Health*. 2016; 41(3):603–11. <https://doi.org/10.1007/s10900-015-0135-9> PMID: 26696118
36. Burns F, Fenton K, Morison L, Mercer C, Erens B, Field J, et al. Factors associated with HIV testing among black Africans in Britain. *Sexually Transmitted Infections*. 2005; 81:494–500. <https://doi.org/10.1136/sti.2004.013755> PMID: 16326854
37. Chamratrithong A, Boonchalaksi W, Yampeka P. Prevention of HIV/AIDS among migrant workers in Thailand (PHAMIT): The baseline survey 2004. Salaya: Mahidol University, 2005.
38. Chen WT, Guthrie B, Shiu CS, Wang L, Weng Z, Li CS, et al. Revising the American dream: how Asian immigrants adjust after an HIV diagnosis. *Journal of Advanced Nursing*. 2015; 71(8):1914–25. <https://doi.org/10.1111/jan.12645> PMID: 25740206
39. Cohen CA. Chronic HBV infection and community-based services for high-risk Asians and Pacific Islanders. PhD [dissertation]. Philadelphia: Drexel University; 2015.
40. Coronado GD, Taylor VM, Tu SP, Yasui Y, Acorda E, Woodall E, et al. Correlates of hepatitis B testing among Chinese Americans. *Journal of Community Health*. 2007; 32(6):379–90. <https://doi.org/10.1007/s10900-007-9060-x> PMID: 17940869
41. Dean J, Mitchell M, Stewart D, Debattista J. Sexual health knowledge and behaviour of young Sudanese Queenslanders: a cross-sectional study. *Sexual Health*. 2017; 14(3):254–60. <https://doi.org/10.1071/SH16171> PMID: 28104040
42. Delgado M, Lundgren LM, Deshpande A, Lonsdale J, Purington T. The association between acculturation and needle sharing among Puerto Rican injection drug users. *Evaluation and Program Planning*. 2008; 31(1):83–91. <https://doi.org/10.1016/j.evalprogplan.2007.05.010> PMID: 17706285
43. Demeke HB. Relationships between HIV-related stigma, coping, social support and health-related quality of life in people living with HIV/AIDS. PhD [dissertation]. Atlanta: Emory University; 2013.
44. Dennis AM, Wheeler JB, Valera E, Hightow-Weidman L, Napravnik S, Swygard H, et al. HIV risk behaviors and sociodemographic features of HIV-infected Latinos residing in a new Latino settlement area in the Southeastern United States. *AIDS Care*. 2013; 25(10):1298–307. <https://doi.org/10.1080/09540121.2013.764964> PMID: 23384328
45. Dias S, Gama A, Severo M, Barros H. Factors associated with HIV testing among immigrants in Portugal. *International Journal of Public Health*. 2011; 56(5):559–66. <https://doi.org/10.1007/s00038-010-0215-7> PMID: 21057852

46. Elford J, Doerner R, McKeown E, Nelson S, Anderson J, Low N. HIV infection among ethnic minority and migrant men who have sex with men in Britain. *Sexually Transmitted Diseases*. 2012; 39(9):678–86. <https://doi.org/10.1097/OLQ.0b013e31825c8018> PMID: 22902663
47. Elford J, McKeown E, Doerner R, Nelson S, Low N, Anderson J. Sexual health of ethnic minority MSM in Britain (MESH project): design and methods. *BMC Public Health*. 2010; 10:419. <https://doi.org/10.1186/1471-2458-10-419> PMID: 20630087
48. Evans AR, Hart GJ, Mole R, Mercer CH, Parutis V, Gerry CJ, et al. Central and east European migrant men who have sex with men: an exploration of sexual risk in the U.K. *Sexually Transmitted Infections*. 2011; 87(4):325–30. <https://doi.org/10.1136/sti.2010.046409> PMID: 21147893
49. Evans C, Suggs LS, Turner K, Occa A, Juma A, Blake H. Mobile phone messaging to promote uptake of HIV testing among migrant African communities in the UK. *Health Education Journal*. 2019; 78(1):24–37. <https://doi.org/10.1177/0017896918785928>
50. Fakoya I, Alvarez-Del Arco D, Copas AJ, Teixeira B, Block K, Genotte AF, et al. Factors associated with access to HIV testing and primary care among migrants living in Europe: cross-sectional survey. *JMIR Public Health and Surveillance*. 2017; 3(4):e84. <https://doi.org/10.2196/publichealth.7741> PMID: 29109072
51. Fenton KA, Chinouya M, Davidson O, Copas A. HIV testing and high risk sexual behaviour among London's migrant African communities: a participatory research study. *Sexually Transmitted Infections*. 2002; 78:241–5. <https://doi.org/10.1136/sti.78.4.241> PMID: 12181459
52. Fernandez-Esquer ME, Atkinson J, Diamond P, Useche B, Mendiola R. Condom use self-efficacy among U.S. and foreign-born Latinos in Texas. *Journal of Sex Research*. 2004; 41(4):390–9. <https://doi.org/10.1080/00224490409552246> PMID: 15765279
53. Fitzgerald K, Chakraborty J, Shah T, Khuder S, J. D. HIV/AIDS knowledge among female migrant farm workers in the Midwest. *Journal of Immigrant Health* 2003; 5:29–36. <https://doi.org/10.1023/a:1021000228911> PMID: 14512756
54. Ford K, Chamrathirong A. Sexual partners and condom use of migrant workers in Thailand. *AIDS and Behavior*. 2007; 11(6):905–14. <https://doi.org/10.1007/s10461-007-9207-x> PMID: 17323124
55. Foster R, McCormack L, Thng C, Wand H, McNulty A. Cross-sectional survey of Chinese-speaking and Thai-speaking female sex workers in Sydney, Australia: factors associated with consistent condom use. *Sexual Health*. 2018; 15(5):389–95. <https://doi.org/10.1071/SH17205> PMID: 30131098
56. Getrich CM, Broidy LM, Kleymann E, Helitzer DL, Kong AS, Sussman AL. Different models of HPV vaccine decision-making among adolescent girls, parents, and health-care clinicians in New Mexico. *Ethnicity and Health*. 2014; 19(1):47–63. <https://doi.org/10.1080/13557858.2013.857767> PMID: 24261842
57. Goldade K, Nichter MA. Risk perceptions and knowledge of sexually transmitted infections (STIs) and HIV among undocumented Nicaraguan migrant women in Costa Rica. *Annals of Anthropological Practice*. 2010; 34(1):195–212. <https://doi.org/10.1111/j.1556-4797.2010.01059.x>
58. Gray C, Crawford G, Reid A, Lobo R. HIV knowledge and use of health services among people from South-East Asia and sub-Saharan Africa living in Western Australia. *Health Promotion Journal of Australia*. 2018; 29(3):274–81. <https://doi.org/10.1002/hpja.168> PMID: 29687507
59. Grieb SMD, Flores-Miller A, Page KR. Solo Se Vive Una Vez! (You Only Live Once): A pilot evaluation of individually tailored video modules aiming to increase HIV testing among foreign-born Latino men. *Journal of Acquired Immune Deficiency Syndromes*. 2017; 74:S104–S12. <https://doi.org/10.1097/QAI.0000000000001239> PMID: 28079720
60. Hamdiui N, Stein M, Timen A, Timmermans D, Wong A, van den Muijsenbergh M, et al. Hepatitis B in Moroccan-Dutch: a quantitative study into determinants of screening participation. *BMC Medicine*. 2018; 16(1):47. <https://doi.org/10.1186/s12916-018-1034-6> PMID: 29598817
61. Hislop TG, Teh C, Low A, Li L, Tu SP, Yasui Y, et al. Hepatitis B knowledge, testing and vaccination levels in Chinese immigrants to British Columbia, Canada. *Canadian Journal of Public Health* 2007; 98(2):125–9. <https://doi.org/10.1007/BF03404323> PMID: 17441536
62. Hwang JP, Huang CH, Yi JK. Knowledge about hepatitis B and predictors of hepatitis B vaccination among Vietnamese American college students. *Journal of American College Health*. 2008; 56(4):377–82. <https://doi.org/10.3200/JACH.56.4.377-382> PMID: 18316280
63. Jenkins CN, McPhee SJ, Wong C, Nguyen T, Euler GL. Hepatitis B immunization coverage among Vietnamese-American children 3 to 18 years old. *Pediatrics*. 2000; 106(6):E78. <https://doi.org/10.1542/peds.106.6.e78> PMID: 11099621
64. Johnston LG. Regional migrant health survey on tuberculosis and HIV and health service response for migrants in Armenia, Azerbaijan and Georgia. Switzerland: 2019.

65. Joseph NP, Belizaire M, Porter CL, Walsh JP, Esang M, Goff G, et al. Ethnic differences in perceived benefits and barriers to HPV vaccine acceptance: a qualitative analysis of young African American, Haitian, Caucasian, and Latino men. *Clinical Pediatrics*. 2014; 53(2):177–85. <https://doi.org/10.1177/0009922813515944> PMID: 24403292
66. Juon HS, Strong C, Kim F, Park E, Lee S. Lay health worker intervention improved compliance with hepatitis B vaccination in Asian Americans: randomized controlled trial. *PLoS ONE*. 2016; 11(9): e0162683. <https://doi.org/10.1371/journal.pone.0162683> PMID: 27617742
67. Juon HS, Lee S, Strong C, Rimal R, Kirk GD, Bowie J. Effect of a liver cancer education program on hepatitis B screening among Asian Americans in the Baltimore-Washington metropolitan area, 2009–2010. *Preventing Chronic Disease*. 2014; 11:130258. <https://doi.org/10.5888/pcd11.130258> PMID: 24503341
68. Kara RG. Predicting HIV testing intention among recent African immigrants. PhD [dissertation]. Minneapolis: Walden University; 2012.
69. Kuehne A, Koschollek C, Santos-Hövenner C, Thorlie A, Müllerschön J, Tshibadi CM, et al. Impact of HIV knowledge and stigma on the uptake of HIV testing—Results from a community-based participatory research survey among migrants from sub-Saharan Africa in Germany. *PLoS ONE*. 2018; 13(4):1–19. <https://doi.org/10.1371/journal.pone.0194244> PMID: 29641527
70. Leite L, Buresh M, Rios N, Conley A, Flys T, Page KR. Cell phone utilization among foreign-born Latinos: a promising tool for dissemination of health and HIV information. *Journal of Immigrant & Minority Health*. 2014; 16(4):661–9. <https://doi.org/10.1007/s10903-013-9792-x> PMID: 23440452
71. Lessard D, Lebouche B, Engler K, Thomas R, Machouf N. Explaining the appeal for immigrant men who have sex with men of a community-based rapid HIV-testing site in Montreal (Actuel sur Rue). *AIDS Care*. 2015; 27(9):1098–103. <https://doi.org/10.1080/09540121.2015.1028880> PMID: 25849524
72. Lin P, Simoni JM, Zemon V. The health belief model, sexual behaviors, and HIV risk among Taiwanese immigrants. *AIDS Education and Prevention*. 2005; 17(5):469–83. <https://doi.org/10.1521/aeap.2005.17.5.469> PMID: 16255642
73. Lofters AK, Vahabi M, Fardad M, Raza A. Exploring the acceptability of human papillomavirus self-sampling among Muslim immigrant women. *Cancer Management and Research*. 2017; 9:323–9. <https://doi.org/10.2147/CMAR.S139945> PMID: 28769590
74. Loos J, Manirankunda L, Platteau T, Albers L, Franssen K, Vermoesen T, et al. Acceptability of a community-based outreach HIV-testing intervention using oral fluid collection devices and web-based HIV test result collection among sub-Saharan African migrants: A mixed-method study. *JMIR Public Health and Surveillance*. 2016; 2(2):e33. <https://doi.org/10.2196/publichealth.5519> PMID: 27493067
75. Manoyos V, Tangmunkongvorakul A, Srithanaviboonchai K, Yangyuenkul S, Grimes RM. Sexual risk-behaviors for HIV infections among young cross-border migrant workers living in urban Chiang Mai, Thailand. *Journal of Health Research*. 2016; 30(5):347–53. <https://doi.org/10.14456/jhr.2016.47>
76. Maxwell AE, Bastani R, Warda US. Pilot test of a single-session AIDS workshop for young Hispanic U.S. immigrants. *Journal of Immigrant Health*. 2002; 4(2):73–9. <https://doi.org/10.1023/A:1014594408471> PMID: 16228762
77. Miller J, Guarnaccia P, Fasina A. AIDS knowledge among Latinos: the roles of language, culture, and socioeconomic status. *Journal of Immigrant Health*. 2002; 4:63–72. <https://doi.org/10.1023/A:1014542324401> PMID: 16228761
78. Montealegre JR. Prevalence of HIV risk-related behaviors among undocumented Central American immigrant women in Houston, Texas, 2010. PhD [dissertation]. Texas: University of Texas; 2011.
79. Montealegre J, Risser J, Selwyn B, McCurdy S, Sabin K. Effectiveness of respondent driven sampling to recruit undocumented Central American immigrant women in Houston, Texas for an HIV behavioral survey. *AIDS and Behavior*. 2013; 17(2):719–27. <https://doi.org/10.1007/s10461-012-0306-y> PMID: 22961500
80. O'Connor CC, Shaw M, Wen LM, Quine S. Low knowledge and high infection rates of hepatitis in Vietnamese men in Sydney. *Sexual Health*. 2008; 5(3):299–302. <https://doi.org/10.1071/sh07084> PMID: 18771647
81. Ogunbade G. Social capital variables as predictors of HIV risk-taking behaviors among sub-Saharan African immigrants in the United States. PhD [dissertation]. Minneapolis: Walden University; 2010.
82. Organista K, Kubo A. Pilot survey of HIV risk and contextual problems and issues in Mexican/Latino migrant day laborers. *Journal of Immigrant and Minority Health*. 2005; 7(4):269–81. <https://doi.org/10.1007/s10903-005-5124-0> PMID: 19813293
83. Pannetier J, Ravalihasy A, Lydié N, Lert F, Desgrées Du Loué A. Prevalence and circumstances of forced sex and post-migration HIV acquisition in sub-Saharan African migrant women in France: an analysis of the ANRS-PARCOURS retrospective population-based study. *The Lancet Public Health*. 2018; 3(1):e16–e23. [https://doi.org/10.1016/S2468-2667\(17\)30211-6](https://doi.org/10.1016/S2468-2667(17)30211-6) PMID: 29307383

84. Platt L, Grenfell P, Bonell C, Creighton S, Wellings K, Parry J, et al. Risk of sexually transmitted infections and violence among indoor-working female sex workers in London: the effect of migration from Eastern Europe. *Sexually Transmitted Infections*. 2011; 87(5):377–84. <https://doi.org/10.1136/sti.2011.049544> PMID: 21572111
85. Plewes K, Lee T, Kajeechewa L, Thwin MM, Lee SJ, Carrara VI, et al. Low seroprevalence of HIV and syphilis in pregnant women in refugee camps on the Thai-Burma border. *International Journal of STD and AIDS*. 2008; 19(12):833–7. <https://doi.org/10.1258/ijsa.2008.008034> PMID: 19050214
86. Ramanathan V, Sitharthan G. Safe sex practices of Indian immigrant men living in Australia: an exploratory research. *Indian Journal of Public Health*. 2014; 58(4):274–7. <https://doi.org/10.4103/0019-557X.146295> PMID: 25491521
87. Rangel MG, Martinez-Donate AP, Hovell MF, Santibanez J, Sipan CL, Izazola-Licea JA. Prevalence of risk factors for HIV infection among Mexican migrants and immigrants: Probability survey in the north border of Mexico. *Salud Publica De Mexico*. 2006; 48(1):3–12. <https://doi.org/10.1590/s0036-36342006000100003> PMID: 16555529
88. Saenz CD. Health risks and health-seeking behaviors of migrant and seasonal farmworkers on the US-Mexico border. PhD [dissertation]. Texas: University of Texas; 2010.
89. Salabarria-Pena Y, Lee JW, Montgomery SB, Hopp HW, Muralles AA. Determinants of female and male condom use among immigrant women of Central American descent. *AIDS and Behavior*. 2003; 7(2):163–74. <https://doi.org/10.1023/a:1023998308892> PMID: 14586201
90. Salehi R. Indicators of access to sexual health services for Toronto newcomer youth. PhD [dissertation]. Canada: York University; 2011.
91. Santos-Hovener C, Marcus U, Koschollek C, Oudini H, Wiebe M, Ouedraogo OI, et al. Determinants of HIV, viral hepatitis and STI prevention needs among African migrants in Germany: a cross-sectional survey on knowledge, attitudes, behaviors and practices. *BMC Public Health*. 2015; 15:753. <https://doi.org/10.1186/s12889-015-2098-2> PMID: 26246382
92. Selvey LA, Lobo RC, McCausland KL, Donovan B, Bates J, Hallett J. Challenges facing Asian sex workers in Western Australia: implications for health promotion and support services. *Frontiers in Public Health*. 2018; 6:171. <https://doi.org/10.3389/fpubh.2018.00171> PMID: 29951477
93. Shiau R, Bove F, Henne J, Zola J, Fang T, Fernyak S. Using survey results regarding hepatitis B knowledge, community awareness and testing behavior among Asians to improve the San Francisco hep B free campaign. *Journal of Community Health*. 2012; 37(2):350–64. <https://doi.org/10.1007/s10900-011-9452-9> PMID: 21874365
94. Şimşek Z, Yentur Doni N, Gül Hilali N, Yildirimkaya G. A community-based survey on Syrian refugee women's health and its predictors in Şanlıurfa, Turkey. *Women and Health*. 2018; 58(6):617–31. <https://doi.org/10.1080/03630242.2017.1321609> PMID: 28430082
95. Spadafino JT, Martinez O, Levine EC, Dodge B, Munoz-Laboy M, Fernandez MI. Correlates of HIV and STI testing among Latino men who have sex with men in New York City. *AIDS Care*. 2016; 28(6):695–8. <https://doi.org/10.1080/09540121.2016.1147017> PMID: 26886172
96. Srithanaviboonchai K, Choi K, van Griensven F, Hudes E, Visaruratana S, Mandel J. HIV-1 in ethnic Shan migrant workers in northern Thailand. *AIDS*. 2002; 16(1):929–31.
97. Stromdahl S, Liljeros F, Thorson AE, Persson KI, Forsberg BC. HIV testing and prevention among foreign-born men who have sex with men: an online survey from Sweden. *BMC Public Health*. 2017; 17(1):139. <https://doi.org/10.1186/s12889-016-3992-y> PMID: 28143465
98. Sumari-de Boer IM, Sprangers MA, Prins JM, Nieuwkerk PT. HIV stigma and depressive symptoms are related to adherence and virological response to antiretroviral treatment among immigrant and indigenous HIV infected patients. *AIDS and Behavior*. 2012; 16(6):1681–9. <https://doi.org/10.1007/s10461-011-0112-y> PMID: 22198315
99. Taylor VM, Jackson JC, Pineda M, Pham P, Fischer M, Yasui Y. Hepatitis B knowledge among Vietnamese immigrants: implications for prevention of hepatocellular carcinoma. *Journal of Cancer Education*. 2000; 15(1):51–5. <https://doi.org/10.1080/08858190009528654> PMID: 10730805
100. Taylor VM, Jackson JC, Chan N, Kuniyuki A, Yasui Y. Hepatitis B knowledge and practices among Cambodian American women in Seattle, Washington. *Journal of Community Health*. 2002; 27(3):151–63. <https://doi.org/10.1023/a:1015229405765> PMID: 12027266
101. Taylor VM, Choe JH, Yasui Y, Li L, Burke N, Jackson JC. Hepatitis B awareness, testing, and knowledge among Vietnamese American men and women. *Journal of Community Health*. 2005; 30(6):477–90. <https://doi.org/10.1007/s10900-005-7282-3> PMID: 16370056
102. Taylor VM, Tu SP, Woodall E, Acorda E, Chen H, Choe J, et al. Hepatitis B knowledge and practices among Chinese immigrants to the United States. *Asian Pacific Journal of Cancer Prevention*. 2006; 7(2):313–7. PMID: 16839229

103. Taylor VM, Seng P, Acorda E, Sawm L, Li L. Hepatitis B knowledge and practices among Cambodian immigrants. *Journal of Cancer Education*. 2009; 24(2):100–4. <https://doi.org/10.1080/08858190802664750> PMID: 19431024
104. Thompson MJ, Taylor VM, Jackson JC, Yasui Y, Kuniyuki A, Tu SP, et al. Hepatitis B knowledge and practices among Chinese American women in Seattle, Washington. *Journal of Cancer Education*. 2002; 17(4):222–6. <https://doi.org/10.1080/08858190209528842> PMID: 12556060
105. Tu RS, Li L, Tsai JH, Yip MP, Terasaki G, Teh C, et al. A cross-border comparison of hepatitis B testing among Chinese residing in Canada and the United States. *Asian Pacific Journal of Cancer Prevention*. 2009; 10(3):483–90. PMID: 19640196
106. UNHCR. HIV and AIDS behavioral surveillance survey (BSS) refugee camps and hosting communities in Kawambwa and Mporokoso, Zambia. Zambia: 2006.
107. UNHCR. Behavioural Surveillance Surveys among refugees and surrounding host population: Kakuma, Kenya. 2004.
108. Uribe CL, Darrow WW, Villanueva LP, Obiaja KC, Sanchez-Brana E, Gladwin H. Identifying HIV risk-reduction strategies for Hispanic populations in Broward County. *Annals of Epidemiology*. 2009; 19(8):567–74. <https://doi.org/10.1016/j.annepidem.2009.04.006> PMID: 19576537
109. Van der Veen YJJ, Voeten H, de Zwart O, Richardus JH. Awareness, knowledge and self-reported test rates regarding hepatitis B in Turkish-Dutch: a survey. *BMC Public Health*. 2010; 10:7. <https://doi.org/10.1186/1471-2458-10-7>
110. Viadro CI, Earp JA. The sexual behavior of married Mexican immigrant men in North Carolina. *Social Science and Medicine*. 2000; 50(5):723–35. [https://doi.org/10.1016/s0277-9536\(99\)00305-6](https://doi.org/10.1016/s0277-9536(99)00305-6) PMID: 10658852
111. Villarreal KM, Wiley DC, Housman J, Martinez-Ramos G. Attitudes about partner communication regarding contraceptive use among Hispanic male college students. *Journal of American College Health*. 2016; 64(4):279–87. <https://doi.org/10.1080/07448481.2015.1117467> PMID: 26731287
112. Westmaas AH, Kok G, Vriens P, Gotz H, Richardus JH, Voeten H. Determinants of intention to get tested for STI/HIV among the Surinamese and Antilleans in the Netherlands: results of an online survey. *BMC Public Health*. 2012; 12:961. <https://doi.org/10.1186/1471-2458-12-961> PMID: 23136830
113. Yau AHL, Ford JA, Kwan PWC, Chan J, Choo Q, Lee TK, et al. Hepatitis B awareness and knowledge in Asian communities in British Columbia. *Canadian Journal of Gastroenterology and Hepatology*. 2016;8. <https://doi.org/10.1155/2016/4278724> PMID: 27446839
114. Zellner JA, Martínez-Donate AP, Sañudo F, Fernández-Cerdeño A, Sipan CL, Hovell MF, et al. The interaction of sexual identity with sexual behavior and its influence on HIV risk among Latino men: results of a community survey in northern San Diego County, California. *American Journal of Public Health*. 2009; 99(1):125–32. <https://doi.org/10.2105/AJPH.2007.129809> PMID: 19008512
115. Zhussupov B, McNutt LA, Gilbert L, Terlikbayeva A, El-Bassel N. Migrant workers in Kazakhstan: gender differences in HIV knowledge and sexual risk behaviors. *AIDS and Behavior*. 2015; 19(7):1298–304. <https://doi.org/10.1007/s10461-014-0914-9> PMID: 25294629
116. Gerbert B, Bronstone A, McPhee S, Pantilat S, Allerton M. Development and testing of an HIV-risk screening instrument for use in health care settings. *American Journal of Preventive Medicine*. 1998; 15(2):103–13. [https://doi.org/10.1016/s0749-3797\(98\)00025-7](https://doi.org/10.1016/s0749-3797(98)00025-7) PMID: 9713665
117. Lux KM, Petosa R. Preventing HIV infection among juvenile delinquents: educational diagnosis using the health belief model. *International Quarterly of Community Health Education*. 1994; 15(2):145–64. <https://doi.org/10.2190/WTBA-HVC1-R16N-RR75> PMID: 20841024
118. Zagumny MJ, Brady DB. Development of the AIDS Health Belief Scale (AHBS). *AIDS Education and Prevention*. 1998; 10(2):173–9. PMID: 9573437
119. Smith A, Agius P, Dyson SM, A, Pitts M. Secondary students and sexual health 2002: Results of the 3rd national survey of Australian secondary students HIV/AIDS and sexual health. Melbourne: Australian Research Centre in Sex, Health and Society, 2003.
120. Marín BV, Gómez CA, Tschann JM, Gregorich SE. Condom use in unmarried Latino men: a test of cultural constructs. *Health Psychology*. 1997; 16(5):458–67. <https://doi.org/10.1037//0278-6133.16.5.458> PMID: 9302543
121. Marín BV, Tschann JM, Gómez CA, Gregorich S. Self-efficacy to use condoms in unmarried Latino adults. *American Journal of Community Psychology*. 1998; 26(1):53–71. <https://doi.org/10.1023/a:1021882107615> PMID: 9574498
122. Dodds C, Hickson F, Weatherburn P, Reid D, Hammond G, Jessup K, et al. BASS Line 2007 survey: Assessing the sexual HIV prevention needs of African people in England. London: London School of Hygiene and Tropical Medicine, 2008.

123. World Health Organization. Behavioral surveillance surveys (BSS) [Available from: <https://www.who.int/hiv/strategic/pubbss/en/>].
124. National Archive of Computerized Data on Aging. National health interview survey series 2020. [Available from: <https://www.icpsr.umich.edu/web/NACDA/series/40/>].
125. Kelley K, Clark B, Brown V, Sitzia J. Good practice in the conduct and reporting of survey research. *International Journal for Quality in Health Care*. 2003; 15(3):261–6. <https://doi.org/10.1093/intqhc/mzg031> PMID: 12803354
126. Vandembroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the reporting of observational studies in epidemiology (STROBE): explanation and elaboration. *PLOS Medicine*. 2007; 4(10):e297. <https://doi.org/10.1371/journal.pmed.0040297> PMID: 17941715
127. Bennett C, Khangura S, Brehaut JC, Graham ID, Moher D, Potter BK, et al. Reporting guidelines for survey research: an analysis of published guidance and reporting practices. *PLOS Medicine*. 2011; 8(8):e1001069. <https://doi.org/10.1371/journal.pmed.1001069> PMID: 21829330
128. Draucker CB, Martsof DS, Poole C. Developing distress protocols for research on sensitive topics. *Archives of Psychiatric Nursing*. 2009; 23(5):343–50. <https://doi.org/10.1016/j.apnu.2008.10.008> PMID: 19766925
129. Groves RM. Three eras of survey research. *Public Opinion Quarterly*. 2011; 75(5):861–71. <https://doi.org/10.1093/poq/nfr057>
130. Smyth J, Pearson J. Internet survey methods: a review of strengths, weaknesses, and innovation In: Das M, Ester P, Kaczmarek L, editors. *Social and behavioral research and the internet: advances in applied methods and research strategies*. New York: Routledge 2011. p. 11–44.
131. Poynton TA, DeFouw ER, Morizio LJ. A systematic review of online response rates in four counseling journals. *Journal of Counseling and Development*. 2019; 97(1):33–42. <https://doi.org/10.1002/jcad.12233>
132. Martin P. A good mix? Mixed mode data collection and cross-national surveys. *ASK Research and Methods*. 2011; 20(1):5–26.
133. De Leeuw E. To mix or not to mix data collection modes in surveys. *Journal of Official Statistics*. 2005; 21(2):233–55.
134. Caspar R, Peytcheva E, Yan T, Lee S, Liw M, Hu M. Pretesting. In: Centre for Social Research, editor. *Guidelines for best-practice in cross-cultural surveys*. Ann Arbor: Survey Research Centre 2016.
135. Survey Research Center. *Guidelines for best practice in cross-cultural surveys*. Ann Arbor: 2016.
136. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandembroucke JP. Strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *PLoS medicine*. 2007; 4(10):e296. <https://doi.org/10.1371/journal.pmed.0040296> PMID: 17941714
137. Joanna Briggs Institute. *Critical Appraisal Tools 2017*. [Available from: https://joannabriggs.org/ebp/critical_appraisal_tools/].
138. CASP UK. *CASP Checklists 2020*. [Available from: <https://casp-uk.net/casp-tools-checklists/>].
139. Méndez M, Font J. Surveying immigrant populations: Methodological strategies, good practices and open questions. In: Méndez M, Font J, editors. *surveying ethnic minorities and immigrant populations. Methodological challenges and research strategies*. Amsterdam University Press; 2013. p. 271–90.