**Supplementary Information**

**HIV epidemiology among female sex workers and their clients in the Middle East and North Africa: Systematic review, meta-analyses, and meta-regressions**

Hiam Chemaitelly MSc,\*1,3 Helen A. Weiss PhD,2,3 Clara Calvert PhD,3 Manale Harfouche MPh,1 and Laith J. Abu-Raddad PhD1,4,5

*1Infectious Disease Epidemiology Group, Weill Cornell Medicine-Qatar, Cornell University, Qatar Foundation – Education City, Doha, Qatar*

*2MRC Tropical Epidemiology Group, London School of Hygiene and Tropical Medicine, London, United Kingdom*

*3Department of Infectious Disease Epidemiology, Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, United Kingdom*

*4Department of Healthcare Policy & Research, Weill Cornell Medicine, Cornell University, New York, New York, USA*

5College of Health and Life Sciences, Hamad bin Khalifa University, Doha, Qatar

**\*Reprintsorcorrespondence**

Hiam Chemaitelly, Weill Cornell Medicine-Qatar, Qatar Foundation - Education City, P.O. Box 24144, Doha, Qatar. Telephone: +(974) 4492-8443. Fax: +(974) 4492-8422. E-mail: [hsc2001@qatar-med.cornell.edu](mailto:hsc2001@qatar-med.cornell.edu)

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**Table S1** Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist [1]

| Section/topic | # | Checklist item | Reported in main text |
| --- | --- | --- | --- |
|  | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | p. 1 |
|  | | | |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | p. 2-3 |
|  | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | p. 4 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | p. 4-5 |
|  | | | |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | NA |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | p. 5-6 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | p. 5 & Box S1 in SI |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | Box S1 in SI |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | p. 5-6 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | p. 6-7 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | p. 6-7 & Box S2 in SI |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | p. 7-8 & Table S2 in SI |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | p. 8 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis. | p.6-8 & Table 5 |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | p. 7-8 & Table S2 in SI |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | p. 8-9 & S3 Table in SI |
|  | | | |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | p. 9-10 & Fig. 1 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | p.10-11, Tables 1-4, and Tables S4 & S5in SI |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12). | p. 12 & Tables S6-S9 in SI |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot. | p. 10-11, Tables 1-4 & Tables S4-S5 in SI |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | p.12-13 & Table 5 |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | p. 12 & Tables S6-S9 in SI |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | p. 13-17, Table 6, & Tables S10-S15 in SI |
| DISCUSSION | | | |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers). | p. 18-22 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias). | p. 22-23 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | p. 23-24 |
|  | | | |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | p. 26 |

*Abbreviations*: *NA* not applicable, *P* page(s), *SI* Supporting information

**Fig. S1** Map of the Middle East and North Africa region. The definition for this region covers 23 countries including Afghanistan, Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Somalia, Sudan (available studies for Sudan before 2011, the year of independence of South Sudan, may have come from both Sudan and the newly indpendent Republic of South Sudan), Syria, Tunisia, United Arab Emirates (UAE), and Yemen. This definition is based on definitions of the World Health Organization, the Joint United Nations Programme on HIV/AIDS, and the World Bank [2]

**C:\Users\Hiam Chemaitelly\Box Sync\Work-PhD\Tables Hiam\Map\Haim map2.tif**

**Box S1** Search criteria for the systematic review of size estimation, HIV incidence, and HIV prevalence studies in FSWs and their clients, in the Middle East and North Africa (MENA)

|  |
| --- |
| **PubMed** (July 29, 2018) |
| ***Sex work*** |
| "Extramarital Relations"[Mesh] OR “Sex Work\*”[Mesh] OR "Sex/analysis"[Mesh] OR "Sex/statistics and numerical data"[Mesh] OR "Sexual partners"[Mesh] OR "Sex Trafficking/epidemiology"[Mesh] OR "Sex Trafficking/statistics and numerical data"[Mesh] OR Sex work\*[Text] OR Sexual work\*[Text] OR Sexwork\*[Text] OR Sex-work\*[Text] OR Sexual partner\*[Text] OR Sex partner\*[Text] OR Sexual contact\*[Text] OR FSW[Text] OR FSWs[Text] OR CSW[Text] OR CSWs[Text] OR SW[Text] OR SWs[Text] OR TSW[Text] OR TSWs[Text] OR TS[Text] OR Travailleuse\* sexe[Text] OR Travailleuse\* sex[Text] OR Bar girl\*[Text] OR Callgirl\*[Text] OR Call girl\*[Text] OR Escort\*[Text] OR Masseuse\*[Text] OR Hostess\*[Text] OR ((Premarital[Text] OR Pre-marital[Text] OR Pre marital[Text] OR Extramarital[Text] OR Extra-marital[Text] OR Extra marital[Text] OR Illicit[Text] OR Illegal[Text]) AND(Sex[Text] OR Sexual[Text] OR Relation\*[Text])) OR Outside marriage[Text] OR Out of marriage[Text] OR “Illegal social behavior”[Text] OR “Illegal social behaviour”[Text] OR Adultery[Text] OR Prostitut\*[Text] OR Promiscu\*[Text] OR Female entertain\*[Text] OR Sex entertain\*[Text] OR Sexual\* entertain\*[Text] OR Entertainment work\*[Text] OR Sex industr\*[Text] OR Sex establishment\*[Text] OR Brothel\*[Text] OR Red light[Text] OR Red-light[Text] OR Red district\*[Text] OR Nightclub\*[Text] OR Pimp[Text] OR ((Intergenerational[Text] OR Cross-generation\*[Text] OR Cross-generational[Text] OR Recreational[Text] OR Commercial[Text] OR Transaction\*[Text] OR Casual[Text] OR Group[Text] OR Informal[Text] OR Street[Text] OR Migrant\*[Text] OR Survival[Text] OR Occupational[Text] OR Tourism[Text]) AND(Sex[Text] OR Sexual\*[Text])) OR Sex seeking[Text] OR Sex-seeking[Text] OR Solicit\*[Text] OR ((Provision\*[Text] OR Provider\*[Text] OR Provid\*[Text] OR Sell\*[Text] OR Sold[Text] OR Exchang\*[Text] OR Trad\*[Text] OR Favor\*[Text] OR Consum\*[Text] OR Commodi\*[Text] OR Paid[Text] OR Paying[Text] OR Pay[Text] OR Payer\*[Text] OR Buying[Text] OR Buy[Text] OR Buyer\*[Text] OR Charg\*[Text] OR Engag\*[Text] OR Service\*[Text] OR Money[Text] OR Cash[Text] OR Drug\*[Text] OR Goods[Text] OR Gift\*[Text]) AND (Sex[Text] OR Sexual\*[Text])) OR Hidden population\*[Text] OR Hard to reach population\*[Text] OR Hard-to-reach population\*[Text] OR Core group\*[Text] OR Core risk group\*[Text] OR Vulnerable women[Text] OR Vulnerable population\*[Text] OR Vulnerable female\*[Text] OR Most-at-risk population\*[Text] OR Most at risk population\*[Text] OR High risk population\*[Text] OR High-risk population\*[Text] OR Population\* at high risk[Text] OR Population\* at high-risk[Text] OR ((Traffick\*[Text] OR Slave\*[Text] OR Coerc\*[Text] OR Abduct\*[Text] OR Exploit\*[Text] OR Abuse\*[Text] OR Violence[Text]) AND(Sex[Text] OR Sexual\*[Text])) |
| ***MENA*** |
| "Middle East"[Mesh] OR "Islam"[Mesh] OR "Arabs"[Mesh] OR "Arab World"[Mesh] OR "Africa, Northern"[Mesh] OR "Sudan"[Mesh] OR "Somalia"[Mesh] OR "Djibouti"[Mesh] OR "Pakistan"[Mesh] OR “South Sudan”[Mesh] OR "Middle East\*"[Text] OR "Middle-East"[Text] OR "North Africa\*"[Text] OR "North-Africa"[Text] OR "EMRO"[Text] OR "Eastern Mediterranean"[Text] OR “Arab\*”[Text] OR “Arab World”[Text] OR "Islam\*"[Text] OR "Afghanistan"[Text] OR "Afghan\*"[Text] OR "Algeria\*"[Text] OR "Bahrain\*"[Text] OR "Djibouti"[Text] OR "Egypt\*"[Text] OR "Jordan\*"[Text] OR "Kuwait\*"[Text] OR "Lebanon"[Text] OR "Leban\*"[Text] OR "Libya\*"[Text] OR "Iran\*"[Text] OR "Iraq\*"[Text] OR "Morocco"[Text] OR “Moroccan\*”[Text] OR "Oman\*"[Text] OR "Pakistan\*"[Text] OR "Qatar\*"[Text] OR "Saudi\*"[Text] OR "Somalia"[Text] OR "Somal\*"[Text] OR "Sudan\*"[Text] OR "Syria\*"[Text] OR "Tunisia\*"[Text] OR "United Arab Emirates"[Text] OR "Emirat\*"[Text] OR "West Bank"[Text] OR "Ghaza\*"[Text] OR "Gaza\*"[Text] OR "Palestine"[Text] OR "Palestinian\*"[Text] OR "Yemen\*"[Text] OR “UAE”[Text] OR “KSA”[Text] |
| ***Women*** |
| "Female/analysis"[Mesh] OR "Female/statistics and numerical data"[Mesh] OR “Women/epidemiology”[Mesh] OR “Women/statistics and numerical data”[Mesh] OR Women[Text] OR Girl\*[Text] OR Female\*[Text] |
| ***Clients/Men*** |
| “Male/complications"[Mesh] OR "Male/diagnosis"[Mesh] OR "Men/statistics and numerical data"[Mesh] OR Men[Text] OR Male[Text] OR Males[Text] OR Client\*[Text] OR Paying partner\*[Text] OR Sugar daddy[Text] OR Sugar daddies[Text] |
|  |
| **FINAL PUBMED SEARCH** |
| **(“Sex work” AND “MENA” AND “Women”) OR (“Sex work” AND “MENA” AND “Clients/Men”)** |
|  |
| **Embase** (July 29, 2018) |
| ***Sex work*** |
| exp prostitution/ or exp casual sex/ or exp transactional sex/ or exp group sex/ or exp sex tourism/ or exp sexual promiscuity/ or exp extramarital sex/ or exp premarital sex/ or exp sexual relation/ or exp sexual partners/ or ((exp sex trafficking/ or exp sexual exploitation/ or exp sexual coercion/) NOT Child) or (sex\* work\* or sexwork\* or sex-work\* or sex partner\* or sexual partner\* or sexual contact\* or premarital sex or premarital sexual or premarital relation\* or pre-marital sex or pre-marital sexual or pre-marital relation\* or pre marital sex or pre marital sexual or pre marital relation\* or extramarital sex or extramarital sexual or extramarital relation\* or extra-marital sex or extra-marital sexual or extra-marital relation\* or extra marital sex or extra marital sexual or extra marital relation\* or illicit sex or illicit sexual or illicit relation\* or illegal sex or illegal sexual or illegal relation\* or (out\* ADJ1 marriage) or illegal social behavio?r or adultery or prostitut\* or promiscu\* or FSW or FSWs or CSW or CSWs or SW or SWs or TSW or TSWs or TS or (women ADJ4 sex\*) or (Travailleuse\* ADJ1 sex\*) or bar girl\* or call girl\* or callgirl\* or escort\* or masseuse\* or hostess\* or female entertain\* or sex entertain\* or sexual entertain\* or entertainment work\* or sex industr\* or sex establishment\* or brothel\* or red light or red-light or (red ADJ1 district\*) or nightclub\* or pimp or recreation\* sex\* or intergenerational sex\* or cross-generation sex\* or cross-generational sex\* or commercial sex\* or transactional sex\* or sex\* transaction\* or casual sex\* or informal sex\* or group sex\* or street sex\* or (migra\* ADJ4 sex\*) or (sex\* ADJ4 migra\*) or survival sex\* or occupational sex\* or sex\* tourism or sex seeking or sex-seeking or solicit\* or (consum\* ADJ4 sex\*) or (sex\* ADJ 4 consumer) or (sex\* ADJ4 consumers) or (sex\* ADJ4 provi\*) or (provi\* ADJ4 sex\*) or (sell\* ADJ4 sex\*) or (sex\* ADJ4 sell\*) or sold sex\* or (exchang\* ADJ4 sex\*) or (sex\* ADJ4 exchange) or (trading ADJ4 sex\*) or (trade\* ADJ4 sex\*) or sex\* trade or sex\* favor\* or (commodi\* ADJ4 sex\*) or (sex\* ADJ4 commodi\*) or (paid ADJ4 sex\*) or (pay\* ADJ4 sex\*) or (sex\* ADJ4 pay\*) or (buy\* ADJ4 sex\*) or (sex\* ADJ4 buy\*) or (charg\* ADJ4 sex\*) or (sex\* ADJ4 charg\*) or (engag\* ADJ4 sex\*) or (sex\* ADJ4 engage\*) or (sex\* ADJ4 service\*) or (service\* ADJ4 sex\*) or (money ADJ4 sex\*) or (sex\* ADJ4 money) or (cash ADJ4 sex\*) or (sex\* ADJ4 cash) or (sex\* ADJ4 drug\*) or (drug\* ADJ4 sex\*) or (sex\* ADJ4 goods) or (goods ADJ4 sex\*) or (sex\* ADJ4 gift\*) or (gift\* ADJ4 sex\*) or hidden population\* or hard to reach population\* or hard-to-reach population\* or (core ADJ1 group\*) or vulnerable women or vulnerable female\*).mp. or ((vulnerable population\* or most-at-risk population\* or most at risk population\* or high risk population\* or high-risk population\* or population\* at high risk or population\* at high-risk).mp. AND (sex\* or infection\* or STI or STIs or STD or STDs or human immunodeficiency virus or HIV\* or AIDS\* or acquired immune deficiency syndrome or acquired immunodeficiency syndrome).mp.) or ((sex trafficking or sexual trafficking or (traffick\* ADJ4 sex\*) or sex\* slave\* or sex\* coerc\* or sex\* abduct\* or sex\* exploit\* or sex\* abuse\* or sex\* violence) NOT Child).mp. or ((women ADJ4 traffick\*) or (girls ADJ4 traffick\*) or (female\* ADJ4 traffick\*) or (traffick\* ADJ4 women) or (traffick\* ADJ4 girls) or (traffick\* ADJ4 female\*)).mp. |
| ***MENA*** |
| exp Middle East/ or exp North Africa/ or exp Arab/ or exp Afghanistan/ or exp Djibouti/ or exp Pakistan/ or exp Somalia/ or exp Sudan/ or exp South Sudan/ or Middle East.mp. or North Africa.mp. or EMRO.mp. or Eastern Mediterranean.mp. or Arab.mp. or Arabs.mp. or Arab World.mp. or Islam.mp. or Afghanistan.mp. or Afghan\*.mp. or Algeria\*.mp. or Bahrain\*.mp. or Djibouti.mp. or Egypt\*.mp. or Jordan\*.mp. or Kuwait\*.mp. or Leban\*.mp. or Libya\*.mp. or Iran\*.mp. or Iraq\*.mp. or Morocc\*.mp. or Oman\*.mp. or Pakistan\*.mp. or Qatar\*.mp. or Saudi\*.mp. or Somal\*.mp. or Sudan\*.mp. or Syria\*.mp. or Tunisia\*.mp. or United Arab Emirates.mp. or Emirat\*.mp. or West Bank.mp. or Ghaza\*.mp. or Gaza\*.mp. or Palestin\*.mp. or Yemen\*.mp. or UAE.mp. or KSA.mp. |
| ***Women*** |
| exp female/ or (women or girl\* or female\*).mp. |
| ***Clients/Men*** |
| exp male/ or (client\* or (paying ADJ1 partner\*) or sugar dadd\* or men or male\*).mp. |
|  |
| **FINAL EMBASE SEARCH** |
| **(“Sex work” AND “MENA” AND “Women”) OR (“Sex work” AND “MENA” AND “Clients/Men”)** |
|  |
| **Regional databases** |
| **HIV and AIDS Asia Pacific Research Statistical Data Information** (May 27, 2018) |
| Keyword search for: “Afghanistan” and “Pakistan” |
|  |
| **Iran Scientific Information Database** (July 23, 2018**)** |
| Keyword search for: “HIV”, “AIDS”, “Human immunodeficiency virus”, “Acquired immune deficiency syndrome”, “sex work”, “prostitute”, “size estim”, and “sexually transmitted infection” |
|  |
| **Iraq Academic Scientific Journals database** (July 23, 2018) |
| Keyword search for: “HIV OR AIDS”, “HIV”, “Human immunodeficiency virus”, “Acquired immune deficiency syndrome”, “sex work”, “prostitute”, “commercial sex”, “size estimation”, and “sexually transmitted infection” |
|  |
| **MENA HIV/AIDS Epidemiology Synthesis Project database** (June 01, 2018) |
| Hand search of all documents in the database |
|  |
| **PakMediNet** (July 23, 2018) |
| Keyword search for: “HIV”, “AIDS”, “Human immunodeficiency virus”, “Acquired immune deficiency syndrome”, “sex work”, “prostitute”, “commercial”, “size estimation”, and “sexually transmitted infection” |
|  |
| **US Census Bureau** (July 17, 2018) |
| Keyword search using each MENA country name |
|  |
| **World Health Organization Index Medicus for the Eastern Mediterranean Region** (July 23, 2018) |
| Keyword search for: “HIV OR AIDS”, “Human AND immunodeficiency AND virus”, “Acquired AND immune AND deficiency AND syndrome”, “prostitute”, and “sex AND worker” |
| **World Health Organization Index Medicus for the Eastern Mediterranean Region** (July 27, 2018) |
| Keyword search for: “Algeria”, “Algerie”, “Djibouti”, “Egypt”, “Egypte”, “Libya”, “Libie”, “Maroc”, “Morocco”, “Tunisia”, “Tunisie”, “Somalia”, “Somalie”, “Sudan”, and “Soudan” |
|  |
| **Abstract archives of the International AIDS Society conferences** (July 28, 2018) |
| Keyword search using each MENA country name |

*Abbreviations*: *FSWs* female sex workers

**Box S2** List of extracted variables for the systematic review of HIV epidemiology among FSWs and their clients in the Middle East and North Africa (MENA)

|  |
| --- |
| **Report characteristics** |
| Author(s), year of publication, full citation, type of publication, and source of data |
|  |
| **General study characteristics** |
| Study population and its characteristics, year(s) of data collection, country of origin, country of survey, city, study site, study design, sampling methodology, estimation methodology, sample size, population definition, eligibility criteria, and participation rate |
|  |
| **Studies/outcome measures** |
| Population-size estimates and population proportions of FSWs and clients |
|  |
| HIV incidence (including number followed-up, follw-up time, sero-conversion risk, incidence rate, and details related to outcome ascertainment) |
|  |
| HIV prevalence (including number tested, number antibody positive, and details related to outcome ascertainment) |
|  |
| **Sexual and injecting risk behaviours and contextual measures** |
| Socio-demographic charcateristics and sex work context (age, age at sexual debut, age at sex work intiation, and marital status), |
|  |
| Condom use with clients and partners (over different time frames, types of sexual partnerships-regular/occasional/paying/non-paying, and sexual acts-vaginal/anal) |
|  |
| Types of sexual partnerships (over different time frames) |
|  |
| Injecting risk behaviour (current/recent/history of drug use, injecting drug use, sex with people who inject drugs, and substance use before or during sex) |
|  |
| Knowledge of HIV/AIDS (knowledge of sexual and injecting modes of transmission, and of condom as HIV prevention method) |
|  |
| Perception of risk of exposure to HIV infection |
|  |
| HIV testing (ever, during the past 12 months, received results) |

*Abbreviations*: *FSWs* female sex workers

**Table S2** Quality assessment criteria for size estimation and HIV prevalence studies in FSWs and their clients (or proxy populations of clients) in the Middle East and North Africa, as identified in the systematic review

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Quality domain** | **ROB assessment** | **Criteria** | **Size estimation** | **HIV prevalence** |
| 1. **Validity of sex work definition** | Low ROB | Clear and valid sex work definition/engagement in paid sex clearly established | X | X |
|  | High ROB | Sex work/engagement in paid sex not well-defined/not clearly established |  |  |
|  | Unclear | Sex work definition/information on engagement in paid sex not provided |  |  |
|  |  |  |  |  |
| 1. **Rigor of estimation methodology** | Low ROB | Method likely to yield representative estimate for the number or population proportion of FSWs or clients such as multiplier unique object, time-location geographical mapping, capture-recapture, and network scale-up, among others | X | NA |
|  | High ROB | Method unlikely to yield representative estimate for the number or population proportion of FSWs or clients such as self-report based on convenience sampling |  |  |
|  | Unclear | Information not reported |  |  |
|  |  |  |  |  |
| 1. **Rigor of sampling methodology** | Low ROB | Studies using probability-based sampling | NA | X |
|  | High ROB | Studies using non-probability sampling |  |  |
|  | Unclear | Information not reported |  |  |
|  |  |  |  |  |
| 1. **Response rate** | Low ROB | ≥60% or ≥60% of target sample size reached in studies using RDS or TLS | X | X |
|  | High ROB | <60% or <60% of target sample size reached in studies using RDS or TLS |  |  |
|  | Unclear | Information not reported |  |  |
|  |  |  |  |  |
| 1. **HIV ascertainment** | Low ROB | HIV ascertainment using biological assays | NA | X |
|  | High ROB | HIV ascertainment based on self-report |  |  |
|  | Unclear | Information not reported |  |  |

*Abbreviations*: *FSWs* female sex workers, *NA* not applicable, *RDS* respondent-driven sampling, *ROB* risk of bias assessment, *TLS* time-location sampling

**Table S3** Details of variables and subcategories included in the meta-regression analyses

|  |  |
| --- | --- |
| **Variable** | **Sub-categories** |
| **Country/subregion**\* | 1. Eastern MENA: Afghanistan, Iran, and Pakistan |
|  | 1. Fertile Crescent: Egypt, Iraq, Jordan, Lebanon, Syria |
|  | 1. Bahrain, Kuwait, and Yemen |
|  | 1. Horn of Africa: Djibouti, Somalia, and South Sudan |
|  | 1. North Africa: Algeria, Libya, Morocco, Sudan, and Tunisia |
|  |  |
| **FSW population type** | 1. Street-based, venues-based, and other FSWs |
|  | 1. Bar girls |
|  |  |
| **Total sample size of tested FSWs** | 1. <100 participants |
|  | 1. ≥100 participants |
|  |  |
| **Median year of data collection**\*\* | 1. <1993 |
|  | 1. 1993-2002 |
|  | 1. ≥2003 |
|  |  |
| **Sampling methodology**† | 1. Non-probability sampling |
|  | 1. Probability-based sampling |
|  |  |
| **Response rate** | 1. ≥60% |
|  | 1. <60%/unclear |
|  | 1. Not applicable‡ |
|  |  |
| **Validity of sex work definition** | 1. Clear & valid definition |
|  | 1. Poorly defined/unclear |
|  | 1. Not applicable‡ |
|  |  |
| **HIV ascertainment** | 1. Biological assays |
|  | 1. Self-report/unclear |
|  | 1. Not applicable‡ |

\*Countries were grouped based on geography and similarity in HIV prevalence levels.

\*\*Year grouping was driven by independent evidence identifying the emergence of HIV epidemics among both men who have sex with men [3] and people who inject drugs [4] in multiple MENA countries around 2003.

†Sampling methodology was not included in the meta-regression analyses of clients of FSWs as too few studies used probability-based sampling (only four).

‡Measures extracted only from routine databases with no reports describing the study methodology were not included in the ROB assessment.

*Abbreviations*: *FSWs* female sex workers

**Table S4** Estimates of subnational representation for the number and population proportion of FSWs and of their clients in the Middle East and North Africa (MENA) reported by identified studies

| Country  Author, year [citation] | Year(s) of data collection | City/ province | Estimation methodology | Sample type | Time frame | Reported size estimate | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N | Range | %\* | Range\* |
| FSWs |  |  |  |  |  |  |  |  |  |
| Afghanistan |  |  |  |  |  |  |  |  |  |
| SAR AIDS HDS, 2008 [5] | 2006-07 | Jalalabad | Enumeration (time-location geographical mapping) | Home & street-based FSWs | Current | 90 | NR | 0·26 | NR |
| SAR AIDS HDS, 2008 [5] | 2006-07 | Kabul | Enumeration (time-location geographical mapping) | Home & street-based FSWs | Current | 898 | NR | 0·19 | NR |
| SAR AIDS HDS, 2008 [5] | 2006-07 | Mazar-i-Sharif | Enumeration (time-location geographical mapping) | Home & street-based FSWs | Current | 172 | NR | 0·28 | NR |
| NACP, 2012 [6] (round II) | 2012 | Herat | Multiplier unique object | FSWs | Past 12 M | 2,134 | NR | NR | NR |
| NACP, 2012 [6] (round II) | 2012 | Kabul | Multiplier unique object | FSWs | Past 12 M | 2,800 | NR | NR | NR |
| Djibouti |  |  |  |  |  |  |  |  |  |
| Trellu-Kane, 2005 [7] | 2005 | Djibouti | Conv sample (self-report) | Gen pop (13-24 years) | Past 12 M | NR | NR | 4 | NR |
| Egypt |  |  |  |  |  |  |  |  |  |
| Jacobsen, 2014 [8] | 2014 | Giza | Enumeration (time-location geographical mapping) | FSWs | Current | 6,092 | 1,407-7,615 | 0·17 | NR |
| Jacobsen, 2014 [8] | 2014 | Alexandria | Enumeration (time-location geographical mapping) | FSWs | Current | 4,225 | 1,011-6,500 | 0·34 | NR |
| Jacobsen, 2014 [8] | 2014 | Sharkia | Enumeration (time-location geographical mapping) | FSWs | Current | 1,345 | 448-1,416 | 0·34 | NR |
| Jacobsen, 2014 [8] | 2014 | Red Sea | Enumeration (time-location geographical mapping) | FSWs | Current | 1,315 | 404-1,384 | 1·92 | NR |
| Jacobsen, 2014 [8] | 2014 | Menia | Enumeration (time-location geographical mapping) | FSWs | Current | 278 | 89-323 | 0·11 | NR |
| Iran |  |  |  |  |  |  |  |  |  |
| Karami, 2017 [9] | NR | Hamadan | Capture-recapture | FSWs | Past 12 M | 842 | 700-1,042 | 0·45 | NR |
| Sharifi, 2017 [10] | 2015 | Ahvaz | Wisdom of the crowds | FSWs | Current | 10,000 | 5,400 | 2·86 | 1·55-3·86 |
| Sharifi, 2017 [10] | 2015 | Arak | Wisdom of the crowds | FSWs | Current | 3,800 | 2,600 | 2·30 | 1·57-3·38 |
| Sharifi, 2017 [10] | 2015 | Bandar Abbas | Wisdom of the crowds | FSWs | Current | 4,000 | 2,200 | 2·87 | 1·58-4·45 |
| Sharifi, 2017 [10] | 2015 | Isfahan | Wisdom of the crowds | FSWs | Current | 12,200 | 7,800 | 2·02 | 1·29-2·74 |
| Sharifi, 2017 [10] | 2015 | Kerman | Wisdom of the crowds | FSWs | Current | 4,600 | 2,500 | 2·46 | 1·34-3·32 |
| Sharifi, 2017 [10] | 2015 | Kermanshah | Wisdom of the crowds | FSWs | Current | 1,600 | 1,200 | 0·59 | 0·45-1·97 |
| Sharifi, 2017 [10] | 2015 | Mashhad | Wisdom of the crowds | FSWs | Current | 12,000 | 6,700 | 1·43 | 0·80-2·01 |
| Sharifi, 2017 [10] | 2015 | Sari | Wisdom of the crowds | FSWs | Current | 800 | 400 | 0·85 | 0·42-1·17 |
| Sharifi, 2017 [10] | 2015 | Shiraz | Wisdom of the crowds | FSWs | Current | 13,300 | 8,700 | 2·75 | 1·80-3·68 |
| Sharifi, 2017 [10] | 2015 | Tabriz | Wisdom of the crowds | FSWs | Current | 13,100 | 9,000 | 2·84 | 1·95-3·94 |
| Sharifi, 2017 [10] | 2015 | Tehran | Wisdom of the crowds | FSWs | Current | 63,700 | 44,500 | 2·52 | 1·76-3·83 |
| Sharifi, 2017 [10] | 2015 | Zahedan | Wisdom of the crowds | FSWs | Current | 840 | 500 | 0·51 | 0·31-1·41 |
| Sharifi, 2017 [10] | 2015 | Ahvaz | Multiplier unique object | FSWs | Current | 1,200 | 180-8,500 | 0·35 | 0·05-2·43 |
| Sharifi, 2017 [10] | 2015 | Arak | Multiplier unique object | FSWs | Current | 3,000 | 500-21,900 | 1·81 | 0·28-13·2 |
| Sharifi, 2017 [10] | 2015 | Bandar Abbas | Multiplier unique object | FSWs | Current | 390 | 170-900 | 0·28 | 0·12-0·65 |
| Sharifi, 2017 [10] | 2015 | Isfahan | Multiplier unique object | FSWs | Current | 2,300 | 1,150-5,850 | 0·38 | 0·19-0·97 |
| Sharifi, 2017 [10] | 2015 | Kerman | Multiplier unique object | FSWs | Current | 1,400 | 200-9,700 | 0·73 | 0·11-5·17 |
| Sharifi, 2017 [10] | 2015 | Kermanshah | Multiplier unique object | FSWs | Current | 70 | 40-120 | 0·03 | 0·01-0·04 |
| Sharifi, 2017 [10] | 2015 | Khoram Abad | Multiplier unique object | FSWs | Current | 200 | 150-290 | 0·17 | 0·13-0·25 |
| Sharifi, 2017 [10] | 2015 | Mashhad | Multiplier unique object | FSWs | Current | 3,000 | 1,700-5,300 | 0·35 | 0·20-0·63 |
| Sharifi, 2017 [10] | 2015 | Sari | Multiplier unique object | FSWs | Current | 4,700 | 1,000-6,600 | 5·00 | 1·06-7·00 |
| Sharifi, 2017 [10] | 2015 | Shiraz | Multiplier unique object | FSWs | Current | 1,300 | 700-22,700 | 0·26 | 0·13-0·54 |
| Sharifi, 2017 [10] | 2015 | Tabriz | Multiplier unique object | FSWs | Current | 170 | 50-700 | 0·04 | 0·01-0·15 |
| Sharifi, 2017 [10] | 2015 | Tehran | Multiplier unique object | FSWs | Current | 7,500 | 1,600-42,300 | 0·3 | 0·06-1·68 |
| Sharifi, 2017 [10] | 2015 | Ahvaz | Network scale-up | Gen pop | Current | 4,300 | 3,300-5,200 | 1·22 | 0·96-1·47 |
| Sharifi, 2017 [10] | 2015 | Arak | Network scale-up | Gen pop | Current | 2,200 | 1,700-2,600 | 1·30 | 1·05-1·55 |
| Sharifi, 2017 [10] | 2015 | Bandar Abbas | Network scale-up | Gen pop | Current | 2,200 | 1,800-2,500 | 1·56 | 1·31-1·84 |
| Sharifi, 2017 [10] | 2015 | Isfahan | Network scale-up | Gen pop | Current | 14,700 | 13,100-16,500 | 2·44 | 2·16-2·74 |
| Sharifi, 2017 [10] | 2015 | Kerman | Network scale-up | Gen pop | Current | 2,000 | 1,500-2,500 | 1·06 | 0·85-1·31 |
| Sharifi, 2017 [10] | 2015 | Kermanshah | Network scale-up | Gen pop | Current | 4,000 | 3,300-4,700 | 1·47 | 1·23-1·75 |
| Sharifi, 2017 [10] | 2015 | Khoram Abad | Network scale-up | Gen pop | Current | 740 | 570-930 | 0·65 | 0·50-0·80 |
| Sharifi, 2017 [10] | 2015 | Mashhad | Network scale-up | Gen pop | Current | 15,200 | 12,500-18,100 | 1·81 | 1·49-2·16 |
| Sharifi, 2017 [10] | 2015 | Sari | Network scale-up | Gen pop | Current | 1,500 | 1,200-1,700 | 1·54 | 1·30-1·81 |
| Sharifi, 2017 [10] | 2015 | Shiraz | Network scale-up | Gen pop | Current | 8,100 | 7,100-9,100 | 1·67 | 1·46-1·89 |
| Sharifi, 2017 [10] | 2015 | Tabriz | Network scale-up | Gen pop | Current | 640 | 420-930 | 0·14 | 0·09-0·19 |
| Sharifi, 2017 [10] | 2015 | Tehran | Network scale-up | Gen pop | Current | 38,700 | 34,200-43,400 | 1·54 | 1·36-1·71 |
| Sharifi, 2017 [10] | 2015 | Zahedan | Network scale-up | Gen pop | Current | 2,600 | 2,200-3,000 | 1·63 | 1·38-1·88 |
| Karami, 2017 [11] | 2016 | Tehran | Capture-recapture | FSWs | Current | 690 | 633-747 | NR | NR |
| Morocco |  |  |  |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | Agadir | Multiplier unique object | FSWs | Past 6 M | 3,639-4,333 | 1,556-5,480 | NR | NR |
| MOH, 2012 [12] | 2011-12 | Fes | Multiplier unique object | FSWs | Past 6 M | 6,028 | 3,631-8,504 | NR | NR |
| MOH, 2012 [12] | 2011-12 | Rabat | Multiplier unique object | FSWs | Past 6 M | 5,683 | 4,760-7,333 | NR | NR |
| MOH, 2012 [12] | 2011-12 | Tanger | Multiplier unique object | FSWs | Past 6 M | 3,956 | 3,677-4,234 | NR | NR |
| Huygens, 2013 [13] | 2013 | Agadir | Census | Brothel-based FSWs | Current | 955 | NR | NR | NR |
| Huygens, 2013[13] | 2013 | Agadir | Capture-recapture | FSWs at floating sites | Current | 7,253 | NR | NR | NR |
| Pakistan |  |  |  |  |  |  |  |  |  |
| NACP, 2005 [14] (pilot) | 2004-05 | Karachi | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, & street-based FSWs | Current | 11,546 | 10,239-12,853 | NR | NR |
| NACP, 2005 [14] (pilot) | 2004-05 | Rawalpindi | Enumeration (time-location geographical mapping) | Kothikhana, home & street-based FSWs | Current | 1,596 | 1,293-1,899 | NR | NR |
| NACP, 2005 [15] (round I) | 2005 | Faisalabad | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, & street-based FSWs | Current | 2,050 | 1,600-2,500 | 0·46 | NR |
| NACP, 2005 [15] (round I) | 2005 | Hyderabad | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, & street-based FSWs | Current | 1,350 | 1,200-1,500 | 0·69 | NR |
| NACP, 2005 [15] (round I) | 2005 | Karachi | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, & street-based FSWs | Current | 11,550 | 10,200-12,900 | 0·58 | NR |
| NACP, 2005 [15] (round I) | 2005 | Lahore | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, & street-based FSWs | Current | 14,150 | 12,100-16,200 | 1·26 | NR |
| NACP, 2005 [15] (round I) | 2005 | Multan | Enumeration (time-location geographical mapping) | Kothikhana, home & street-based FSWs | Current | 2,500 | 2,000-3,000 | 0·99 | NR |
| NACP, 2005 [15] (round I) | 2005 | Peshawar | Enumeration (time-location geographical mapping) | Kothikhana, home & street-based FSWs | Current | 950 | 800-1,100 | 0·45 | NR |
| NACP, 2005 [15] (round I) | 2005 | Quetta | Enumeration (time-location geographical mapping) | Kothikhana, home & street-based FSWs | Current | 750 | 600-900 | 0·64 | NR |
| NACP, 2005 [15] (round I) | 2005 | Sukkur | Enumeration (time-location geographical mapping) | Kothikhana, home & street-based FSWs | Current | 1,750 | 1,500-2,000 | 0·88 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Bannu | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 125 | NR | 0·04 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Faisalabad | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 9,500 | NR | 1·30 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Gujranwala | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 2,421 | NR | 0·58 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Hyderabad | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 2,750 | NR | 0·71 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Karachi | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 25,550 | NR | 0·74 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Lahore | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 24,625 | NR | 1·34 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Larkana | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 525 | NR | 0·44 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Multan | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 5,075 | NR | 1·22 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Peshawar | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 1,550 | NR | 0·44 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Quetta | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 2,500 | NR | 1·10 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Rawalpindi | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 1,596 | NR | 0·31 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Sargodha | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 1,831 | NR | 0·67 | NR |
| Emmanuel, 2010 [16] (round II) | 2006 | Sukkur | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 2,550 | NR | 1·14 | NR |
| Khan, 2011 [17] | 2007 | Lahore | Network scale-up | FSWs | NR | 5,226 | NR | NR | NR |
| Khan, 2011 [17] | 2007 | Lahore | Network scale-up | FSWs (<30 years) | NR | NR | NR | 0·43 | NR |
| Khan, 2011 [17] | 2007 | Lahore | Network scale-up | FSWs (30+ years) | NR | NR | NR | 0·56 | NR |
| NACP, 2008 [18] | 2007 | Faisalabad | Enumeration (time-location geographical mapping) | Adolescent FSWs | Current | 86 | NR | NR | NR |
| NACP, 2008 [18] | 2007 | Karachi | Enumeration (time-location geographical mapping) | Adolescent FSWs | Current | 498 | NR | NR | NR |
| NACP, 2008 [18] | 2007 | Lahore | Enumeration (time-location geographical mapping) | Adolescent FSWs | Current | 9 | NR | NR | NR |
| NACP, 2008 [18] | 2007 | Larkana | Enumeration (time-location geographical mapping) | Adolescent FSWs | Current | 5 | NR | NR | NR |
| NACP, 2008 [18] | 2007 | Mardan | Enumeration (time-location geographical mapping) | Adolescent FSWs | Current | 2 | NR | NR | NR |
| NACP, 2008 [18] | 2007 | Peshawar | Enumeration (time-location geographical mapping) | Adolescent FSWs | Current | 1,030 | NR | NR | NR |
| NACP, 2008 [18] | 2007 | Quetta | Enumeration (time-location geographical mapping) | Adolescent FSWs | Current | 105 | NR | NR | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | DG Khan | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 1,413 | 1,307-1,518 | 1·30 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Faisalabad | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 4,846 | 4,381-5,311 | 0·50 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Haripur | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 2,994 | 2,850-3,138 | 1·19 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Hyderabad | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 4,566 | 4,018-5,113 | 0·85 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Karachi | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 25,399 | 21,794-29,004 | 0·55 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Lahore | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 23,766 | 21,109-26,422 | 1·15 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Larkana | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 1,114 | 969-1,258 | 0·82 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Mirpurkhas | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 884 | 852-915 | 0·85 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Multan | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 5,308 | 4,767-5,847 | 0·80 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Nawabshah | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 2,011 | 1,672-2,352 | 1·42 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Peshawar | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 3,317 | 2,897-3,736 | 0·42 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Quetta | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 3,710 | 3,271-4,149 | 1·07 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Rawalpindi | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 3,635 | 3,263-4,021 | 0·34 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Sargodha | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 3,898 | 3,597-4,198 | 1·25 | NR |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | Sukkur | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 2,317 | 2,031-2,610 | 1·05 | NR |
| Punjab ACP, 2015 [21] | 2014 | Faisalabad | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 7,556 | 5,500-9,612 | NR | NR |
| Punjab ACP, 2015 [21] | 2014 | Lahore | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 25,716 | 21,685-29,746 | NR | NR |
| Punjab ACP, 2015 [21] | 2014 | Multan | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 6,561 | 4,272-8,850 | NR | NR |
| Punjab ACP, 2015 [21] | 2014 | Sargodha | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 4,327 | 2,987-5,667 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Bahawalpur | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 6,201 | 5,522-6,737 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Bannu | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 192 | 171-209 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | DG Khan | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 1,349 | 1,201-1,466 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Gujranwala | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 4,069 | 3,624-4,420 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Gujrat | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 317 | 282-344 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Hyderabad | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 4426 | 3,942-4,808 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Karachi | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 25,191 | 22,434-27,367 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Kasur | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 1,739 | 1,549-1,889 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Larkana | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 4,593 | 4,090-4,990 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Mirpurkhas | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 2,084 | 1,856-2,264 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Nawabshah | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 1,690 | 1,505-1,836 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Peshawar | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 765 | 681-831 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Rawalpindi | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 2,465 | 2,195-2,678 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Quetta | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 4,121 | 3,670-4,477 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Sheikhupura | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 6,252 | 5,568-6,792 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Sialkot | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 2,031 | 1,809-2,206 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Sukkur | Enumeration (time-location geographical mapping) | Kothikhana, home, street-based, & other FSWs | Current | 3,307 | 2,945-3,593 | NR | NR |
| NACP, 2017 [22] (round V) | 2016-17 | Turbat | Enumeration (time-location geographical mapping) | Brothel, kothikhana, home, street-based, & other FSWs | Current | 523 | 466-568 | NR | NR |
| Somalia |  |  |  |  |  |  |  |  |  |
| WHO, 2011[23] | 2011 | Berbera & Bossaso | NR | FSWs | Current | 614 | NR | NR | NR |
| MOH, 2016 [24] | 2016 | Bossaso | Enumeration (time-location geographical mapping) | FSWs | Past 12 M | 911 | 736-1,079 | NR | NR |
| MOH, 2016 [24] | 2016 | Hargeisa | Enumeration (time-location geographical mapping) | FSWs | Past 12 M | 1,126 | 842-1,409 | NR | NR |
| MOH, 2016 [24] | 2016 | Mogadishu | Multiplier unique object | FSWs | Past 12 M | 963 | NR | NR | NR |
| Sudan |  |  |  |  |  |  |  |  |  |
| NACP, 2002 [25] | 2002 | Khartoum, Gezira, Kassala | Pop-bsd survey (self-report) | Refugees (predom. women) | Past 12 M | NR | NR | 0·83 | NR |
| NACP, 2002 [25] | 2002 | Khartoum, Gezira, Kassala | Conv sample (self-report) | ANC attendees | Past 12 M | NR | NR | 0·5 | NR |
| NACP, 2005 [26] | 2005 | South Darfur | Conv sample (self-report) | Tea and food sellers | Lifetime | NR | NR | 3·00 | NR |
| UNHCR, 2007 [27] | 2006 | Juba, South Sudan | Pop-bsd survey (self-report) | Gen pop (15-49 years) | Lifetime | NR | NR | 0·4 | NR |
| UNHCR, 2007 [27] | 2006 | Juba, South Sudan | Pop-bsd survey (self-report) | Gen pop (15-49 years) | Past 12 M | NR | NR | 0·2 | NR |
| NAP, 2015 [28] | 2008 | Juba, South Sudan | Conv sample (self-report) | Gen pop | Past 12 M | NR | NR | 10 | NR |
| NAP, 2015 [28] | 2008 | Morobo, South Sudan | Conv sample (self-report) | Gen pop | Past 12 M | NR | NR | 13 | NR |
| WHO, 2011 [23] | 2012 | Juba, South Sudan | NR | FSWs | Current | 2,511 | NR | NR | NR |
| WHO, 2011 [23] | 2012 | Yambio, South Sudan | NR | FSWs | Current | 375 | NR | NR | NR |
| NAP, 2016 [29] | 2015 | Juba, Yei, & Nimule, South Sudan | NR | FSWs | NR | 4,700 | NR | NR | NR |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | Multiplier unique object | FSWs | Past 6 M | 5,800 | 4,927-6,673 | NR | NR |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | Capture-recapture | FSWs | Past 6 M | 5,306 | 4,673-5,939 | NR | NR |
| Tunisia |  |  |  |  |  |  |  |  |  |
| Hsairi, 2012 [31] | 2011 | Tunis | Multiplier unique object | Street-based FSWs | Current | 541 | 447-681 | NR | NR |
| Hsairi, 2012 [31] | 2011 | Sfax | Multiplier unique object | Street-based FSWs | Current | 596 | 477-795 | NR | NR |
| Hsairi, 2012 [31] | 2011 | Sousse | Multiplier unique object | Street-based FSWs | Current | 291 | 250-350 | NR | NR |
| Yemen |  |  |  |  |  |  |  |  |  |
| MOH, 2010 [32] | NR | Aden | Enumeration (time-location geographical mapping) | FSWs | Current | NR | 1,875-4,260 | NR | 1·16-2·64 |
| MOH, 2010 [32] | NR | Hodeida | Enumeration (time-location geographical mapping) | FSWs | Current | NR | 1,580-1,759 | NR | 1·89-2·10 |
| MOH, 2010 [32] | NR | Mukallah | Enumeration (time-location geographical mapping) | FSWs | Current | NR | 1,488-1,786 | NR | 2·07-2·49 |
| MOH, 2010 [32] | NR | Sanaa | Enumeration (time-location geographical mapping) | FSWs | Current | NR | 3,092-4,495 | NR | 0·64-2·10 |
| MOH, 2010 [32] | NR | Taiz | Enumeration (time-location geographical mapping) | FSWs | Current | NR | 1,050-1,835 | NR | 0·80-1·40 |
| Clients of FSWs |  |  |  |  |  |  |  |  |  |
| Afghanistan |  |  |  |  |  |  |  |  |  |
| Mansoor, 2008[33] | 2007 | Balkh, Herat, Kabul, & Nangahar | Pop-bsd survey (self-report) | Freshmen students | Past 12 M | NR | NR | 5·2 | NR |
| Djibouti |  |  |  |  |  |  |  |  |  |
| Trellu-Kane, 2005[7] | 2005 | Djibouti | Conv sample (self-report) | Gen pop (13-24 years) | Past 12 M | NR | NR | 17 | NR |
| Iran |  |  |  |  |  |  |  |  |  |
| Shokoohi, 2012[34] | NR | Kerman | Network scale-up, (probability method) based on conv sample | Gen pop | Past 12 M | 9,314 | 7,710-10,916 | 7·0 | 5·8-8·2 |
| Shokoohi, 2012 [34] | NR | Kerman | Network scale-up, (frequency method) based on conv sample | Gen pop | Past 12 M | 3,203 | 1,704-5,130 | 2·4 | 1·3-3·9 |
| Khalajabadi, 2018 [35] | 2013-14 | Tehran | Pop-bsd survey (self-report) | University students | Last sex | NR | NR | 1·3 | NR |
| Khalajabadi, 2018 [35] | 2013-14 | Tehran | Pop-bsd survey (self-report) | University students | Lifetime | NR | NR | 6·6 | NR |
| Lebanon |  |  |  |  |  |  |  |  |  |
| Melikian, 1954 [36] | 1952 | Beirut | Conv sample (self-report) | University students in a liberal and comparatively Western college student environment | Past 12 M | NR | NR | 59·3 | NR |
| Melikian, 1967[37] | 1963 | Beirut | Conv sample (self-report) | University students in a liberal and comparatively Western college student environment | Past 12 M | NR | NR | 40·6 | NR |
| Ghandour, 2014[38] | 2012 | Beirut | Pop-bsd survey (self-report) | University students (18-30 years) | Lifetime paid sex | NR | NR | 20·1 | NR |
| Pakistan |  |  |  |  |  |  |  |  |  |
| Faisel, 2005 [39] | 2004-05 | Lahore | Pop-bsd survey (self-report) | Migrant workers | Past 12 M | NR | NR | 6·8 | NR |
| Minhas, 2005 [40] | 2005 | NR | Self-report (conv sample) | Students | Current | NR | NR | 7 | NR |
| Somalia |  |  |  |  |  |  |  |  |  |
| Ismail, 1990[41] | 1986 | Mogadishu | Self-report (conv sample) | Healthcare workers and medical students | NR | NR | NR | 48 | NR |
| Ismail, 1990 [42] | 1987 | Jambaluul village | Conv sample (self-report; take all) | Gen pop | Lifetime | NR | NR | 29 | NR |
| MOH, 2016 [24] | 2016 | Bossaso | Enumeration (time-location geographical mapping) | Secondary key informants | Past 12 M | 3,469 | 2,480-4,453 | NR | NR |
| MOH, 2016 [24] | 2016 | Bossaso | Wisdom of the crowds | Gen pop | Past 12 M | 3,530 | NR | NR | NR |
| MOH, 2016 [24] | 2016 | Hargeisa | Enumeration (time-location geographical mapping) | Secondary key informants | Past 12 M | 1,828 | 1,301-2,353 | NR | NR |
| MOH, 2016 [24] | 2016 | Hargeisa | Wisdom of the crowds | Gen pop | Past 12 M | 1,559 | NR | NR | NR |
| MOH, 2016 [24] | 2016 | Mogadishu | Enumeration (time-location geographical mapping) | Secondary key informants | Past 12 M | 2,599 | 1,801-3,395 | NR | NR |
| MOH, 2016 [24] | 2016 | Mogadishu | Wisdom of the crowds | Gen pop | Past 12 M | 2,202 | NR | NR | NR |
| Sudan |  |  |  |  |  |  |  |  |  |
| McCarthy, 1989[43] | 1987-88 | Port Sudan, Kassala, Gederef, Juba & Omdurman | Conv sample (self-report) | Soldiers attending outpatient military clinics | Lifetime | NR | NR | 51·6 | NR |
| Holt, 2003 [44] | 1992 | Dimma refugee camp | Conv sample (self-report) | Sudanese refugees | Lifetime | NR | NR | 46·0 | 39·0-53·0 |
| Holt, 2003 [44] | 1992 | Dimma refugee camp | Conv sample (self-report) | Sudanese refugees | Past 3 M | NR | NR | 31·0 | 25·0-38·0 |
| NACP, 2002 [25] | 2002 | Blue Nile & Equatoria | Conv sample (self-report) | Military personnel | Past 12 M | NR | NR | 11·7 | NR |
| UNHCR, 2007 [27] | 2006 | Juba, South Sudan | Pop-bsd survey (self-report) | Gen pop (15-49 years) | Lifetime | NR | NR | 1·7 | NR |
| UNHCR, 2007 [27] | 2006 | Juba, South Sudan | Pop-bsd survey (self-report) | Gen pop (15-49 years) | Past 12 M | NR | NR | 1·4 | NR |
| United Arab Emirates |  |  |  |  |  |  |  |  |  |
| MOH, 2014 [45] | 2010-11 | NR | Conv sample (self-report) | University students | Lifetime | NR | NR | 0·07 | NR |

The table is sorted by year(s) of data collection or year of publication if year of data collection was not reported.

\*The decimal places of the population proportion figures are as reported in the original reports.

*Abbreviations*: *ACP* AIDS Control Program, *ANC* antenatal clinic, *Conv* convenience, *DG Khan* Dera Ghazi Khan, *Gen* general, *FSWs* female sex workers, *M* months, *MOH* ministry of Health, *NACP* National AIDS Control Programme, *NAP* National AIDS Program, *NR* not reported, *Pop* population, *Pop-bsd* population-based, *SAR AIDS HDS* South Asia Region AIDS Human Development Sector, *UNHCR* United Nations Higher Commission for Refugees, *WHO* World Health Organization

**Table S5** HIV point-prevalence measures in FSWs as extracted or obtained from various sources including the US Census Bureau database, the WHO-EMRO, and the UNAIDS epidemiological fact sheets databases, among other sources of data

| **Country**  **Author, year [citation]** | **Year(s) of data collection** | **City/province** | **Study site** | **Sampling** | **Population** | **Sample size** | **HIV prev**\* **(%)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Afghanistan** |  |  |  |  |  |  |  |
| MENA HIV ESP, 2013[46] | 2011-12 | National | NR | NR | FSWs | 487 | 0 |
| MENA HIV ESP, 2013 [46] | 2012 | National | NR | NR | FSWs | 1039 | 0·3 |
| **Algeria** |  |  |  |  |  |  |  |
| Abu-Raddad, 2010 [2] | 2004 | NR | NR | NR | FSWs | NR | 3·0 |
| Abu-Raddad, 2010 [2] | 2004 | NR | NR | NR | FSWs | NR | 4·0 |
| Jenkins, 2003 [47] | 1988 | NR | NR | NR | FSWs | NR | 1·2 |
| MOH, 1990 [48] | 1988 | Oran | NR | Conv | FSWs | 52 | 1·9 |
| MOH, 1990 [48] | 1988 | Blida | NR | Conv | FSWs | 34 | 0 |
| MOH, 1990 [48] | 1988 | Tlemcen | NR | Conv | FSWs | 43 | 0 |
| MOH, 1990 [48] | 1988 | Ghardaia | NR | Conv | FSWs | 19 | 0 |
| MOH, 1990 [48] | 1988 | Biskra | NR | Conv | FSWs | 13 | 7·7 |
| MOH, 1990 [48] | 1988 | Constantine | NR | Conv | FSWs | 237 | 0·4 |
| MOH, 1990 [48] | 1988 | Tindouf | NR | Conv | FSWs | 11 | 0 |
| Addad, 1993 [49] | 1991 | NR | NR | NR | FSWs | NR | 0 |
| Jenkins, 2003 [47] | 2000 | NR | NR | NR | FSWs | 20 | 10 |
| MOH, 2009 [50] | 2000 | Tamanrasset & Oran | Sentinel surveillance | Conv | FSWs | 139 | 2·9 |
| UNAIDS, 2008 [51] | 2000 | Tamanrasset | NR | NR | FSWs | NR | 20 |
| Abu-Raddad, 2010 [2] | 2004 | NR | NR | NR | FSWs | NR | 2·0 |
| MOH, 2009 [50] | 2004 | National | Sentinel surveillance | Conv | FSWs | 185 | 3·8 |
| MOH, 2009 [50] | 2007 | National | Sentinel surveillance | Conv | FSWs | 380 | 4·0 |
| MOH, 2016 [52] | 2008 | Tamanrasset | Sentinel surveillance | Conv | FSWs | 161 | 1·2 |
| MOH, 2016 [52] | 2012 | Tamanrasset | Sentinel surveillance | Conv | FSWs | 109 | 4·6 |
| MOH, 2014 [53] | 2014 | Saida | Sentinel surveillance | Conv | FSWs | 78 | 5·1 |
| MOH, 2017 [54] | 2017 | NR | NR | NR | FSWs | NR | 5·5 |
| MOH, 2018 [55] | 2018 | NR | NR | NR | FSWs | NR | 4·2 |
| **Bahrain** |  |  |  |  |  |  |  |
| MOH, 2012 [56] | 2010-11 | National | Detainment center | Conv | FSWs tested at detainment | 724 | 0·8 |
| **Djibouti** |  |  |  |  |  |  |  |
| Jenkins, 2003 [47] | 1987 | NR | NR | NR | Street-based FSWs | NR | 3·9 |
| UNAIDS, 2008 [51] | 1987 | Djibouti | NR | NR | FSWs | NR | 2·1 |
| Bailly, 1988 [57] | 1987-88 | NR | NR | NR | FSWs | 251 | 2·8 |
| UNAIDS, 2008 [51] | 1988 | Djibouti | NR | NR | FSWs | NR | 4·2 |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | FSWs | 560 | 5·2 |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | Bar girls | 476 | 2·1 |
| MENA HIV ESP, 2010 [2] | 1990 | NR | Sentinel surveillance | Conv | Bar girls | 190 | 5·8 |
| UNAIDS, 2008 [51] | 1990 | Djibouti (Major urban areas) | NR | NR | FSWs | NR | 19·5 |
| Jenkins, 2003 [47] | 1991 | NR | NR | NR | Bar girls | NR | 14·2 |
| MENA HIV ESP, 2010 [2] | 1991 | NR | Sentinel surveillance | Conv | FSWs | 449 | 31·4 |
| MENA HIV ESP, 2010 [2] | 1991 | NR | Sentinel surveillance | Conv | Bar girls | 618 | 13·1 |
| OMS, 2001 [58] | 1991 | NR | NR | NR | FSWs | NR | 39·8 |
| UNAIDS, 2008 [51] | 1991 | Djibouti (Major urban areas) | NR | NR | FSWs | NR | 26·0 |
| MENA HIV ESP, 2010 [2] | 1992 | NR | Sentinel surveillance | Conv | FSWs | 400 | 43·0 |
| MENA HIV ESP, 2010 [2] | 1992 | NR | Sentinel surveillance | Conv | Bar girls | 724 | 12·4 |
| MOH, 1993[59] | 1992 | NR | NR | NR | Street-based FSWs | NR | 51·4 |
| MOH, 1993 [59] | 1992 | NR | NR | NR | Bar girls | NR | 21·7 |
| UNAIDS, 2008[51] | 1992 | Djibouti (Major urban areas) | NR | NR | FSWs | NR | 36·6 |
| Jenkins, 2003 [47] | 1993 | NR | NR | NR | Bar girls | NR | 25·6 |
| Jenkins, 2003 [47] | 1993 | NR | NR | NR | Street-based FSWs | NR | 55·8 |
| MOH, 1993 [59] | 1993 | NR | NR | NR | Bar girls | 411 | 23·4 |
| MOH, 1993 [59] | 1993 | NR | NR | NR | Street-based FSWs | 313 | 56·5 |
| OMS, 2001 [58] | 1993 | NR | NR | NR | Bar girls | NR | 27·0 |
| Shrestha, 1999 [60] | 1993 | NR | Bars | NR | Bar girls | 1039 | 14·7 |
| Shrestha, 1999 [60] | 1993 | NR | NR | NR | FSWs | 571 | 47·5 |
| UNAIDS, 2008 [51] | 1993 | Djibouti (Major urban areas) | NR | NR | FSWs | NR | 37·7 |
| UNAIDS, 2008 [51] | 1993 | Outside major urban areas | NR | NR | FSWs | NR | 26·3 |
| UNAIDS, 2008 [51] | 1993 | Outside major urban areas | NR | NR | FSWs | NR | 0·1 |
| Shrestha, 1999 [60] | 1994 | NR | Bars | NR | Bar girls | 852 | 12·2 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | FSWs | 573 | 45·4 |
| UNAIDS, 2008 [51] | 1994 | Outside major urban areas | NR | NR | FSWs | NR | 25·5 |
| UNAIDS, 2008 [51] | 1994 | Outside major urban areas | NR | NR | FSWs | NR | 0 |
| Shrestha, 1999 [60] | 1995 | NR | Bars | NR | Bar girls | 68 | 11·8 |
| UNAIDS, 2008 [51] | 1995 | Outside major urban areas | NR | NR | FSWs | NR | 36·8 |
| UNAIDS, 2008 [51] | 1995 | Outside major urban areas | NR | NR | FSWs | NR | 0·1 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | FSWs | 364 | 41·5 |
| US Dep. of State, 2000 [61] | 1995 | NR | NR | NR | FSWs | NR | 57·0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | FSWs | 294 | 32·7 |
| UNAIDS, 2008 [51] | 1996 | Outside major urban areas | NR | NR | FSWs | NR | 0 |
| Shrestha, 1999 [60] | 1997 | NR | NR | NR | FSWs | 327 | 32·7 |
| UNAIDS, 2008 [51] | 1997 | Outside major urban areas | NR | NR | FSWs | NR | 0 |
| Bahdon, 1998 [62] | 1998 | NR | NR | NR | FSWs | 117 | 28·2 |
| MOH, 1999 [63] | 1998 | NR | NR | NR | FSWs | 142 | 27·5 |
| UNAIDS, 2008 [51] | 1998 | Outside major urban areas | NR | NR | FSWs | NR | 0 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | FSWs | 42 | 38·1 |
| UNAIDS, 2008 [51] | 1999 | Outside major urban areas | NR | NR | FSWs | NR | 0 |
| UNAIDS, 2008 [51] | 1999 | Outside major urban areas | NR | NR | FSWs | NR | 0 |
| MENA HIV ESP, 2010 [2] | 2000 | NR | Sentinel surveillance | Conv | FSWs | 34 | 20·6 |
| MOH, 2008 [64] | 2007 | NR | NR | NR | FSWs | 66 | 19·7 |
| MOH, 2010 [65] | 2007 | NR | Sentinel surveillance | Conv | FSWs | NR | 18·0 |
| MOH, 2008 [64] | 2008 | NR | NR | NR | FSWs | 52 | 17·3 |
| WHO, 2011 [23] | 2008 | NR | Clinics | Conv | FSWs | 79 | 20·3 |
| MOH, 2010 [65] | 2009 | NR | Sentinel surveillance | Conv | FSWs | NR | 15·3 |
| MENA HIV ESP, 2013 [46] | 2012 | Djibouti | Clinical center | Conv | FSWs | 718 | 13·1 |
| **Egypt** |  |  |  |  |  |  |  |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | FSWs | 347 | 0 |
| Mourad, 1992 [66] | 1990-91 | Cairo | NR | NR | FSWs | 154 | 0 |
| MOH, 2001 [67] | 1992 | NR | NR | Conv | FSWs | 160 | 0 |
| MOH, 2001 [67] | 1993 | NR | NR | Conv | FSWs | 221 | 0 |
| Murugasampillay, 1995[68] | 1993 | Alexandria | NR | Conv | FSWs | 42 | 0 |
| MOH, 2001 [67] | 1994 | NR | NR | Conv | FSWs | 194 | 0 |
| MOH, 2001 [67] | 1995 | NR | NR | Conv | FSWs | 129 | 0 |
| MENA HIV ESP, 2010 [2] | 1996 | NR | Sentinel surveillance | Conv | FSWs | 145 | 0·7 |
| MOH, 2001 [67] | 1996 | NR | NR | Conv | FSWs | 112 | 0·9 |
| MENA HIV ESP, 2010 [2] | 1997 | NR | Sentinel surveillance | Conv | FSWs | 79 | 0 |
| MOH, 2001 [67] | 1997 | NR | NR | Conv | FSWs | 179 | 1·1 |
| MENA HIV ESP, 2010 [2] | 1998 | NR | Sentinel surveillance | Conv | FSWs | 69 | 0 |
| MOH, 2001 [67] | 1998 | NR | NR | Conv | FSWs | 269 | 1·5 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | FSWs | 172 | 0·6 |
| MOH, 2001 [67] | 1999 | NR | NR | Conv | FSWs | 183 | 1·1 |
| MOH, 2001 [67] | 2000 | NR | NR | Conv | FSWs | 129 | 0 |
| MOH, 2001 [67] | 2001 | NR | NR | Conv | FSWs | 65 | 0 |
| MENA HIV ESP, 2010 [2] | 2002 | NR | Sentinel surveillance | Conv | FSWs | 203 | 0 |
| MENA HIV ESP, 2010 [2] | 2003 | NR | Sentinel surveillance | Conv | FSWs | 265 | 0 |
| MENA HIV ESP, 2010 [2] | 2003 | NR | Sentinel surveillance | Conv | Bar girls | 181 | 0 |
| MENA HIV ESP, 2010 [2] | 2004 | NR | Sentinel surveillance | Conv | FSWs | 345 | 0 |
| US Census Bureau, 2017 [69] | 2004 | NR | Sentinel surveillance | Conv | FSWs | 308 | 0 |
| MENA HIV ESP, 2010 [2] | 2005 | NR | Sentinel surveillance | Conv | FSWs | 192 | 0 |
| MENA HIV ESP, 2010 [2] | 2006 | National | NR | NR | FSWs & bar girls | 975 | 0 |
| Arafa, 2007 [70] | 2006-07 | Alexandria | Clinic | Conv | FSWs | NR | 0 |
| NAP, 2014 [71] | 2010 | Cairo | NGO | Conv | FSWs | 137 | 0 |
| NAP, 2014 [71] | 2013 | NR | VCT | Conv | FSWs | 188 | 0·5 |
| NAP, 2017 [72] | 2016 | NR | Sentinel surveillance | Conv | FSWs | 249 | 1·2 |
| **Iran** |  |  |  |  |  |  |  |
| NACP, 1994 [73] | 1987-91 | NR | Sentinel surveillance | Conv | FSWs | 3596 | 0·03 |
| MENA HIV ESP, 2010 [2] | 1990 | NR | Sentinel surveillance | Conv | FSWs | 708 | 0·1 |
| MENA HIV ESP, 2010 [2] | 1991-92 | NR | Sentinel surveillance | Conv | FSWs | 2897 | 0 |
| NACP, 1994 [73] | 1993-94 | Evin | Sentinel surveillance | Conv | FSWs | 400 | 0 |
| Eltayeb, 1995 [74] | 1994 | NR | Rehab. centers | Conv | FSWs | 31 | 0 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | FSWs | 505 | 0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | FSWs | 120 | 0 |
| Shrestha, 1999 [60] | 1997 | NR | NR | NR | FSWs | 220 | 0 |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | FSWs | 1605 | 0 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | FSWs | 800 | 0 |
| Feizzadeh, 2010 [75] | 2000 | Charmanhal | Prison | Conv | Incarcerated FSWs | NR | 14 |
| MENA HIV ESP, 2010 [2] | 2000-01 | NR | Sentinel surveillance | Conv | FSWs | 404 | 0 |
| MENA HIV ESP, 2010 [2] | 2002 | NR | Sentinel surveillance | Conv | FSWs | 309 | 0 |
| MENA HIV ESP, 2010 [2] | 2003-05 | NR | Sentinel surveillance | Conv | FSWs | 44 | 2·3 |
| MENA HIV ESP, 2010 [2] | 2005 | Isfahan | Sentinel surveillance | Conv | FSWs | 258 | 0 |
| MOH, 2006 [76] | 2005 | Tehran | NR | Conv | FSWs | 50 | 0 |
| MENA HIV ESP, 2010 [2] | 2006 Q1 & Q3 | National | NR | NR | FSWs & bar girls | 301 | 2·7 |
| MENA HIV ESP, 2010 [2] | 2006 | Isfhan | Sentinel surveillance | Conv | FSWs | 281 | 0 |
| Feizzadeh, 2010 [75] | 2007 | Kermanshah | PHC | Conv | FSWs attending clinics | NR | 3 |
| Feizzadeh, 2010 [75] | 2007 | Kohkilouye | Prison | Conv | Incarcerated FSWs | NR | 11 |
| **Iraq** |  |  |  |  |  |  |  |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | Bar girls | 300 | 0 |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | FSWs | 420 | 0 |
| MENA HIV ESP, 2010 [2] | 1990 | NR | Sentinel surveillance | Conv | Bar girls | 429 | 0 |
| MENA HIV ESP, 2010 [2] | 1990 | NR | Sentinel surveillance | Conv | FSWs | 678 | 0 |
| MENA HIV ESP, 2010 [2] | 1991 | NR | Sentinel surveillance | Conv | Bar girls | 334 | 0 |
| MENA HIV ESP, 2010 [2] | 1991 | NR | Sentinel surveillance | Conv | FSWs | 225 | 0 |
| MENA HIV ESP, 2010 [2] | 1992 | NR | Sentinel surveillance | Conv | Bar girls | 369 | 0 |
| MENA HIV ESP, 2010 [2] | 1992 | NR | Sentinel surveillance | Conv | FSWs | 14 | 0 |
| Shrestha, 1999 [60] | 1993 | NR | NR | NR | Bar girls | 1337 | 0 |
| Shrestha, 1999 [60] | 1993 | NR | NR | NR | FSWs | 987 | 0 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | Bar girls | 1083 | 0 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | FSWs | 1084 | 0 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | Bar girls | 876 | 0 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | FSWs | 1408 | 0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | Bar girls | 472 | 0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | FSWs | 1272 | 0·07 |
| Shrestha, 1999 [60] | 1997 | NR | NR | NR | Bar girls | 582 | 0 |
| Shrestha, 1999 [60] | 1997 | NR | NR | NR | FSWs | 475 | 0 |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | Bar girls | 1027 | 0 |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | FSWs | 12 | 0 |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | Bar girls | 33 | 0 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | Bar girls | 98 | 0 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | FSWs | 1255 | 0 |
| MENA HIV ESP, 2010 [2] | 2000 | NR | Sentinel surveillance | Conv | Bar girls | 87 | 0 |
| MENA HIV ESP, 2010 [2] | 2000 | NR | Sentinel surveillance | Conv | FSWs | 199 | 0 |
| MENA HIV ESP, 2010 [2] | 2001 | NR | Sentinel surveillance | Conv | Bar girls | 153 | 0 |
| MENA HIV ESP, 2010 [2] | 2001 | NR | Sentinel surveillance | Conv | FSWs | 253 | 0 |
| MENA HIV ESP, 2010 [2] | 2002 | NR | Sentinel surveillance | Conv | Bar girls | 96 | 0 |
| MENA HIV ESP, 2010 [2] | 2002 | NR | Sentinel surveillance | Conv | FSWs | 294 | 0 |
| **Jordan** |  |  |  |  |  |  |  |
| El-Tayeb, 1995 [77] | 1990 | NR | NR | NR | FSWs | 40 | 0 |
| El-Tayeb, 1995 [77] | 1991 | NR | NR | NR | FSWs | 75 | 1·3 |
| El-Tayeb, 1995 [77] | 1994-95 | NR | NR | NR | FSWs | 12 | 0 |
| **Lebanon** |  |  |  |  |  |  |  |
| NACP, 1994 [78] | 1987-89 | National | NR | Conv | FSWs | 741 | 0 |
| NACP, 1994 [78] | 1992 | National | NR | Conv | FSWs | 1507 | 0·3 |
| NACP, 1994 [78] | 1993 | National | NR | Conv | FSWs | 2195 | 0·1 |
| NACP, 1994 [78] | 1994 | National | NR | Conv | FSWs | 819 | 0 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | FSWs | 2912 | 0·07 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | FSWs | 2438 | 0 |
| Jenkins, 2003 [47] | 1999 | NR | NR | NR | FSWs | 205 | 0 |
| Riedner, 2009 [79] | 2008 | NR | NR | NR | FSWs | NR | 0·7 |
| NACP, 2010 [80] | 2008-09 | NR | VCT | Conv | FSWs | 41 | 2·4 |
| **Libya** |  |  |  |  |  |  |  |
| Shazly, 1991 [81] | 1990 | NR | NR | NR | FSWs | 22 | 18·2 |
| Shrestha, 1999 [60] | 1993 | NR | NR | NR | FSWs | 554 | 1·1 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | FSWs | 604 | 1·2 |
| **Morocco** |  |  |  |  |  |  |  |
| Benslimane, 1987 [82] | 1984-87 | Casablanca | NR | Conv | FSWs | 27 | 3·7 |
| Riyad, 1990 [83] | 1990 | Casablanca | NR | Conv | FSWs | 28 | 7·1 |
| MOH, 2008 [84] | 2001 | Souss Massa Draa | Sentinel surveillance | Conv | FSWs | NR | 6·3 |
| MOH, 2013 [85] | 2001 | National | Sentinel surveillance | Conv | Incarcerated FSWs | 217 | 2·3 |
| MOH, 2013 [85] | 2002 | National | Sentinel surveillance | Conv | Incarcerated FSWs | 350 | 3·1 |
| MOH, 2006 [86] | 2003 | NR | NGO | Conv | FSWs | 316 | 2·4 |
| MOH, 2013 [85] | 2003 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 264 | 2·3 |
| MOH, 2013 [85] | 2004 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 771 | 1·9 |
| Bennani, 2006 [87] | 2005 | NR | Prison | Conv | Incarcerated FSWs | NR | 2·9 |
| MOH, 2008 [84] | 2005 | National | Sentinel surveillance | Conv | FSWs | NR | 2·0 |
| MOH, 2013 [85] | 2005 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 227 | 2·2 |
| MOH, 2008 [84] | 2006 | Souss Massa Draa | Sentinel surveillance | Conv | FSWs | NR | 4·1 |
| MOH, 2010 [88] | 2006 | National | Sentinel surveillance | Conv | FSWs | NR | 2·5 |
| MOH, 2010 [88] | 2006 | Souss Massa Draa | Sentinel surveillance | Conv | FSWs | NR | 4·3 |
| MOH, 2013 [85] | 2006 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 650 | 0·2 |
| MOH, 2010 [88] | 2007 | NA | NR | Conv | FSWs | 810 | 2·6 |
| MOH, 2013 [85] | 2007 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 774 | 2·7 |
| MOH, 2013 [85] | 2008 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 1079 | 2·1 |
| MOH, 2013 [2] | 2008 | National | VCT | Conv | FSWs | 3110 | 1·3 |
| MOH, 2013 [85] | 2009 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 965 | 2·4 |
| MOH, 2013 [2] | 2009 | National | VCT | Conv | FSWs | 3484 | 2·1 |
| MOH, 2013 [85] | 2010 | National | Sentinel surveillance | Conv | Incarcerated FSWs & FSWs attending clinics | 1158 | 2·7 |
| MOH, 2013 [2] | 2010 | National | VCT | Conv | FSWs | 4380 | 2·4 |
| MOH, 2013 [89] | 2011 | National | Sentinel surveillance | Conv | FSWs | 1432 | 1·8 |
| MOH, 2013 [2] | 2011 | National | VCT | Conv | FSWs | 4895 | 1·8 |
| Loudyi, 2013[90] | 2012 | Fes | VCT | Conv | FSWs | 927 | 0·9 |
| MOH, 2013 [85] | 2012 | National | Sentinel surveillance | Conv | FSWs attending clinics | 643 | 2·0 |
| MOH, 2013 {Abu-Raddad L, 2010 #43} | 2012 | National | VCT | Conv | FSWs | 10355 | 1·6 |
| **Pakistan** |  |  |  |  |  |  |  |
| Girgis, 1990 [91] | 1986-90 | NR | NR | NR | FSWs | 84 | 0 |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | FSWs | 84 | 0 |
| MENA HIV ESP, 2010 [2] | 1991-92 | NR | Sentinel surveillance | Conv | FSWs | 17 | 0 |
| Shrestha, 1999 [60] | 1993 | NR | NR | NR | FSWs | 649 | 1·2 |
| Shrestha, 1999 [60] | 1994-95 | NR | NR | NR | FSWs | 142 | 0·7 |
| UNAIDS, 2008 [51] | 1995 | Karachi | NR | NR | FSWs | NR | 0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | FSWs | 104 | 0 |
| Rizvi, 1999 [92] | 1997 | Multan | Red-light district | Conv | FSWs | 577 | 0·5 |
| MENA HIV ESP, 2010 [2] | 1999-00 | NR | Sentinel surveillance | Conv | FSWs | 186 | 3·8 |
| MENA HIV ESP, 2010 [2] | 2001 | NR | Sentinel surveillance | Conv | FSWs | 103 | 0 |
| Shah, 2001 [93] | 2001 | Sindh | VCT | Conv | FSWs | 60 | 1·7 |
| MENA HIV ESP, 2010 [2] | 2002-04 | NR | Sentinel surveillance | Conv | FSWs | 24 | 8·3 |
| Pasha, 2008 [94] | 2007 | Quetta | NR | NR | FSWs | 92 | 0 |
| Riedner, 2009 [79] | 2008 | NR | NR | NR | FSWs | NR | 0·2 |
| Pasha, 2009 [95] | 2009 | Faisalabad | NR | NR | FSWs | 92 | 7 |
| Pasha, 2011 [96] | 2011 | NR | NR | NR | FSWs | NR | 1·2 |
| Mir, 2013 [97] | 2013 | NR | NR | NR | FSWs | NR | 0·6 |
| **Somalia** |  |  |  |  |  |  |  |
| Omar, 1988 [98] | 1986-87 | Mogadishu | Community (urban areas) | Conv | FSWs | 287 | 0·4 |
| Jenkins, 2003 [47] | 1990 | NR | NR | NR | FSWs | NR | 2 |
| Jenkins, 2003 [47] | 1990 | NR | NR | NR | FSWs | NR | 4 |
| Duffy, 1999 [99] | 1999 | Somaliland | NR | NR | FSWs | 17 | 47·1 |
| **Sudan** |  |  |  |  |  |  |  |
| Ahmed, 1990 [100] | 1989 | South Sudan | NR | NR | FSWs | 1027 | 2·8 |
| Ahmed, 1990 [100] | 1989 | East Equatoria, South Sudan | NR | NR | FSWs | 171 | 7·6 |
| Ahmed, 1990 [100] | 1989 | West Equatoria, South Sudan | NR | NR | FSWs | 70 | 24·3 |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | FSWs | 920 | 2·7 |
| Basha, 2006 [101] | 2006 | NR | NR | NR | FSWs | NR | 1·6 |
| Abu-Raddad, 2010 [2] | 2007 | NR | NR | NR | FSWs | NR | 1·7 |
| Elrashied, 2009 [102] | 2009 | Khartoum | NR | NR | FSWs | 345 | 2·7 |
| NAP, 2015 [28] | 2011 | NR | NR | NR | FSWs | NR | 12 |
| NAP, 2015 [28] | 2014 | NR | NR | NR | FSWs | 764 | 28·9 |
| NAP, 2016 [29] | 2015 | South Sudan | NGO | Conv | FSWs | 2204 | 21 |
| **Syria** |  |  |  |  |  |  |  |
| El-Tayeb, 1995 [103] | 1987-89 | NR | Sentinel surveillance | Conv | FSWs | 294 | 0 |
| El-Tayeb, 1995 [103] | 1990 | NR | Sentinel surveillance | Conv | FSWs | 369 | 0 |
| El-Tayeb, 1995 [103] | 1991 | NR | Sentinel surveillance | Conv | FSWs | 650 | 0 |
| El-Tayeb, 1995 [103] | 1992 | NR | Sentinel surveillance | Conv | FSWs | 502 | 0 |
| El-Tayeb, 1995 [103] | 1992 | NR | Sentinel surveillance | Conv | Bar girls | 1043 | 0 |
| El-Tayeb, 1995 [103] | 1993 | NR | Sentinel surveillance | Conv | FSWs | 794 | 0 |
| El-Tayeb, 1995 [103] | 1993 | NR | Sentinel surveillance | Conv | Bar girls | 697 | 0 |
| El-Tayeb, 1995 [103] | 1994 | NR | Sentinel surveillance | Conv | FSWs | 555 | 0 |
| El-Tayeb, 1995 [103] | 1994 | NR | Sentinel surveillance | Conv | Bar girls | 1825 | 0 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | FSWs | 525 | 0 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | Bar girls | 1901 | 0 |
| El-Tayeb, 1995 [103] | 1995 | NR | Sentinel surveillance | Conv | FSWs | 59 | 0 |
| El-Tayeb, 1995 [103] | 1995 | NR | Sentinel surveillance | Conv | Bar girls | 158 | 0 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | FSWs | 1289 | 0 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | Bar girls | 1269 | 0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | FSWs | 1526 | 0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | Bar girls | 1507 | 0 |
| Shrestha, 1999 [60] | 1997 | NR | NR | NR | FSWs | 1707 | 0 |
| Shrestha, 1999 [60] | 1997 | NR | NR | NR | Bar girls | 1717 | 0 |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | FSWs | 1628 | 0·1 |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | Bar girls | 2313 | 0·03 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | FSWs | 2688 | 0 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | Bar girls | 2278 | 0 |
| Shrestha, 1999 [60] | 1999 | NR | NR | NR | FSWs | 1408 | 0 |
| Shrestha, 1999 [60] | 1999 | NR | NR | NR | Bar girls | 1166 | 0 |
| MENA HIV ESP, 2010 [2] | 2000 | NR | Sentinel surveillance | Conv | Bar girls | 2274 | 0 |
| MENA HIV ESP, 2010 [2] | 2000 | NR | Sentinel surveillance | Conv | FSWs | 2188 | 0 |
| MENA HIV ESP, 2010 [2] | 2001 | NR | Sentinel surveillance | Conv | Bar girls | 3304 | 0·1 |
| MENA HIV ESP, 2010 [2] | 2001 | NR | Sentinel surveillance | Conv | FSWs | 2281 | 0 |
| MENA HIV ESP, 2010 [2] | 2002 | NR | Sentinel surveillance | Conv | Bar girls | 2688 | 0·04 |
| MENA HIV ESP, 2010 [2] | 2002 | NR | Sentinel surveillance | Conv | FSWs | 1846 | 0 |
| MENA HIV ESP, 2010 [2] | 2003 | NR | Sentinel surveillance | Conv | Bar girls | 2653 | 0·04 |
| MENA HIV ESP, 2010 [2] | 2003 | NR | Sentinel surveillance | Conv | FSWs | 1019 | 0 |
| MENA HIV ESP, 2010 [2] | 2004 | NR | Sentinel surveillance | Conv | Bar girls | 4784 | 0·02 |
| MENA HIV ESP, 2010 [2] | 2004 | NR | Sentinel surveillance | Conv | FSWs | 1324 | 0 |
| MENA HIV ESP, 2010 [2] | 2005 | NR | Sentinel surveillance | Conv | Bar girls | 2673 | 0 |
| MENA HIV ESP, 2010 [2] | 2005 | NR | Sentinel surveillance | Conv | FSWs | 680 | 0·2 |
| MOH, 2005 [104] | 2005 | Damascus | Sentinel surveillance | Conv | FSWs | 400 | 0·2 |
| MENA HIV ESP, 2010 [2] | 2006, Q1 | National | NR | NR | FSWs | 197 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q1 | National | NR | NR | Bar girls | 1528 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q2 | National | NR | NR | FSWs | 311 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q2 | National | NR | NR | Bar girls | 1354 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q3 | National | NR | NR | FSWs | 121 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q3 | National | NR | NR | Bar girls | 2001 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q4 | National | NR | NR | FSWs | 345 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q4 | National | NR | NR | Bar girls | 1197 | 0 |
| MENA HIV ESP, 2010 [2] | 2007, Q2 | National | NR | NR | FSWs | 596 | 0 |
| MENA HIV ESP, 2010 [2] | 2007, Q2 | National | NR | NR | Bar girls | 3570 | 0 |
| MENA HIV ESP, 2010 [2] | 2007, Q3 | National | NR | NR | FSWs | 526 | 0 |
| MENA HIV ESP, 2010 [2] | 2007, Q3 | National | NR | NR | Bar girls | 3421 | 0 |
| NACP, 2008 [105] | 2007 | NR | Sentinel surveillance | Conv | FSWs | 1288 | 0 |
| NACP, 2008 [105] | 2007 | NR | Sentinel surveillance | Conv | Bar girls | 7024 | 0 |
| Al-Sayed, 2010 [106] | 2009 | National | Sentinel surveillance | Conv | FSWs | 878 | 0 |
| Al-Sayed, 2010 [106] | 2009 | National | Sentinel surveillance | Conv | Bar girls | 8479 | 0 |
| MENA HIV ESP, 2013 [46] | 2011 | National | NR | NR | FSWs | 108 | 0 |
| MENA HIV ESP, 2013 [46] | 2011 | National | NR | NR | Bar girls | 6145 | 0 |
| **Tunisia** |  |  |  |  |  |  |  |
| Van de Perre, 1988 [107] | 1985 | NR | NR | NR | FSWs | 108 | 1·9 |
| Giraldo, 1988 [108] | 1985-87 | NR | NR | NR | FSWs | 373 | 1·9 |
| Gharbi, 1987 [109] | 1987 | Tunis | NR | NR | FSWs | 198 | 0 |
| Taibi, 1989 [110] | 1987 | Sfax | NR | NR | FSWs | 36 | 0 |
| MOH, 1990 [111] | 1988-89 | NR | NR | NR | FSWs | 970 | 0·6 |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | FSWs | 523 | 0 |
| MENA HIV ESP, 2010 [2] | 1989 | NR | Sentinel surveillance | Conv | Bar girls | 447 | 1·3 |
| Fekih, 1991 [112] | 1990 | NR | Sentinel surveillance | Conv | FSWs | 273 | 0 |
| MENA HIV ESP, 2010 [2] | 1991 | NR | Sentinel surveillance | Conv | FSWs | 374 | 0·3 |
| MENA HIV ESP, 2010 [2] | 1992 | NR | Sentinel surveillance | Conv | FSWs | 778 | 0 |
| MENA HIV ESP, 2010 [2] | 1992 | NR | Sentinel surveillance | Conv | Bar girls | 88 | 2·3 |
| NAP, 2005 [113] | 1992 | NR | NR | Conv | Street-based FSWs | NR | 2·3 |
| Shrestha, 1999 [60] | 1993 | NR | NR | NR | FSWs | 402 | 0·3 |
| Shrestha, 1999 [60] | 1994 | NR | NR | NR | FSWs | 880 | 0·1 |
| Shrestha, 1999 [60] | 1995 | NR | NR | NR | FSWs | 1091 | 0 |
| Shrestha, 1999 [60] | 1996 | NR | NR | NR | FSWs | 1020 | 0·4 |
| NAP, 2005 [113] | 1997 | NR | NR | Conv | Street-based FSWs | NR | 0 |
| Shrestha, 1999 [60] | 1997 | NR | NR | NR | FSWs | 992 | 0·1 |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | FSWs | 694 | 0 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | FSWs | 996 | 0 |
| Shrestha, 1999 [60] | 1999 | NR | NR | NR | FSWs | 570 | 0 |
| MENA HIV ESP, 2010 [2] | 2000 | NR | Sentinel surveillance | Conv | FSWs | 483 | 0 |
| NAP, 2005 [113] | 2000 | NR | NR | Conv | FSWs | NR | 0 |
| Jenkins, 2003 [47] | 2001 | NR | NR | NR | FSWs | 458 | 0·2 |
| MENA HIV ESP, 2010 [2] | 2001 | NR | Sentinel surveillance | Conv | FSWs | 554 | 0·2 |
| NAP, 2005 [113] | 2001 | NR | Prison | Conv | Incarcerated FSWs | 100 | 0 |
| MENA HIV ESP, 2010 [2] | 2002 | NR | Sentinel surveillance | Conv | FSWs | 434 | 0 |
| NAP, 2005 [113] | 2002 | NR | NR | Conv | Legal FSWs | 1051 | 0 |
| NAP, 2005 [113] | 2002 | NR | NR | Conv | Street-based FSWs | 125 | 0 |
| MENA HIV ESP, 2010 [2] | 2003 | NR | Sentinel surveillance | Conv | FSWs | 916 | 0 |
| NAP, 2005 [113] | 2003 | NR | NR | Conv | Legal FSWs | 1109 | 0 |
| NAP, 2005 [113] | 2003 | NR | NR | Conv | Street-based FSWs | 13 | 0 |
| MENA HIV ESP, 2010 [2] | 2004 | NR | Sentinel surveillance | Conv | FSWs | 200 | 0 |
| MOH, 2006 [114] | 2004 | NR | NR | Conv | Legal FSWs | 568 | 0 |
| MENA HIV ESP, 2010 [2] | 2005 | NR | Sentinel surveillance | Conv | FSWs | 210 | 0 |
| MOH, 2006 [114] | 2005 | NR | NR | Conv | Legal FSWs | 640 | 0 |
| MOH, 2006 [114] | 2005 | NR | NR | Conv | Street-based FSWs | 18 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q2 | National | NR | NR | FSWs & bar girls | 151 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q3 | National | NR | NR | FSWs & bar girls | 93 | 0 |
| MENA HIV ESP, 2010 [2] | 2006, Q4 | National | NR | NR | FSWs & bar girls | 213 | 0 |
| MENA HIV ESP, 2010 [2] | 2007, Q1 & Q2 | National | NR | NR | FSWs & bar girls | 83 | 0 |
| UNAIDS, 2008 [115] | 2008 | NR | NR | NR | FSWs | NR | 2·3 |
| MOH, 2010 [116] | 2008 | NR | Sentinel surveillance | Conv | Legal FSWs | 300 | 0·3 |
| MOH, 2010 [116] | 2009 | NR | Sentinel surveillance | Conv | Legal FSWs | NR | 0 |
| **Yemen** |  |  |  |  |  |  |  |
| Shrestha, 1999 [60] | 1998 | NR | NR | NR | FSWs | 88 | 4·6 |
| MENA HIV ESP, 2010 [2] | 1999 | NR | Sentinel surveillance | Conv | FSWs | 73 | 2·7 |
| MENA HIV ESP, 2010 [2] | 2000-01 | NR | Sentinel surveillance | Conv | FSWs | 39 | 0 |
| Jenkins, 2003 [47] | 2001 | NR | NR | NR | FSWs | NR | 7 |
| MENA HIV ESP, 2010 [2] | 2002-03 | NR | Sentinel surveillance | Conv | FSWs | 434 | 0 |
| MENA HIV ESP, 2010 [2] | 2004 | NR | Sentinel surveillance | Conv | FSWs | 203 | 0·5 |
| MENA HIV ESP, 2010 [2] | 2005-06 | NR | Sentinel surveillance | Conv | FSWs | 20 | 0 |
| MENA HIV ESP, 2010 [2] | 2006 Q1, Q2 & Q4 | National | NR | NR | FSWs & bar girls | 20 | 0 |

The table is sorted by year(s) of data collection or year of publication if year of data collection was not reported.

\*The decimal places of the prevalence figures are as reported in the original reports, but prevalence figures with more than one decimal places were rounded to one decimal place, with the exception of those below 0·1%.

*Abbreviations*: *Conv* convenience, *Dep* department, *FSWs* female sex workers, *MENA HIV ESP* MENA HIV/AIDS Epidemiology Synthesis Project, *MOH* Ministry of Health, *NACP* National AIDS Control programme, *NAP* National AIDS Program, *NGO* non-governmental organization, *NR* not reported, *OMS* Organisation Mondiale de la Sante, *PHC* primary healthcare centers, *Prev* prevalence, *Q* Quarter, *UNAIDS* The Joint United Nations Programme on HIV/AIDS, *VCT* voluntary counselling and testing, *WHO* World Health Organization, *WHO-EMRO* World Health Organization Regional Office for the Eastern Mediterranean

**Table S6** Summary of the risk of bias (ROB) assessment of size estimation and HIV prevalence studies in FSWs and their clients (or proxy populations of clients), in the Middle East and North Africa (MENA). Measures only extracted from routine databases with no reports describing the study methodology were not included in the ROB assessment

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ROB quality domains** | **Size estimation studies** | | | | **HIV prevalence studies** | | | |
| **FSWs** | | **Clients** | | **FSWs** | | **Clients** | |
| **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** |
| **Sex work definition** |  |  |  |  |  |  |  |  |
| Low ROB | 153 | 95·0 | 39 | 100·0 | 116 | 78.9 | 12 | 36·4 |
| High ROB | 0 | 0·0 | 0 | 0·0 | 0 | 0.0 | 1 | 3·0 |
| Unclear | 8 | 5·0 | 0 | 0·0 | 31 | 21.1 | 20 | 60·6 |
|  |  |  |  |  |  |  |  |  |
| **Estimation methodology** |  |  |  |  |  |  |  |  |
| Low ROB | 156 | 96·9 | 27 | 69·2 | NA | NA | NA | NA |
| High ROB | 5 | 3·1 | 12 | 30·8 | NA | NA | NA | NA |
| Unclear | 0 | 0·0 | 0 | 0·0 | NA | NA | NA | NA |
|  |  |  |  |  |  |  |  |  |
| **Rigor of sampling methodology** |  |  |  |  |  |  |  |  |
| Low ROB | NA | NA | NA | NA | 101 | 68.7 | 4 | 12·1 |
| High ROB | NA | NA | NA | NA | 43 | 29.3 | 29 | 87·9 |
| Unclear | NA | NA | NA | NA | 3 | 2.0 | 0 | 0·0 |
|  |  |  |  |  |  |  |  |  |
| **Response rate** |  |  |  |  |  |  |  |  |
| Low ROB | 86 | 53·4 | 19 | 48·7 | 92 | 62.6 | 4 | 12·1 |
| High ROB | 4 | 2·5 | 1 | 2·5 | 8 | 5.4 | 1 | 3·0 |
| Unclear | 71 | 44·1 | 19 | 48·7 | 47 | 32.0 | 28 | 84·9 |
|  |  |  |  |  |  |  |  |  |
| **HIV ascertainment** |  |  |  |  |  |  |  |  |
| Low ROB | NA | NA | NA | NA | 146 | 99.3 | 33 | 100·0 |
| High ROB | NA | NA | NA | NA | 1 | 0.7 | 0 | 0·0 |
| Unclear | NA | NA | NA | NA | 0 | 0.0 | 0 | 0·0 |
|  |  |  |  |  |  |  |  |  |
| **Total number of studies** | 161 | 100·0 | 39 | 100·0 | 147 | 100.0 | 33 | 100·0 |
|  |  |  |  |  |  |  |  |  |
| **Summary** |  |  |  |  |  |  |  |  |
| **Low ROB** |  |  |  |  |  |  |  |  |
| At least 1 domain | 161 | 100·0 | 39 | 100·0 | 147 | 100.0 | 33 | 100·0 |
| At least 2 domains | 152 | 94·4 | 32 | 82·1 | 125 | 85.0 | 13 | 39·4 |
| At least 3 domains | 82 | 50·9 | 14 | 35·9 | 79 | 53.7 | 2 | 6·1 |
|  |  |  |  |  |  |  |  |  |
| **High ROB** |  |  |  |  |  |  |  |  |
| At least 1 domain | 9 | 5·6 | 13 | 33·3 | 51 | 34.7 | 29 | 87·9 |
| At least 2 domains | 0 | 0·0 | 0 | 0·0 | 1 | 0.7 | 2 | 6·1 |
| At least 3 domains | 0 | 0·0 | 0 | 0·0 | 0 | 0.0 | 0 | 0·0 |

*Abbreviations*: *FSWs* female sex workers, *NA* not applicable

**Table S7** Risk of bias (ROB) assessment of estimates of national and subnational representation for the number and population proportion of FSWs and of their clients, in the Middle East and North Africa

| **Country**  **Author, year [citation]** | **Year(s) of data collection** | **Size estimate** | | **Risk of bias assessment** | | |
| --- | --- | --- | --- | --- | --- | --- |
| **N or range** | **%** | **Sex work definition** | **Estimation methodology** | **Response rate** |
| **FSWs** |  |  |  |  |  |  |
| ***National estimates*** |  |  |  |  |  |  |
| **Egypt** |  |  |  |  |  |  |
| Bahaa, 2010 [117] | 2004-08 | NR | 0·4 | Low ROB | High ROB | Unclear |
| Jacobsen, 2014 [8] | 2014 | 22,986 | 0·24 | Low ROB | Low ROB | Unclear |
| **Iran** |  |  |  |  |  |  |
| Sharifi, 2017 [10] | 2015 | 19,800 | 0·31 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 98,500 | 1·54 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 152,200 | 2·38 | Low ROB | Low ROB | Unclear |
| **Lebanon** |  |  |  |  |  |  |
| Kahhaleh, 2009 [118] | 1996 | NR | 0·54 | Low ROB | Low ROB | Unclear |
| Kahhaleh, 2009 [118] | 2004 | NR | 0·53 | Low ROB | Low ROB | Low ROB |
| **Morocco** |  |  |  |  |  |  |
| Bennani, 2013 [119] | 2011 | 85,000 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2013 [120] | 2013 | NR | 6·9 | Low ROB | Low ROB | Low ROB |
| MOH, 2013 [120] | 2013 | NR | 2·4 | Low ROB | Low ROB | Low ROB |
| **Pakistan** |  |  |  |  |  |  |
| NACP, 2005 [15] (round I) | 2005 | 35,050 | 0·78 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 167,501 | 0·44 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 89,178 | 0·72 | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 64,829 | NR | Low ROB | Low ROB | Low ROB |
| **Sudan** |  |  |  |  |  |  |
| AFROCENTER Group, 2005 [121] | 2005 | NR | 0·4 | Low ROB | High ROB | Unclear |
| **Yemen** |  |  |  |  |  |  |
| MOH, 2010 [32] | NR | 58,934 | 1·16-2·10 | Unclear | Low ROB | Unclear |
| ***Subnational estimates*** |  |  |  |  |  |  |
| **Afghanistan** |  |  |  |  |  |  |
| SAR AIDS HDS, 2008 [5] | 2006-07 | 90 | 0·26 | Low ROB | Low ROB | Unclear |
| SAR AIDS HDS, 2008 [5] | 2006-07 | 898 | 0·19 | Low ROB | Low ROB | Unclear |
| SAR AIDS HDS, 2008 [5] | 2006-07 | 172 | 0·28 | Low ROB | Low ROB | Unclear |
| NACP, 2012 [6] (round II) | 2012 | 2,134 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [6] (round II) | 2012 | 2,800 | NR | Low ROB | Low ROB | Low ROB |
| **Djibouti** |  |  |  |  |  |  |
| Trellu-Kane, 2005 [7] | 2005 | NR | 4 | Low ROB | High ROB | Low ROB |
| **Egypt** |  |  |  |  |  |  |
| Jacobsen, 2014 [8] | 2014 | 6,092 | 0·17 | Low ROB | Low ROB | Unclear |
| Jacobsen, 2014 [8] | 2014 | 4,225 | 0·34 | Low ROB | Low ROB | Unclear |
| Jacobsen, 2014 [8] | 2014 | 1,345 | 0·34 | Low ROB | Low ROB | Unclear |
| Jacobsen, 2014 [8] | 2014 | 1,315 | 1·92 | Low ROB | Low ROB | Unclear |
| Jacobsen, 2014 [8] | 2014 | 278 | 0·11 | Low ROB | Low ROB | Unclear |
| **Iran** |  |  |  |  |  |  |
| Karami, 2017 [9] | NR | 842 | 0·45 | Low ROB | Low ROB | Low ROB |
| Sharifi, 2017 [10] | 2015 | 10,000 | 2·86 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 3,800 | 2·30 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 4,000 | 2·87 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 12,200 | 2·02 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 4,600 | 2·46 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 1,600 | 0·59 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 12,000 | 1·43 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 800 | 0·85 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 13,300 | 2·75 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 13,100 | 2·84 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 63,700 | 2·52 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 840 | 0·51 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 1,200 | 0·35 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 3,000 | 1·81 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 390 | 0·28 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 2,300 | 0·38 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 1,400 | 0·73 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 70 | 0·03 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 200 | 0·17 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 3,000 | 0·35 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 4,700 | 5 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 1,300 | 0·26 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 170 | 0·04 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 7,500 | 0·3 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 4,300 | 1·22 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 2,200 | 1·30 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 2,200 | 1·56 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 14,700 | 2·44 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 2,000 | 1·06 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 4,000 | 1·47 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 740 | 0·65 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 15,200 | 1·81 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 1,500 | 1·54 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 8,100 | 1·67 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 640 | 0·14 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 38,700 | 1·54 | Low ROB | Low ROB | Unclear |
| Sharifi, 2017 [10] | 2015 | 2,600 | 1·63 | Low ROB | Low ROB | Unclear |
| Karami, 2017 [11] | 2016 | 690 | NR | Low ROB | Low ROB | Low ROB |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | 3,639-4,333 | NR | Low ROB | Low ROB | Low ROB |
| MOH, 2012 [12] | 2011-12 | 6,028 | NR | Low ROB | Low ROB | Low ROB |
| MOH, 2012 [12] | 2011-12 | 5,683 | NR | Low ROB | Low ROB | Low ROB |
| MOH, 2012 [12] | 2011-12 | 3,956 | NR | Low ROB | Low ROB | Low ROB |
| Huygens, 2013 [13] | 2013 | 955 | NR | Unclear | Low ROB | Low ROB |
| Huygens, 2013 [13] | 2013 | 7,253 | NR | Unclear | Low ROB | Low ROB |
| **Pakistan** |  |  |  |  |  |  |
| NACP, 2005 [14] (pilot) | 2004-05 | 11,546 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [14] (pilot) | 2004-05 | 1,596 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 2,050 | 0·46 | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 1,350 | 0·69 | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 11,550 | 0·58 | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 14,150 | 1·26 | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 2,500 | 0·99 | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 950 | 0·45 | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 750 | 0·64 | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 1,750 | 0·88 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 125 | 0·04 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 9,500 | 1·30 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 2,421 | 0·58 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 2,750 | 0·71 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 25,550 | 0·74 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 24,625 | 1·34 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 525 | 0·44 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 5,075 | 1·22 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 1,550 | 0·44 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 2,500 | 1·10 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 1,596 | 0·31 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 1,831 | 0·67 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2010 [16] (round II) | 2006 | 2,550 | 1·14 | Low ROB | Low ROB | Low ROB |
| Khan, 2011 [17] | 2007 | 5,226 | NR | Low ROB | Low ROB | Low ROB |
| Khan, 2011 [17] | 2007 | NR | 0·43 | Low ROB | Low ROB | Low ROB |
| Khan, 2011 [17] | 2007 | NR | 0·56 | Low ROB | Low ROB | Low ROB |
| NACP, 2008 [18] | 2007 | 86 | NR | Low ROB | Low ROB | Unclear |
| NACP, 2008 [18] | 2007 | 498 | NR | Low ROB | Low ROB | Unclear |
| NACP, 2008 [18] | 2007 | 9 | NR | Low ROB | Low ROB | Unclear |
| NACP, 2008 [18] | 2007 | 5 | NR | Low ROB | Low ROB | Unclear |
| NACP, 2008 [18] | 2007 | 2 | NR | Low ROB | Low ROB | Unclear |
| NACP, 2008 [18] | 2007 | 1,030 | NR | Low ROB | Low ROB | Unclear |
| NACP, 2008 [18] | 2007 | 105 | NR | Low ROB | Low ROB | Unclear |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 1,413 | 1·30 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 4,846 | 0·50 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 2,994 | 1·19 | Low ROB | Low ROB | High ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 4,566 | 0·85 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 25,399 | 0·55 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 23,766 | 1·15 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 1,114 | 0·82 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 884 | 0·85 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 5,308 | 0·80 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 2,011 | 1·42 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 3,317 | 0·42 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 3,710 | 1·07 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 3,635 | 0·34 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 3,898 | 1·25 | Low ROB | Low ROB | Low ROB |
| Emmanuel, 2013 [19, 20] (round IV) | 2011-12 | 2,317 | 1·05 | Low ROB | Low ROB | Low ROB |
| Punjab ACP, 2015 [21] | 2014 | 7,556 | NR | Low ROB | Low ROB | Low ROB |
| Punjab ACP, 2015 [21] | 2014 | 25,716 | NR | Low ROB | Low ROB | Low ROB |
| Punjab ACP, 2015 [21] | 2014 | 6,561 | NR | Low ROB | Low ROB | Low ROB |
| Punjab ACP, 2015 [21] | 2014 | 4,327 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 6,201 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 192 | NR | Low ROB | Low ROB | High ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 1,349 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 4,069 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 317 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 4,426 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 25,191 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 1,739 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 4,593 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 2,084 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 1,690 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 765 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 2,465 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 4,121 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 6,252 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 2,031 | NR | Low ROB | Low ROB | High ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 3,307 | NR | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 523 | NR | Low ROB | Low ROB | High ROB |
| **Somalia** |  |  |  |  |  |  |
| MOH, 2016 [24] | 2016 | 911 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2016 [24] | 2016 | 1,126 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2016 [24] | 2016 | 963 | NR | Low ROB | Low ROB | Unclear |
| **Sudan** |  |  |  |  |  |  |
| NACP, 2002 [25] | 2002 | NR | 0·83 | Low ROB | Low ROB | Low ROB |
| NACP, 2002 [25] | 2002 | NR | 0·5 | Low ROB | High ROB | Low ROB |
| NACP, 2005 [26] | 2005 | NR | 3 | Low ROB | High ROB | Low ROB |
| UNHCR, 2007 [27] | 2006 | NR | 0·4 | Low ROB | Low ROB | Low ROB |
| UNHCR, 2007 [27] | 2006 | NR | 0·2 | Low ROB | Low ROB | Low ROB |
| MOH, 2016 [30] | 2015-16 | 5,800 | NR | Low ROB | Low ROB | Low ROB |
| MOH, 2016 [30] | 2015-16 | 5,306 | NR | Low ROB | Low ROB | Low ROB |
| **Tunisia** |  |  |  |  |  |  |
| Hsairi, 2012 [31] | 2011 | 541 | NR | Low ROB | Low ROB | Low ROB |
| Hsairi, 2012 [31] | 2011 | 596 | NR | Low ROB | Low ROB | Low ROB |
| Hsairi, 2012 [31] | 2011 | 291 | NR | Low ROB | Low ROB | Low ROB |
| **Yemen** |  |  |  |  |  |  |
| MOH, 2010 [32] | NR | 1,875-4,260 | 1·16-2·64 | Unclear | Low ROB | Unclear |
| MOH, 2010 [32] | NR | 1,580-1,759 | 1·89-2·10 | Unclear | Low ROB | Unclear |
| MOH, 2010 [32] | NR | 1,488-1,786 | 2·07-2·49 | Unclear | Low ROB | Unclear |
| MOH, 2010 [32] | NR | 3,092-4,495 | 0·64-2·10 | Unclear | Low ROB | Unclear |
| MOH, 2010 [32] | NR | 1,050-1,835 | 0·80-1·40 | Unclear | Low ROB | Unclear |
| **Clients of FSWs** |  |  |  |  |  |  |
| ***National estimates*** |  |  |  |  |  |  |
| **Afghanistan** |  |  |  |  |  |  |
| Todd, 2007 [122] | 2005-06 | NR | 3·57 | Low ROB | Low ROB | Unclear |
| Todd, 2012 [123] | 2010-11 | NR | 12·5 | Low ROB | Low ROB | Low ROB |
| **Egypt** |  |  |  |  |  |  |
| Bahaa, 2010 [117] | 2004-08 | NR | 0·9 | Low ROB | High ROB | Unclear |
| **Lebanon** |  |  |  |  |  |  |
| Kahhaleh, 2009 [118] | 1996 | NR | 9·7 | Low ROB | Low ROB | Unclear |
| Adib, 2002 [124] | 1999 | NR | 13·84 | Low ROB | Low ROB | Low ROB |
| Kahhaleh, 2009 [118] | 2004 | NR | 5·65 | Low ROB | Low ROB | Low ROB |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2007 [125] | 2007 | NR | 35·3 | Low ROB | Low ROB | Unclear |
| MOH, 2007 [125] | 2007 | NR | 2 | Low ROB | Low ROB | Unclear |
| MOH, 2013 [120] | 2013 | NR | 10·5 | Low ROB | Low ROB | Low ROB |
| MOH, 2013 [120] | 2013 | NR | 0·3 | Low ROB | Low ROB | Low ROB |
| **Pakistan** |  |  |  |  |  |  |
| Mir, 2013 [126] | 2007 | NR | 11·9 | Low ROB | Low ROB | Low ROB |
| Mir, 2013 [126] | 2007 | NR | 5·8 | Low ROB | Low ROB | Low ROB |
| **Sudan** |  |  |  |  |  |  |
| NACP, 2004 [127] | 2004 | NR | 0·3 | Low ROB | High ROB | Unclear |
| AFROCENTER Group, 2005 [121] | 2005 | NR | 0·5 | Low ROB | High ROB | Unclear |
| ***Subnational estimates*** |  |  |  |  |  |  |
| **Afghanistan** |  |  |  |  |  |  |
| Mansoor, 2008 [33] | 2007 | NR | 5·2 | Low ROB | Low ROB | Low ROB |
| **Djibouti** |  |  |  |  |  |  |
| Trellu-Kane, 2005 [7] | 2005 | NR | 17 | Low ROB | High ROB | Low ROB |
| **Iran** |  |  |  |  |  |  |
| Shokoohi, 2012 [34] | NR | 9,314 | 7·0 | Low ROB | Low ROB | Unclear |
| Shokoohi, 2012 [34] | NR | 3,203 | 2·4 | Low ROB | Low ROB | Unclear |
| Khalajabadi, 2018 [35] | 2013-14 | NR | 1·3 | Low ROB | Low ROB | Low ROB |
| Khalajabadi, 2018 [35] | 2013-14 | NR | 6·6 | Low ROB | Low ROB | Low ROB |
| **Lebanon** |  |  |  |  |  |  |
| Melikian, 1954 [36] | 1952 | NR | 59·3 | Low ROB | High ROB | Unclear |
| Melikian, 1967 [37] | 1963 | NR | 40·6 | Low ROB | High ROB | Low ROB |
| Ghandour, 2014 [38] | 2012 | NR | 20·1 | Low ROB | Low ROB | High ROB |
| **Pakistan** |  |  |  |  |  |  |
| Faisel, 2005 [39] | 2004-05 | NR | 6·8 | Low ROB | Low ROB | Low ROB |
| Minhas, 2005 [40] | 2005 | NR | 7 | Low ROB | High ROB | Unclear |
| **Somalia** |  |  |  |  |  |  |
| Ismail, 1990 [41] | 1986 | NR | 48 | Low ROB | High ROB | Unclear |
| Ismail, 1990 [42] | 1987 | NR | 29 | Low ROB | Low ROB | Low ROB |
| MOH, 2016 [24] | 2016 | 3,469 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2016 [24] | 2016 | 3,530 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2016 [24] | 2016 | 1,828 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2016 [24] | 2016 | 1,559 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2016 [24] | 2016 | 2,599 | NR | Low ROB | Low ROB | Unclear |
| MOH, 2016 [24] | 2016 | 2,202 | NR | Low ROB | Low ROB | Unclear |
| **Sudan** |  |  |  |  |  |  |
| McCarthy, 1989 [43] | 1987-88 | NR | 51·6 | Low ROB | High ROB | Unclear |
| Holt, 2003 [44] | 1992 | NR | 46·0 | Low ROB | High ROB | Low ROB |
| Holt, 2003 [44] | 1992 | NR | 31·0 | Low ROB | High ROB | Low ROB |
| NACP, 2002 [25] | 2002 | NR | 11·7 | Low ROB | High ROB | Low ROB |
| UNHCR, 2007 [27] | 2006 | NR | 1·7 | Low ROB | Low ROB | Low ROB |
| UNHCR, 2007 [27] | 2006 | NR | 1·4 | Low ROB | Low ROB | Low ROB |

The table is sorted by year(s) of data collection or year of publication if year of data collection was not reported.

*Abbreviations*: *ACP* AIDS Control Program, *FSWs* female sex workers, *MOH* Ministry of Health, *NACP* National AIDS Control Programme, *NAP* National AIDS Program, *NR* not reported, *SAR AIDS HDS* South Asia Region AIDS Human Development Sector, *UNHCR* United Nations Higher Commission for Refugees

**Table S8** Risk of bias (ROB) assessment of HIV prevalence studies in FSWs in the Middle East and North Africa

| **Country**  **Author, year [citation]** | **Year(s) of data collection** | **Sample size** | **HIV prev** **(%)** | **Sex work definition** | **Sampling methodology** | **Response rate** | **HIV ascertainment** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Studies using probability-based sampling** | | | | | | | |
| **Afghanistan** |  |  |  |  |  |  |  |
| SAR AIDS HDS, 2008 [5] | 2006-07 | 45 | 0 | Low ROB | Low ROB | Unclear | Low ROB |
| SAR AIDS HDS, 2008 [5] | 2006-07 | 87 | 0 | Low ROB | Low ROB | Unclear | Low ROB |
| NACP, 2010 [128] (round I) | 2009 | 368 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [6] (round II) | 2012 | 344 | 0·9 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [6] (round II) | 2012 | 333 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [6] (round II) | 2012 | 355 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| **Egypt** |  |  |  |  |  |  |  |
| MOH, 2006 [129] (round I) | 2006 | 118 | 0·8 | Unclear | High ROB | High ROB | Low ROB |
| MOH, 2010 [130] (round II) | 2010 | 200 | 0 | Low ROB | High ROB | Low ROB | Low ROB |
| **Iran** |  |  |  |  |  |  |  |
| Navadeh, 2012 [131] | 2010 | 139 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| Sajadi, 2013 [132] (round I) | 2010 | 817 | 4·5 | Low ROB | Low ROB | Low ROB | Low ROB |
| Kazerooni, 2014 [133] | 2010-11 | 278 | 4·7 | Low ROB | Low ROB | Low ROB | Low ROB |
| Moaeyedi-Nia [134] | 2012-13 | 161 | 5 | Low ROB | Low ROB | Unclear | Low ROB |
| Mirzazadeh, 2016 [135] (round II) | 2015 | 1,337 | 2·1 | Low ROB | High ROB | Unclear | Low ROB |
| Karami, 2017 [11] | 2016 | 369 | 4·6 | Low ROB | Low ROB | Low ROB | High ROB |
| **Jordan** |  |  |  |  |  |  |  |
| WHO, 2011 [23] (round I) | 2009 | 225 | 0 | Unclear | Low ROB | Unclear | Low ROB |
| MOH, 2014 [136] (round II) | 2013 | 358 | 0·6 | Low ROB | Low ROB | Unclear | Low ROB |
| MOH, 2014 [136] (round II) | 2013 | 102 | 0 | Low ROB | Low ROB | Unclear | Low ROB |
| MOH, 2014 [136] (round II) | 2013 | 212 | 0·5 | Low ROB | Low ROB | Unclear | Low ROB |
| **Lebanon** |  |  |  |  |  |  |  |
| Mahfoud, 2010 [137] | 2007-08 | 95 | 0 | Low ROB | Low ROB | High ROB | Low ROB |
| **Libya** |  |  |  |  |  |  |  |
| Valadez, 2013 [138] (round I) | 2010-11 | 69 | 15·7 | Low ROB | Low ROB | High ROB | Low ROB |
| **Morocco** |  |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | 364 | 5·1 | Low ROB | Low ROB | Low ROB | Low ROB |
| MOH, 2012 [12] | 2011-12 | 359 | 1·8 | Low ROB | Low ROB | Low ROB | Low ROB |
| MOH, 2012 [12] | 2011-12 | 392 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| MOH, 2012 [12] | 2011-12 | 319 | 1·4 | Low ROB | Low ROB | Low ROB | Low ROB |
| **Pakistan** |  |  |  |  |  |  |  |
| Bokhari, 2007 [139] | 2004 | 378 | 0·5 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 400 | 0·8 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 359 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 411 | 0·7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2005 [15] (round I) | 2005 | 368 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 194 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 398 | 0·3 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 403 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 425 | 0·02 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 423 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 398 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2007 [140] (round II) | 2006 | 400 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| Hawkes, 2009 [141] | 2007 | 107 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| Hawkes, 2009 [141] | 2007 | 426 | 0 | Low ROB | Low ROB | Unclear | Low ROB |
| Khan, 2011 [17] | 2007 | 730 | 0·7 | Low ROB | Low ROB | Unclear | Low ROB |
| NACP, 2010 [142] (special IBBSS among FSWs) | 2009 | 2,197 | 1·0 | Unclear | Unclear | Unclear | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 375 | 0·5 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 376 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 211 | 0·9 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 377 | 1·9 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 375 | 0·5 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 375 | 1·9 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 375 | 0·3 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 367 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 345 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 375 | 0 | Low ROB | Low ROB | High ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 345 | 0.3 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [20] (round IV) | 2012 | 375 | 0.8 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 351 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 196 | 1.5 | Low ROB | Low ROB | High ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 0.8 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 304 | 0.7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 250 | 0.4 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 2.2 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 387 | 2.6 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 4.1 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 4.1 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 3.8 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 265 | 3 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 0.3 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 363 | 1.7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 364 | 8.8 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 193 | 0 | Low ROB | Low ROB | High ROB | Low ROB |
| NACP, 2017 [22] (round V) | 2016-17 | 72 | 0 | Low ROB | Low ROB | High ROB | Low ROB |
| **Somalia** |  |  |  |  |  |  |  |
| Testa, 2008 [143] (round I) | 2008 | 237 | 5.2 | Low ROB | Low ROB | Low ROB | Low ROB |
| IOM, 2017 [144] (round II) | 2014 | 96 | 4.8 | Low ROB | Low ROB | High ROB | Low ROB |
| **Sudan** |  |  |  |  |  |  |  |
| Elkarim, 2002 [145] | 2002 | 367 | 4.4 | Low ROB | Low ROB | Unclear | Low ROB |
| Abdelrahim, 2010 [146] | 2008 | 321 | 0.9 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2010 [147] | 2008-09 | 267 | 0.1 | Unclear | Low ROB | Unclear | Low ROB |
| NACP, 2012 [148] | 2011 | 305 | 0.3 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 279 | 1.5 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 282 | 0.6 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 296 | 0.7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 288 | 5.0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 287 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 303 | 0.7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 296 | 1 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 293 | 7.7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 291 | 0.7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 303 | 0.7 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 299 | 0.2 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 284 | 1 | Low ROB | Low ROB | Low ROB | Low ROB |
| NACP, 2012 [148] | 2011 | 288 | 1.3 | Low ROB | Low ROB | Low ROB | Low ROB |
| MOH, 2016 [30] | 2015-16 | 835 | 37.9 | Low ROB | Low ROB | Low ROB | Low ROB |
| **Tunisia** |  |  |  |  |  |  |  |
| Hsairi, 2012 [31] | 2009 | 703 | 0.4 | Low ROB | Low ROB | Unclear | Low ROB |
| Hsairi, 2012 [31] | 2011 | 357 | 0.6 | Low ROB | Low ROB | Low ROB | Low ROB |
| Hsairi, 2012 [31] | 2011 | 284 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| Hsairi, 2012 [31] | 2011 | 347 | 1.2 | Low ROB | Low ROB | Low ROB | Low ROB |
| **Yemen** |  |  |  |  |  |  |  |
| Stulhofer, 2008 [149] (round I) | 2008 | 244 | 1.3 | Unclear | Low ROB | Unclear | Low ROB |
| MOH, 2014 [150] (round I) | 2010-11 | 301 | 0 | Unclear | Low ROB | Unclear | Low ROB |
| **Studies using non-probability sampling** | | | | | | | |
| **Afghanistan** |  |  |  |  |  |  |  |
| Todd, 2010 [151] | 2006-08 | 520 | 0.2 | Low ROB | High ROB | Unclear | Low ROB |
| **Djibouti** |  |  |  |  |  |  |  |
| Rodier, 1993 [152] | 1987 | 66 | 4.6 | Low ROB | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1987 | 221 | 1.4 | Low ROB | High ROB | Unclear | Low ROB |
| Constantine, 1992 [153] | 1988 | 33 | 18.2 | Unclear | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1988 | 78 | 9.0 | Low ROB | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1988 | 255 | 2.7 | Low ROB | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1990 | 116 | 41.7 | Low ROB | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1990 | 180 | 5.0 | Low ROB | High ROB | Unclear | Low ROB |
| Couzineau, 1991 [154] | 1991 | 300 | 43 | Unclear | High ROB | Unclear | Low ROB |
| Couzineau, 1991 [154] | 1991 | 397 | 13.1 | Unclear | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1991 | 292 | 36.0 | Low ROB | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1991 | 360 | 15.3 | Low ROB | High ROB | Unclear | Low ROB |
| Philippon, 1997 [155] | 1995 | 176 | 49 | Unclear | High ROB | Unclear | Low ROB |
| Marcelin, 2002 [156] | 1998-99 | 43 | 70 | Unclear | High ROB | Unclear | Low ROB |
| Marcelin, 2002 [156] | 1998-99 | 123 | 7 | Unclear | High ROB | Unclear | Low ROB |
| **Egypt** |  |  |  |  |  |  |  |
| Sheba, 1988 [157] | 1986-87 | 87 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Watts, 1993[158] | 1986-90 | 349 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Kabbash, 2012 [159] | 2009-10 | 431 | 0 | Unclear | High ROB | Low ROB | Low ROB |
| **Iran** |  |  |  |  |  |  |  |
| Jahani, 2005 [160] | 2002 | 149 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Kassaian, 2012 [161] | 2009-10 | 91 | 0 | Low ROB | High ROB | Low ROB | Low ROB |
| Taghizadeh, 2015 [162] | 2014 | 184 | 4 | Unclear | High ROB | Low ROB | Low ROB |
| Asadi-Ali, 2018 [163] | 2015 | 133 | 1.5 | Low ROB | High ROB | Low ROB | Low ROB |
| **Lebanon** |  |  |  |  |  |  |  |
| Naman, 1989 [164] | 1985-87 | 291 | 0.3 | Unclear | High ROB | Unclear | Low ROB |
| **Morocco** |  |  |  |  |  |  |  |
| MOH, 2008 [165] | 2007 | 141 | 1.4 | Unclear | High ROB | Low ROB | Low ROB |
| **Pakistan** |  |  |  |  |  |  |  |
| Iqbal, 1996 [166] | 1987-94 | 21 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Baqi, 1998 [167] | 1993-94 | 77 | 0 | Low ROB | High ROB | Low ROB | Low ROB |
| Anwar, 1998 [168] | NR | 103 | 1.9 | Unclear | Unclear | Unclear | Low ROB |
| Bokhari, 2007 [139] | 2004 | 421 | 0 | Low ROB | High ROB | Low ROB | Low ROB |
| Shah, 2004 [169] | 2004 | 157 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Shah, 2004 [170] | 2004 | 163 | 1.2 | Unclear | High ROB | Unclear | Low ROB |
| Akhtar, 2008 [171] | 2007 | 246 | 0 | Unclear | Unclear | Unclear | Low ROB |
| Raza, 2015 [172] | 2014 | NR | 0 | Unclear | High ROB | Unclear | Low ROB |
| **Somalia** |  |  |  |  |  |  |  |
| Jama, 1987 [173] | 1985-86 | 85 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Burans, 1990 [174] | NR | 89 | 0 | Unclear | High ROB | Low ROB | Low ROB |
| Scott, 1991 [175] | 1989 | 57 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Corwin, 1991 [176] | 1990 | 302 | 3 | Unclear | High ROB | Unclear | Low ROB |
| Jama Ahmed, 1991 [177] | 1991 | 155 | 0.6 | Unclear | High ROB | Unclear | Low ROB |
| **Sudan** |  |  |  |  |  |  |  |
| Burans, 1990 [178] | 1987 | 203 | 0 | Low ROB | High ROB | Unclear | Low ROB |
| McCarthy, 1995 [179] | NR | 50 | 16 | Unclear | High ROB | Low ROB | Low ROB |
| **Tunisia** |  |  |  |  |  |  |  |
| Bchir, 1988 [180] | 1987 | 42 | 0 | Low ROB | High ROB | Unclear | Low ROB |
| Hassen, 2003 [181] | NR | 51 | 0 | Low ROB | High ROB | Low ROB | Low ROB |
| Znazen, 2010 [182] | 2007 | 183 | 0 | Low ROB | High ROB | Low ROB | Low ROB |

The table is sorted by year(s) of data collection.

*Abbreviations*: *FSWs* female sex workers, *IBBSS* integrated bio-behavioural surveillance survey, *IOM* International Organization for Migration, *MOH* Ministry of Health, *NACP* National AIDS Control Programme, *NAP* National AIDS Program, *NR* not reported, *Prev* prevalence, *SAR AIDS HDS* South Asia Region AIDS Human Development Sector, *WHO* World Health Organization

**Table S9** Risk of bias (ROB) assessment of HIV prevalence studies in clients of FSWs (or proxy populations of clients) in the Middle East and North Africa

| **Country**  **Author, year [citation]** | **Year(s) of data collection** | **Sample size** | **HIV prev (%)** | **Sex work definition** | **Sampling method** | **Response rate** | **HIV ascertainment** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Djibouti** |  |  |  |  |  |  |  |
| Rodier, 1993 [152] | 1987 | 252 | 0.8 | Unclear | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1988 | 249 | 0.8 | Unclear | High ROB | Unclear | Low ROB |
| Fox, 1989 [183] | NR | 105 | 1.0 | High ROB | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1990 | 106 | 1.9 | Unclear | High ROB | Unclear | Low ROB |
| Rodier, 1993 [152] | 1991 | 193 | 10.4 | Unclear | High ROB | Unclear | Low ROB |
| **Egypt** |  |  |  |  |  |  |  |
| Sheba, 1988 [157] | 1986-87 | 302 | 0 | Unclear | High ROB | Unclear | Low ROB |
| **Kuwait** |  |  |  |  |  |  |  |
| Al-Owaish, 2000 [184] | 1996-97 | 617 | 0 | Low ROB | Low ROB | Unclear | Low ROB |
| Al-Owaish, 2000 [184] | 1996-97 | 1,367 | 0 | Low ROB | Low ROB | Unclear | Low ROB |
| Al-Owaish, 2002 [185] | 2002 | 599 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Al-Mutairi, 2007 [186] | 2003-04 | 520 | 0 | Low ROB | High ROB | High ROB | Low ROB |
| **Morocco** |  |  |  |  |  |  |  |
| Heikel, 1999 [187] | 1992-96 | 1,131 | 0.9 | Unclear | High ROB | Unclear | Low ROB |
| Manhart, 1996 [188] | 1996 | 223 | 1.4 | Unclear | High ROB | Unclear | Low ROB |
| Alami, 2002 [189] | 2001 | 422 | 0 | Unclear | High ROB | Unclear | Low ROB |
| **Pakistan** |  |  |  |  |  |  |  |
| Mujeeb, 1993 [190] | NR | 32 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Memon, 1997 [191] | 1994-95 | 50 | 0 | Unclear | High ROB | Unclear | Low ROB |
| NAP, 1996 [192] | 1995 | 402 | 0 | Unclear | High ROB | Unclear | Low ROB |
| NAP, 1996 [192] | 1995 | 295 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Rehan, 2003 [193] | 1999 | 138 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Rehan, 2003 [193] | 1999 | 148 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Rehan, 2003 [193] | 1999 | 93 | 1.1 | Unclear | High ROB | Unclear | Low ROB |
| Rehan, 2003 [193] | 1999 | 86 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Bhutto, 2011 [194] | 2000-09 | 4,288 | 0.06 | Low ROB | High ROB | Unclear | Low ROB |
| Bokhari, 2007 [139] | 2004 | 120 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| Razvi, 2014 [195] | 2010-14 | 465 | 1.1 | Low ROB | High ROB | Unclear | Low ROB |
| NAP, 2012 [196] | 2011 | 381 | 0 | Low ROB | Low ROB | Low ROB | Low ROB |
| **Somalia** |  |  |  |  |  |  |  |
| Ismail, 1990 [41] | 1986 | 101 | 0 | Low ROB | High ROB | Unclear | Low ROB |
| Scott, 1991 [175] | 1989 | 50 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Burans, 1990 [174] | NR | 45 | 0 | Low ROB | High ROB | Low ROB | Low ROB |
| Corwin, 1991 [176] | 1990 | 26 | 0 | Unclear | High ROB | Unclear | Low ROB |
| Ismail, 2007 [197] | 2007 | NR | 7.4 | Unclear | High ROB | Low ROB | Low ROB |
| **Sudan** |  |  |  |  |  |  |  |
| McCarthy, 1989 [198] | 1987 | 157 | 0 | Low ROB | High ROB | Unclear | Low ROB |
| McCarthy, 1989 [43] | 1987-88 | 398 | 2.5 | Low ROB | High ROB | Unclear | Low ROB |
| McCarthy, 1995 [179] | NR | 37 | 13.5 | Low ROB | High ROB | Unclear | Low ROB |

The table is sorted by year(s) of data collection or year of publication if year of data collection was not reported.

*Abbreviations*: *FSWs* female sex workers, *MOH* Ministry of Health, *NAP* National AIDS Program, *NR* not reported, *Prev* prevalence

**Table S10** Results of meta-regression analyses to identify associations with HIV prevalence, sources of between-study heterogeneity, and trend in HIV prevalence in clients of FSWs (or proxy populations of clients such as male STI clinic attendees), in the Middle East and North Africa (MENA)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Studies** | **Samples** | **Univariable analyses** | | | **Multivariable analysis** | | |
| **Sources of heterogeneity**\* |  | **Total N** | **Total N** | **OR (95% CI)** | **LR test p-value**‡ | **Variance explained R2**£ **(%)** | **AOR (95% CI)** | **p-value** | **LR test p-value**¥ |
| **Country/subregion**\*\* |  |  |  |  |  |  |  |  |  |
| Pakistan | Pakistan | 12 | 6,498 | 1.00 | <0.001 | 29.0 | 1.00 |  | <0.001 |
| Egypt | Egypt | 6 | 1,362 | 1.34 (0.28-6.30) |  |  | 1.56 (0.32-7.53) | 0.581 |  |
| Kuwait & Yemen | Kuwait & Yemen† | 7 | 6,535 | 0.24 (0.06-1.06) |  |  | 0.26 (0.06-1.13) | 0.072 |  |
| Horn of Africa | Djibouti, Somalia, South Sudan | 27 | 3,269 | 19.58 (6.69-57.36) |  |  | 17.85 (6.02-52.87) | <0.001 |  |
| North Africa | Algeria, Morocco, Sudan | 95 | 11,867 | 3.00 (1.16-7.76) |  |  | 2.77 (0.95-8.05) | 0.062 |  |
|  |  |  |  |  |  |  |  |  |  |
| **Total sample size of tested clients/male STI clinic attendees** | <100 | 18 | 502 | 1.00 | 0.021 | 3.0 | 1.00 |  | 0.271 |
| ≥100 | 129 | 29,029 | 0.34 (0.14-0.84) |  |  | 0.63 (0.28-1.44) | 0.271 |  |
|  |  |  |  |  |  |  |  |  |  |
| **Median year of data collection**⁑ | <2003 | 42 | 13,889 | 1.00 | 0.506 | 0 | 1.00 |  | 0.588 |
| ≥2003 | 105 | 15,642 | 1.25 (0.64-2.46) |  |  | 1.24 (0.57-2.72) | 0.588 |  |

\*Only country, sample size, and year of data collection had sufficient number of studies to warrant conduct of meta-regression analyses.

\*\*Countries were grouped based on geography and similarity in HIV prevalence levels. Given the large fraction of studies with zero HIV prevalence, particularly in the Fertile Crescent, an increment of 0.1 was added to number of events in all studies when generating log odds, and Eastern MENA was thus used also as a statistically better reference. While this choice of increment was arbitrary, other increments yielded the same findings, though some of the effect sizes changed in scale.

⁑Year grouping was driven by independent evidence identifying the emergence of HIV epidemics among both men who have sex with men[3] and people who inject drugs[4] in multiple MENA countries around 2003. Missing values for year of data collection (only four stratified measures) were imputed using data for year of publication adjusted by the median difference between year of publication and median year of data collection (for studies with complete information).

†Only one study was from Yemen.

‡Predictors with p-value ≤0.1 were considered as showing strong evidence for an association with (prevalence) odds, and were hence included in the multivariable analysis. Median year was also included in the multivariable model given its importance.

£Adjusted R-squared in the final multivariable model=28.78%

¥Predictors with p-value ≤0.1 in the multivariable model were considered as showing strong evidence for an association with (prevalence) odds.

*Abbreviations*: *AOR* adjusted odds ratio, *CI* confidence interval, *Coll* collection, *FSWs* female sex workers, *LR* likelihood ratio, *OR* odds ratio, *STI* sexually transmitted infection

**Table S11** Condom use among FSWs and their clients in the Middle East and North Africa

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Country**  **Author, year [citation]** | **Year(s) of data collection** | **City/province** | **Population** | **Condom use** | | |
| **Time frame** | **Use (%)** | **Consistent use (always/most of the time among all FSWs) (%)** |
| **FSWS** |  |  |  |  |  |  |
| **VAGINAL SEX** |  |  |  |  |  |  |
| **With client** |  |  |  |  |  |  |
| **Afghanistan** |  |  |  |  |  |  |
| SAR AIDS HDS, 2008 [5] | 2006-07 | Jalalabad | All FSWs | Ever | 29.0 | 16.0 |
| SAR AIDS HDS, 2008 [5] | 2006-07 | Mazar-i-Sharif | All FSWs | Ever | 40.0 | 32.0 |
| Todd, 2010 [151] | 2006-08 | Kabul, Jalalabad, Mazar-i-Sharif | All FSWs | Ever | 30.2 | 38.2\* |
| NACP, 2010 [128] | 2009 | Kabul | All FSWs | Last sex | 58.1 | NR |
| NACP, 2012 [6] | 2012 | Herat | All FSWs | Last sex | 67.0 | NR |
| NACP, 2012 [6] | 2012 | Kabul | All FSWs | Last sex | 64.0 | NR |
| NACP, 2012 [6] | 2012 | Mazar-i-Sharif | All FSWs | Last sex | 26.1 | NR |
| **Algeria** |  |  |  |  |  |  |
| MOH, 2014 [53] | 2014 | Saida | All FSWs | Last sex | 84.1 | NR |
| **Djibouti** |  |  |  |  |  |  |
| Rodier, 1993 [152] | 1990 | Djibouti | All FSWs | NR | NR | 41.9 |
| Rodier, 1993 [152] | 1990 | Djibouti | All bar girls | NR | NR | 92.7 |
| Rodier, 1993 [152] | 1991 | Djibouti | All FSWs | NR | NR | 28.4 |
| Rodier, 1993 [152] | 1991 | Djibouti | All bar girls | NR | NR | 90.9 |
| Philippon, 1997 [155] | 1995 | Djibouti | All FSWs | NR | 86.0 | 48.0 |
| Trellu-Kane, 2005 [7] | 2005 | Djibouti | All FSWs | Last sex | 25.0 | NR |
| MOH, 2010 [65] | 2007 | Djibouti | All FSWs | Last sex | 94.2 | NR |
| **Egypt** |  |  |  |  |  |  |
| MOH, 2006 [129] | 2006 | Cairo | All FSWs | Last sex | 31.4 | NR |
| Kabbash, 2012 [159] | 2009-10 | Cairo | FSWs who heard of condoms | Last sex | 22.4 | 16.7† |
| Kabbash, 2012 [159] | 2009-10 | Cairo | FSWs who heard of condoms | Past 1 M | 32.6 | NR |
| MOH, 2010 [130] | 2010 | Cairo | All FSWs | Last sex | 25.0 | 16.5 |
| MOH, 2010 [130] | 2010 | Cairo | All FSWs | Past 1 M | 41.0 | NR |
| NAP, 2014 [71] | 2010 | Cairo | All FSWs | Last sex | 10.0 | NR |
| **Iran** |  |  |  |  |  |  |
| Jahani, 2005 [160] | 2002 | NR | All FSWs | NR | NR | 83.2 |
| Kassaian, 2012 [161] | 2009-10 | Isfahan | All FSWs | NR | 64.8 | 48.4 |
| Sajadi, 2013 [132] | 2010 | National | All FSWs | Last sex | 57.1 | 49.1 |
| Kazerooni, 2014 [133] | 2010-11 | Shiraz | All FSWs | Last sex | 54.0 | 45.3\* |
| Kazerooni, 2014 [133] | 2010-11 | Shiraz | All FSWs | Past 1 M | 79.8 | NR |
| Moayedi-Nia, 2016 [134] | 2012-13 | Tehran | All FSWs | Last sex | 65.2 | NR |
| Taghizadeh, 2015 [162] | 2014 | Sari | All FSWs | Last sex | 78.5 | 62.4 |
| Asadi-Ali, 2018 [163] | 2015 | Northern Iran | All FSWs | Last sex | 43.3 | 42.3\* |
| Asadi-Ali, 2018 [163] | 2015 | Northern Iran | All FSWs | Ever | 83.6 | NR |
| Mirzazadeh, 2016 [135] | 2015 | National | NR | NR | NR | 26.0 |
| Karami, 2017 [11] | 2016 | Tehran | All FSWs | Last sex | 56.1 | 39.3 |
| Navadeh, 2012 [131] | 2010 | Kerman | All FSWs | Last sex | 83.1 | NR |
| **Jordan** |  |  |  |  |  |  |
| MOH, 2010 [199] | 2009 | 4 governorates | All FSWs | Last sex | 51.0 | NR |
| MOH, 2014 [136] | 2013 | Amman | All FSWs | Last sex | 80.0 | NR |
| MOH, 2014 [136] | 2013 | Irbid | All FSWs | Last sex | 67.0 | NR |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2006 [86] | 2003 | NR | All FSWs | Last sex | 37.3 | NR |
| MOH, 2008 [165] | 2007 | Agadir, Rabat Sale, Tanger | Al FSWs | NR | 83.0 | 40.4 |
| MOH, 2012 [12] | 2011-12 | Agadir | All FSWs | Last sex | 42.0 | 28.7 |
| MOH, 2012 [12] | 2011-12 | Fes | All FSWs | Last sex | 49.5 | 26.3 |
| MOH, 2012 [12] | 2011-12 | Rabat | All FSWs | Last sex | 51.1 | 34.6 |
| MOH, 2012 [12] | 2011-12 | Tanger | All FSWs | Last sex | 63.1 | 58.3 |
| MOH, 2013 [120] | 2013 | National | All FSWs | Past 12 M | 61.0 | 6.4 |
| **Lebanon** |  |  |  |  |  |  |
| Mahfoud, 2010 [137] | 2007-08 | Greater Beirut | All FSWs | Past 1 M | 97.7 | 95.2 |
| **Pakistan** |  |  |  |  |  |  |
| Baqi, 1998 [167] | 1993-94 | Karachi | All FSWs | Ever | 9.8 | 0 |
| NACP, 2005[200] | 2004 | Karachi | All FSWs | Last sex | 25.0 | NR |
| NACP, 2005 [200] | 2004 | Lahore | All FSWs | Last sex | 53.0 | NR |
| NACP, 2005 [14] | 2004-05 | Karachi | All FSWs | Last sex | 36.7 | 18.1 |
| NACP, 2005 [14] | 2004-05 | Rawalpindi | All FSWs | Last sex | 49.3 | 16.7 |
| NACP, 2005 [15] | 2005 | Faisalabad | All FSWs | Last sex | 19.0 | 3.0 |
| NACP, 2005 [15] | 2005 | Hyderabad | All FSWs | Last sex | 17.0 | 13.0 |
| NACP, 2005 [15] | 2005 | Karachi | All FSWs | Last sex | 50.0 | 30.0 |
| NACP, 2005 [15] | 2005 | Lahore | All FSWs | Last sex | 68.0 | 42.0 |
| NACP, 2005 [15] | 2005 | Multan | All FSWs | Last sex | 35.0 | 14.0 |
| NACP, 2005 [15] | 2005 | Peshawar | All FSWs | Last sex | 23.0 | 11.0 |
| NACP, 2005 [15] | 2005 | Quetta | All FSWs | Last sex | 40.0 | 16.0 |
| NACP, 2005 [15] | 2005 | Sukkur | All FSWs | Last sex | 17.0 | 13.0 |
| NACP, 2007 [140] | 2006 | National | All FSWs | Last sex | 45.0 | 23.0 |
| NACP, 2007 [140] | 2006 | Bannu | All FSWs | NR | NR | 5.0 |
| NACP, 2007 [140] | 2006 | Faisalabad | All FSWs | NR | NR | 16.0 |
| NACP, 2007 [140] | 2006 | Gujranwala | All FSWs | NR | NR | 12.0 |
| NACP, 2007 [140] | 2006 | Hyderabad | All FSWs | NR | NR | 36.0 |
| NACP, 2007 [140] | 2006 | Karachi | All FSWs | NR | NR | 44.0 |
| NACP, 2007 [140] | 2006 | Lahore | All FSWs | NR | NR | 31.0 |
| NACP, 2007 [140] | 2006 | Larkana | All FSWs | NR | NR | 28.0 |
| NACP, 2007 [140] | 2006 | Multan | All FSWs | NR | NR | 5.0 |
| NACP, 2007 [140] | 2006 | Peshawar | All FSWs | NR | NR | 33.0 |
| NACP, 2007 [140] | 2006 | Quetta | All FSWs | NR | NR | 33.0 |
| NACP, 2007 [140] | 2006 | Rawalpindi | All FSWs | NR | NR | 31.0 |
| NACP, 2007 [140] | 2006 | Sargodha | All FSWs | NR | NR | 12.0 |
| NACP, 2007 [140] | 2006 | Sukkur | All FSWs | NR | NR | 7.0 |
| Hawkes, 2009 [141] | 2007 | Abbottabad, Rawalpindi | All FSWs | Last sex | 38.0 | 12.0 |
| Khan, 2011 [17] | 2007 | Lahore | All FSWs | NR | NR | 65.0 |
| NACP, 2010 [142] | 2009 | Punjab | All FSWs | Last sex | 43.3 | NR |
| NACP, 2012 [20] | 2011 | DG Khan | All FSWs | Last sex | 32.0 | 8.0 |
| NACP, 2012 [20] | 2011 | Faisalabad | All FSWs | Last sex | 43.0 | 30.0 |
| NACP, 2012 [20] | 2011 | Karachi | All FSWs | Last sex | 67.0 | 48.0 |
| NACP, 2012 [20] | 2011 | Haripur | All FSWs | Last sex | 44.0 | 24.0 |
| NACP, 2012 [20] | 2011 | Lahore | All FSWs | Last sex | 46.0 | 31.0 |
| NACP, 2012 [20] | 2011 | Larkana | All FSWs | Last sex | 58.0 | 53.0 |
| NACP, 2012 [20] | 2011 | Multan | All FSWs | Last sex | 48.0 | 24.0 |
| NACP, 2012 [20] | 2011 | Peshawar | All FSWs | Last sex | 43.0 | 27.0 |
| NACP, 2012 [20] | 2011 | Quetta | All FSWs | Last sex | 57.0 | 38.0 |
| NACP, 2012 [20] | 2011 | Rawalpindi | All FSWs | Last sex | 14.0 | 8.0 |
| NACP, 2012 [20] | 2011 | Sargodha | All FSWs | Last sex | 35.5 | 14.0 |
| NACP, 2012 [20] | 2011 | Sukkur | All FSWs | Last sex | 21.0 | 5.0 |
| Punjab NACP, 2015 [201] | 2014 | Faisalabad | All FSWs | Last sex | 71.2 | 38.2 |
| Punjab NACP, 2015 [201] | 2014 | Lahore | All FSWs | Last sex | 66.2 | 32.4 |
| Punjab NACP, 2015 [201] | 2014 | Multan | All FSWs | Last sex | 68.4 | 34.6 |
| Punjab NACP, 2015 [201] | 2014 | Sargodha | All FSWs | Last sex | 74.4 | 37.2 |
| NACP, 2017 [22] | 2016-17 | Bahawalpur | All FSWs | Last sex | 58.0 | 39.8 |
| NACP, 2017 [22] | 2016-17 | Bannu | All FSWs | Last sex | 74.0 | 46.4 |
| NACP, 2017 [22] | 2016-17 | DG Khan | All FSWs | Last sex | 65.1 | 29.4 |
| NACP, 2017 [22] | 2016-17 | Gujranwala | All FSWs | Last sex | 65.8 | 65.5 |
| NACP, 2017 [22] | 2016-17 | Gujrat | All FSWs | Last sex | 31.0 | 16.7 |
| NACP, 2017 [22] | 2016-17 | Hyderabad | All FSWs | Last sex | 59.9 | 37.9 |
| NACP, 2017 [22] | 2016-17 | Larkana | All FSWs | Last sex | 11.8 | 11.3 |
| NACP, 2017 [22] | 2016-17 | Karachi | All FSWs | Last sex | 61.5 | 45.5 |
| NACP, 2017 [22] | 2016-17 | Kasur | All FSWs | Last sex | 29.4 | 23.6 |
| NACP, 2017 [22] | 2016-17 | Mirpurkhas | All FSWs | Last sex | 28.8 | 17.3 |
| NACP, 2017 [22] | 2016-17 | Nawabshah | All FSWs | Last sex | 14.8 | 4.7 |
| NACP, 2017 [22] | 2016-17 | Peshawar | All FSWs | Last sex | 67.9 | 46.8 |
| NACP, 2017 [22] | 2016-17 | Quetta | All FSWs | Last sex | 89.8 | 75.0 |
| NACP, 2017 [22] | 2016-17 | Rawalpindi | All FSWs | Last sex | 4.1 | 1.1 |
| NACP, 2017 [22] | 2016-17 | Sheikhupura | All FSWs | Last sex | 74.4 | 72.7 |
| NACP, 2017 [22] | 2016-17 | Sialkot | All FSWs | Last sex | 94.8 | 93.3 |
| NACP, 2017 [22] | 2016-17 | Sukkur | All FSWs | Last sex | 61.4 | 55.8 |
| NACP, 2017 [22] | 2016-17 | Turbat | All FSWs | Last sex | 45.8 | 12.5 |
| **Somalia** |  |  |  |  |  |  |
| Testa, 2008 [143] | 2008 | Hargeisa | All FSWs | Last sex | 25.6 | 6.0 |
| IOM, 2017 [144] | 2014 | Hargeisa | All FSWs | Last sex | 31.5 | 17.5 |
| **Sudan** |  |  |  |  |  |  |
| Elkarim, 2002 [145] | 2002 | National | All FSWs | Last sex | 1.2 | 0.9 |
| Abdelrahim, 2010 [146] | 2008 | Khartoum | All FSWs | Last sex | 45.0 | 35.9 |
| Elhadi, 2013 [202] | 2011 | Alshamalia | All FSWs | Last sex | 41.0 | 24.1 |
| Elhadi, 2013 [202] | 2011 | Blue Nile | All FSWs | Last sex | 4.7 | 23.9 |
| Elhadi, 2013 [202] | 2011 | Gadarif | All FSWs | Last sex | 16.2 | 12.4 |
| Elhadi, 2013 [202] | 2011 | Gezira | All FSWs | Last sex | 8.2 | 5.0 |
| Elhadi, 2013 [202] | 2011 | Kassala | All FSWs | Last sex | 55.1 | 0.7 |
| Elhadi, 2013 [202] | 2011 | Khartoum | All FSWs | Last sex | 30.3 | 18.5 |
| Elhadi, 2013 [202] | 2011 | North Darfur | All FSWs | Last sex | 23.0 | 11.4 |
| Elhadi, 2013 [202] | 2011 | North Kodofan | All FSWs | Last sex | 15.8 | 8.9 |
| Elhadi, 2013 [202] | 2011 | Red Sea | All FSWs | Last sex | 18.7 | 13.7 |
| Elhadi, 2013 [202] | 2011 | River Nile | All FSWs | Last sex | 28.8 | 18.6 |
| Elhadi, 2013 [202] | 2011 | Sinnar | All FSWs | Last sex | 8.4 | 3.1 |
| Elhadi, 2013 [202] | 2011 | South Darfur | All FSWs | Last sex | 21.6 | 24.5 |
| Elhadi, 2013 [202] | 2011 | West Darfur | All FSWs | Last sex | 14.6 | 7.6 |
| Elhadi, 2013 [202] | 2011 | White Nile | All FSWs | Last sex | 12.5 | 5.0 |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | All FSWs | Last sex | 72.4 | 72.4 |
| **Syria** |  |  |  |  |  |  |
| MOH, 2005 [104] | 2005 | NR | All FSWs | NR | 84.8 | 33.8 |
| **Tunisia** |  |  |  |  |  |  |
| Znazen, 2010 [182] | 2007 | Gabes, Sousse, Tunis | All FSWs | NR | NR | 60.6 |
| Hassen, 2003 [181] | NR | Sousse | All FSWs | NR | 65.0 | 36.8 |
| MOH, 2010 [203] | 2009 | Sfax, Sousse, Tunis | All FSWs | Last sex | 51.6 | 23.7 |
| **Yemen** |  |  |  |  |  |  |
| Stulhofer, 2008 [149] | 2008 | Aden | All FSWs | Last sex | 57.1 | NR |
| MOH, 2014 [150] | 2010 | Hodeida | All FSWs | Last sex | 34.9 | NR |
| **With regular client** |  |  |  |  |  |  |
| **Lebanon** |  |  |  |  |  |  |
| Mahfoud, 2010 [137] | 2007-08 | Greater Beirut | FSWs with regular client in past 1 M | Last sex | 92.0 | 99.0 |
| **Libya** |  |  |  |  |  |  |
| Valadez, 2013 [138] | 2010-11 | Tripoli | FSWs with regular client in past 6 M | Last sex | 76.7 | 56.8 |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | Agadir | FSWs with regular client in past 1 M | Last sex | 50.1 | 69.3\* |
| MOH, 2012 [12] | 2011-12 | Fes | FSWs with regular client in past 1 M | Last sex | 43.2 | 56.9\* |
| MOH, 2012 [12] | 2011-12 | Rabat | FSWs with regular client in past 1 M | Last sex | 55.9 | 81.7\* |
| MOH, 2012 [12] | 2011-12 | Tanger | FSWs with regular client in past 1 M | Last sex | 68.9 | 85.0\* |
| **Pakistan** |  |  |  |  |  |  |
| Bokhari, 2007 [139] | 2004 | Karachi | FSWs with regular client in past 7 days | Last sex | 25.5 | 3.3 |
| Bokhari, 2007 [139] | 2004 | Lahore | FSWs with regular client in past 7 days | Last sex | 47.0 | 20.1 |
| **Sudan** |  |  |  |  |  |  |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | FSWs with regular client in past 6 M | Last sex | 68.0 | NR |
| **Tunisia** |  |  |  |  |  |  |
| Hsairi, 2012 [31] | 2011 | Sfax, Sousse, Tunis | FSWs with regular client in past 1 M | Last sex | 44.3 | 41.5 |
| **Yemen** |  |  |  |  |  |  |
| Stulhofer, 2008 [149] | 2008 | Aden | FSWs with regular client in past 1 M | Last sex | 56.7 | 57.8 |
| **With one-time client** |  |  |  |  |  |  |
| **Lebanon** |  |  |  |  |  |  |
| Mahfoud, 2010 [137] | 2007-08 | Greater Beirut | FSWs with one-time client in past 1 M | Last sex | 96.0 | 100 |
| **Libya** |  |  |  |  |  |  |
| Valadez, 2013 [138] | 2010-11 | Tripoli | FSWs with one-time client in past 6 M | Last sex | 83.1 | 63.4 |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | Agadir | FSWs with one-time client in past 1 M | Last sex | 58.3 | NR |
| MOH, 2012 [12] | 2011-12 | Fes | FSWs with one-time client in past 1 M | Last sex | 54.6 | NR |
| MOH, 2012 [12] | 2011-12 | Rabat | FSWs with one-time client in past 1 M | Last sex | 60.3 | NR |
| MOH, 2012 [12] | 2011-12 | Tanger | FSWs with one-time client in past 1 M | Last sex | 72.5 | NR |
| **Pakistan** |  |  |  |  |  |  |
| Bokhari, 2007 [139] | 2004 | Karachi | FSWs with one-time client in past 7 days | Last sex | 28.5 | 2.4 |
| Bokhari, 2007 [139] | 2004 | Lahore | FSWs with one-time client in past 7 days | Last sex | 47.9 | 21.8 |
| **Sudan** |  |  |  |  |  |  |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | FSWs with one-time client in past 6 M | Last sex | 61.0 | NR |
| **Tunisia** |  |  |  |  |  |  |
| Hsairi, 2012 [31] | 2011 | Sfax, Sousse, Tunis | FSWs with one-time client in past 1 M | Last sex | 54.8 | 45.5 |
| **Yemen** |  |  |  |  |  |  |
| Stulhofer, 2008 [149] | 2008 | Aden | FSWs with one-time client in past 7 days | Last sex | 57.4 | 49.6 |
| **With non-paying partner** |  |  |  |  |  |  |
| **Egypt** |  |  |  |  |  |  |
| MOH, 2006 [129] | 2006 | Cairo | FSWs with non-paying partner | Last sex | 6.8 | NR |
| MOH, 2010 [130] | 2010 | Cairo | FSWs with non-paying partner | Last sex | 11.0 | 5.5 |
| MOH, 2010 [130] | 2010 | Cairo | FSWs with non-paying partner | Past 12 M | 27.4 | NR |
| Kabbash, 2012 [159] | 2009-10 | Greater Cairo | FSWs who heard of condoms and with non-paying partner in past 6 M | Last sex | 13.4 | 10.3† |
| **Iran** |  |  |  |  |  |  |
| Sajadi, 2013 [132] | 2010 | National | FSWs with non-paying partner in past 7 days | Last sex | 36.3 | 28.0 |
| Navadeh, 2012 [131] | 2010 | Kerman | All FSWs | Last sex | 78.3 | NR |
| Kazerooni, 2014 [133] | 2010-11 | Shiraz | All FSWs | Last sex | 45.8 | 27.1\* |
| Kazerooni, 2014 [133] | 2010-11 | Shiraz | All FSWs | Past 1 M | 77.4 | NR |
| **Lebanon** |  |  |  |  |  |  |
| Mahfoud, 2010 [137] | 2007-08 | Greater Beirut | FSWs with non-paying partner in past 1 M | Last sex | 48.0 | 64.0 |
| **Pakistan** |  |  |  |  |  |  |
| Bokhari, 2007 [139] | 2004 | Karachi | FSWs with non-paying partner in past 7 days | Last sex | 22.5 | 8.3 |
| Bokhari, 2007 [139] | 2004 | Lahore | FSWs with non-paying partner in past 7 days | Last sex | 21.8 | 8.0 |
| NACP, 2005 [14] | 2004-05 | Karachi | FSWs with non-paying partner | Last sex | 22.2 | NR |
| NACP, 2005 [14] | 2004-05 | Rawalpindi | FSWs with non-paying partner | Last sex | 13.3 | NR |
| NACP, 2005 [14] | 2004-05 | Karachi | FSWs with non-paying partner in past 1 M | Past 1 M | 48.6 | 19.1 |
| NACP, 2005 [14] | 2004-05 | Rawalpindi | FSWs with non-paying partner in past 1 M | Past 1 M | 26.7 | 4.8 |
| Hawkes, 2009 [141] | 2007 | Abbottabad, Rawalpindi | FSWs with non-paying partner | NR | 49.0 | NR |
| Punjab NACP, 2015 [201] | 2014 | Punjab | FSWs with non-paying partner | Past 1 M | NR | 15.1 |
| NACP, 2017 [22] | 2016-17 | National | FSWs with non-paying partner | Last sex | NR | 10.9 |
| **Somalia** |  |  |  |  |  |  |
| Testa, 2008 [143] | 2008 | Hargeisa | FSWs with non-paying partner | Last sex | 4.9 | 8.3 |
| IOM, 2017 [144] | 2014 | Hargeisa | All FSWs | Last sex | 18.8 | 18.7 |
| **Sudan** |  |  |  |  |  |  |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | FSWs with non-paying partner | Last sex | 75.0 | 71.0 |
| **Syria** |  |  |  |  |  |  |
| MOH, 2005 [104] | 2005 | NR | FSWs with non-paying partner | NR | 68.6 | 28.2 |
| **Tunisia** |  |  |  |  |  |  |
| MOH, 2010 [203] | 2009 | Sfax, Sousse, Tunis | All FSWs | NR | NR | 19.2 |
| Hsairi, 2012 [31] | 2011 | Sfax, Sousse, Tunis | FSWs with non-paying partner in past 1 M | Last sex | 12.1 | 11.6 |
| **Yemen** |  |  |  |  |  |  |
| Stulhofer, 2008 [149] | 2008 | Aden | FSWs with non-paying partner | Last sex | 28.8 | 25.7 |
| **With regular non-paying partner** | |  |  |  |  |  |
| **Iran** |  |  |  |  |  |  |
| Moayedi-Nia, 2016 [134] | 2012-13 | Tehran | FSWs with a stable partner | NR | 49.0 | NR |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | Agadir | FSWs with regular partner in past 1 M | Last sex | 20.3 | 48.7\* |
| MOH, 2012 [12] | 2011-12 | Fes | FSWs with regular partner in past 1 M | Last sex | 36.9 | 60.8\* |
| MOH, 2012 [12] | 2011-12 | Rabat | FSWs with regular partner in past 1 M | Last sex | 23.8 | 82.8\* |
| MOH, 2012 [12] | 2011-12 | Tanger | FSWs with regular partner in past 1 M | Last sex | 43.3 | 60.6\* |
| **Pakistan** |  |  |  |  |  |  |
| Hawkes, 2009 [141] | 2007 | Abbottabad, Rawalpindi | FSWs with regular non-paying partner | Last sex | 46.0 | 15.0 |
| NACP, 2012 [20] | 2011 | National | FSWs with regular non-paying partner | NR | NR | 20.6 |
| **Sudan** |  |  |  |  |  |  |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | FSWs with regular partner in past 6 M | Last sex | NR | 40 |
| **With occasional non-paying partner** | |  |  |  |  |  |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | Agadir | FSWs with occasional partner in past 1 M | Last sex | 59.0 | 2.7\* |
| MOH, 2012 [12] | 2011-12 | Fes | FSWs with occasional partner in past 1 M | Last sex | 43.8 | 46.3\* |
| MOH, 2012 [12] | 2011-12 | Rabat | FSWs with occasional partner in past 1 M | Last sex | 64.8 | 50.0\* |
| MOH, 2012 [12] | 2011-12 | Tanger | FSWs with occasional partner in past 1 M | Last sex | 80.1 | 64.1\* |
| **ANAL SEX** |  |  |  |  |  |  |
| **With clients** |  |  |  |  |  |  |
| **Iran** |  |  |  |  |  |  |
| Kazerooni, 2014 [133] | 2010-11 | Shiraz | All FSWs | Past 1 M | 66.7 | NR |
| **Libya** |  |  |  |  |  |  |
| Valadez, 2013 [138] | 2010-11 | Tripoli | FSWs reporting anal sex in past 1 M | Last sex | 0 | NR |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | Agadir | FSWs reporting anal sex in past 1 M | Last sex | 52.6 | 63.6\* |
| MOH, 2012 [12] | 2011-12 | Fes | FSWs reporting anal sex in past 1 M | Last sex | 35.5 | 55.6\* |
| MOH, 2012 [12] | 2011-12 | Rabat | FSWs reporting anal sex in past 1 M | Last sex | 86.5 | 33.3\* |
| MOH, 2012 [12] | 2011-12 | Tanger | FSWs reporting anal sex in past 1 M | Last sex | 68.2 | 86.7\* |
| **Pakistan** |  |  |  |  |  |  |
| Bokhari, 2007 [139] | 2004 | Karachi | FSWs reporting anal sex with regular client | Last sex | 6.8 | NR |
| Bokhari, 2007 [139] | 2004 | Lahore | FSWs reporting anal sex with regular client | Last sex | 22.3 | NR |
| Bokhari, 2007 [139] | 2004 | Karachi | FSWs reporting anal sex with one-time client | Last sex | 6.7 | NR |
| Bokhari, 2007 [139] | 2004 | Lahore | FSWs reporting anal sex with one-time client | Last sex | 37.5 | NR |
| NACP, 2005 [14] | 2004-05 | Karachi | FSWs reporting anal sex in past 1 M | Last sex | 17.0 | NR |
| NACP, 2005 [14] | 2004-05 | Rawalpindi | FSWs reporting anal sex in past 1 M | Last sex | 17.2 | NR |
| NACP, 2005 [14] | 2005 | Faisalabad | FSWs reporting anal sex | Last sex | 25.0 | NR |
| NACP, 2005 [14] | 2005 | Hyderabad | FSWs reporting anal sex | Last sex | 14.0 | NR |
| NACP, 2005 [14] | 2005 | Karachi | FSWs reporting anal sex | Last sex | 29.0 | NR |
| NACP, 2005 [14] | 2005 | Lahore | FSWs reporting anal sex | Last sex | 55.0 | NR |
| NACP, 2005 [14] | 2005 | Multan | FSWs reporting anal sex | Last sex | 17.0 | NR |
| NACP, 2005 [14] | 2005 | Peshawar | FSWs reporting anal sex | Last sex | 17.0 | NR |
| NACP, 2005 [14] | 2005 | Quetta | FSWs reporting anal sex | Last sex | 14.0 | NR |
| NACP, 2005 [14] | 2005 | Sukkur | FSWs reporting anal sex | Last sex | 35.0 | NR |
| NACP, 2007 [140] | 2006 | National | FSWs reporting anal sex | Last sex | 7.9 | NR |
| Hawkes, 2009 [141] | 2007 | Abbottabad & Rawalpindi | FSWs reporting anal sex | Last sex | 61.0 | NR |
| NACP, 2010 [142] | 2009 | Punjab | FSWs reporting anal sex | Last sex | 5.2 | NR |
| NACP, 2012 [20] | 2011 | Karachi | FSWs reporting anal sex | Last sex | 52.0 | NR |
| NACP, 2012 [20] | 2011 | DG Khan | FSWs reporting anal sex | Last sex | 36.0 | NR |
| NACP, 2012 [20] | 2011 | Faisalabad | FSWs reporting anal sex | Last sex | 46.0 | NR |
| NACP, 2012 [20] | 2011 | Haripur | FSWs reporting anal sex | Last sex | 36.0 | NR |
| NACP, 2012 [20] | 2011 | Lahore | FSWs reporting anal sex | Last sex | 49.0 | NR |
| NACP, 2012 [20] | 2011 | Larkana | FSWs reporting anal sex | Last sex | 13.0 | NR |
| NACP, 2012 [20] | 2011 | Multan | FSWs reporting anal sex | Last sex | 23.0 | NR |
| NACP, 2012 [20] | 2011 | Peshawar | FSWs reporting anal sex | Last sex | 12.0 | NR |
| NACP, 2012 [20] | 2011 | Quetta | FSWs reporting anal sex | Last sex | 56.0 | NR |
| NACP, 2012 [20] | 2011 | Rawalpindi | FSWs reporting anal sex | Last sex | 10.0 | NR |
| NACP, 2012 [20] | 2011 | Sargodha | FSWs reporting anal sex | Last sex | 19.0 | NR |
| NACP, 2012 [20] | 2011 | Sukkur | FSWs reporting anal sex | Last sex | 39.0 | NR |
| Punjab NACP, 2015 [201] | 2014 | Faisalabad | FSWs reporting anal sex in past 1 M | Last sex | 26.2 | NR |
| Punjab NACP, 2015 [201] | 2014 | Lahore | FSWs reporting anal sex in past 1 M | Last sex | 15.2 | NR |
| Punjab NACP, 2015 [201] | 2014 | Multan | FSWs reporting anal sex in past 1 M | Last sex | 16.0 | NR |
| Punjab NACP, 2015 [201] | 2014 | Sargodha | FSWs reporting anal sex in past 1 M | Last sex | 18.9 | NR |
| NACP, 2017 [22] | 2016-17 | Bannu | FSWs reporting anal sex | Last sex | 60.2 | NR |
| NACP, 2017 [22] | 2016-17 | Bahawalpur | FSWs reporting anal sex | Last sex | 11.9 | NR |
| NACP, 2017 [22] | 2016-17 | DG Khan | FSWs reporting anal sex | Last sex | 4.9 | NR |
| NACP, 2017 [22] | 2016-17 | Gujranwala | FSWs reporting anal sex | Last sex | 19.7 | NR |
| NACP, 2017 [22] | 2016-17 | Gujrat | FSWs reporting anal sex | Last sex | 24.6 | NR |
| NACP, 2017 [22] | 2016-17 | Hyderabad | FSWs reporting anal sex | Last sex | 30.8 | NR |
| NACP, 2017 [22] | 2016-17 | Karachi | FSWs reporting anal sex | Last sex | 4.1 | NR |
| NACP, 2017 [22] | 2016-17 | Kasur | FSWs reporting anal sex | Last sex | 10.4 | NR |
| NACP, 2017 [22] | 2016-17 | Larkana | FSWs reporting anal sex | Last sex | 1.6 | NR |
| NACP, 2017 [22] | 2016-17 | Mirpurkhas | FSWs reporting anal sex | Last sex | 8.5 | NR |
| NACP, 2017 [22] | 2016-17 | Nawabshah | FSWs reporting anal sex | Last sex | 1.4 | NR |
| NACP, 2017 [22] | 2016-17 | Peshawar | FSWs reporting anal sex | Last sex | 13.2 | NR |
| NACP, 2017 [22] | 2016-17 | Quetta | FSWs reporting anal sex | Last sex | 42.9 | NR |
| NACP, 2017 [22] | 2016-17 | Rawalpindi | FSWs reporting anal sex | Last sex | 0 | NR |
| NACP, 2017 [22] | 2016-17 | Sheikhupura | FSWs reporting anal sex | Last sex | 27.5 | NR |
| NACP, 2017 [22] | 2016-17 | Sialkot | FSWs reporting anal sex | Last sex | 6.2 | NR |
| NACP, 2017 [22] | 2016-17 | Sukkur | FSWs reporting anal sex | Last sex | 18.1 | NR |
| NACP, 2017 [22] | 2016-17 | Turbat | FSWs reporting anal sex | Last sex | 6.9 | NR |
| **With non-paying partner** |  |  |  |  |  |  |
| **Iran** |  |  |  |  |  |  |
| Kazerooni, 2014 [133] | 2010-11 | Shiraz | FSWs reporting anal sex | Past 1 M | 39.0 | NR |
| **CLIENTS OF FSWS** |  |  |  |  |  |  |
| **Afghanistan** |  |  |  |  |  |  |
| Todd, 2012 [123] | 2010-11 | National | Army recruits ever clients of FSWs | Last sex | 17.9 | 9.3 |
| **Djibouti** |  |  |  |  |  |  |
| Trellu-Kane, 2005 [7] | 2005 | Djibotui | Men aged 13-24 years clients of FSWs in past 12 M | Last sex | 53.0 | NR |
| **Morocco** |  |  |  |  |  |  |
| MOH, 2007 [125] | 2007 | National | Men aged 15-24 ever clients of FSWs | Ever | 77.2 | 35.0 |
| MOH, 2013 [120] | 2013 | National | Men aged 15-24 years clients of FSWs in past 12 M | Past 12 M | 90.4 | 45.2 |
| **Pakistan** |  |  |  |  |  |  |
| Bokhari, 2007 [139] | 2004 | Karachi | Truck drivers clients of FSWs in past 12 M | Last sex | 1.7 | NR |
| Bokhari, 2007 [139] | 2004 | Lahore | Truck drivers clients of FSWs in past 12 M | Last sex | 6.9 | NR |
| Faisel, 2005 [39] | 2004-05 | Lahore | Migrant men clients of FSWs in past 12 M | Last sex | 10.0 | 15.0\* |
| Mir, 2013 [126] | 2007 | National | Men clients of FSWs in past 12 M | Past 12 M | 33.1 | 17.3 |
| **Sudan** |  |  |  |  |  |  |
| UNHCR, 2007 [27] | 2006 | Juba, South Sudan | Men clients of FSWs in past 12 M | Last sex | 0 | NR |

The table is sorted by year(s) of data collection.

\*Consistent condom use among FSWs who reported condom use with client/partner.

†Consistent condom use among FSWs who ever heard of condoms.

*Abbreviations*: *CI* confidence interval, *FSWs* female sex workers, *IOM* International Organization for Migration, *M* month(s), *MOH* Ministry of Health, *NACP* National AIDS Control Programme, *NAP* National AIDS Program, *NR* not reported, *SAR AIDS HDS* South Asia Region AIDS Human Development Sector, *STI* sexually transmitted infections, *UNHCR* United Nations High Commissioner for Refugees

**Table S12** Measures of injecting drug use and overlap with people who inject drugs (PWID) among FSWs in the Middle East and North Africa

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Country**  **Author, year [citation]** | **Year(s) of data collection** | **City/**  **province** | **Drug use** | | | **Injecting drug use** | | | **Sex with PWID** | | |
| **Pop** | **Time frame** | **Proportion (%)** | **Pop** | **Time frame** | **Proportion (%)** | **Pop** | **Time frame** | **Proportion (%)** |
| **FSWS** |  |  |  |  |  |  |  |  |  |  |  |
| **Afghanistan** |  |  |  |  |  |  |  |  |  |  |  |
| Todd, 2010 [151] | 2006-08 | Jalalabad, Kabul, Mazar-i-Sharif | All FSWs | Ever | 6.9 | All FSWs | Ever | 0.4 | NR | NR | NR |
| NACP, 2010 [128] | 2009 | Kabul | All FSWs | Ever | 1.9 | All FSWs | Ever | 0 | All FSWs | Past 1 M | 0.5 |
| NACP, 2012 [6] | 2012 | Kabul | All FSWs | Ever | 1.7 | All FSWs | Ever | 0.1 | All FSWs | Past 12 M | 3.8 |
| NACP, 2012 [6] | 2012 | Herat | All FSWs | Ever | 11.7 | All FSWs | Ever | 7.1 | All FSWs | Past 12 M | 13.6 |
| NACP, 2012 [6] | 2012 | Mazar-i-Sharif | All FSWs | Ever | 5.5 | All FSWs | Ever | 0 | All FSWs | Past 12 M | 6.5 |
| **Egypt** |  |  |  |  |  |  |  |  |  |  |  |
| MOH, 2006 [129] | 2006 | Cairo | All FSWs | Ever | 78.8 | All FSWs | Past 12 M | 9.3 | NR | NR | NR |
| Kabbash, 2012 [159] | 2009-10 | Cairo | All FSWs | Ever | 49.0 | All FSWs | Past 12 M | 5.6 | NR | NR | NR |
| MOH, 2010 [130] | 2010 | Cairo | All FSWs | Ever | 51.5 | All FSWs | Past 12 M | 6.0 | NR | NR | NR |
| **Iran** |  |  |  |  |  |  |  |  |  |  |  |
| Kassaian, 2012 [161] | 2009-10 | Isfahan | All FSWs | Ever | 61.3 | All FSWs | NR | 19.0 | NR | NR | NR |
| Kassaian, 2012 [161] | 2009-10 | Isfahan | NR | NR | NR | Ever DU | Ever | 24.1 | NR | NR | NR |
| Sajadi, 2013 [132] | 2010 | National | All FSWs | Ever | 73.8 | Ever DU | Ever | 20.5 | NR | NR | NR |
| Sajadi, 2013 [132] | 2010 | National | NR | NR | NR | Ever IDU | Active IDU | 26.6 | NR | NR | NR |
| Mirzazadeh, 2016 [135] | 2010 | National | NR | NR | NR | All FSWs | Ever | 13.6 | NR | NR | NR |
| Navadeh, 2012 [131] | 2010 | Kerman | NR | NR | NR | All FSWs | Ever | 18.0 | NR | NR | NR |
| Kazerooni, 2014 [133] | 2010-11 | Shiraz | All FSWs | Ever | 69.9 | Ever DU | Ever | 16.4 | NR | NR | NR |
| Moayedi-Nia, 2016 [134] | 2012-13 | Tehran | All FSWs | Ever | 90.7 | NR | NR | NR | NR | NR | NR |
| Moayedi-Nia, 2016 [134] | 2012-13 | Tehran | Ever DU | Current | 50.9 | Active DU | Ever | 25.5 | NR | NR | NR |
| Taghizadeh, 2015 [162] | 2014 | Sari | All FSWs | Current | 59.0 | Active DU | Current | 1.1 | NR | NR | NR |
| Asadi-Ali, 2018 [163] | 2015 | Northern Iran | All FSWs | Past 12 M | 39.7 | All FSWs | NR | NR | NR | NR | NR |
| Mirzazadeh, 2016 [135] | 2015 | National | All FSWs | Ever | 59.8 | All FSWs | Ever | 6.1 | NR | NR | NR |
| Karami, 2017 [11] | 2016 | Tehran | NR | NR | NR | NR | NR | NR | All FSWs | NR | 23.6 |
| **Lebanon** |  |  |  |  |  |  |  |  |  |  |  |
| Naman, 1989 [164] | 1985-87 | NR | NR | NR | NR | All FSWs | NR | 1.4 | NR | NR | NR |
| Mahfoud, 2010 [137] | 2007-08 | Beirut | NR | NR | NR | All FSWs | Ever | 0 | NR | NR | NR |
| **Libya** |  |  |  |  |  |  |  |  |  |  |  |
| Valadez, 2013 [138] | 2010-11 | Tripoli | All FSWs | Past 6 M | 1.2 | All FSWs | Ever | 0 | NR | NR | NR |
| **Morocco** |  |  |  |  |  |  |  |  |  |  |  |
| MOH, 2012 [12] | 2011-12 | Agadir | All FSWs | Ever | 13.2 | Ever DU | Ever | 0.3 | NR | NR | NR |
| MOH, 2012 [12] | 2011-12 | Fes | All FSWs | Ever | 17.7 | Ever DU | Ever | 6.8 | NR | NR | NR |
| MOH, 2012 [12] | 2011-12 | Rabat | All FSWs | Ever | 8.1 | Ever DU | Ever | 0 | NR | NR | NR |
| MOH, 2012 [12] | 2011-12 | Tanger | All FSWs | Ever | 7.9 | Ever DU | Ever | 11.8 | NR | NR | NR |
| MOH, 2012 [12] | 2011-12 | Agadir | Ever DU | Past 6 M | 81.6 | NR | NR | NR | NR | NR | NR |
| MOH, 2012 [12] | 2011-12 | Fes | Ever DU | Past 6 M | 95.0 | NR | NR | NR | NR | NR | NR |
| MOH, 2012 [12] | 2011-12 | Rabat | Ever DU | Past 6 M | 85.8 | NR | NR | NR | NR | NR | NR |
| MOH, 2012 [12] | 2011-12 | Tanger | Ever DU | Past 6 M | 79.4 | NR | NR | NR | NR | NR | NR |
| **Pakistan** |  |  |  |  |  |  |  |  |  |  |  |
| Baqi, 1998 [167] | 1993-94 | Karachi | All FSWs | Current | 1.2 | All FSWs | Ever | 0 | NR | NR | NR |
| Bokhari, 2007 [139] & NACP, 2005 [14] | 2004 | Karachi | NR | NR | NR | All FSWs | Past 12 M | 4.4 | All FSWs | NR | 18.2 |
| Bokhari, 2007 [139] & NACP, 2005 [14] | 2004 | Lahore | NR | NR | NR | All FSWs | Past 12 M | 1.2 | All FSWs | NR | 22.8 |
| NACP, 2005 [14] | 2004-05 | Karachi | All FSWs | Current | 23.1 | All FSWs | Current | 4.6 | NR | NR | NR |
| NACP, 2005 [14] | 2004-05 | Rawalpindi | All FSWs | Current | 8.9 | All FSWs | Current | 0 | NR | NR | NR |
| NACP, 2005 [14] | 2005 | Faisalabad | NR | NR | NR | All FSWs | Past 6 M | 8.0 | All FSWs | Past 6 M | 33.0 |
| NACP, 2005 [14] | 2005 | Hyderabad | NR | NR | NR | All FSWs | Past 6 M | 0 | All FSWs | Past 6 M | 5.0 |
| NACP, 2005 [14] | 2005 | Karachi | NR | NR | NR | All FSWs | Past 6 M | 1.0 | All FSWs | Past 6 M | 3.0 |
| NACP, 2005 [14] | 2005 | Lahore | NR | NR | NR | All FSWs | Past 6 M | 2.5 | All FSWs | Past 6 M | 19.0 |
| NACP, 2005 [14] | 2005 | Multan | NR | NR | NR | All FSWs | Past 6 M | 3.0 | All FSWs | Past 6 M | 8.0 |
| NACP, 2005 [14] | 2005 | Peshawar | NR | NR | NR | All FSWs | Past 6 M | 0 | All FSWs | Past 6 M | 17.0 |
| NACP, 2005 [14] | 2005 | Quetta | NR | NR | NR | All FSWs | Past 6 M | 5.0 | All FSWs | Past 6 M | 15.0 |
| NACP, 2005 [14] | 2005 | Sukkur | NR | NR | NR | All FSWs | Past 6 M | 8.0 | All FSWs | Past 6 M | 8.0 |
| NACP, 2007 [140] | 2006 | Bannu | NR | NR | NR | All FSWs | Past 6 M | 3.2 | All FSWs | Past 6 M | 6.8 |
| NACP, 2007 [140] | 2006 | Faisalabad | NR | NR | NR | All FSWs | Past 6 M | 7.5 | All FSWs | Past 6 M | 31.0 |
| NACP, 2007 [140] | 2006 | Gujranwala | NR | NR | NR | All FSWs | Past 6 M | 5.3 | All FSWs | Past 6 M | 30.3 |
| NACP, 2007 [140] | 2006 | Hyderabad | NR | NR | NR | All FSWs | Past 6 M | 3.3 | All FSWs | Past 6 M | 2.3 |
| NACP, 2007 [140] | 2006 | Karachi | NR | NR | NR | All FSWs | Past 6 M | 0.7 | All FSWs | Past 6 M | 4.2 |
| NACP, 2007 [140] | 2006 | Lahore | NR | NR | NR | All FSWs | Past 6 M | 1.6 | All FSWs | Past 6 M | 16.9 |
| NACP, 2007 [140] | 2006 | Larkana | NR | NR | NR | All FSWs | Past 6 M | 1.0 | All FSWs | Past 6 M | 0.3 |
| NACP, 2007 [140] | 2006 | Multan | NR | NR | NR | All FSWs | Past 6 M | 1.0 | All FSWs | Past 6 M | 2.3 |
| NACP, 2007 [140] | 2006 | Peshawar | NR | NR | NR | All FSWs | Past 6 M | 1.7 | All FSWs | Past 6 M | 6.7 |
| NACP, 2007 [140] | 2006 | Quetta | NR | NR | NR | All FSWs | Past 6 M | 1.5 | All FSWs | Past 6 M | 3.3 |
| NACP, 2007 [140] | 2006 | Sargodha | NR | NR | NR | All FSWs | Past 6 M | 1.3 | All FSWs | Past 6 M | 12.5 |
| NACP, 2007 [140] | 2006 | Sukkur | NR | NR | NR | All FSWs | Past 6 M | 0 | All FSWs | Past 6 M | 0 |
| Hawkes, 2009 [141] | 2007 | Abbottabad, Rawalpindi | NR | NR | NR | All FSWs | Past 12 M | 3.0 | All FSWs | Past 12 M | 36.0 |
| Khan, 2011 [17] | 2007 | Lahore | NR | NR | NR | All FSWs | NR | 0.4 | NR | NR | NR |
| NACP, 2010 [142] | 2009 | Punjab | NR | NR | NR | All FSWs | Past 6 M | 6.0 | All FSWs | Past 6 M | 7.0 |
| NACP, 2012 [20] | 2011 | DG Khan | NR | NR | NR | All FSWs | Past 6 M | 5.1 | All FSWs | Past 6 M | 1.1 |
| NACP, 2012 [20] | 2011 | Faisalabad | NR | NR | NR | All FSWs | Past 6 M | 6.4 | All FSWs | Past 6 M | 13.8 |
| NACP, 2012 [20] | 2011 | Haripur | NR | NR | NR | All FSWs | Past 6 M | 2.4 | All FSWs | Past 6 M | 1.9 |
| NACP, 2012 [20] | 2011 | Karachi | NR | NR | NR | All FSWs | Past 6 M | 1.9 | All FSWs | Past 6 M | 5.6 |
| NACP, 2012 [20] | 2011 | Lahore | NR | NR | NR | All FSWs | Past 6 M | 5.1 | All FSWs | Past 6 M | 7.2 |
| NACP, 2012 [20] | 2011 | Larkana | NR | NR | NR | All FSWs | Past 6 M | 0.3 | All FSWs | Past 6 M | 0.5 |
| NACP, 2012 [20] | 2011 | Multan | NR | NR | NR | All FSWs | Past 6 M | 16.8 | All FSWs | Past 6 M | 24.8 |
| NACP, 2012 [20] | 2011 | Peshawar | NR | NR | NR | All FSWs | Past 6 M | 0 | All FSWs | Past 6 M | 0.3 |
| NACP, 2012 [20] | 2011 | Quetta | NR | NR | NR | All FSWs | Past 6 M | 6.7 | All FSWs | Past 6 M | 30.3 |
| NACP, 2012 [20] | 2011 | Rawalpindi | NR | NR | NR | All FSWs | Past 6 M | 1.3 | All FSWs | Past 6 M | 2.1 |
| NACP, 2012 [20] | 2011 | Sargodha | NR | NR | NR | All FSWs | Past 6 M | 5.2 | All FSWs | Past 6 M | 23.2 |
| NACP, 2012 [20] | 2011 | Sukkur | NR | NR | NR | All FSWs | Past 6 M | 6.1 | All FSWs | Past 6 M | 39.7 |
| PNACP, 2015 [201] | 2014 | Faisalabad | NR | NR | NR | All FSWs | Past 6 M | 1.4 | All FSWs | Past 6 M | 0.5 |
| PNACP, 2015 [201] | 2014 | Lahore | NR | NR | NR | All FSWs | Past 6 M | 1.0 | All FSWs | Past 6 M | 3.1 |
| PNACP, 2015 [201] | 2014 | Multan | NR | NR | NR | All FSWs | Past 6 M | 4.0 | All FSWs | Past 6 M | 3.8 |
| PNACP, 2015 [201] | 2014 | Sargodha | NR | NR | NR | All FSWs | Past 6 M | 2.1 | All FSWs | Past 6 M | 2.6 |
| NACP, 2017 [22] | 2016-17 | Bahawalpur | NR | NR | NR | All FSWs | Past 12 M | 1.1 | All FSWs | Past 12 M | 0.3 |
| NACP, 2017 [22] | 2016-17 | Bannu | NR | NR | NR | All FSWs | Past 12 M | 0 | All FSWs | Past 12 M | 0.5 |
| NACP, 2017 [22] | 2016-17 | DG Khan | NR | NR | NR | All FSWs | Past 12 M | 0.3 | All FSWs | Past 12 M | 0 |
| NACP, 2017 [22] | 2016-17 | Gujranwala | NR | NR | NR | All FSWs | Past 12 M | 0.7 | All FSWs | Past 12 M | 0.3 |
| NACP, 2017 [22] | 2016-17 | Gujrat | NR | NR | NR | All FSWs | Past 12 M | 5.6 | All FSWs | Past 12 M | 19.4 |
| NACP, 2017 [22] | 2016-17 | Hyderabad | NR | NR | NR | All FSWs | Past 12 M | 10.4 | All FSWs | Past 12 M | 25.5 |
| NACP, 2017 [22] | 2016-17 | Karachi | NR | NR | NR | All FSWs | Past 12 M | 0 | All FSWs | Past 12 M | 3.4 |
| NACP, 2017 [22] | 2016-17 | Kasur | NR | NR | NR | All FSWs | Past 12 M | 0.3 | All FSWs | Past 12 M | 5.5 |
| NACP, 2017 [22] | 2016-17 | Larkana | NR | NR | NR | All FSWs | Past 12 M | 0.5 | All FSWs | Past 12 M | 0.5 |
| NACP, 2017 [22] | 2016-17 | Mirpurkhas | NR | NR | NR | All FSWs | Past 12 M | 0.5 | All FSWs | Past 12 M | 4.9 |
| NACP, 2017 [22] | 2016-17 | Nawabshah | NR | NR | NR | All FSWs | Past 12 M | 9.3 | All FSWs | Past 12 M | 3.8 |
| NACP, 2017 [22] | 2016-17 | Peshawar | NR | NR | NR | All FSWs | Past 12 M | 1.1 | All FSWs | Past 12 M | 14.0 |
| NACP, 2017 [22] | 2016-17 | Quetta | NR | NR | NR | All FSWs | Past 12 M | 9.3 | All FSWs | Past 12 M | 54.9 |
| NACP, 2017 [22] | 2016-17 | Rawalpindi | NR | NR | NR | All FSWs | Past 12 M | 0.3 | All FSWs | Past 12 M | 4.9 |
| NACP, 2017 [22] | 2016-17 | Sheikhupura | NR | NR | NR | All FSWs | Past 12 M | 5.5 | All FSWs | Past 12 M | 45.2 |
| NACP, 2017 [22] | 2016-17 | Sialkot | NR | NR | NR | All FSWs | Past 12 M | 0 | All FSWs | Past 12 M | 0 |
| NACP, 2017 [22] | 2016-17 | Sukkur | NR | NR | NR | All FSWs | Past 12 M | 5.5 | All FSWs | Past 12 M | 16.5 |
| NACP, 2017 [22] | 2016-17 | Turbat | NR | NR | NR | All FSWs | Past 12 M | 2.8 | All FSWs | Past 12 M | 25.0 |
| **Somalia** |  |  |  |  |  |  |  |  |  |  |  |
| Burans, 1990 [174] | NR | Mogadishu | All FSWs | Current | 13.5 | All FSWs | NR | 0 | NR | NR | NR |
| Testa, 2008 [143] | 2008 | Hargeisa | All FSWs | Past 1 M | 0.6 | All FSWs | Past 12 M | 0 | NR | NR | NR |
| IOM, 2017 [144] | 2014 | Hargeisa | All FSWs | Ever | 85.2 | All FSWs | Past 12 M | 0.6 | NR | NR | NR |
| IOM, 2017 [144] | 2014 | Hargeisa | All FSWs | Past 1 M | 4.7 | NR | NR | NR | NR | NR | NR |
| **Sudan** |  |  |  |  |  |  |  |  |  |  |  |
| Elhadi, 2013 [202] | 2011 | Alshamalia | NR | NR | NR | All FSWs | Ever | 1.5 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | Blue Nile | NR | NR | NR | All FSWs | Ever | 0.9 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | Gadarif | NR | NR | NR | All FSWs | Ever | 0.5 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | Gezira | NR | NR | NR | All FSWs | Ever | 0.4 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | Kassala | NR | NR | NR | All FSWs | Ever | 0.9 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | Khartoum | NR | NR | NR | All FSWs | Ever | 2.3 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | North Darfur | NR | NR | NR | All FSWs | Ever | 5.0 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | North Kodofan | NR | NR | NR | All FSWs | Ever | 0.1 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | Red Sea | NR | NR | NR | All FSWs | Ever | 0 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | River Nile | NR | NR | NR | All FSWs | Ever | 0.6 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | Sinnar | NR | NR | NR | All FSWs | Ever | 1.0 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | South Darfur | NR | NR | NR | All FSWs | Ever | 2.6 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | West Darfur | NR | NR | NR | All FSWs | Ever | 1.6 | NR | NR | NR |
| Elhadi, 2013 [202] | 2011 | White Nile | NR | NR | NR | All FSWs | Ever | 1.6 | NR | NR | NR |
| MOH, 2016 [30] | 2015-16 | Juba, South Sudan | All FSWs | Past 6 M | 14.0 | NR | NR | NR | NR | NR | NR |
| **Syria** |  |  |  |  |  |  |  |  |  |  |  |
| MOH, 2005 [104] | 2005 | NR | NR | NR | NR | All FSWs | Ever | 10.0 | NR | NR | NR |
| **Tunisia** |  |  |  |  |  |  |  |  |  |  |  |
| MOH, 2010 [203] | 2009 | Sfax, Sousse, Tunis | All FSWs | Ever | 31.3 | NR | NR | NR | NR | NR | NR |
| Hsairi, 2012 [31] | 2011 | Sfax | All FSWs | Ever | 29.2 | Ever DU | Past 12 M | 0 | NR | NR | NR |
| Hsairi, 2012 [31] | 2011 | Sousse | All FSWs | Ever | 24.8 | Ever DU | Past 12 M | 4.7 | NR | NR | NR |
| Hsairi, 2012 [31] | 2011 | Tunis | All FSWs | Ever | 18.8 | Ever DU | Past 12 M | 8.8 | NR | NR | NR |
| **Yemen** |  |  |  |  |  |  |  |  |  |  |  |
| Stulhofer, 2008 [149] | 2008 | Aden | All FSWs | Past 1 M | 2.4 | All FSWs | Past 1 M | 2.1 | NR | NR | NR |
| **CLIENTS OF FSWS** |  |  |  |  |  |  |  |  |  |  |  |
| **Afghanistan** |  |  |  |  |  |  |  |  |  |  |  |
| Todd, 2012 [123] | 2010-11 | National | Army recruits-clients | Ever | 32.9 | NR | NR | NR | NR | NR | NR |
| **Somalia** |  |  |  |  |  |  |  |  |  |  |  |
| Burans, 1990 [174] | NR | Mogadishu | NR | NR | NR | STI clinic attendees | NR | 0 | NA | NA | NA |
| Rehan, 2003 [193] | 1999 | Lahore, Karachi, Peshawar, Quetta | STI clinic attendees | NR | 10.5 | NR | NR | NR | NA | NA | NA |

The table is sorted by year(s) of data collection.

*Abbreviations*: *DU* drug users, *FSWs* female sex workers, *IDU* injecting drug users, *IOM* International Organization for Migration, *M* month(s), *MOH* Ministry of Health, *NA* not applicable, *NACP* National AIDS Control Programme, *NR* not reported, *PNACP* Punjab National AIDS Control Programme, *Prp* proportion, *PWID* people who inject drugs

**Table S13** HIV/AIDS knowledge among FSWs in the Middle East and North Africa

|  | **Afghanistan** | **Egypt** | **Iran** | **Lebanon** | **Morocco** | **Pakistan** | **Somalia** | **Sudan** | **Syria** | **Tunisia** | **Yemen** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Aware of HIV/AIDS** |  |  |  |  |  |  |  |  |  |  |  |
| Ever heard of HIV/AIDS (%) | 25.4 [6], 32.4 [128], 37.8 [6], 39.9 [6], 54.0 [5], 75.0 [5] | 100.0 [129], 89.0 [130] | 92.7 [132], 98.7 [162] |  | 84.3 [12], 99.0 [12], 99.6 [12], 100.0 [12] | 35.0 [141], 64.1 [15], 68.4 [139], 66.9 [22], 68.7 [140], 75.2 [139], 80.3 [14], 80.4 [20], 80.7 [14], 83.0 [17], 87.3 [201] | 64.9 [176], 96.2 [143], 97.3 [144] | 98.4 [146] | 97.5 [204] | 94.2 [31], 95.0 [203] |  |
| **Aware of sex as a mode of HIV transmission** | | | | | | | | | | | |
| In all FSWs (%) | 59.0 [5], 72.0 [5] |  |  |  | 72.0 [86] | 50.8 [22], 63.8 [14], 68.6 [14] |  | 78.5 [30], 85.4 [146] | 94.9 [204] |  |  |
| In FSWs who ever heard of HIV (%) |  |  |  |  |  | 68.9 [140], 70.2 [140], 71.9 [140], 74.0 [140], 75.5 [140], 75.9 [140], 81.7 [15], 84.6 [140], 84.8 [201], 86.5 [140], 86.6 [140], 87.1 [140], 87.3 [140], 93.7 [140], 94.3 [20] |  |  |  |  |  |
| **Aware of HIV transmission through unprotected sex** | | | | | | | | | | | |
| In all FSWs (%) | 14.1 [128], 24.2 [6], 32.0 [5], 34.7 [6], 34.8 [6], 47.0 [5] |  | 89.8 [132] | 88.0 [137] | 50.6 [12], 58.4 [12], 59.8 [12], 61.0 [12], 72.0 [86] | 15.4 [14], 26.0 [139], 39.7 [142], 45.3 [14], 46.8 [22], 54.5 [139], 75.8 [20] | 51.6 [144], 70.6 [143] | 57.9 [30] | 76.6 [204] |  | 77.9 [149] |
| In FSWs who ever heard of HIV (%) |  | 49.4 [130] |  |  |  | 38.6 [140], 44.0 [140], 44.9 [140], 47.6 [140], 47.8 [140], 60.4 [15], 68.5 [140], 71.7 [140], 72.9 [140], 73.2 [20], 78.2 [140], 78.8 [140], 81.2 [140], 86.3 [201], 86.8 [140] |  |  |  | 66.1 [31], 78.9 [203], 83.1 [31], 86.7 [31] |  |
| **Aware of sharing needles as a mode of HIV transmission** | | | | | | | | | | | |
| In all FSWs (%) | 30.7 [128] |  | 95.4 [132] | 91.0 [137] | 84.9 [12], 93.4 [12], 95.3 [12], 99.6 [12] | 11.5 [14], 18.9 [22], 57.0[14], 63.3 [139], 72.1 [139] | 95.8 [143], 99.5 [144] | 91.3 [146] | 86.4 [104] |  |  |
| In FSWs who ever heard of HIV (%) |  | 88.2 [130] |  |  |  | 32.6 [20], 37.3 [140], 42.4 [15], 67.1 [201] |  |  |  | 92.4 [31], 92.9 [31], 96.4 [31] |  |

*Abbreviations:* *FSWs* female sex workers

**Table S14** Perception of risk among FSWs in the Middle East and North Africa

| **Perception of being at risk of HIV** | **Iran** | **Lebanon** | **Pakistan** | **Sudan** | **Syria** | **Yemen** |
| --- | --- | --- | --- | --- | --- | --- |
| No risk (%) |  |  |  | 4.9 [148], 7.0 [200], 11.2 [30], 12.5 [148], 14.3 [148], 15.1 [148], 15.9 [146], 21.4 [148], 22.7 [148], 23.7 [148], 25.8 [148], 26.9 [148], 27.6 [148], 29.0 [200], 34.2 [148], 35.8 [148], 37.8 [148], 44.4 [148] | 16.1 [204] |  |
| At risk |  |  |  |  |  |  |
| Among all FSWs (%) | 48.5 [132] | 44.0 [137] | 22.8 [22], 23.0 [14], 25.2 [14], 45.0 [17] |  |  |  |
| Among FSWs who ever heard of HIV (%) |  |  | 28.0 [15], 38.0 [140], 45.1 [20], 65.9 [201] |  |  |  |
| Low risk (%) |  |  |  | 7.1 [148], 8.6 [148], 8.8 [148], 11.6 [148], 12.1 [148], 12.1 [148], 12.4 [148], 13.7 [148], 18.3 [148], 19.8 [148], 24.1 [148], 27.0 [146], 27.3 [148], 31.5 [148], 32.1 [148], 46.9 [30] | 46.2 [104] |  |
| Medium risk (%) |  |  |  | 5.3 [148], 5.5 [148], 9.1 [148], 10.6 [148], 11.2 [148], 11.4 [148], 15.3 [148], 16.3 [148], 16.4 [148], 19.9 [148], 20.2 [148], 22.9 [148], 23.5 [148], 27.3 [30], 32.9 [148], 36.1 [146] |  |  |
| High risk (%) |  |  |  | 5.9 [148], 6.6 [148], 7.4 [148], 8.6 [148], 9.6 [148], 10.9 [148], 13.8 [148], 14.3 [148], 14.5 [148], 14.6 [30], 15.5 [148], 15.8[148], 20.7 [148], 21.0 [146], 21.4 [148], 32.0 [148] | 18.7 [204] | 14.1 [149] |

*Abbreviations*: *FSWs* female sex workers

**Table S15** HIV testing among FSWs in the Middle East and North Africa

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HIV testing** | **Afg** | **Alg** | **Egypt** | **Iran** | **Leb** | **Lib** | **Mor** | **Pakistan** | **Somal** | **Sudan** | **Syria** | **Tunisia** | **Yemen** |
| **Ever tested** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ever tested among all FSWs (%) | 4.0 [5], 4.3 [128], 12.0 [5], 21.7 [6], 93.2 [6], 96.2 [6] |  |  | 45.0 [205], 80.6 [205], 99.4 [162] | 79.0 [137] |  | 24.3 [12], 33.5 [12], 34.8 [12], 36.0 [12] | 4.9 [14], 6.0 [141], 8.5 [14], 17.2 [22] | 5.0 [143], 29.6 [144] | 4.4 [148], 5.2 [148], 5.4 [148], 8.0 [148], 8.6 [148], 9.4 [148], 10.4 [148], 12.2 [148], 14.4 [148], 14.6 [148], 17.6 [148], 17.9 [148], 22.0 [148], 23.9 [148], 78.7 [30] | 45.0 [104] |  | 20.1 [149] |
| Ever tested among FSWs who ever heard of HIV (%) |  |  | 3.4 [130] |  |  |  |  | 0.5 [140], 0.5 [140], 1.5 [140], 2.8 [140], 2.8 [140], 3.3 [140], 4.1 [140], 6.2 [15], 8.3 [140], 8.5 [140], 14.4 [140], 15.7 [20], 15.8 [140], 16.5 [140], 55.9 [201] |  |  |  | 21.8 [31], 27.7 [31], 38.0 [31], 15.5 [203] |  |
| Ever received results among FSWs who ever tested for HIV (%) | 78.6 [6], 81.0 [6], 96.9 [6] |  |  |  | 99.0 [137] |  | 91.9 [12], 95.5 [12], 96.0 [12], 96.7 [12] | 60.0 [201] |  |  | 75.8 [104] | 87.2 [31] |  |
| Ever tested and received results among all FSWs (%) |  |  |  |  |  |  |  | 0.7 [139], 0.9 [139] | 4.0 [143] |  |  | 8.8 [203] |  |
| **Tested in past 12 M** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Tested in past 12 months among all FSWs (%) |  |  |  | 35.9 [206] |  |  | 13.4 [12], 17.9 [12], 20.3 [12], 25.3 [12] |  |  | 0.9 [148], 2.5 [148], 3.1 [148], 4.5 [148], 5.2 [148], 6.2 [148], 8.1 [148], 8.5 [148], 9.6 [148], 11.1 [148], 12.1 [148], 12.4 [148], 12.7 [148], 19.1 [148] | 38.0 [204] | 14.3 [31] |  |
| Tested in past 12 months among FSWs who ever tested for HIV (%) | 43.1 [6], 57.1 [6], 75.0 [6] |  | 33.3 [130] |  | 82.0 [137] |  | 58.9 [12], 59.4 [12], 65.1 [12],  71.7 [12] |  | 47.7 [143], 77.2 [144] |  |  |  | 38.9 [149] |
| Received results in past 12 M among all FSWs (%) |  |  |  |  |  |  |  |  |  | 0.4 [148], 1.7 [148], 2.4 [148], 4.1 [148], 5.4 [148], 6.0 [148], 7.8 [148], 8.3 [148], 9.2 [148], 10.0 [148], 10.8 [148], 11.5 [148], 11.6 [148], 18.4 [148] |  |  |  |
| Received results among FSWs who tested for HIV in past 12 M (%) |  |  |  | 79.0 [206] |  |  |  |  | 86.7 [144], 100.0 [143] | 38.5 [148], 51.8 [148], 86.0 [148], 89.8 [148], 91.6 [148], 93.3 [148], 93.5 [148], 93.5 [148], 93.8 [148], 93.9 [148], 96.0 [148]¸96.4 [148], 99.3 [148], 100.0 [148] |  |  |  |
| Tested & received results in past 12 M among all FSWs (%) |  | 20.0 [53], 29.5 [53] | 1.1 [71, 130], 100 [71] (identified by NGO) | 27.5 [205], 32.9 [134], 70.4 [205] |  | 38.6 [138] | 14.2 [12], 16.3 [12], 18.5 [12], 25.0 [12] | 14.1 [142], 15.5 [142] |  | 7.0 [146] |  | 13.4 [31], 14.1 [203] | 6.0 [150] |

*Abbreviations*: *Afg* Afghanistan, *Alg* Algeria, *FSWs* female sex workers, *Leb* Lebanon, *Lib* Libya, *M* month(s), *Mor* Morocco, *Somal* Somalia

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