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# The proportion of HIV disclosure to sexual partners among people diagnosed with HIV in China: A systematic review and meta-analysis

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**Background:** Sexual behavior is one of the main routes of HIV/AIDS spread. HIV disclosure to sexual partners has been confirmed to be an important strategy for HIV/AIDS prevention and control. We conducted a systematic review and meta-analysis to pool proportions and characteristics of HIV disclosure to sexual partners among people diagnosed with HIV in China.

**Methods:** We searched eight databases and extracted the data on HIV disclosure to partners. Heterogeneity of the data was tested with $I^2$. Published bias subjectively and objectively analyzed through the funnel plot and Egger's regression test. Subgroup analyses were performed to explore the variation in the proportion by sexual partnership types (unclassified, regular, casual sexual partners), whether being men who have sex with men (MSM), and when to diagnose. The sources of heterogeneity were analyzed. Sensitivity analysis was carried out to evaluate the stability of the results.

**Results:** Out of 3,698 studies, 44 were included in the review; 11 targeted on MSM. The pooled proportion of HIV disclosure to sexual partners was 65% (95% CI: 56%–75%; 34 studies). Sub-group analyses indicated the proportions of HIV disclosure to regular, casual and unclassified sexual partners were 63% (95% CI: 45%–81%; 31 studies), 20% (95% CI: 8%–33%; nine studies), and 66% (95% CI: 59%–73%; 14 studies), respectively. Fifty-seven percent (95% CI: 45%–69%; three studies) disclosed on the day of diagnosis, 62% (95% CI: 42%–82%; four studies) disclosed within 1 month, and 39% (95% CI: 2%–77%; four studies) disclosed 1 month later. Among MSM, the disclosure to regular male partners, regular female sexual partners, spouses, and casual partner were 47% (95% CI: 29%–65%; six studies), 49% (95% CI: 33%–65%; three studies), 48% (95% CI: 18%–78%; seven studies), and 34% (95% CI: 19%–49%; four studies), respectively.

**Conclusions:** The disclosure prevalence of people diagnosed with HIV to sexual partners still need improving in China, and it varies among partner

types, key populations, and time being diagnosed. HIV disclosure strategies and procedures need to be developed more detailed and tailored based on the pain points of disclosure status, so as to ultimately prevent HIV transmission through sexual contact.

**Systematic review registration:** https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022291631, identifier: CRD42022291631.

KEYWORDS

**HIV disclosure, sexual partners, people diagnosed with HIV, China, systematic review and meta-analysis**

## Introduction

HIV epidemic is a severe global public health problem (1). Since 1981, 79.3 million people have been diagnosed with HIV (PDWH), and 36.3 million have died of AIDS-related illnesses (2). By the end of 2021, 1.14 million PDWH were reported surviving in China (3). Of the newly reported cases in 2021, 97% were self-reported getting infected through sexual contact, and among them, 26% were through male-to-male sexual contact (3). Fear of negative consequences has been shown to be the main barrier for partner disclosure, which includes discrimination, violence, refusal of sex and divorce (4–6). Thus, they may conceal their HIV condition to partners, which might increase HIV transmission through sexual contact (7).

HIV partner disclosure has been advocated by World Health Organization (WHO) to reduce HIV transmission through sexual contact, especially for HIV key populations, men who have sex with men (MSM), female sex workers, drug users, and transgender people (8, 9). The HIV disclosure rate varied between countries and was lowest in developing countries (16.7%—86%) (10). In China, the disclosure of HIV is usually based on PDWH's own willingness (11). Despite more open policies about partner notification strategy for sexually transmitted diseases (12, 13), promotion of safer sex (14–16), and increased numbers in HIV testing, the proportion of HIV partner disclosure in China was very inconsistent (17). Literatures recorded the disclosure rate in China to be between 11.4% (18) and 90.2% (19), which could not reflect the overall disclosure situation in China.

We systematically searched eight databases (PubMed, Cochrane Library, Embase, Web of Science, China National Knowledge Internet, Wan Fang, Sino Med, and VIP data) using the terms: "HIV," "sexual partner," and "disclosure" and found 17 published systematic reviews. They focused on influencing factors of HIV disclosure (14, 20–22), disclosure policies and their effectiveness (13, 23, 24), interventions for HIV disclosure (25, 26), evaluation of self-report disclosure tools (27), and the HIV disclosure among specific populations such as adolescents or immigrants (28–30). Four reviews synthesized the proportions of HIV partner disclosure among Ethiopian adults with PDWH (31–34). One (31) reported 76.03% of pooled disclosure rate (18 studies, 8,009 participants), while the other (32) reported 73% of disclosure rate (12 studies, 4,528 participants). Two other reviews (33, 34) reported 74.63% (22 studies, 8,873 participants) and 75.95% (18 studies, 7,084 participants) disclosure proportions, respectively. However, there is still a lack of knowledge about the special characteristics of HIV disclosure to sexual partners (31–34). The quality of the reviews was also low, resulting in high publication bias (32, 34). Considering that sexual contact has become the main transmission route of the increasing global HIV epidemic, disclosing HIV to sexual partners could be an effective strategy in preventing secondary HIV transmission from HIV high-risk populations to the general population (35, 36). However, China still uses non-systematically evaluation of the HIV partner disclosure, which makes the development of HIV disclosure promotion programs challenging (37). Therefore, given the high prevalence of HIV sexual transmission in China, the large number of PDWH and the treatment burden, it is important to focus on Chinese literature about HIV disclosure to sexual partners (38, 39). Considering some studies conducted in China were published in Chinese journals, which were not indexed in English databases, we selected four Chinese databases (China National Knowledge Internet, Wan Fang, Sino Med, and VIP data), which would cover almost all the studies published in Chinese.

We aimed to conduct a systematic review and meta-analysis to determine the pooled proportions of HIV disclosure to sexual partners in China. We defined HIV disclosure as PDWH notifying partners voluntarily by themselves, including active notification (i.e., spontaneous notification after diagnosis) or passive notification (after being advised by the health care professional, the PDWH choose to disclose on his own) (40). We also combined HIV disclosure proportions under different situations, such as disclosure among MSM, to different sexual partnership types, and when to disclose after diagnosis. We hope that the knowledge gained by this review could provide references to enrich the partner disclosure policies

for Chinese policymakers, guide the development of targeted partner disclosure promotion interventions, and assist the achievement of the ultimate goal of ending AIDS in 2030 (41).

# Methods

This review synthesized the disclosure proportion using the JBI methodology for single prevalence or incidence systematic reviews (42). The protocol was registered in the PROSPERO database (CRD42022291631). The review was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (43).

## Data source and search strategy

A comprehensive search was carried out using eight electronic databases, including four Chinese (the China National Knowledge Internet, Wan Fang, Sino Med, and VIP data) and four international databases (PubMed, Cochrane Library, Embase, and Web of Science). These databases were selected as they cover as much of the literature we need as possible (44). The search was limited to all primary studies published from 1981 until the search date. Gray literature, including conference abstracts, graduate dissertations, and unpublished articles were screened using Google Scholar. We contacted the authors if there was any doubt about the data or if further details were needed. In addition, we searched references of included studies for potentially eligible studies (45).

The main search terms and phrases were "HIV," "AIDS," "HIV disclosure," "sexual partner," "reveal," "partner notification," "China," and "Chinese." For example, Boolean search using AND, OR were used in search strategy in PubMed as follows: [HIV [MeSH Terms] OR HIV infections [MeSH Terms] OR Acquired Immunodeficiency Syndrome [MeSH Terms] OR Human immunodeficiency virus OR HIV infections OR AIDS OR Acquired Immunodeficiency Syndrome (AIDS)] AND [Truth Disclosure [MeSH Terms] OR Self Disclosure [MeSH Terms] OR Disclosure [MeSH Terms] OR HIV Disclosure OR HIV serostatus disclosure OR partner disclosure OR (disclos*) OR (expos*) OR (reveal*) OR partner notification] AND (China OR Chinese). We adjusted the retrieval formula on this basis according to different databases. All citations were imported into Endnote 20.0 to find and remove duplicates. Detailed search formulas for each database were provided in the Supplementary Table S1.

## Eligibility criteria

We applied the following inclusion criteria: (1) studies reported HIV disclosure of PDWH (≥18 years old) (46) who have at least one sexual partner; (2) disclosing to one or more partners (regardless of regular or casual sexual partners) counts as eligible; (3) all observational (cross-sectional, cohort, and case-control) studies assessed HIV disclosure in China. Baseline data from randomized controlled studies, mixed studies, and intervention studies would also be used; (4) studies published after 1981, when the first five AIDS cases were reported in the world (47). The search was restricted to English and Chinese language.

The exclusion criteria were: (1) studies including PDWH who did not explicitly report having a sexual partner would be excluded; (2) reported data could not extract the disclosure rate; (3) studies were qualitative, reviews, systematic reviews, or meta-analyses.

## Selection of studies

Two reviewers (WP and XS) independently searched the literature, browsed through the titles and abstracts, and finally screened the full text that met the inclusion criteria (48). Discrepancies were resolved by consultation or discussion with a third reviewer (XL). For studies excluded, we recorded the reasons for rejection to ensure a transparent and open selection process. For multiple articles with the same study data, we only retained one published article that met the inclusion criteria, especially which one had extractable data, and combined the same data as one.

## Data extraction

Once the eligible studies have been identified, two reviewers extracted data on the variables (including author, year, province, study design, population, sample size, types of sexual partners reported, and HIV disclosure events; Table 1). Data extraction has been done independently by two reviewers (WP and XS), and followed by comparison to ensure data accuracy; differences were resolved through joint discussion by team members (48).

## Evaluation of study quality

The studies included were assessed by two reviewers (WP and QZ) independently, using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross-Sectional Studies (49). Since we used baseline data only from intervention studies, cohort studies, and mixed studies, we also evaluated them using the checklist. Each item rated "yes" referring value "1" was summed giving a range of a possible total score between 0 and 8 on the checklist. Based on Zhang's method (50), we classified below 3 as low quality, 4–7 as medium quality, and

TABLE 1 Characteristics and quality of included studies.

| No. | Authors year | Province | Study design | Study population | Sample size* (male/female) | Outcomes | | Quality score |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Type of sexual partner | HIV disclosure events** | |
| 1 | Wu 2021 | Chongqing | Cohort study | PDWH: unclassified | 312 (207/105) | Spouse | 156/175 | 5 |
| 2 | Qi 2012 | Yunnan | Cross-sectional study | PDWH: unclassified | 300 (186/114) | Spouse | 101/300 | 8 |
| 3 | Zhao 2016 | Jiangsu | Cohort study | PDWH: unclassified | 152 (142/10) | Spouse | 75/152 | 7 |
| 4 | Ni 2011 | Xinjiang | Cross-sectional study | PDWH: unclassified | 3,071 (1,900/1,171) | Unclassified | 2,010/2,467 | 7 |
| 5 | Xue 2011 | Xinjiang | Cross-sectional study | PDWH: unclassified | 257 (217/40) | Unclassified | 139/154 | 6 |
| 6 | Zhuo 2020 | Sichuan | Cross-sectional study | PDWH: unclassified | 850 (670/180) | Spouse | 735/850 | 8 |
| 7 | Huang 2018 | Shenyang | Cross-sectional study | PDWH:only MSM | 524 (524/0) | Spouse | 72/115 | 6 |
| 8 | Wang M 2013 | Shanghai | Cross-sectional study | PDWH:only MSM | 200 (200/0) | Regular male partners | 78/200 | 8 |
| 9 | Hu 2017 | Shanxi | Cross-sectional study | PDWH: unclassified | 223 (212/11) | Spouse | 75/89 | 8 |
| 10 | Yu 2017 | Yunnan | Case-control study | PDWH: unclassified | 223 (–/–) | Spouse | 91/223 | 8 |
| 11 | Shan 2010 | Yunnan | Cross-sectional study | PDWH: unclassified | 497 (250/247) | Regular sexual partner | 307/389 | 8 |
| | | | | | | Casual sexual partner | 1/16 | |
| 12 | Chen 2019 | Unclear | Cross-sectional study | PDWH: unclassified | 243 (218/25) | Unclassified | 113/144 | 8 |
| 13 | Hu 2014 | Guangxi | Cross-sectional study | PDWH: unclassified | 425 (294/131) | Regular sexual partner | 245/425 | 8 |
| 14 | Gao 2010 | Yunnan | Cross-sectional study | PDWH: unclassified | 305 (165/140) | Regular sexual partner | 128/283 | 8 |
| | | | | | | Casual sexual partner | 3/160 | |
| 15 | Asimuguli 2021 | Xinjiang | Cross-sectional study | PDWH: unclassified | 201 (130/71) | Unclassified | 131/201 | 8 |
| 16 | Wang Q 2013 | Henan | Cross-sectional study | PDWH: unclassified | 557 (210/347) | Spouse | 203/557 | 5 |
| 17 | Lan 2020 | Guangxi | Cross-sectional study | PDWH: only MSM | 91 (91/0) | Regular female sexual partner | 28/91 | 8 |
| | | | | | | Regular male partners | 24/91 | |
| 18 | Chen 2010 | Unclear | Cross-sectional study | PDWH: unclassified | 23 (14/9) | Spouse | 19/23 | 5 |
| 19 | Yang 2015 | Guangxi | Case-control study | PDWH: unclassified | 397 (299/98) | Spouse | 388/397 | 8 |
| 20 | Qin 2021 | Anhui | Cross-sectional study | PDWH: unclassified | 217 (170/47) | Spouse | 163/217 | 6 |

*(Continued)*

TABLE 1 (Continued)

| No. | Authors year | Province | Study design | Study population | Sample size* (male/female) | Outcomes | | Quality score |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Type of sexual partner | HIV disclosure events** | |
| 21 | Mi 2010 | Sichuan | Cross-sectional study | PDWH: only MSM | 202 (202/0) | Regular sexual partner | 48/109 | 6 |
| | | | | | | Casual sexual partner | 15/106 | |
| 22 | Liu 2013 | Hunan | Cross-sectional study | PDWH: unclassified | 262 (207/55) | Unclassified | 137/262 | 8 |
| 23 | He 2021 | Beijing | Cross-sectional study | PDWH: unclassified | 200 (200/0) | Unclassified | 118/188 | 8 |
| 24 | Liu 2011 | Shandong | Cross-sectional study | PDWH: unclassified | 213 (–/–) | Spouse | 102/117 | 7 |
| 25 | Li 2021 | Sichuan | Cross-sectional study | PDWH: unclassified | 283 (212/71) | Unclassified | 236/283 | 8 |
| 26 | Yang 2005 | Beijing, Guangdong | Cross-sectional study | PDWH: unclassified | 214 (148/66) | Unclassified | 119/214 | 6 |
| 27 | Xu 2011 | Henan, Zhejiang, Gansu, Yunnan | Mixed study | PDWH: unclassified | 481 (331/150) | Spouse | 440/481 | 6 |
| 28 | Zhou 2014 | Jiangsu | Cross-sectional study | PDWH: only MSM | 164 (164/0) | Spouse | 109/164 | 8 |
| 29 | Yang 2011 | Hubei | Cross-sectional study | PDWH: only MSM | 100 (100/0) | Regular sexual partner | 19/100 | 5 |
| 30 | Yang 2018 | Jiangsu | Cross-sectional study | PDWH: unclassified | 466 (443/23) | Regular male partners | 115/150 | 8 |
| | | | | | | Spouse | 128/180 | |
| 31 | Jin 2017 | Guangdong | Cross-sectional study | PDWH: only MSM | 340 (340/0) | Unclassified | 162/253 | 8 |
| | | | | | | Regular sexual partner | 135/200 | |
| | | | | | | Spouse | 12/31 | |
| | | | | | | Casual sexual partner | 67/148 | |
| 32 | Liu 2017 | Shanghai, Sichuan | Cross-sectional study | PDWH: only MSM | 308 (308/0) | Regular sexual partner | 174/274 | 8 |
| | | | | | | Spouse | 38/83 | |
| | | | | | | Casual sexual partner | 62/210 | |
| 33 | Xiao 2015 | Guangxi | Cross-sectional study | PDWH: unclassified | 2,987 (–/–) | Unclassified | 125/1,093 | 6 |
| 34 | Mao 2018 | Guangxi | Cross-sectional study | PDWH: unclassified | 1,254 (742/512) | Regular sexual partner | 851/1,254 | 7 |
| 35 | Xiao 2018 | Hunan | Cross-sectional study | PDWH: unclassified | 184 (133/51) | Unclassified | 68/104 | 8 |

*(Continued)*

TABLE 1 (Continued)

| No. | Authors year | Province | Study design | Study population | Sample size* (male/female) | Outcomes | | Quality score |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Type of sexual partner | HIV disclosure events** | |
| 36 | Yan 2019 | Hebei, Sichuan, Jiangsu | Cross-sectional study | PDWH: only MSM | 432 (432/0) | Regular female sexual partner | 215/432 | 8 |
| 37 | Yan 2021 | Guangdong | Cross-sectional study | PDWH: only MSM | 944 (944/0) | Regular sexual partner | 300/461 | 6 |
| | | | | | | Casual sexual partner | 194/416 | |
| 38 | Ding 2011 | Xinjiang, Yunnan | Cross-sectional study | PDWH: unclassified | 88 (53/35) | Unclassified | 54/88 | 8 |
| 39 | Wang 2010 | Guangxi, Yunnan | Cross-sectional study | PDWH: unclassified | 946 (494/452) | Regular sexual partner | 620/654 | 7 |
| | | | | | | Casual sexual partner | 7/54 | |
| | | | | | | Unclassified | 625/693 | |
| 40 | Qiao 2016 | Guangxi | Cross-sectional study | PDWH: unclassified | 791 (420/371) | Unclassified | 405/791 | 7 |
| 41 | Zang 2015 | Guangxi | Cross-sectional study | PDWH: unclassified | 147 (103/44) | spouse | 88/92 | 6 |
| 42 | Chen 2014 | Guangdong, Chongqing, Sichuan | Cross-sectional study | PDWH: only MSM | 541 (541/0) | Regular male partners | 263/423 | 8 |
| | | | | | | Spouse | 19/423 | |
| 43 | Chen 2013 | Gansu | Cross-sectional study | PDWH: unclassified | 232 (206/26) | Regular sexual partner | 94/148 | 8 |
| | | | | | | Casual sexual partner | 6/114 | |
| 44 | Zhang 2009 | Yunnan, Guangxi | Mixed study | PDWH: unclassified | 974 (553/421) | Regular sexual partner | 516/549 | 8 |
| | | | | | | Casual sexual partner | 11/54 | |

PDWH unclassified: The study participants included were people diagnosed with HIV, and no distinction has been made between special groups such as men who have sex with men (MSM); PDWH only MSM: The study participants included were MSM populations diagnosed with HIV.
*Sample size means the number of people living with HIV included in the study.
**HIV disclosure events were calculated by the formula: The number of people who disclosed HIV to (some type) of sexual partners/the number of people who had (certain types of partners).

above 7 as high quality (Table 1). Discrepancies were resolved by consultation or discussion with a third reviewer (CZ).

## Statistical analysis

Extracted data was exported to Stata 16.0 for meta-analysis. The statistical heterogeneity of the pooled rate was assessed according to $I^2$ with a $p$-value. $p$-value <0.05 indicated heterogeneity existence. The $I^2$ value presented low, medium and high heterogeneity by the cut of 25, 50 and 75% values (51). Since high heterogeneity was shown in the final data, we employed the random effects model to estimate the pooled proportion and produce 95% confidence intervals (CI) (52, 53).

We checked the publication bias using a funnel plot, by judging the symmetry of the figure. We also conducted an Egger's regression test, which would be suggestive of the significant absence of publication bias if the $p$-value is more than

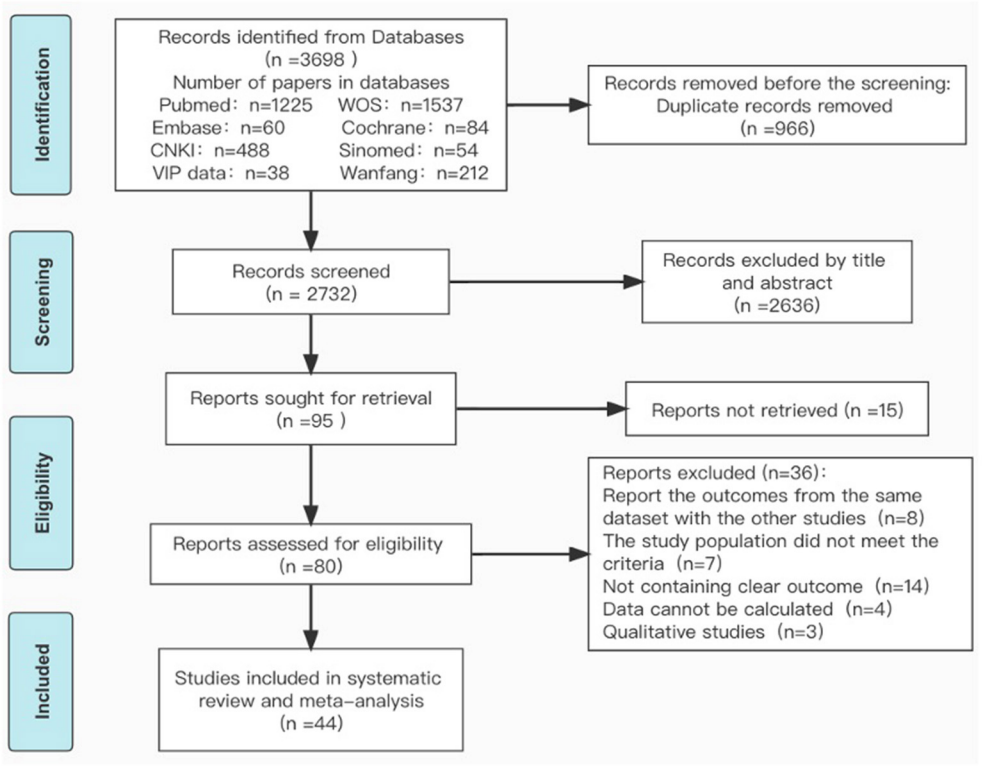


FIGURE 1
Flow chart of literature search and selection procedures and outcomes.

0.05 (54). In addition, subgroup analyses were undertaken based on the different types of sexual partners (unclassified, regular, and casual sexual partners) among the common population and MSM, and when to disclose (on the day ofdiagnosis, within 1 month, and 1 month later after diagnosis). Sensitivity analysis was conducted to assess the stability of the pooled proportion by eliminating one study in each turn (55).

# Results

## Study characteristics

Searches of the literature were up to November 23, 2021. We retrieved 3,698 studies from eight databases. Among these, 3,644 articles were excluded and 44 studies were selected for data synthesis. The selection process and reasons for exclusion were illustrated in Figure 1.

All included 44 studies (19, 56–62) were published between 2005 and 2021. The study regions covered 55.88% (19/34) of provinces in China (Table 1). Thirty-five studies (19, 56–62) were published in Chinese and the remaining nine studies were published in English (18, 63–70). Except for two case-control (71, 72), two cohort studies (56, 58), and two mixed studies (73, 74), 38 studies were cross-sectional studies (19, 57, 60, 62, 66–69, 75–83). A total of 21,821 PDWHs were included in the review, of which 3,846 (17.6%) were MSM. The male to female ratio was 2.66 in the pooled study population. In addition, among the included MSM, 1,223 (31.8%) had regular male partners, 984 (25.6%) had regular female partners, 1,011 (26.3%) had spouses, and 880 (22.9%) had casual sexual partners.

## Quality assessment

The average score for the quality appraisal for the 44 studies was 7.2. Of these, 25 studies (57, 60, 62, 71, 77, 81, 84, 85) were high-quality (56.8%) and the rest of the studies were on moderate quality (43.2%); no low-quality studies were identified (Table 1, Supplementary Table S2).

## The general proportion of HIV partner disclosure

The proportion of HIV disclosure to sexual partners ranged from 11 to 98% (18, 72) reported by 34 studies (19, 56–62), and the pooled proportion was found to be 65% (95% CI:

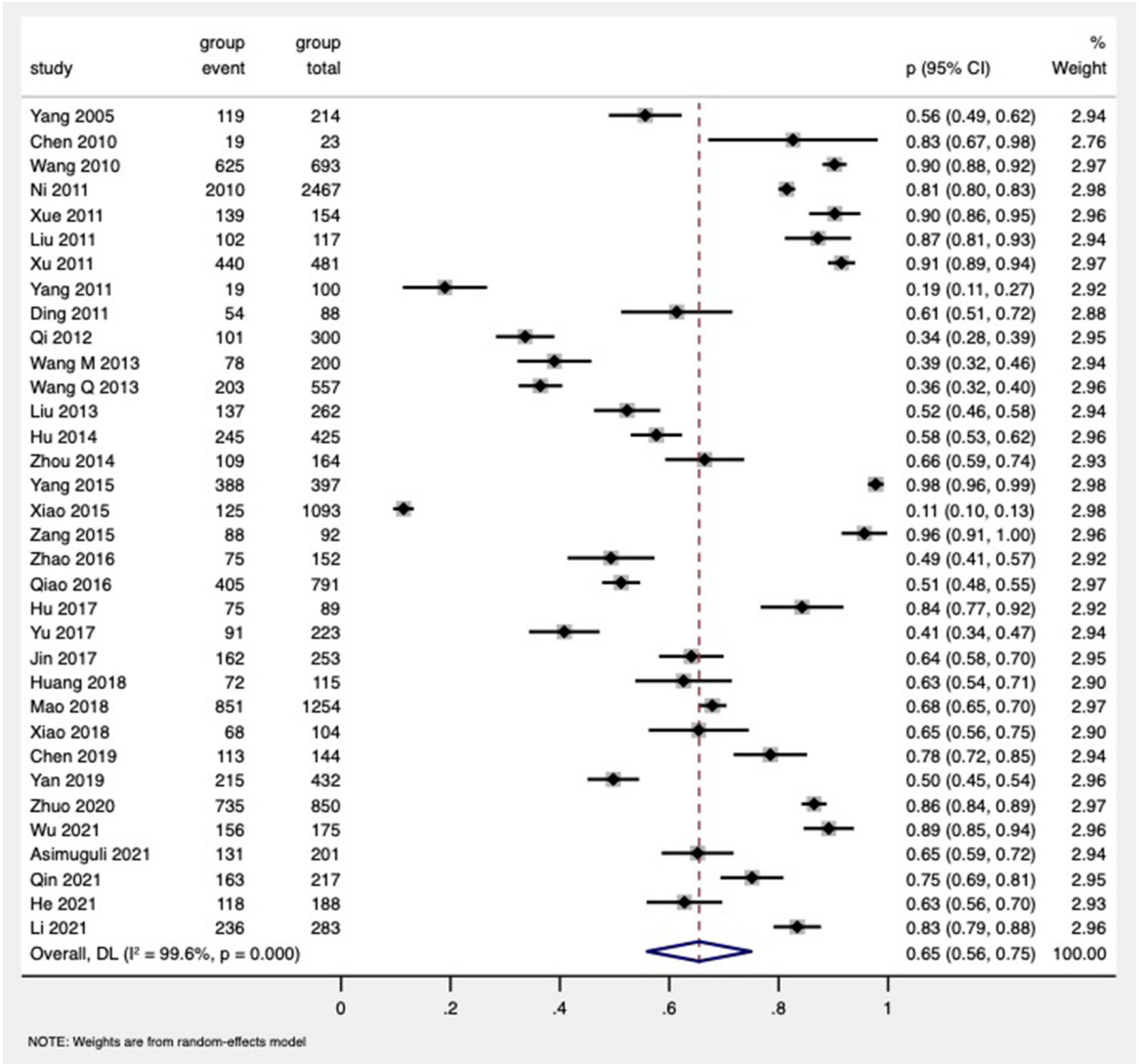


FIGURE 2
Forest of the pooled proportion of HIV disclosure to sexual partners of PDWH in China.

56%−75%), with a high level of heterogeneity ($I^2 = 99.6\%$; $p < 0.001$) (Figure 2). We conducted subgroup analyses to explore the variation of partner disclosure rates, which were reported below (Supplementary Table S3).

## The proportion of partner disclosure to different types of sexual partners

Among all PDWH (including MSM) (19, 56–62), the subgroup analysis indicated that the proportion of HIV disclosure to unclassified types of sexual partners was similar (63%, 95% CI: 45%−81%, 14 studies) to regular sexual partners (66%, 95% CI: 59%−73%, 31 studies), and both of them were far higher than the disclosure to casual sexual partners (20%, 95% CI: 8%−33%, nine studies; Figure 3).

## The proportion of partner disclosure at different times

The subgroup analysis based on seven studies was performed (19, 56, 72, 79, 86–88). The analysis suggested that the highest disclosure proportion was within 1 month after diagnosis (62%, 95% CI: 42%−82%, four studies), followed by on the day of diagnosis (57%, 95% CI: 45%−69%,

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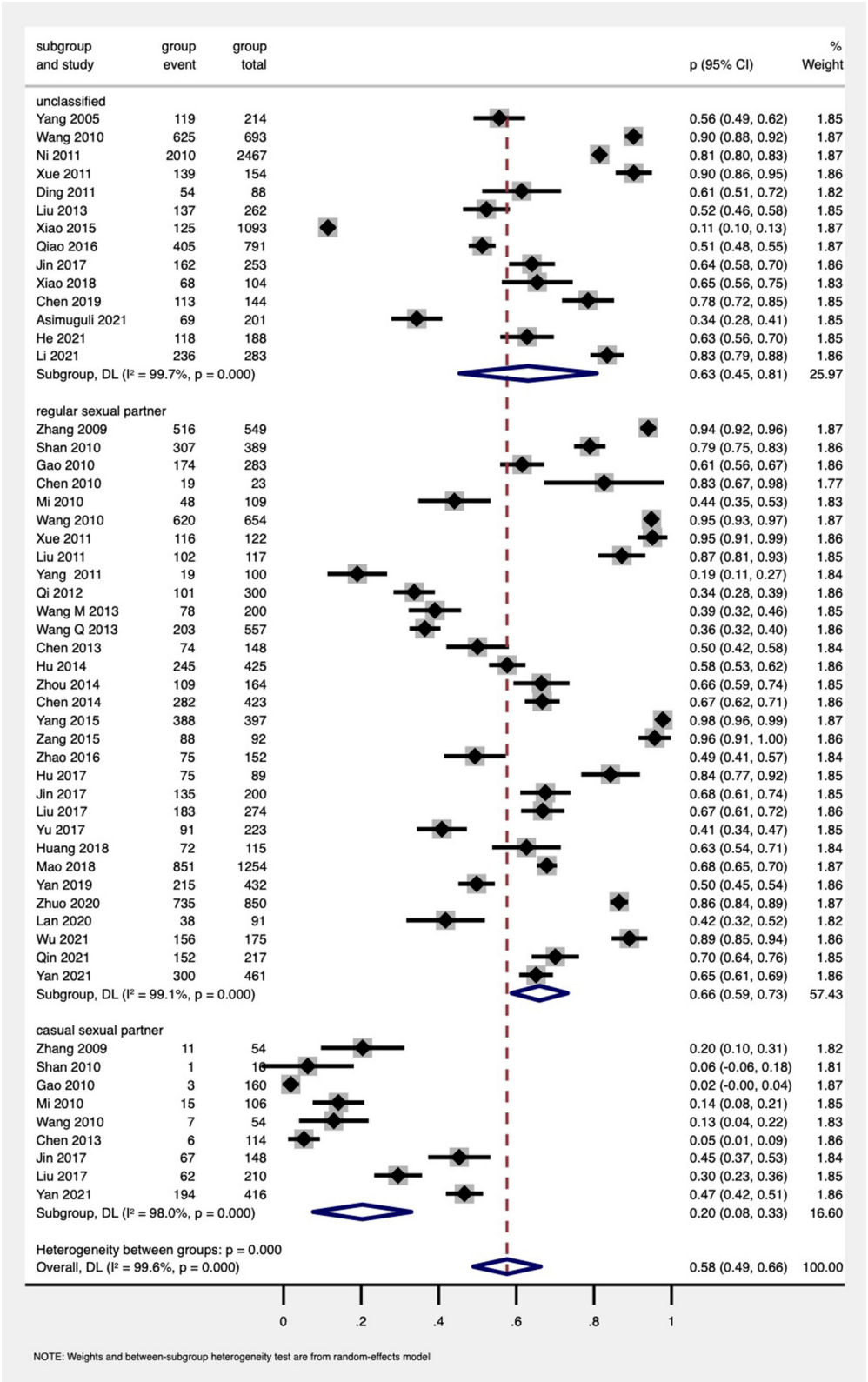


FIGURE 3
Forest plot of subgroup analysis by types of sexual partners among PDWH.

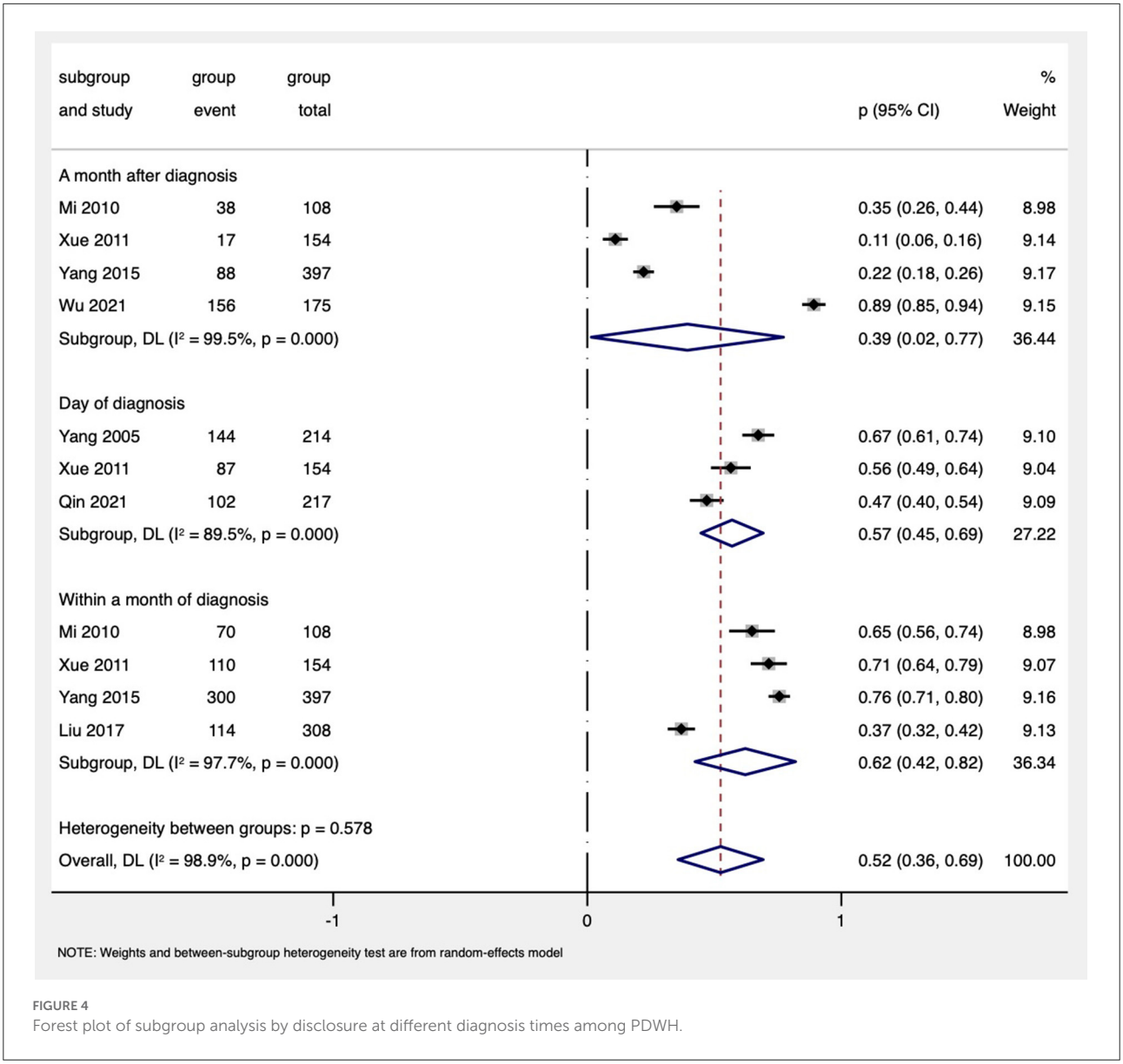


FIGURE 4
Forest plot of subgroup analysis by disclosure at different diagnosis times among PDWH.

three studies), and the lowest disclosure rate was at 1 month later after diagnosis (39%, 95% CI: 2%−77%, four studies; Figure 4).

## The proportion of HIV disclosure to different types of sexual partners among MSM

As for MSM, 11 studies (61, 62, 78, 81, 86, 89–91) reported the disclosure rate to regular partners, and four studies (66, 86, 88, 91) reported the disclosure to casual partners. The proportions of disclosure to regular male partners, regular female sexual partners, and spouses among the MSM were 47% (95% CI: 29%−65%, six studies), 49% (95% CI: 33%−65%, three studies), and 48% (95% CI: 18%−78%, seven studies), respectively. MSM had the lowest rate of HIV disclosure to casual partners (34%, 95% CI: 19%−49%, four studies; Figure 5).

## Risk of bias across studies

The presence of publication bias was evaluated both subjectively and objectively. The funnel plots seemed symmetric (Supplementary Figure S1), and Egger's regression test ($t = -1.27$, $p = 0.213$) also indicated the absence of publication bias.

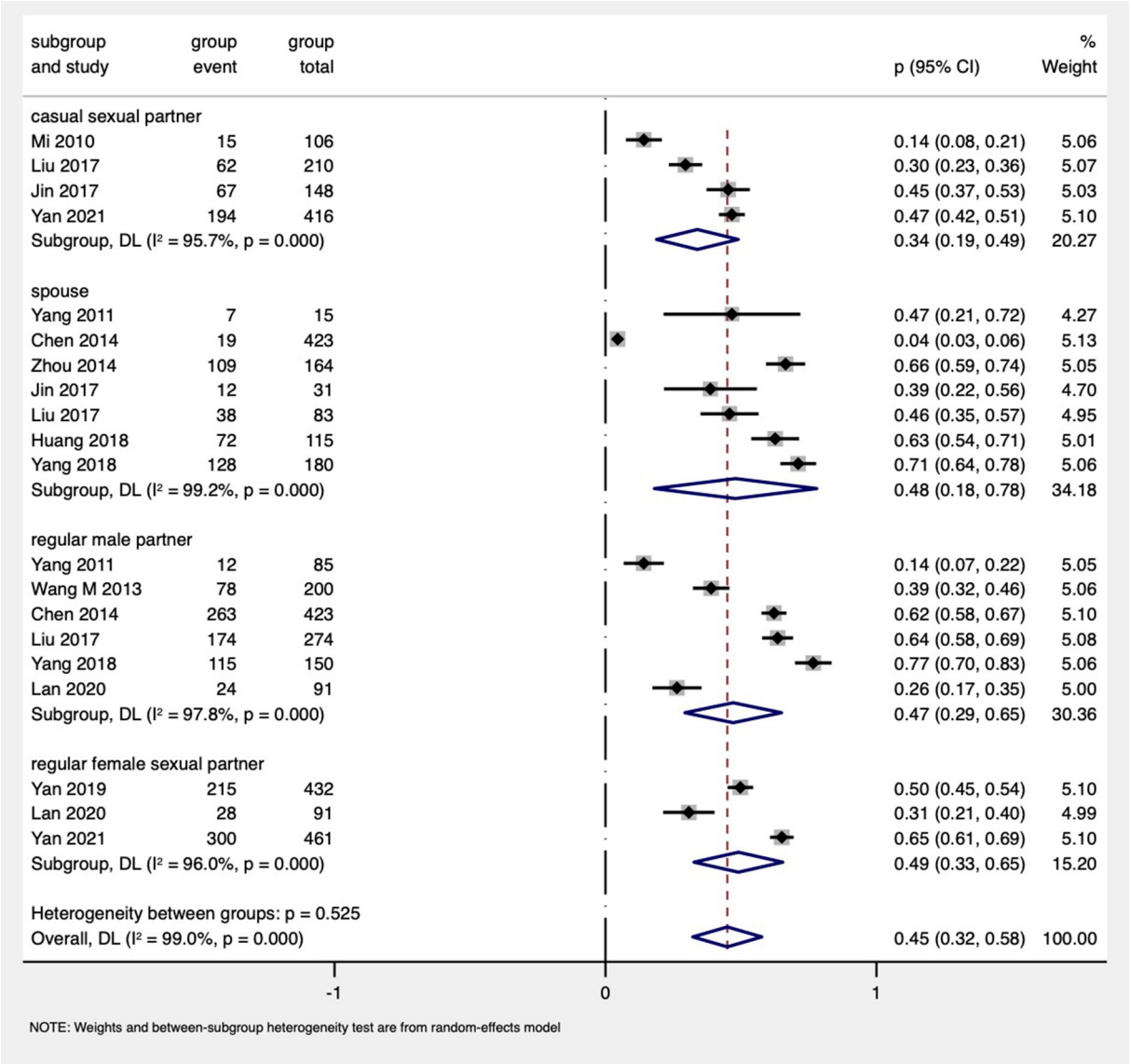


FIGURE 5
Forest plot of subgroup analysis by types of sexual partners among MSM PDWH.

## Sensitivity analysis

We conducted a sensitivity analysis by removing those four studies (56, 78, 80, 92) where their quality score was the lowest (five score), which may influence the overall rate. We removed one study in each turn, and then removed all these four studies. We recalculated the pooled estimation on the remaining studies. The combined results of overall rate estimates were consistent and without apparent fluctuation, with a narrow range from 0.65 (95% CI: 0.55–0.74) to 0.67 (95% CI: 0.57–0.76), which was similar to the primary results. This analysis confirmed the stability of the pooled results (Supplementary Figure S2).

# Discussion

In this review, the overall prevalence of HIV disclosure to sexual partners among Chinese PDWH was 65%. Our findings support previous studies conducted in Togo (93) and Uganda (94). On the contrary, our HIV disclosure rate was lower than in the United States (95), and some African countries, such as Kenya (96), South Africa (97), Ethiopia (31).

There might be two rationales for the low HIV disclosure rate in China. First, the different regional backgrounds and HIV disclosure policies in the world would affect HIV partner disclosure. For example, the United States has long

regarded partner notification as an important strategy for AIDS prevention, which may promote HIV disclosure (98–100). And in several African countries which were severely affected by HIV, laws on HIV disclosure have also been issued (101). Hence, due to the mature legal policies, self-disclosure in these regions was higher. However, at present, China has only a national-level policy of "prevention and control regulation" (102), stating that HIV partner disclosure should be totally voluntary. Just four provinces in China have issued local mandatory policies on spouse notification (103, 104), which have been shown to effectively increase PDWH's activeness of HIV disclosure in these areas (73). Second, HIV-related stigma toward PDWH has been confirmed to be the key barrier for HIV disclosure (105). In China, HIV stigma is higher than in developed countries and some African countries (106, 107). In addition, compared to American and European countries (108–110), China has demonstrated a higher judgmental attitude toward MSM due to the traditional social norm and Confucianism philosophy (111). Our previous study also indicated that married MSM PDWH in China would prefer to disclose HIV status than sexual orientation, however, disclosing HIV status to sexual partners will increase the risk of sexual orientation exposure, which make them conceal their HIV status (112). That is why the regular partner disclosure rate was very low among MSM (47%−49%) as shown by our synthesized data.

Our results indicated that the disclosure proportions varied according to different sexual partnerships being highest in regular partners and lowest in casual partners. This review showed that PDWH tend to disclose to regular partners (66%) rather than casual partners (20%), which was similar to the studies conducted in both developing and developed countries like Africa and America (95, 113, 114). Regular sexual partners (115) were defined as whom they had stable sex relationships for more than 3 months, including legally married spouses (116). As an intimate relationship, regular partners can provide PDWH with emotional support, treatment advice, and coping strategies for HIV-related stigma (117). However, casual partners are mainly acquainted in the process of one-night stands or commercial sex (118), thus the relationships are often built on sexual stimulation or an exchange of money, which are unstable or weaker than that with regular partners. Besides, usually, it is not easy to find the causal sexual partners again to notify the status (119), and they also have a low sense of responsibility to disclose to such partners (120, 121). In terms of MSM, our synthesized result also showed they were reluctant to disclose to causal sexual partners (34%).

The synthesized results also indicated that HIV disclosure varied at different times after diagnosis, which was supported by the study in Tanzania (122). In this review, PDWH would prefer to notify partners within 1 month of diagnosis if they decided to disclose; this finding support previous results in Nigeria (123). Since an HIV-positive diagnosis is a stressful event for patients, they tend to take an active approach to the disease response, hoping to alleviate fear and shame by disclosing as soon as possible (122, 124). In addition, if they did not disclose within 1 month's diagnosis, along with the improvement of CD4 counts and reduced viral load, they would become more reluctant to disclose, as indicated by a study conducted in Kenya (124), which is also supported by our synthesized results.

This systematic review and meta-analysis have a couple of limitations, which should be carefully considered. First, there may be a selection bias due to the studies included in this review being limited to Chinese and English, which could not represent articles published in other languages. Second, there may exist a reporting bias. In the included studies, the measures of HIV disclosure were mostly self-reported by participants, which may lead to information bias. Third, although we have conducted subgroup and sensitivity analyses, there was still large heterogeneity in the results. It might be due to the large variation of the sample size in the included studies, and the wide coverage of the study settings, which included 19 provinces in China, where the partner disclosure policies were significantly different as discussed above. In addition, some studies included only MSM, which may also lead to a large heterogeneity in the final pooled disclosure proportion. Finally, the literature retrieval was not completed on the same day, which may result in potentially inconsistent query answers from the database itself (125).

This systematic review has several implications for future studies and practices. First, it provides evidence for policymakers to consider how to systematically promote HIV partner disclosure. Potential ethical issues should be considered during the policy development. Second, timely HIV disclosure can promote HIV testing of partners, avoid high-risk sexual behavior, facilitate condom use, and reduce HIV transmission between partners (126, 127). Therefore, patients should be encouraged to disclose to their partners in the early stage of diagnosis. Third, intervention studies could be designed in future studies by targeting especially the low disclosure rate population of MSM, and the causal sexual partners of HIV infected, so as to prevent HIV transmission through HIV key populations to the general population.

## Conclusions

The pooled HIV disclosure to sexual partners in China was 65%. The lowest disclosure was to casual partners, and the disclosure significantly decreased after 1 month of diagnosis, it will raise a concern in the development of HIV disclosure policy. Therefore, the government or relevant health departments need to develop more detailed HIV disclosure strategies, especially for patients with multiple sex partners, so as to ultimately prevent HIV transmission through sexual contact, and achieve the "95–95–95" target in 2030 (128).

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Author contributions

WP and XS conducted the literature search, evaluated the study quality, and extracted the data. WP and QZ analyzed the data by Stata software. MV and XL supervised the draft writing. WP wrote the main manuscript text. All the authors determined the methodology and reviewed and edited the manuscript.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.1004869/full#supplementary-material

SUPPLEMENTARY TABLE S1
The search terms used in the databases and the number of results.

SUPPLEMENTARY TABLE S2
Assessment of methodological quality of analytical cross-sectional studies ($n = 44$).

SUPPLEMENTARY TABLE S3
Subgroup analyses of HIV disclosure to sexual partners.

SUPPLEMENTARY FIGURE S1
Funnel plot of HIV disclosure to sexual partners among PDWH.

SUPPLEMENTARY FIGURE S2
Sensitivity analysis for the pooled proportion of HIV disclosure to sexual partners.

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