

# A Review of Prevalence Estimation Methods for Human Trafficking Populations

Public Health Reports  
2022, Vol. 137(Supplement 1) 46S–52S  
© 2021, Association of Schools and  
Programs of Public Health  
All rights reserved.  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/00333549211044010  
journals.sagepub.com/home/phr



Elyssa Schroeder, MSSW<sup>1</sup>; Timothy G. Edgemon, PhD<sup>2</sup>; Lydia Aletraris, PhD<sup>1</sup> ; Njeri Kagotho, PhD, MSW<sup>3</sup>; Jody Clay-Warner, PhD<sup>4</sup>; and David Okech, PhD, MSW<sup>1</sup>

## Abstract

Human trafficking has long-lasting implications for the well-being of trafficked people, families, and affected communities. Prevention and intervention efforts, however, have been stymied by a lack of information on the scale and scope of the problem. Because trafficked people are mostly hidden from view, traditional methods of establishing prevalence can be prohibitively expensive in the recruitment, participation, and retention of survey participants. Also, trafficked people are not randomly distributed in the general population. Researchers have therefore begun to apply methods previously used in public health research and other fields on hard-to-reach populations to measure the prevalence of human trafficking. In this topical review, we examine how these prevalence methods used for hard-to-reach populations can be used to measure the prevalence of human trafficking. These methods include network-based approaches, such as respondent-driven sampling and the network scale-up method, and venue-based methods. Respondent-driven sampling is useful, for example, when little information about the trafficked population has been produced and when an adequate sampling frame does not exist. The network scale-up method is unique in that it does not target the hidden population directly. The implications of our work internationally include the need for documenting and validating the various prevalence estimation methods in the United States in a more robust way than was done in existing efforts. In providing this roadmap for estimating the prevalence of human trafficking, our overarching goal is to promote the equitable treatment and overall well-being of the socially disadvantaged populations who disproportionately experience human trafficking.

## Keywords

human trafficking, prevalence estimation, hard-to-reach populations, network-based sampling, venue-based sampling

Twenty years after the passage of the Palermo Protocol<sup>1</sup> and the United States' Trafficking Victims Protection Act,<sup>2</sup> policy makers, service providers, and researchers have designed intervention programs, enacted legal remedies, and completed research studies on human trafficking (hereinafter, trafficking). Human trafficking occurs when a trafficker compels someone to provide labor or services or to engage in commercial sex, or prostitution, through the use of force, fraud, or coercion; or abduction, deception, or the abuse of power or a position of vulnerability; or when a trafficker causes a child to engage in commercial sex (whether or not force, fraud, or coercion are used). The coercion can be subtle or overt, physical or psychological. Human trafficking can include, but does not require, movement. People may be considered trafficked people regardless of whether they were born into a state of servitude, experienced exploitation in their hometown, traveled to the exploitative situation,

previously consented to work for a trafficker, or participated in a crime as a direct result of being trafficked.<sup>1,3</sup>

What was once considered primarily a criminal justice concern is now recognized as a complex public health issue with wide-reaching consequences.<sup>4,5</sup> However, prevention and intervention efforts are hindered by a lack of information on the scope of the problem and its nuanced components.

<sup>1</sup> African Programming and Research Initiative to End Slavery (APRIES), School of Social Work, University of Georgia, Athens, GA, USA

<sup>2</sup> University of Cincinnati Corrections Institute, Cincinnati, OH, USA

<sup>3</sup> College of Social Work, The Ohio State University, Columbus, OH, USA

<sup>4</sup> Department of Sociology, University of Georgia, Athens, GA, USA

## Corresponding Author:

David Okech, PhD, MSW, University of Georgia, School of Social Work, 279 Williams St, Room 119, Athens, GA 30602, USA.

Email: dokech@uga.edu

Because trafficked people are a hard-to-reach population, traditional survey sampling that relies on preestablished sample frames often produces unreliable and cost-prohibitive estimates, as well as incomplete information about the nature of trafficking. To create responsive interventions, researchers, practitioners, and policy makers need accurate and reliable data on the scope and magnitude of the problem and the people affected.

A public health approach relies on defining a problem, identifying risk and protection factors, and developing intervention strategies.<sup>5</sup> Although other approaches, such as criminal justice–focused approaches, intervene at the perpetrator level, a public health approach focuses on preventative measures and caring for the survivors’ mental and physical well-being posttrafficking.<sup>6,7</sup> This type of approach, as applied to trafficking, relies on knowing the scope of the problem, which creates the need for accurate prevalence data on trafficking. Prevalence is defined as “the proportion of the population affected by a given condition at an exact point in time (stock) or over a specified time period (flow).”<sup>8</sup> Developing successful interventions hinges on understanding the population experiencing exploitation; however, the population is often misunderstood, with concepts such as smuggling, legalized prostitution, or undocumented immigration rendering interventions ill-informed by evidence and difficult to evaluate.

Research teams have released various prevalence measures, some estimating all forms of human trafficking as a whole and others estimating smaller segments of one particular trafficking population in a contained region.<sup>8,9</sup> These large-scale estimates function as a powerful advocacy tool and serve as a benchmark for the United Nations Sustainable Development Goal related to trafficking.<sup>8,10,11</sup> However, commonly cited estimates of sex and labor trafficking are criticized for being inaccurate or misleading because of weak methodology or inaccurate interpretation by the public.<sup>9,12</sup>

Researchers face 2 main types of challenges when gathering prevalence data: tangible and methodological. Tangible challenges, which are concerned with practical deficiencies, include lack of coordinated data systems, practitioner training, and consistent survivor identification tools.<sup>8</sup> Methodological challenges concentrate on difficulties in the scientific process, such as determining which trafficking elements to include in the prevalence count and the method(s) chosen to estimate the size of the population. The lack of consistent definitions and standardized data collection used throughout trafficking research further complicates prevalence estimates.<sup>4,13</sup> Human trafficking encompasses many interconnected yet distinct types of exploitation, each needing nuanced and contextualized definitions. Implementing standardized and accurate definitions throughout the research community could lay the foundation for comparable data and frequently used terms.<sup>3,14</sup> Although in 2015, the International Labour Organization created standardized statistics as a goal in its contribution to research and the United Nations Sustainable Development Goal 8.7,<sup>15</sup> these legal definitions still need to be

operationalized into measurable items across the research community.

In this topical review, we describe how researchers are using common prevalence methods for hard-to-reach populations to measure the prevalence of human trafficking. These methods include network-based methods and venue-based methods. We analyze the basic usefulness of each approach and discuss the relative usefulness of each method for studying various trafficked populations. In providing a roadmap for estimating the prevalence of human trafficking, our overarching goal is to promote the equitable treatment and overall well-being of the medically underserved populations that disproportionately experience trafficking. Isolation, stigma, fear of retribution by traffickers, fear of deportation, and other factors known to inhibit disclosure can exert pressure on survivors’ health care experiences, health care access, and health services engagement. Our ongoing research in West Africa and collaboration with 6 international research teams inform ongoing efforts to estimate the prevalence of trafficking in the United States and globally. This review is not exhaustive; rather, it focuses on 3 methodologies—respondent-driven sampling (RDS), time–location sampling (TLS), and network scale-up method (NSUM)—that actively engage with participants and/or their networks, in contrast to other prevalence methods, such as the capture–recapture method, which rely on administrative data. The reason for this focus is that although later methods can also generate valid estimates, engaging with participants in research serves an important additional objective that goes beyond prevalence estimation by including the voices of trafficked people in designing services that can effectively meet their health, social, psychological, and economic needs.

### *Respondent-Driven Sampling (RDS)*

Those who conduct research on hard-to-reach populations often use RDS because it can generate a study sample by relying on initial participants (“seeds”) to recruit other participants from their networks.<sup>16</sup> For RDS to work, seeds are provided with a fixed number of referral coupons, with which they recruit peers fitting the study criteria. The referral coupons contain information about the recruiter, sampling location, and other data required to map network characteristics.<sup>17</sup> Using RDS, each seed receives 3–5 referral coupons; however, this number can vary depending on the required sample size.<sup>17,18</sup> RDS assumes that seeds and subsequent responders are known to each other and networked together and that these smaller networks are all linked to a single network.<sup>19</sup> Therefore, RDS is most appropriate for groups that have some sort of social connection, such as trafficked laborers.<sup>20</sup>

RDS has been used in prevalence studies of sex and labor trafficking as well as in studies of related populations, such as sex workers and undocumented migrant workers.<sup>18,21–24</sup> For example, Zhang implemented RDS to estimate the prevalence of labor trafficking among unauthorized migrant workers in San Diego.<sup>24</sup> Chohaney used RDS to gather a sample of street-based

sex workers in Ohio to identify risk factors and determinants of sex trafficking.<sup>21</sup> In both studies, RDS also provided detailed information about trafficking experiences, which resulted in public health interventions. For example, Chohaney's prevalence research translated into tangible policy and practice recommendations for Ohio's state government.<sup>22</sup>

### *Time–Location Sampling (TLS)*

TLS is a venue-based method used to generate probability-based samples of hard-to-reach populations, such as people at risk of HIV, substance-using populations, and sexual minority groups at risk of trafficking.<sup>25–28</sup> The main premise of TLS is to access people on the basis of where and when they gather rather than their living spaces. For example, people experiencing homelessness might gather at local shelters for meals and services. A TLS frame is constructed using 3 tiers of randomization: (1) randomizing from an exhaustive list of all relevant venues, (2) the days and times selected to enumerate potential participants, and (3) randomly selecting study participants from the previously randomized venue at the randomized time.

Researchers first catalogue all potential venues frequented by the study population.<sup>29</sup> If a full census of venues is unlikely, researchers aim to locate as diverse a pool as possible. Venues are assigned to a day/time observational slot. Research team members observe the sites and record the characteristics, including movement patterns, of people who frequent each location. Research teams then randomly select venues and potential participants to interview. Weights are applied to ensure that the estimates produced are generalizable by accounting for clustering within venues and the unequal selection probability of people within venues.<sup>30,31</sup> For example, when sampling clients of a homeless shelter, mealtimes and non-mealtimes would be weighted differently. Because some hard-to-reach populations have unpredictable congregation patterns, researchers generally use an iterative process in which venue characteristics are reviewed and considered for inclusion to accommodate diverse participants.<sup>26,28</sup> Thus, TLS is a resource- and time-intensive approach requiring crucial foundational work.

Because TLS has not been widely used in trafficking research to date, examples are limited. However, TLS is promising in that it provides a way to access groups of trafficked people who cannot otherwise be observed by traditional survey methods. For example, RDS studies have shown that people in forced labor might congregate in particular housing developments for shelter.<sup>21</sup> People who are trafficked for sex might be forced to congregate in certain nightlife areas.<sup>32</sup> Thus, researchers can review research on trafficked people through methods such as RDS in a particular geographic region or sector to identify known venues for TLS. Fully understanding how and where trafficked people congregate also provides ample information for targeted intervention development.

### *Network Scale-up Method (NSUM)*

The NSUM uses information about respondents' networks to produce prevalence estimates.<sup>33</sup> It has been used in public health to measure hard-to-reach populations, including sex workers and heroin users.<sup>34–36</sup> A major advantage of NSUM is that it allows for the estimation of target population size without interviewing members of the target population, which is particularly useful when estimating the prevalence of trafficking.<sup>37</sup>

The NSUM assumes that people's social networks are roughly representative of the local population. Thus, it is possible to determine the prevalence of a characteristic in the population by knowing the average prevalence of the characteristic in respondents' networks. To produce this estimate, researchers determine how many people are in each respondent's network (ie, how many people the respondent "knows"). To increase response accuracy, researchers typically define "knowing" narrowly. A typical definition is people (1) the respondent knows by sight and by name, (2) who also know the respondent by sight and by name, and (3) with whom the respondent has shared a meal in the last year.<sup>38</sup> Respondents are asked how many people they "know" who are members of populations of known size, such as people with a particular last name or occupation.<sup>39,40</sup> The size of the respondent's network is then estimated from the prevalence of that characteristic in the population. For example, if the respondent knows 4 people with a particular last name, and 400 people in the local population have that last name, then the respondent knows approximately 1% of the local population. Responses to several questions about populations of known size are averaged to produce an estimate of the size of each respondent's network. A similar logic is then applied to respondent reports about the number of people in their social network who have the characteristic of interest, which contributes to overall estimates of the prevalence of this characteristic in the population.

This method is easily applied to measuring the prevalence of trafficking. To estimate the number of people trafficked for sex, for example, respondents would answer a series of questions to determine how many people they know who have experiences that meet the definition of sex trafficking, as well as questions about how many people they know who have particular known characteristics. Network prevalence rates are then averaged across respondents and scaled up to produce population-level estimates of sex trafficking.

### *Methodology Summary*

Each method of establishing prevalence in trafficking has strengths and weaknesses that affect their appropriateness in trafficking research. Notably, trafficking is not monolithic. The method that works best for measuring the prevalence of adult sex trafficking in Brazil may not be the best method for measuring the prevalence of labor trafficking in agricultural sectors in the United States.

Because of its peer-recruitment nature, RDS is useful when little information is available about the trafficked population and an adequate sampling frame does not exist. However, reliance of RDS on peer recruitment can create problems when participants decline to refer peers out of protection (masking) and when recruited peers do not meet the study criteria (volunteerism). Although TLS overcomes weaknesses associated with RDS by not relying on participant networks, it must account for both unequal selection probabilities and clustering.

Recent innovations have resulted in a novel approach known as Vincent Link Tracing Sampling (VLTS),<sup>41,42</sup> which uses a traditional RDS recruitment process with a conventional sampling design, such as simple random sampling. Unlike RDS, VLTS uses a generously sized representative initial sample and only a few waves of sampling, so that it samples wide rather than deep to maximize the number of entry points. A large number of initial seeds is selected over well-dispersed geographic areas using administrative data. Additional linking is made by mapping the demographic profile from respondents who are recruited through someone's network but are also part of another respondent's personal network, which allows for sophisticated inference procedures for population size estimation to be applied.

NSUM is unique in that it does not target the hidden population directly. Although this feature makes NSUM useful when the hard-to-reach population cannot be accessed, it still requires population-level information on known characteristics, which is not always available in the developing world. These participant-engaging methodologies represent a handful of prevalence methods for hard-to-reach populations; however, they are currently being used to understand and estimate various sectors and geographic locations of trafficking. Thus, the selection of which method to use must be determined through careful consideration of data availability, resources, and the ability to correct for methodological bias through factors such as random sampling or procurement of multiple sampling frames.

## Implications for Research, Policy, and Programming: Lessons From the Field

As members of the African Programming and Research Initiative to End Slavery (APRIES), we are using NSUM to estimate the prevalence of child trafficking in 6 hotspots in Guinea and Sierra Leone.<sup>42</sup> Our experience indicates the importance of writing survey questions in consultation with local experts who are familiar with the prevailing culture to frame questions on this sensitive topic appropriately. Careful consideration of the local context is equally important in developing questions about trafficking for US prevalence studies, given variations in how local communities understand trafficking and engage with the people affected by it.

Accurate, population-specific prevalence estimation is necessary for effective public health interventions and has been identified as a priority for public health research on

human trafficking.<sup>5</sup> Relying on a public health approach requires researchers to determine prevalence with precision and accuracy so that risk and protective factors come to light to inform strategic and implementable prevention strategies. Researchers have identified some ubiquitous social determinants of health that facilitate trafficking across sectors, including poverty, sex/gender, labor migration, and interpersonal violence.<sup>7,43</sup> However, each observation of trafficking has its own determinants that can be combatted only when known. For example, the trafficking of both young people running away from the US foster care system<sup>44</sup> and children in debt bondage working in South Asian brick kilns<sup>45</sup> is linked to poverty; however, how poverty and relevant systems interact to create the conditions for each type of trafficking differs greatly. Unless an affected population is understood and the scope of the problem is seen, policy makers and practitioners are left in the dark. Trafficking is a public health issue; therefore, it is important that research exists to assist and protect survivors, hold perpetrators accountable, and reduce facilitators of trafficking.<sup>46</sup>

Although progress has been made in these areas, much can be done to integrate research, policy, and practice. The global community has raised an extraordinary amount of funding since the passing of seminal anti-trafficking legislation.<sup>47</sup> From 2000 to 2013, 30 countries committed more than \$4 billion to anti-trafficking efforts. The United States led this funding surge, accounting for about 60% of the global total.<sup>47</sup> Unfortunately, it is not possible to estimate the funding proportion dedicated to research in the United States or globally. Despite worldwide attention and anti-trafficking efforts, confusion remains about the scale and severity of the problem globally or locally. A 2018 literature review of 94 articles found that much of the extant trafficking research lacked clear conceptualization and definitions of trafficking, as well as evidence-informed empirical research to inform programs and policy.<sup>46</sup> The varied methods and definitions have led researchers to question the veracity of prevalence estimates currently driving programming, policies, and massive funding expenditures.<sup>24,48-50</sup>

Given the persistent challenges of prevalence research, US-based and other organizations have convened 5 roundtables on human trafficking prevalence estimates, including the Prevalence Reduction Innovation Forum (PRIF) kickoff virtual conference in May 2020, which ARIES coordinated with funding from the US Department of State Office to Monitor and Combat Trafficking in Persons.<sup>42</sup>

The PRIF research project will document the usefulness of various methodological approaches by implementing multiple prevalence estimation methodologies on the same human trafficking target population in a restricted geographic sector.<sup>3,42</sup> Using corresponding methods in this way allows for evaluation of each method and provides practical information for the development of interventions.



The PRIF is supporting US researchers in their testing and comparison of multiple prevalence estimation methodologies in geographic hotspots in Brazil, Costa Rica, Morocco, Pakistan, Tanzania, and Tunisia. All PRIF partners are incorporating NSUM in their prevalence surveys and are also using 1 or 2 other estimation methods.<sup>3</sup>

Although the studies are international, the lessons learned will inform research in the United States in several ways. First, the PRIF produced a document of statistical definitions that is already being adopted by US scholars.<sup>3</sup> Second, we hope that a focus on geographically restricted research will be beneficial in increasing hotspot research in the United States, with relevant lessons learned for similar trafficking sectors. Focusing programs and policies on hotspots should be more effective in reducing trafficking than general efforts directed toward wider populations. Third, the comparison of multiple estimation methods will place US funders in a position to determine the estimation methods that are a better fit for various contexts. For example, lessons learned about the proper application of TLS could inform the study of trafficked and other socially stigmatized populations in the United States, including undocumented people, people at risk of HIV, substance-using populations, and sexual minority groups at risk of trafficking. NSUM could be particularly relevant in rural US communities, given its roots in low-resourced countries and indirect approach of prevalence estimation. A key element of the PRIF research project is a meta-analysis of all methods used by research teams to examine exaggeration ratios relative to each method that show by how much one approach produces higher or lower prevalence estimates. No current meta-analyses exist on prevalence measurement of human trafficking. The PRIF research project will also examine the cost-effectiveness of each method and dimensions of heterogeneity that make one method preferable in a given context. Findings of the meta-analysis are expected to be released by late 2022. Finally, a focus on trafficking hotspots together with the use of the most appropriate prevalence estimation methods will inform program effectiveness by translating prevalence data into a baseline for better monitoring and evaluation purposes.

This topical review offers insight into current prevalence methods for hard-to-reach populations and their relevance to human trafficking science. As more is discovered about each sector and nuance of human trafficking, practitioners and policy makers can use targeted strategies to support survivors. We hope that the next 20 years will see a revolution in prevalence estimation techniques for hard-to-reach populations, including trafficked people, thereby leading to a measurable reduction of the problem through evidence-informed programs and data-driven policies.


### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: US State Department Office to Monitor and Combat Trafficking in Persons (SSJTIP18CA0015 & SSJTIP19CA0032).

### ORCID iD

Lydia Aletraris, PhD  <https://orcid.org/0000-0002-1771-7791>

### References

1. United Nations General Assembly. Protocol to prevent, suppress and punish trafficking in persons, especially women and children, supplementing the United Nations Convention Against Transnational Organized Crime. November 15, 2000. Accessed August 26, 2021. <https://www.ohchr.org/en/professionalinterest/pages/protocoltraffickinginpersons.aspx>
2. Victims of Trafficking and Violence Protection Act of 2000. Pub L No 106-386 (2000).
3. US Department of State Office to Monitor and Combat Trafficking in Persons, Okech D, Aletraris L, Schroeder E. *Human Trafficking Statistical Definitions: Prevalence Reduction Innovation Forum*. University of Georgia African Programming and Research Initiative to End Slavery, US Department of State Office to Monitor and Combat Trafficking in Persons; 2020.
4. Miller CL, Lyman M. Research informing advocacy: an anti-human trafficking tool. In: Chisolm-Straker M, Stoklosa H, eds. *Human Trafficking Is a Public Health Issue: A Paradigm Expansion in the United States*. Springer; 2017:293-307.
5. Rothman EF, Stoklosa H, Baldwin SB, et al. Public health research priorities to address US human trafficking. *Am J Public Health*. 2017;107(7):1045-1047. doi:10.2105/AJPH.2017.303858
6. Greenbaum J. A public health approach to global child sex trafficking. *Annu Rev Public Health*. 2020;41:481-497. doi:10.1146/annurev-publhealth-040119-094335
7. Zimmerman C, Kiss L. Human trafficking and exploitation: a global health concern. *PLoS Med*. 2017;14(11):e1002437. doi:10.1371/journal.pmed.1002437
8. Brunner J. *Getting to Good Human Trafficking Data: Assessing the Landscape in Southeast Asia and Promising Practices From ASEAN Governments and Civil Society*. WSD Handa Center for Human Rights & International Justice at Stanford University; 2018. Accessed November 10, 2020. [https://humanrights.stanford.edu/sites/g/files/sbiybj5951/f/publications/good\\_ht\\_data\\_policy\\_report\\_final.pdf](https://humanrights.stanford.edu/sites/g/files/sbiybj5951/f/publications/good_ht_data_policy_report_final.pdf)
9. Fedina L. Use and misuse of research in books on sex trafficking: implications for interdisciplinary researchers, practitioners, and advocates. *Trauma Violence Abuse*. 2015;16(2):188-198. doi:10.1177/1524838014523337
10. International Labour Organization, Walk Free Foundation, and International Organization for Migration. *Global Estimates of Modern Slavery: Forced Labour and Forced Marriage*. International Labour Organization; 2017. Accessed November

- 15, 2020. [https://www.ilo.org/wcmsp5/groups/public/-dgreports/-dcomm/documents/publication/wcms\\_575479.pdf](https://www.ilo.org/wcmsp5/groups/public/-dgreports/-dcomm/documents/publication/wcms_575479.pdf)
11. Guilbert K. Expert views: can landmark data boost global fight against modern slavery? *Thomson Reuters Foundation News*. September 19, 2017. Accessed November 30, 2020. <http://news.trust.org/item/20170919040651-f8j8f>
  12. Dottridge M. Global trafficking prevalence data distorts efforts to stop patterns of human trafficking. *Anti-Trafficking Rev*. 2017;8:161-164. doi:10.14197/atr.201217812
  13. Farrell A, McDevitt J. Enhancing the collection and standardization of human trafficking data: examples for data collection efforts in the United States. In: Aghazarm C, Laczko F, Farrell A, eds. *Human Trafficking: New Directions for Research*. International Organization for Migration; 2008:15-26.
  14. Brunner J. *Inaccurate Numbers, Inadequate Policies: Enhancing Data to Evaluate the Prevalence of Human Trafficking in ASEAN*. East-West Center; 2015. Accessed November 10, 2020. [https://www.eastwestcenter.org/system/tdf/private/brunner-trafficking2015\\_3.pdf?file=1&type=node&id=35344](https://www.eastwestcenter.org/system/tdf/private/brunner-trafficking2015_3.pdf?file=1&type=node&id=35344)
  15. International Labour Organization. *ILO Data Initiative on Modern Slavery: Better Data for Better Policies*. International Labour Organization Special Action Programme to Combat Forced Labour; 2015.
  16. Heckathorn DD. Respondent-driven sampling: a new approach to the study of hidden populations. *Social Probl*. 1997;44(2):174-199. doi:10.2307/3096941
  17. Fedina L, Perdue T, Bright CL, Williamson C. An ecological analysis of risk factors for runaway behavior among individuals exposed to commercial sexual exploitation. *J Child Adolesc Trauma*. 2019;12(2):221-231. doi:10.1007/s40653-018-0229-5
  18. Zhang SX, Spiller MW, Finch BK, Qin Y. Estimating labor trafficking among unauthorized migrant workers in San Diego. *Ann Am Acad Polit Soc Sci*. 2014;653(1):65-86. doi:10.1177/0002716213519237
  19. Pullum T, Cappa C, Orlando J, et al. Systems and strategies for identifying and enumerating children outside of family care. *Child Abuse Negl*. 2012;36(10):701-710. doi:10.1016/j.chiabu.2012.09.003
  20. Patterson O, Zhuo X. Modern trafficking, slavery, and other forms of servitude. *Annu Rev Sociol*. 2018;44(1):407-439. doi:10.1146/annurev-soc-073117-041147
  21. Chohaney ML. Minor and adult domestic sex trafficking risk factors in Ohio. *J Soc Social Work Res*. 2016;7(1):117-141. doi:10.1086/685108
  22. Williamson C, Perdue T, Belton L, Burns O. *Domestic Sex Trafficking in Ohio: Research & Analysis Subcommittee, Ohio Human Trafficking Commission*. Ohio Human Trafficking Commission; 2012. Accessed October 30, 2020. <https://www.ohioattorneygeneral.gov/getattachment/27542187-0e4d-4d48-9b47-8ecbe6ed21b2/2012-Domestic-Sex-Trafficking-in-Ohio-Report.aspx>
  23. Grosso AL, Ketende S, Dam K, et al. Structural determinants of health among women who started selling sex as minors in Burkina Faso. *J Acquir Immune Defic Syndr*. 2015;68(suppl 2):162-170. doi:10.1097/QAI.0000000000000447
  24. Zhang SX. Measuring labor trafficking: a research note. *Crime Law Soc Change*. 2012;58(4):469-482. doi:10.1007/s10611-012-9393-y
  25. Ferreira LOC, de Oliveira ES, Raymond HF, Chen SY, McFarland W. Use of time–location sampling for systematic behavioral surveillance of truck drivers in Brazil. *AIDS Behav*. 2008;12(4 suppl):32-38. doi:10.1007/s10461-008-9386-0
  26. MacKellar D, Valleroy L, Karon J, Lemp G, Janssen R. The Young Men's Survey: methods for estimating HIV seroprevalence and risk factors among young men who have sex with men. *Public Health Rep*. 1996;111(suppl 1):138-144.
  27. Parsons JT, Grov C, Kelly BC. Comparing the effectiveness of two forms of time–space sampling to identify club drug–using young adults. *J Drug Issues*. 2008;38(4):1061-1081. doi:10.1177/002204260803800407
  28. Muhib FB, Lin LS, Stueve A, et al. A venue-based method for sampling hard-to-reach populations. *Public Health Rep*. 2001;116(suppl 1):216-222. doi:10.1093/phr/116.S1.216
  29. Kendall C, Kerr LRFS, Gondim RC, et al. An empirical comparison of respondent-driven sampling, time location sampling, and snowball sampling for behavioral surveillance in men who have sex with men, Fortaleza, Brazil. *AIDS Behav*. 2008;12(suppl 1):97-104. doi:10.1007/s10461-008-9390-4
  30. Karon JM, Wejnert C. Statistical methods for the analysis of time–location sampling data. *J Urban Health*. 2012;89(3):565-586. doi:10.1007/s11524-012-9676-8
  31. Xia Q, Torian LV. To weight or not to weight in time–location sampling: why not do both? *AIDS Behav*. 2013;17(9):3120-3123. doi:10.1007/s10461-013-0528-7
  32. Brunovskis A, Tyldum G. *Crossing Borders: An Empirical Study of Transnational Prostitution and Trafficking in Human Beings*. Fafo; 2004. Accessed November 10, 2020. [https://fafo.no/media/com\\_netsukii/426.pdf](https://fafo.no/media/com_netsukii/426.pdf)
  33. Killworth PD, McCarty C, Bernard HR, Shelley GA, Johnsen EC. Estimation of seroprevalence, rape, and homelessness in the United States using a social network approach. *Eval Rev*. 1998;22(2):289-308. doi:10.1177/0193841X9802200205
  34. Teo AKJ, Prem K, Chen MIC, et al. Estimating the size of key populations for HIV in Singapore using the network scale-up method. *Sex Transm Infect*. 2019;95(8):602-607. doi:10.1136/sextrans-2018-053747
  35. Kadushin C, Killworth PD, Bernard HR, Beveridge AA. Scale-up methods as applied to estimates of heroin use. *J Drug Issues*. 2006;36(2):417-440. doi:10.1177/002204260603600209
  36. Ezoe S, Morooka T, Noda T, Sabin ML, Koike S. Population size estimation of men who have sex with men through the network scale-up method in Japan. *PLoS One*. 2012;7(1):e31184. doi:10.1371/journal.pone.0031184
  37. Shelton JF. Proposed utilization of the network scale-up method to estimate the prevalence of trafficked persons. In: Kangaspunta K, ed. *Forum on Crime and Society*. 8th volume. United Nations Office on Drugs and Crime; 2015:85-94.

38. Feehan DM, Umubyeyi A, Mahy M, Hladik W, Salganik MJ. Quantity versus quality: a survey experiment to improve the network scale-up method. *Am J Epidemiol*. 2016;183(8):747-757. doi:10.1093/aje/kwv287
39. Guo W, Bao S, Lin W, et al. Estimating the size of HIV key affected populations in Chongqing, China, using the network scale-up method. *PLoS One*. 2013;8(8):e71796. doi:10.1371/journal.pone.0071796
40. Yang XY, Yang F. Estimating religious populations with the network scale-up method: a practical alternative to self-report. *J Sci Study Relig*. 2017;56(4):703-719. doi:10.1111/jssr.12479
41. Vincent K, Zhang SX, Dank M. Searching for sex trafficking victims: using a novel link-tracing method among commercial sex workers in Muzaffarpur, India [published online November 26, 2019]. *Crime Delinq*. doi:10.1177/0011128719890265
42. US Department of State Office to Monitor and Combat Trafficking in Persons. TIP Office project descriptions. Accessed December 3, 2020. <https://www.state.gov/tip-office-project-descriptions/>
43. Perry KM, McEwing L. How do social determinants affect human trafficking in Southeast Asia, and what can we do about it? A systematic review. *Health Hum Rights*. 2013;15(2):138-159.
44. Latzman NE, Gibbs DA, Feinberg R, Kluckman MN, Aboul-Hosn S. Human trafficking victimization among youth who run away from foster care. *Child Youth Serv Rev*. 2019;98(2):113-124. doi:10.1016/j.chilyouth.2018.12.022
45. Bhukuth A. Child labour and debt bondage: a case study of brick kiln workers in Southeast Asia. *J Asian Afr Stud*. 2005;40(4):287-302. doi:10.1177/0021909605055776
46. Okech D, Choi YJ, Elkins J, Burns AC. Seventeen years of human trafficking research in social work: a review of the literature. *J Evid Inf Soc Work*. 2018;15(2):103-122. doi:10.1080/23761407.2017.1415177
47. Gleason KA, Cockayne J. *Official Development Assistance and SDG Target 8.7: Measuring Aid to Address Forced Labour, Modern Slavery, Human Trafficking and Child Labour*. Delta 8.7 & United Nations University Centre for Policy Research; 2018. Accessed November 8, 2020. [https://delta87.org/wp-content/uploads/2018/10/Official-Development-Assistance-and-SDG-Target-8.7\\_FINAL\\_WEB.pdf](https://delta87.org/wp-content/uploads/2018/10/Official-Development-Assistance-and-SDG-Target-8.7_FINAL_WEB.pdf)
48. Weitzer R. New directions in research on human trafficking. *Ann Am Acad Polit Soc Sci*. 2014;653(1):6-24. doi:10.1177/0002716214521562
49. Weitzer R. Sex trafficking and the sex industry: the need for evidence-based theory and legislation. *J Crim Law Criminol*. 2011;101(4):1337-1370.
50. Zhang SX. Beyond the "Natasha" story: a review and critique of current research on sex trafficking. *Glob Crime*. 2009;10(3):178-195. doi:10.1080/17440570903079899