



## Evaluation methods for vaccination campaigns on college campuses: A scoping review



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### ABSTRACT

**Background:** Vaccinations are successful, cost-effective tools to prevent the spread of certain infectious diseases. Many colleges conduct vaccination campaigns on their campuses for various vaccine-preventable diseases, including measles, mumps, influenza, HPV, and most recently, for SARS-CoV-2, the virus responsible for COVID-19. Implementing these campaigns requires substantial effort and understanding their effectiveness is an important factor in justifying these programs.

**Aim:** This scoping review aims to identify, review, and summarize existing evaluation methods for vaccination campaigns on college campuses in order to provide evaluation guidance for institutions planning future vaccination campaigns.

**Methods:** Publications that focused on vaccination campaigns on college campuses for students and/or faculty and staff and described their evaluation methods were included in our analysis. A systematic search of the literature identified 2,101 articles. After duplicates were removed, titles and abstracts were screened, and references searched, 43 articles were identified for full-text review. Sixteen articles provided evaluation information and were systematically reviewed.

**Results:** Interventions targeted a variety of vaccine-preventable diseases, with the majority either aiming to increase HPV vaccine uptake or vaccinate against meningococcal serogroups. Most studies reported on campaigns that included both educational activities and provided vaccinations. Evaluation methods varied widely. Some studies measured vaccine-related knowledge and attitudes. Vaccine uptake was most commonly measured as a simple count of doses administered.

**Conclusions:** College campus vaccination campaigns are evaluated in multiple ways, with little consistency in how the effectiveness of campaigns are measured. There is a need to develop clear evaluation methods for college vaccination programs, especially how to calculate vaccination rates associated with these efforts.

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## Introduction

Vaccine-preventable diseases have both financial and emotional impact, including hospitalizations, doctor visits, missed time from work and school, morbidity, and even mortality [1]. Vaccinations are successful, cost-effective tools to prevent the spread of certain infectious diseases [2]. By implementing vaccination programs in the United States, major advances have been made toward the reduction and elimination of many infectious diseases [1].

The American College of Health (ACHA) strongly supports the use of vaccines to protect the health of individual students and college campus communities [3,4]. Due to the adverse health impact of vaccine-preventable diseases, many colleges and universities have implemented vaccination requirements prior to admission. While immunization policies at colleges and universities differ greatly, many institutions conduct vaccination campaigns on their campuses for various vaccine-preventable diseases, including measles, mumps, influenza, HPV, and most recently, for the SARS-CoV-2, the virus responsible for COVID-19. Understanding how to effectively measure outcomes associated with vaccination campaigns on college and university campuses is imperative in determining the impact and value of such campaigns. However, it is unclear what kind of information is available in the literature regarding methods to evaluate vaccination campaigns on college campuses. This scoping review aims to identify, review, and summarize existing evaluation methods for vaccination campaigns on college campuses in order to provide evaluation guidance for institutions planning future vaccination campaigns. This review systematically maps reported evaluation methods, delineates the strengths and weaknesses of these methods, and identifies opportunities for further improvement in methods to evaluate vaccination campaigns.

The purpose of this scoping review is to explore the existing evaluation methods for vaccination campaigns. The research question development followed the guidance of The JBI Reviewers' Manual based upon the PCC (Population, Concept, and Context) elements for inclusion criteria. The review question for this scoping review is: What evaluation methods currently exist for vaccination campaigns on college campuses?

## Methods

This scoping review utilized the framework proposed by Arksey and O'Malley, with adaptations made by Levac et al and by the Joanna Briggs Institute (JBI) [5–7]. The guidance from the Preferred Reporting Items for Systematic Reviews and meta-Analyses for Scoping Reviews (PRISMA-ScR) was utilized to develop the protocol and reported the study identification process in a PRISMA-ScR figure [8].

In order to be included, publications had to focus on vaccination campaigns on college campuses for students and/or faculty and staff and had to provide some description of how they evaluated the vaccination campaign. Studies were excluded if they did not report on a vaccination campaign conducted on a college campus, did not report any vaccination campaign outcomes, were not published in English, or were not about vaccination of humans. PubMed, EMBASE (via Ovid), CINAHL, and PsycINFO (via Ovid) were searched to identify potential studies for inclusion in the review. The search strategies were drafted and refined through team discussion. The final search strategy for each database can be found in Supplement 1. The search results were imported into Zotero, a reference management system, and duplicates were removed. An independent review of the title and abstract for every article was completed by reviewers working in pairs. Any discrepancies were resolved by discussion with a third reviewer. All articles that were determined to meet the eligibility criteria, were

then moved to the full text review stage. Two reviewers independently screened the articles for final inclusion in the review and disagreements were resolved by discussion with the entire review team. The exclusion reason for any article at this stage was recorded. A data extraction form was developed and programmed into Qualtrics. The data extraction form was piloted and refined by the reviewers as a team. Data abstracted included article characteristics, study aims, targeted disease, country in which program took place, characteristics of the study population, study location, and vaccination intervention/program, program duration, method of evaluation of campaign, program results and outcome data, and funding source. Two reviewers independently extracted data from each article. Data were then organized into a table to characterize the studies, describe the methods by which each vaccination campaign was evaluated, and report the results of each campaign.

## Results

The search strategy initially identified 2,101 articles. Following the removal of 614 duplicates, 1,487 articles remained. A review of the titles and abstract revealed a substantial number of articles reporting vaccine campaign results for K-12 schools or articles reporting knowledge and attitudes towards various vaccines. Following the inclusion and exclusion criteria 1,445 articles were excluded and 43 articles were retained for full-text analysis, including one additional article identified from searching references. After the full-texts were screened, a total of 16 studies were identified for inclusion. The PRISMA flow diagram in Fig. 1 shows the results of each stage of the search and screening process.

All of the included studies reported on interventions that were conducted on a college or university campus. Table 1 provides key elements of each study. Six articles implemented interventions to increase HPV vaccine uptake and six interventions aimed to vaccinate against meningococcal serogroups: one intervention vaccinated against all Meningococcal serogroups, four interventions vaccinated against Meningococcal B, and one intervention vaccinated against Meningococcal C. The remaining interventions were vaccine campaigns against influenza [9], measles [10], rubella [11], and measles and rubella [12]. Seven reported on vaccination campaigns conducted in response to a disease outbreak or exposure [11,13–18], and nine were health promotion and prevention efforts [9,10,12,19–24].

A range of intervention approaches were described. The majority of the studies reported that the campaign included both educational activities and vaccinations. Methods for implementing the educational campaigns ranged from creating a personalized educational website based on the respondent's baseline survey [20] to sending vaccine-specific information via mail [14] or providing student-directed promotional materials via yards signs, posters, and banners on the university campus [21]. Other interventions offered vaccination clinics only. Given the variable scope of the interventions, the length of each intervention also varied. Some interventions took place over several days to weeks, while others took place over months, and some occurred across more than one academic year.

There were multiple, diverse methods of evaluation for the campaigns. While two studies utilized participant self-report as the method of determining how many students were vaccinated during the campaign [12,20], the rest utilized health center and immunization registry records. Most reported the count of students or other personnel who received a vaccine, the percentage of individuals receiving the vaccine from an overall enrollment or target population, and in some cases the percentage of individuals receiving the vaccine from a group determined to be eligible for the vaccine. Vaccine series completion rates were sometimes assessed for vaccinations requiring multiple doses. Some interventions compared rate

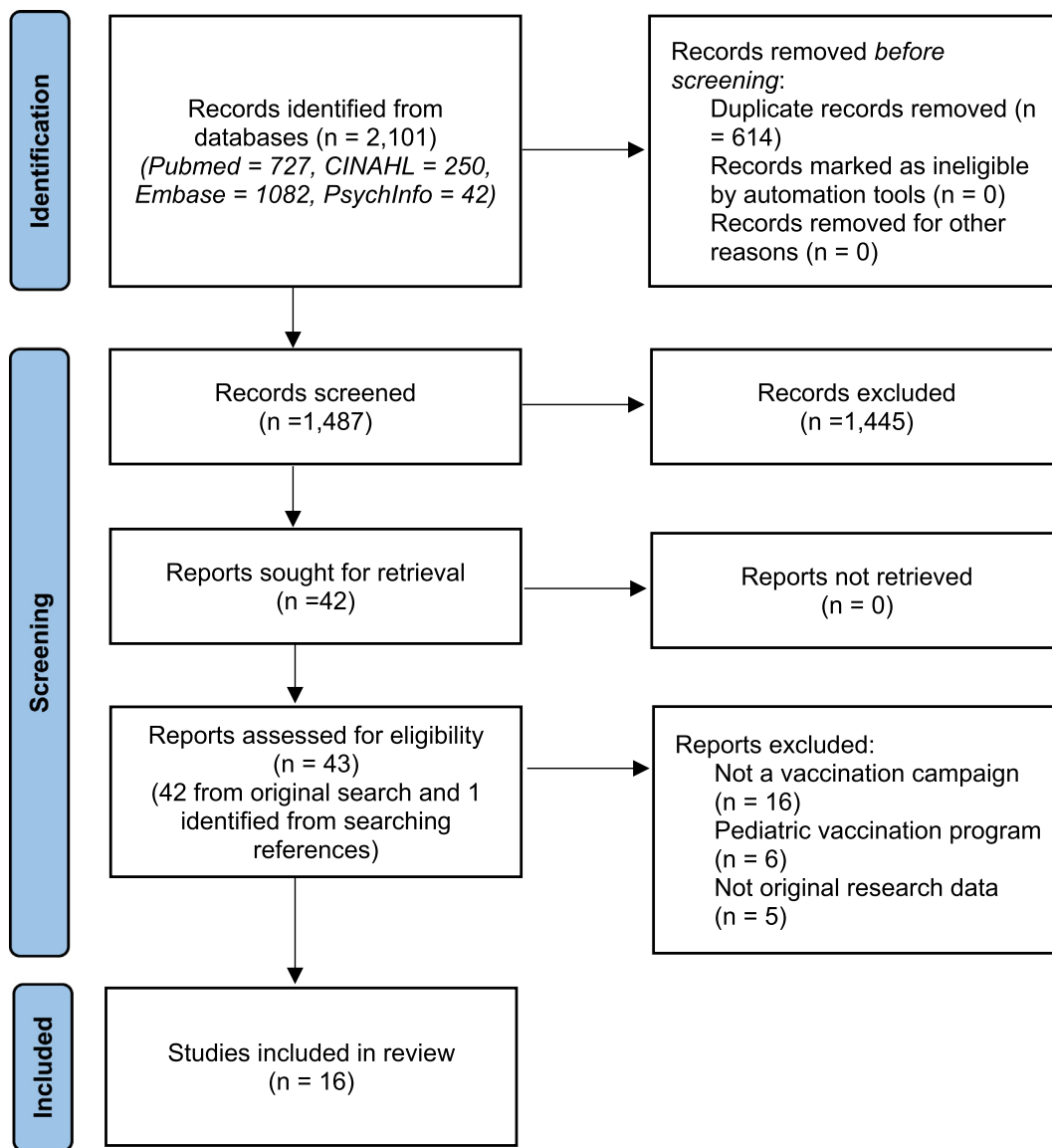


Fig. 1. PRISMA flow diagram for identification of studies.

of vaccine uptake during the campaign to previous years' uptake rate [14,24], while other interventions compared vaccine uptake rates pre- and post-intervention [9,16]. The difference in the vaccination rate between males and females was commonly reported for HPV vaccine campaigns, as well as for a measles and rubella campaign [12] and a rubella campaign [11]. Several interventions also assessed students' knowledge and attitudes regarding the vaccine or the targeted infection [12,15,16,19,20,23], as well as reasons for unwillingness to receive the vaccine [12].

Few articles reported statistics other than vaccine uptake rates and increased knowledge. However, Navarrete et al. developed and implemented an HPV patient assistance program (PAP) for uninsured or underinsured students at a university with a predominantly Hispanic population. An aim of the program's implementation was to assess how many students accessed the program and completed the series.

**Discussion**

This scoping review identified 16 articles that reported the evaluation of vaccination campaigns on college campuses. Although

campaigns are plentiful, relatively few publish the evaluation and outcomes of these efforts.

While reporting the count of vaccine doses or number of individuals vaccinated is valuable, without a denominator of the eligible population, there is limited ability to evaluate the impact of the program. Studies that utilized enrollment data or some other method to determine the potential number of eligible vaccine recipients are better able to communicate the effectiveness of their campaign. However, there are limitations to this method, especially for vaccines for which some in the population may not be eligible due to prior vaccination, age, or other factors. For example, many students are now matriculating into college up-to-date on HPV vaccination, with 2020 reports showing 58.6 % of 13–17 year olds in the US being fully vaccinated against HPV [25]. Because this vaccine is not usually required for enrollment, there is no tracking of how many students on a campus are already vaccinated and therefore should not be in the denominator for a vaccination rate of an HPV vaccination campaign. Importantly, campaigns that reported on a vaccination effort in response to an outbreak, in which nearly all members of the student population would be eligible and appropriate targets for the vaccine, were more likely to

**Table 1**  
Characteristics of literature found on the evaluation of vaccination campaigns on college campuses.

Citation	Disease	Study Aims	Intervention	Intervention Duration	Intervention Evaluation	Key Results
<b>Ayala-Marin et al. (2015)</b>	HPV	To build a community-academic alliance aiming to promote a sustainable infrastructure of research, outreach, and service for HPV vaccination among college students	Education and vaccination campaign Educational outreach events targeted at both college students and parents, as well as vaccination clinics	December 2014 – November 2015	Percentage of students' and parents' increased knowledge of both HPV and the HPV vaccine Number of students who attended one of the vaccine clinics Number of students who received their first dose	HPV and HPV vaccine knowledge increased from an average score of 66 % and 72 % to an average score of 95 % and 93 %, respectively 137 students attended at least one of the 5 vaccination clinics held on two campuses, where 61 % received their first dose of the HPV vaccine
<b>Bennet et al. (2015)</b>	HPV	To compare the impact of an individually tailored online intervention to an untailored intervention on HPV vaccine uptake among previously unvaccinated female university students	Individually tailored education and vaccination campaign Participants were surveyed to assess knowledge, attitudes, and vaccination intention for HPV vaccine. Then, they were randomized to an educational website based on their baseline survey responses (intervention group) or to a CDC factsheet on HPV vaccine (control group).	One time exposure to the intervention and then participants completed a follow-up assessment 3 months after the intervention (2013)	Pre/post survey of knowledge, attitudes, and intention related to HPV vaccine Post survey assessed HPV vaccine uptake by responding "yes, no, or don't know" to the statement: "I have received at least one dose of the HPV vaccine."	Overall, the proportion of students with high knowledge about HPV vaccination increased from 32 % (baseline) to 50 % (3 months after intervention), with no differences in knowledge improvement between the intervention groups. There were no changes in risk perception nor intention to be vaccinated from baseline to 3 months in either group. No difference in HPV vaccine uptake between the two groups 3 months after exposure to the intervention
<b>Capitano et al. (2018)</b>	Meningococcal B	To report experience implementing university mass immunization program in response to a MenB outbreak	Mass 'opt-in' vaccination event in response to outbreak with incentives to motivate attendance	Spring, Summer and Fall 2015	Total number of students receiving vaccine dose 1, 2, and 3 Percent received vaccine dose (total students received vaccine dose divided by number of eligible students)	60 % all eligible students received dose one, 29 % received dose two, and 10 % received dose three. Approximately half of the students received the vaccine at on-campus clinics, the remaining received the vaccine off-campus
<b>Collins et al. (2003)</b>	Meningitis	To assess the impact of educational efforts on meningococcal vaccine immunization rates among first-year university students	Education and vaccination campaign Several on-campus vaccination opportunities initiatives via vaccination clinics and at University Health Services Outreach and education efforts included messaging via mail, phone, websites, news articles, advice from healthcare professionals The campaign also mailed educational materials about the vaccine and meningitis to students prior to the class of 2004 and 2005's arrival to campus (compared to class 2003 – did not receive education material).	Summer 2004, Summer 2005	Evaluated by reviewing health history forms and health services records. Used class size number from university, number of students arrived vaccinated, and number of immunizations provided.	The total number of students immunized before or after arrival to campus increased from 40 % for the class of 2003, to 50 % and 60 % for the class of 2004 and 2005, respectively.

Table 1 (continued)

Citation	Disease	Study Aims	Intervention	Intervention Duration	Intervention Evaluation	Key Results
<b>Elaziz et al. (2010)</b>	Measles, Rubella (MR)	To report uptake of MR vaccine and reasons for declining the vaccine among non-medical and medical students and to assess the knowledge about the vaccine and the diseases.	Measles and Rubella disease and vaccine knowledge and catch-up vaccination campaign  Posters and flyers advertised the campaign and provided information about the diseases and vaccine	3 weeks (2008)	Survey assessed knowledge about MR diseases and vaccine, how learned about the campaign, if vaccinated in the current campaign, history of past MMR vaccination or measles or rubella infection, and for those not vaccinated, the reason for this  Number of medical students participating in survey who reported being vaccinated during the campaign divided by the total number of respondents	Knowledge: 22.5 % medical and 18.5 % non-medical students scored > 50 % on the knowledge assessment  Campaign awareness: 73.3 % saw posters/flyers  Immunity history: 20 % uncertain of past infection status; 40 % did not know whether they had previously received MMR vaccine or not  Vaccine uptake: 65 % medical students immunized  The most popular reason among the 120 medical students not willing to get an MR vaccine was the lack of information (43.3 %).
<b>Fisher et al. (2018)</b>	Meningococcal B	To evaluate mass vaccination clinics via student attendance, student demographics, method of communication for notifications, and motivations for attendance to guide planning for future mass vaccination programs	Mass vaccination campaign  Posters, emails to students and parents, texts, social media, give aways, sidewalk chalk messages, and news articles advertised the campaign	One year (2015)	Evaluated using Oregon's "ALERT" immunization information system to yield tables with numbers of doses one, two and three given at the mass vaccine clinics and for vaccinations given to 18–23 year olds from February 17–November 1, 2015 in the university's county  Used university data of total undergrads and subgroups by race, ethnicity, housing status, and affiliation with Greek organizations during each term of 2015 – to calculate vaccination rates overall and for subgroups  Students completed surveys while in line at vaccine clinics	2,678 (14 %) undergraduate students were completely immunized  A total of 8,482 individual vaccine doses were given to 5,674 unique students at the mass vaccine clinics  Survey respondents reported they preferred to be notified by email from the university and the most common reasons given for getting vaccinated were concern about developing meningococcal infection and parents asking the student to get vaccinated.
<b>Gerend et al. (2019)</b>	HPV	To evaluate an HPV vaccination intervention implemented on a university campus.	Education and vaccination campaign.  Intervention included 1) student-directed campaign materials promoting HPV vaccination (yard signs, posters, a large banner, an HPV questions & answers page on the university health services (UHS) website, weekly social media posts); 2) HPV vaccination training of UHS health care providers (30-minute presentation), where they were encouraged to recommend HPV vaccination to students attending UHS from January - March 2019.	3 months, (January - March 2019)	Evaluated by the number of HPV vaccine doses administered at university health services, compared between spring 2018 semester (control) with spring 2019 semester (intervention).	A 75 % increase in HPV vaccination for students of all ages (290 doses in spring 2018 vs 509 doses in spring 2019).  A higher percentage of HPV doses was administered to females in both semesters.

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Table 1 (continued)

Citation	Disease	Study Aims	Intervention	Intervention Duration	Intervention Evaluation	Key Results
<b>Huang et al. (2018)</b>	Influenza	To evaluate the effect of implementing a campus community health worker program (Health PALs) on college student influenza vaccination rates	Education and vaccination campaign In the pilot intervention, Health PALs were present in the dining hall during 4 of the 6 flu clinic, greeted students, informed them on the benefits and importance of flu vaccination, and answered questions. In the enhanced intervention, personalized campaigns targeting each of the dormitory was added.	Five years (2011–2016)	Difference-in-difference analysis of number of students vaccinated at campus vaccination clinics during intervention (4 intervention and 2 control clinics)  Difference-in-difference analysis to determine if the intervention motivated students to actively seek out a flu clinic or simply reached students who came across the clinic during daily routine	Vaccinations increased by 66 % in the pilot year compared to prior years  Vaccinations increased 85 % across dormitory clinics compared to the university-wide control  Dinner attendance was 15 % higher during enhanced intervention compared to baseline, indicating students may be seeking out the clinic. No increase in dinner attendance was detected during the pilot.
<b>Lang et al. (2021)</b>	Measles	To describe the effect of measles vaccination campaign in employees and students at two universities	Vaccination campaign Cost-free consultation and measles vaccination campaign through a university travel clinic	Travel Clinic for 3 days during June 2019 (booster immunizations offered until December 2019)	Total number (and demographics) of participants and number vaccinated	411 individuals participated  91.5 % (376) were vaccinated and 83 individuals (22.1 % of those vaccinated) returned for a booster immunization.  8.5 % (35) participants were not vaccinated at all due to sufficient immunization
<b>Navarrete et al. (2014)</b>	HPV	To describe the development and implementation of a human papillomavirus (HPV) vaccine patient assistance program (PAP) at a Hispanic-serving institutions and to collect data on the number who accessed the program and completed the series	Developed and implemented an HPV vaccination program, including a patient assistance program	Two years (2011–2013)	Clinic documentation of total vaccine disease administered to PAP-eligible patients	89 individuals qualified for the PAP  100 % received dose 1, 79.8 % received dose 2, and 48.3 % completed the series by receiving dose 3  Of those not completing the series via the PAP program, 72 % were lost to follow-up. Other reasons included adverse reaction, age > 26, transferred/graduated, and obtained health insurance
<b>Piedimonte et al. (2018)</b>	HPV	To determine knowledge and awareness of HPV and develop a targeted education and vaccination campaign to increase uptake	Education and vaccination campaign Phase 1: Email and social media advertisement for resident-led campaign, with vaccinations provided onsite. Phase 2: resident outreach to organize education events and distribute pamphlets, educational booths on campus, posters, social media, email, classroom announcements, clinics.	Phase 1: 3 day vaccination clinic (2015) Phase 2: 2 1/2-day vaccination clinic (2016)	Number of people vaccinated and percent of those who complete the vaccination schedule  Comparison of total number of vaccines doses given in intervention year compared to prior year  Secondary endpoints were knowledge and awareness of HPV and cervical cancer assessed in phase 1	Phase 1: 56 responders to the questionnaire, among whom 29 were vaccinated onsite and 50 % of those who received a first dose completed the three-dose vaccination schedule  25 % had not heard of HPV vaccination  Phase 2: 64 students at one campus and 9 at a second campus were vaccinated on site. An additional 502 vaccines were given in 2016 compared with 56 in 2015 at one campus and 455 were given in 2016 compared with 371 in 2015 at another campus

Table 1 (continued)

Citation	Disease	Study Aims	Intervention	Intervention Duration	Intervention Evaluation	Key Results
Richardson et al. (2021)	Meningococcal B	To evaluate intervention designed to increase MenB vaccine awareness and uptake	Education and vaccination campaign  Campus-wide campaign to increase MenB vaccination rate.  Community-level intervention with one month of advertising, social media, peer educator information tables and residence hall info sessions  Two campus immunization mass vaccination days at university student health center law	Education and on-site vaccine events took place over a one-month period following the pretest (2018)  Follow-up surveys were sent out at 3 months and 1 year post intervention	Pre/posttest design with a double posttest  Pretest collected prior to the intervention, collected contact info for follow-up  Two posttest surveys sent to those who completed pretest  Primary outcome was MenB initiation (one dose) or series completion (2 or 3 doses depending on vaccine brand) as recorded in state immunization registry  Secondary outcomes assessed reach of educational events and advertising, awareness and attitudes toward MenB vaccine, and Health Belief Model constructs associated with receiving the vaccine	24 % had received at least one MenB vaccine dose and 13 % had completed the series prior to intervention  840 doses of MenB vaccine were given at the on-campus events  By one year postintervention 33 % of students in study had received at least one dose and 21 % had completed the series  At three-month postintervention 36 % had heard about the MenB vaccine on campus, 12 % heard about the slogan used in the advertisements
Roberts et al. (1996)	Meningococcal C	To determine accurate campaign vaccination rate and to identify factors that predict non-vaccination	Mass vaccination campaign in response to an outbreak  Local and university media coverage, letters sent to all students about campaign, campus posters	3 days (1993)	Number of injections given compared to a university estimate of size of target population (did not exclude students over 30, who were already vaccinated or were not attending the campus that semester)  Nested case control study the next fall included all students under 30 during the campaign and who returned to campus in the fall. Case (non-vaccinees) were matched to controls (vaccinees) by age at 2:1 ratio	12,374 persons were vaccinated -included 11,410 students in target population, 128 students 30+, 836 staff/students from other campus. Thorough search of university's student database showed 13,165 students in the target population, vaccination rate calculated as 87 %  Vaccinees were more likely than non-vaccinees to have received info about campaign from variety of sources and less likely to report that access to the vaccination center was difficult.  93 % vaccination rate among students returning to campus (corrected for students who were not on campus that semester, previously vaccinated, or had medical reason not to be vaccinated)
Schloss et al. (2019)	HPV	To increase HPV vaccination on campus	Education and vaccination campaign  Three-tiered effort: 1) theory-informed education and promotion about HPV and the vaccine; 2) training all staff at campus health on how to answer questions about and recommend HPV vaccination; 3) a text message reminder system for subsequent vaccine dose reminders	6 months (2018)	Total number of students vaccinated at campus health clinics and comparison to total number vaccinated in same period in prior year  Review of state vaccine registry data for number of off campus vaccination	In the first three weeks, 120 students were vaccinated in campus health clinics, representing a 900 % increase in campus HPV vaccinations from the same period in the prior year  An additional 24 vaccinations identified in state registry that were received off campus

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Table 1 (continued)

Citation	Disease	Study Aims	Intervention	Intervention Duration	Intervention Evaluation	Key Results
Soeters et al. (2017)	Meningococcal B	To investigate MenB vaccination in response to an outbreak on meningococcal carriage	Mass vaccination campaign in response to an outbreak  Five mass vaccination campaigns and meningococcal carriage evaluation, with required opt-out forms for persons who declined vaccination	February, April, September, and November 2015 and March 2016	Percent of eligible persons receiving each dose of MenB vaccine	Among eligible persons, 94 % (3525/3745) received first dose, 80 % (2988/3741) received second dose, 75 % (3045/4087) received third dose
Stevenson et al. (1998)	Rubella	To enhance population immunity to rubella to avoid further campus outbreaks	Mass vaccination campaign in response to an outbreak  Targeted full-time male students and staff under 35 and full-time female students and staff under 40. Excluded students who had previously been given MR as part of the MR campaign two years prior  Notices and letters of invitation sent to every student living on campus, to each academic department, and to the in term address of all students off campus. Emails, posters, radio advertisement, information to local medical practitioners	1 week (6 3-hour evening sessions and a 6-hour weekend daytime session) (1996)	Total number of individuals vaccinated during campaign  Evaluated % coverage achieved as number vaccinated/denominator from university data for each targeted group	A total of 1795 students, staff, extras (visitors, partners/spouses) were vaccinated  Coverage estimated: 43 % female and 46 % male students living in university accommodations  17 % female and 19 % male students living off campus  5 % female and 7 % male staff  30 % female and 33 % male overall full-time students

report a vaccination rate and clearly describe how the denominator for the rate was determined. Some studies search the local immunization registry to identify vaccinations received off campus, improving the accuracy of the number of vaccines received. However, most immunization registries are specific to individual states, so clinical staff may not have the ability to access immunization registry records for students who attend college in a state in which they did not receive their childhood vaccinations. A national immunization registry could facilitate better evaluation of vaccination campaigns by providing comprehensive data on vaccinations administered, as well as overall immunization status of a student population which would allow a determination of the number of individuals who had not received a particular vaccine in a student population.

There are several limitations to the current review. It is possible that important literature on vaccination campaigns on college campuses was missed. For example, only published, peer-reviewed literature was reviewed, and it is possible that many campaigns only reported the results of the efforts to funders or to internal constituents. While key insights from such reporting may have been omitted, there is no clear way to identify these reports nor any ability to judge the quality of such reports. Many studies conducted in elementary through high school were reported in the literature. However, these were excluded from this review because they primarily reported on efforts to provide required immunizations. Insights from how these programs are evaluated were not included in this review. Finally, a formal quality assessment of the included studies was not conducted as part of this review.

College vaccination campaigns are one way of increasing immunization for infectious diseases. Implementing vaccination cam-

paigns requires substantial effort and understanding the effectiveness of such campaigns is an important factor in justifying these programs. There are relatively few reports in the peer-reviewed published literature of the vaccination campaign outcomes and evaluation methods of outcomes varies widely. There is a need to develop clear evaluation methods for vaccination programs on college campuses in order to support these efforts.

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This work was supported by the Indiana Immunization Coalition.

### Data availability

No data was used for the research described in the article.

### Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Marie Barnard reports financial support was provided by Indiana Immunization Coalition.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jvacx.2022.100226>.



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