Effectiveness of Mass and Small Media Campaigns to Improve Cancer Awareness and Screening Rates in Asia: A Systematic Review

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abstract

PURPOSE The main objective of this systematic review was to identify whether mass and small media interventions improve knowledge and attitudes about cancer, cancer screening rates, and early detection of cancer in Asia.

METHODS The review was conducted according to a predefined protocol. Medline, EMBASE, CINAHL, Web of Science, Cochrane Library, and Google Scholar were searched in September 2017, and data extraction and rating of methodologic study quality (according to Joanna Briggs Institute rating procedures) were performed independently by reviewers.

RESULTS Twenty-two studies (reported across 24 papers) met the inclusion criteria. Most studies (n = 21) were conducted in high or upper-middle income countries; targeted breast (n = 11), cervical (n = 7), colorectal (n = 3), or oral (n = 2) cancer; and used small media either alone (n = 15) or in combination with mass media and other components (n = 5). Studies regarding cancer screening uptake were of medium to high quality and mainly reported positive outcomes for cervical cancer and mixed results for breast and colorectal cancer. The methodologic strength of research that investigated change in cancer-related knowledge and the cost effectiveness of interventions, respectively, were weak and inconclusive.

CONCLUSION Evidence indicated that small media campaigns seemed to be effective in terms of increasing screening uptake in Asia, in particular cervical cancer screening. Because of the limited number of studies in Asia, it was not possible to be certain about the effectiveness of mass media in improving screening uptake and the effectiveness of campaigns in improving cancer-related knowledge.

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INTRODUCTION

According to the Global Cancer Observatory (GLOBOCAN; April 10, 2018), Asia accounts for almost one half of newly detected cancer cases (48.4%) and more than one half of cancer deaths globally (57.3%). The most common cancers are lung, colorectal, breast, stomach, and liver cancer.1 Asia is a continent composed of diverse countries in terms of cultures and religions as well as economies. Most Asian countries have developing economies and are classified as lower-middle-income countries (LMICs).2 The strong association between the Human Development Index and age-standardized cancer incidence is reflected in the high cancer incidence rates in Asia given that most Asian countries are LMICs.3 LMICs experience high cancer mortality rates, and many deaths could be avoided through improved screening services that would facilitate early presentation and treatment.4 Population-based screening programs are lacking in most Asian countries, and the often less than optimum availability of screening facilities contributes to late detection.4 One of the priorities of the WHO is to reduce premature mortality from noncommunicable diseases including cancer by 25% by 2020.5 According to the WHO and other experts, one of the first steps towards early diagnosis is to raise awareness about cancer signs and symptoms and to encourage the seeking of help.5 Therefore, there is a priority need for programs that raise awareness about the warning signs and symptoms of cancer and the benefits of early detection. This form of secondary prevention should be implemented in countries in which resources for population-based screening are lacking, particularly for cancers such as colorectal and breast cancer.6 Evaluations of mass and small media programs in Western countries have reported promising results in terms of promoting healthy behaviors,7 increasing cancer-related knowledge,8 improving screening rates,9,10 and diagnosing cancer at an earlier stage.11 However, there is a need to identify, appraise, and
summarize available evidence about the effectiveness of media campaigns to improve health-seeking behavior for cancer-related symptoms in Asia.\textsuperscript{12} Mass media include communication channels such as television, radio, newspapers, billboards, posters, the Internet, and small media (ie, smartphones, smart TVs, and tablets) intended to reach large numbers of people.\textsuperscript{7,13,14} Small media are generally aimed at individuals rather than groups (eg, mailed letters and/or other mailed information [eg, brochures and leaflets], telephone calls, e-mails, text messages [Short Message System], and CDs or videos intended for individuals or small group viewings).\textsuperscript{15} The aim of this systematic review was to identify whether mass and/or small media campaigns increased knowledge and awareness about signs and symptoms of cancer, improved attitudes towards cancer screening, and increased screening attendance, self-screening, and detection rates of cancer in Asian countries.

**Study Selection**
Publications that reported findings from campaigns using mass media (TV, radio, Internet, mobile telephone, social media, newsletters, or magazine or print advertisement), small media (brochures, leaflets, newsletters, letters, or videos), or both, were included in this systematic review if they included one of the primary outcomes under investigation: (1) cancer awareness, (2) cancer knowledge, (3) attitudes and beliefs about cancer, (4) self-efficacy to self-screen and/or see a doctor, (5) actual self-screening behavior, (6) clinical attendance because of cancer-related symptoms, (7) cancer screening attendance, and (8) numbers of cancer cases detected. Secondary outcome measures under review were the cost effectiveness of campaigns and downstaging of cancer.

**Inclusion criteria.** Randomized and nonrandomized studies, cohort studies, quasi-experimental studies (QESs), interrupted time series, and pilot studies were eligible for inclusion if they met the following criteria: (1) were in a peer-reviewed publication, (2) were written in the English language, (3) were published before September 2017, (4) included adults 18 years of age or older, (5) were set in Asia, (6) targeted the general population or a subpopulation, (7) included mass and/or small media components that addressed at least one outcome, (8) kept individual and/or group intervention components to a minimum, and (9) investigated any cancer.

**Exclusion criteria.** We excluded (1) interventions that were targeted at minority Asian populations (eg, Chinese living in the United States); (2) systematic reviews and cross-sectional studies, as well as conference abstracts and brief communications if sufficient details could not be obtained; and (3) studies of patients with diagnosed cancer and/or health professionals alone (studies targeting both health professionals and general populations were considered).

**Data Extraction**
Heterogeneity among the studies under review did not allow for a meta-analysis to be conducted as originally planned. Instead, we systematically extracted data independently from included full-text papers into a data capture template. As with the search strategy, two pairs of reviewers (D.S. and T.T.S., oder D.P.), and any discrepancies were resolved by a third reviewer (M. Donnelly).
D.P., M. Dahlui, S.Y.L. or M. Donnelly) extracted data and discrepancies between reviewers were resolved by discussion with M. Donnelly.

**Methodological Quality Assessment**

We applied the relevant critical appraisal tool by the Joanna Briggs Institute (JBI) to assess the quality of each included study. Randomized controlled trials (RCTs) were scored on 13 questions and QESs were scored on nine items. D.S. and C.T. conducted the quality review, and any disagreement was resolved in discussion with M. Donnelly.

**RESULTS**

The search generated 18,374 studies, of which 22 studies (published in 24 papers) met the eligibility criteria for inclusion in this systematic review (Fig 1). According to the JBI study criteria, 11 of 22 studies were RCTs (published in 13 papers) and 11 of 22 studies were QESs.

**Study Quality**

RCTs were of medium to high quality (Table 1; ie, all studies met seven to 10 JBI criteria). Criteria that were not met related mainly to blinding of participants, individuals delivering the intervention, and outcome assessors. In addition, some papers were unclear about whether random assignment had taken place or treatment allocation had been concealed. QESs were of mixed quality and ranged from meeting two of nine criteria\(^{19}\) to nine of nine criteria\(^{20,21}\) (Table 2).

**Study Characteristics**

Study characteristics are outlined in Tables 1 and 3.

*Study population.* The majority of studies focused on breast cancer,\(^{17,20,28-30,33,34,36,37,39,41}\) followed by cervical cancer,\(^{20-23,31,32,35,41,42}\) colorectal cancer,\(^{25-27}\) oral cancer,\(^{38,40}\) and gastric cancer.\(^{27}\) The countries in which the studies were conducted included Japan,\(^{20,21,26,28,41}\) Malaysia,\(^{22,23,40,42}\) Korea,\(^{27,37,39}\) Taiwan,\(^{17,31,32}\) Israel,\(^{25,36}\) Lebanon,\(^{19,29}\) Singapore,\(^{30,33}\) India,\(^{34}\) Turkey,\(^{35}\) and Iran.\(^{38}\) (Fig 2).

Individual studies targeted between 45 and 75,559 participants. Studies that aimed to increase awareness about breast and cervical cancer included women only, with the exception of two studies, one of which targeted the parents of adult daughters\(^{20}\) and another study that targeted both mothers and daughters.\(^{37}\) A study focusing on colorectal and gastric cancer targeted men only,\(^{27}\) and four studies (either targeting colorectal or oral cancer) included both men and women.\(^{25,26,38,40}\) The age range of included participants differed among studies and the type of cancer addressed (ie, cervical cancer awareness studies generally targeted women 20 years of age and older, breast cancer awareness studies targeted those 30 years of age and older, and some included women 50 years of age and older (with...
| First Author | True RA | Concealed Allocation to TGs | Similarity Between TGs at Baseline | Blinding of Participants | Blinding of Those Delivering Treatment | Blinding of OAs | Identical Treatment of Groups (oti) | Complete Follow-Up | Analysis of Participants in Groups to Which They Were Randomly Assigned | Same Measurements for TGs | Reliable Measures | Approp. Statistics | Approp. Trial Design | Overall Rating |
|-------------|--------|-----------------------------|----------------------------------|--------------------------|---------------------------------------|----------------|-------------------------------|-------------------|-------------------------------------------------|-------------------|------------------|------------------|------------------|----------------|
| Abdul Rashid | + ? | + ? | + ? | + | + | + | + | + | + | + | + | + | + | + | 10+ |
| Abdullah | + + | + | - | - | - | - | ? | | + | - | + | - | + | + | 7+ |
| Hagoel | ? ? | + ? | ? ? | + | + | + | ? | | + | + | + | + | + | + | 9+ |
| Hirai | ? ? | + ? | ? ? | + | + | + | ? | | + | + | + | + | + | + | 9+ |
| Hong | ? ? | ? | ? | ? | ? | | | | | | | | | | |
| Ishikawa | + ? | - | ? | + | + | - | + | + | + | + | + | + | + | 9+ |
| Lakkis | + ? | ? | ? | ? | + | + | + | + | + | + | + | + | + | + | 9+ |
| Lin | + + | + | + | + | ? | + | + | ? | + | + | + | + | + | + | 10+ |
| Ng | ? ? | ? | ? | + | ? | + | + | + | + | + | + | ? | + | 7+ |
| Hou | - - | + | ? | ? | ? | + | + | - | + | + | + | + | + | 7+ |
| Seow | + ? | ? | ? | - | ? | + | - | + | + | + | + | + | + | + | 7+ |

Abbreviations: Approp., appropriate; +, yes; −, no; ?, unclear; JBI, Joanna Briggs Institute; n/a, not applicable; OAs, outcome assessors; oti, other than intervention; RA, random assignment; TGs, treatment groups.
| First Author          | Clear Cause and Effect | Participants Were Included in Any Comparisons Similar | Similar Treatment of Groups Other Than the Intervention of Interest | Control Group Present | Multiple Measurements of Outcome | Complete Follow-Up and Adequate Description of Differences | Outcomes of Participants Included Comparisons Measured in the Same Way | Reliable Measurement of Outcomes | Appropriate Statistical Analysis | Total Score |
|-----------------------|------------------------|------------------------------------------------------|------------------------------------------------------------------|-----------------------|--------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------|--------------------------------|-------------|
| Adib29                | +                      | −                                                    | −                                                               | −                     | −                              | n/a                                                         | n/a                                                                 | −                               | +                               | 2+          |
| Gadgil34              | +                      | +                                                    | +                                                               | −                     | +                              | n/a                                                         | n/a                                                                 | +                               | 6+                             |
| Guvenc35              | +                      | +                                                    | +                                                               | −                     | +                              | n/a                                                         | −                                                                 | −                               | 4+                             |
| Heymann36             | +                      | ?                                                    | +                                                               | +                     | +                              | n/a                                                         | n/a                                                                 | +                               | ?                               | 6+          |
| Heo37                 | +                      | +                                                    | +                                                               | −                     | −                              | n/a                                                         | n/a                                                                 | +                               | −                               | 4+          |
| Motallebnejad38       | +                      | +                                                    | +                                                               | −                     | −                              | n/a                                                         | n/a                                                                 | +                               | −                               | 4+          |
| Park39                | +                      | −                                                    | +                                                               | +                     | −                              | n/a                                                         | +                                                                 | +                               | 6+                             |
| Saleh41               | +                      | −                                                    | +                                                               | −                     | −                              | n/a                                                         | n/a                                                                 | +                               | +                               | 4+          |
| Tabuchi41             | +                      | +                                                    | +                                                               | +                     | −                              | n/a                                                         | +                                                                 | +                               | +                               | 7+          |
| Ueda21                | +                      | +                                                    | +                                                               | +                     | +                              | +                                                           | +                                                                 | +                               | +                               | 9+          |
| Yagi20                | +                      | +                                                    | +                                                               | +                     | +                              | +                                                           | +                                                                 | +                               | +                               | 9+          |

Abbreviations: +, yes; −, no; ?, unclear; JBI, Joanna Briggs Institute; n/a, not applicable.
| First Author and Country       | Population                                      | Setting/Community          | Classification of Intervention (small media, mass media, or others) | Intervention Timeline | Outcome(s)                                                                 |
|-------------------------------|------------------------------------------------|-----------------------------|---------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------|
| Ishikawa et al.                | Women 51-59 years old, listed in local health department database, no screening in past 2 years | Community                   | Small media                                                         | November 2009        | Primary: mammogram uptake. Secondary: cost effectiveness. Outcomes were collected from medical records from health clinics. |
| Lakkis et al.                 | 40-75 years old, with health insurance plan and cell phone number, no screening in past 2 years | Community                   | Small media                                                         | April-June 2010      | Primary: mammogram uptake. Outcomes were self-reported mammograms covered by insurance. |
| Lin et al.                    | 35-69 years old, no screening experience and no intention to have screening, never had breast cancer, Internet at home or work + computer experience | Community                   | Small media                                                         | Follow-up: measurements taken directly before and after intervention | Primary: perceptions and intentions to obtain mammogram. Outcomes were self-reported mammograms covered by insurance. |
| First Author and Country | Population                                                                 | Classification of Intervention (small media, mass media, or others) and Intervention                                                                 | Timeline                                                                                   | Outcome(s)                                                                                           |
|--------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Ng26, Singapore          | Characteristics: women from Singapore population registry 50-64 years old, no screening in the past 1 year or biopsy within 6 months, no cancer history, not pregnant<br>Sample: n = 67,656 eligible women received invitations, n = 28,231 responded (IG); n = 97,294 were not invited (CG)<br>Setting: nationwide | Small media Singapore Breast Cancer Screening Project<br>IG: letter invitation for a free mammogram; if no reply: 2 follow-up letters<br>CG: No invitation sent | Invitations were issued over 2 years, starting October 1994; one-off letter, follow-up letters sent the following 2 months<br>Follow-up: data were collected for 2 years | Primary: effectiveness or mammography screening technique<br>Secondary: detection of cancer; size and stage distribution of cancer, interval cancer rates<br>Primary outcome was collected from medical records from National Breast Carcinoma Registry |
| Seow29, Singapore        | Characteristics: women 50-64 years old, nonattending women who were invited once before for screening<br>Sample: n = 1,500 were targeted (n = 500 in each group)<br>Setting: nationwide | Small media Singapore breast cancer screening project (women who did not respond to first invitation were due their second reminder, as reported in Ng et al26)<br>IG1: letter (invitation with screening date for a free mammogram and pamphlet with screening info)<br>IG2: same as IG1 + educational folder mailed<br>IG3: same as IG2 delivered by trained female field worker | Intervention was a one-off contact in December 1996<br>Follow-up: data were collected 5 weeks after designated appointment date | Primary: mammogram uptake<br>Outcome was collected from medical records from National Breast Carcinoma Registry |
| Cervical cancer          |                                                                                           |                                                                                                                                                |                                                                                           |                                                                                                     |
| Rashid17,18, Malaysia    | Characteristics: women 20-65 years old, negative Papanicolau test previous year<br>Sample: n = 1,000 (n = 250 in each group)<br>Setting: community clinics | Small media IG1: postal letter<br>IG2: registered letter<br>IG3: SMS<br>IG4: telephone call (all IGs contained the date for a free Papanicolau test and telephone number to reschedule) | Intervention was a one-off contact in June 2011<br>Follow-up: data were collected for 8 weeks after intervention | Primary: Papanicolau test uptake<br>Secondary: cost effectiveness<br>Outcome was collected from medical records from the Papanicolau test program information system |
| First Author and Country | Population | Classification of Intervention (small media, mass media, or others) and Intervention | Timeline | Outcome(s) |
|--------------------------|------------|-----------------------------------------------------------------------------------|----------|------------|
| Abdullah19 Malaysia      | Characteristics: female teachers who did not attend Papanicolau test in the past 3 years, reproductive age | Small media | Predata collection and intervention were conducted between January and November 2010 | Primary: Papanicolau test uptake; Outcome was collected through a self-reported questionnaire |
|                          | Sample: n = 403 at baseline; n = 398 at follow-up (IG: n = 199; CG: n = 199) | IG: (1) letter (invitation for a free Papanicolau test) and pamphlet (information about cervical cancer and Papanicolau test) hand delivered by school principal; (2) telephone call reminder (1×) after 4 weeks to reiterate importance of Papanicolau test | Follow-up: data were collected for 24 weeks after initial contact | |
|                          | Setting: workplace (public secondary schools) | CG: no intervention (opportunistic screening) | | |
| Hou27,28 Taiwan          | Characteristics: women ≥ 30 years old (younger if married), no screening in past 1 year, family member of inpatients admitted to one of teaching hospitals in Taiwan (August-September 1999) | Small media | Recruitment took place between August and September 1999; intervention duration was 3 months | Primary: Papanicolau test uptake; Secondary: difference between early adopters and nonearly adopters; Outcomes were collected through a self-reported questionnaire |
|                          | Sample: n = 424 (baseline IG: n = 212; CG: n = 212; follow-up IG: n = 123; CG: n = 124) | IG: month 1: welcome letter, mailed educational brochure, quotes from women who completed Papanicolau test, screening schedule; month 2: invitation letter for a free Papanicolau test and mailed materials: fact sheet, screening schedule, role model stories; month 3: telephone call from health educator to offer barriers counseling and/or assistance with appointment scheduling | Follow-up: IG: during telephone call (pre) and mailed survey (post); CG: mailed survey (post only) | |
|                          | Setting: hospital | CG: monthly newsletter with general health information from hospital | | |
| Colorectal cancer        | Characteristics: men and women 50-74 years old from national database, no history of inflammatory bowel disease or bowel malignancy, no colonoscopy in past 3 years; no FOBT in previous 1 year | Small media | One-off letter was sent, followed by a one-off SMS 1 week later, in 2013 | Primary: FOBT uptake; Outcomes were collected from medical records from National Israeli Colorectal Cancer Early Detection database |
| Hagoel20 Israel          | Sample: n = 48,091 (IG1: n = 9,631; IG2: n = 9,996; IG3: n = 9,630; IG4: n = 9,632; IG5: n = 9,602) | All participants received (1) a mailed letter, asking them to mail back an FOBT test order form or pick up a free-of-charge FOBT at a local clinic and (2) an SMS reminder. Five types of letters were sent to different groups: IG1: interrogative reminders + no social context reference; IG2: interrogative reminders + social context reference; IG3: no reminder; IG4: noninterrogative reminder + no social context reference; IG5: noninterrogative reminder + social context | Follow-up: data were collected for 6 months after intervention | |
|                          | Setting: nationwide | | | |

(Continued on following page)
| First Author and Country | Population | Classification of Intervention (small media, mass media, or others) and Intervention | Timeline | Outcome(s) |
|-------------------------|------------|----------------------------------------------------------------------------------------|----------|------------|
| Hirai21 Japan           | Characteristics: men and women, 46-66 years old, no FOBT in past 1 year, membership in Japan’s national health insurance program | Small media Mailed letter for substituted screening (4 types): IG1: tailored matched message condition, tailored and print reminder for screening IG2: tailored unmatched message condition and print reminder for screening (for IG1 and IG2: 3 different messages based on screening intention) | First contact was made in Oct 2010, a second contact (reminder) was made in November 2010 Follow-up: data were collected for 5 months | Primary: FOBT uptake Secondary: cost-effectiveness Outcomes were collected from medical records from health care facilities |
| Hong22 Korea            | Characteristics: men 50-59 years old, in the lowest 50% of the National Health Insurance Corporation Premium, had not received cancer screening tests previously | Small media IG1: letter plus mailed information (screening eligibility, and free screening availability; information about cancer and screening; financial aid programs for patients with cancer) IG2: telephone call (counseling, same information as in IG1 conveyed, called up to 3 times) IG3: IG1 plus IG2 (letters were sent 2 weeks after telephone calls) | Intervention was delivered during September 2012 Follow-up: data were collected for 4 months (1 month during intervention and for 3 months after intervention) | Primary: screening of stomach and colorectal cancer Outcome was collected from medical records from clinics |
| Adib30 Lebanon          | Characteristics: women ≥ 40 years old for survey 1 and 2 and ≥ 35 years old for surveys 3-5 from selected clusters | Small media + mass media + others (1) discounted price for mammography (in 160 centers); (2) pamphlets in supermarkets, pharmacies, waiting rooms, salons, with clinics offering reduced price screening; (3) educational CD for health care professionals; (4) billboards, street signs, pink ribbons; (5) TV and radio advertisements; TV talk shows; (6) SMS advertisement; (7) campaign banners on homepages of main Internet providers | Intervention was delivered once a year (throughout October) 2002-2005 Data collection: data were collected once a year in January 2004, 2005, and 2006 | Primary: mammogram uptake Outcome was collected through a self-reported, tested questionnaire |

(Continued on following page)
| First Author and Country | Population | Classification of Intervention (small media, mass media, or others) and Intervention | Timeline | Outcome(s) |
|-------------------------|------------|---------------------------------------------------------------------------------|----------|------------|
| Gadgil34 India          | Characteristics: women 30-69 years old employed at Bhaba Atomic Research Centre (and family members), enrolled in occupational health care scheme | Small media + others (1) mailed awareness brochures on annual basis (4×) about breast anatomy, signs and symptoms of breast cancer; (2) breast clinics by trained nurses: education, counseling, BSE; and physicians: clinical breast examination; (3) walk-in clinics to teach about breast changes with silicon model (all health care costs covered by employer) | Intervention was delivered once a year in June from 2013 to 2016 | Primary mammogram uptake |
|                         |            |                                                                                | Data collection: Pre: January 2005-May 2013; Post: June 2013-June 2016 | Outcome was collected from medical records from occupational health care scheme |
| Heymann36 Israel        | Characteristics: female members of Maccabi Healthcare Services, 40-65 years old | Small media + mass media + others (1) mailed information packs that discussed health, including breast cancer; (2) letter included in information pack asking participant to visit primary care physician who would discuss health prevention issues and refer her to appropriate tests; (3) mailed incentive: substantial discount on face cream when visiting physician; (4) 75 × 15-s TV ads | Intervention was delivered during March 2001 | Primary mammogram uptake |
|                         |            |                                                                                | Data collection: Pre: March-April 1998, 1999, 2000; Post: March-April 2002, 2003 | Outcome was collected from medical records from Maccabi Health Care Services |
| Heo37 Korea             | Characteristics: female students, workers, local residents; ≥ 19 years old, no history of breast cancer, smartphone owner | Mass media Smartphone application: reminder of optimal day to perform breast self-examination, motivational tools including participant’s mother, record keeping, educational content | Intervention was delivered from mid-July to mid-September 2012 (approximately 2 months) | Primary: breast self-examination practice |
|                         |            |                                                                                | Data collection: directly after intervention completion | Outcome was collected through self-reported questionnaire |
| Park39 Korea            | Characteristics: female, 30-69 years old, permanent residents in intervention city | Small media + mass media + others Gunpo Cancer Screening Project IG: (1) posters on apartment billboards and in clinic waiting rooms and pharmacy; (2) leaflets (hand delivered) distributed at street events; (3) letters to promote breast cancer screening (free of charge to all); (4) street promotion; (5) outbound telephone calls to women who signed application form at street promotions; (6) monthly neighborhood meetings; (7) small group educational sessions; (8) online blog on breast cancer screening CG: no intervention | Intervention duration was 6-7 months | Primary: address barriers toward breast cancer screening, improve attitudes and beliefs; mammogram uptake |
|                         |            |                                                                                | Data collection: Pre: June 2008; Post: 7 months later | Outcomes were collected through self-reported questionnaire (based on Health Belief Model and Transtheoretical Model) |

(Continued on following page)
### TABLE 3. Study Characteristics of Randomized Controlled Trials and Quasi-Experimental Studies (Continued)

| First Author and Country | Population | Classification of Intervention (small media, mass media, or others) and Intervention | Timeline | Outcome(s) |
|--------------------------|------------|--------------------------------------------------------------------------------|---------|------------|
| **Cervical cancer**      |            |                                                                                 |         |            |
| Guvenc35 Turkey          | Characteristics: women ≥ 21 years of age, no gynecologic cancer history, no screening in past 1 year, living in study area, literate, sexually active, have telephone number | Small media + others Three Stages of Nursing Intervention: Stage I: mailed educational brochures and invitation to attend a free Papanicolau test Stage II: telephone interviews Stage III: face-to-face interviews | Intervention was conducted in 2008 Data collection: pre and post (no time period or dates given) | Primary: Papanicolau test uptake, knowledge and beliefs about Papanicolau test Outcomes were collected through a self-reported questionnaire (sociodemographic information; Knowledge, Health Belief Model Scale for Cervical Cancer; and Papanicolau test) |
| Ueda33 Japan             | Characteristics: women 20-49 years old, residents of study area (IG: 20, 25, 30, 35, and 40 years old; CG: 21, 26, 31, 36, and 41 years old) Sample: n = 1,500-3,500 women in every age category, each year Setting: nationwide | Small media IG: mailed free cervical cancer screening coupon CG: no intervention | A one-off coupon was sent to all women in the applicable age category each year (2009-2012) Data collection: Pre: 2008 Post: 2009-2012 | Primary: Papanicolau test uptake Outcome was collected from medical records |
| Yagi32 Japan             | Characteristics: IG1: women 20 years old; IG2: parents with daughters 20 years old, still living at home, no history of Papanicolau test; CG: women 21 years old Sample: IG1: n = 1,976; IG2: n = 1,916 Setting: nationwide | Small media IG1: mailed free screening coupon and reminder postcard IG2: same as IG1 + leaflet to parents encouraging them to show their daughters a cartoon (encouraged girls to have a Papanicolau test) CG: never received intervention | Intervention for IG1 was conducted in May 2013 and Jan 2014; intervention for IG2 was conducted in May 2014 and January 2013 Data collection: data were collected for 3 months | Primary: Papanicolau test uptake Outcome was collected from medical records |
| Breast and cervical cancer |            |                                                                                 |         |            |

(Continued on following page)
| First Author and Country | Population | Classification of Intervention (small media, mass media, or others) and Intervention | Timeline | Outcome(s) |
|-------------------------|------------|-------------------------------------|---------|------------|
| Tabuchi41 | Japan | Characteristics: IG: women 20, 25, 30, 35, and 40 years old for Papanicolau test and 40, 45, 50, 55, and 60 years old for mammography; CG: female, ≥ 1 year old; IG: ≥ 2 years old | Small media IG: free cervical or breast screening vouchers were distributed (usually by mail but occasionally by hand) and mailed information leaflets CG: no intervention | One-off voucher (+ leaflet) was sent between September 2009 and March 2010 Data collection: Pre: 2007 Post: 2010 | Primary: (1) Papanicolau test uptake; (2) mammogram uptake Secondary: cost per uptake Outcomes were collected through a self-reported questionnaire (Comprehensive Survey of Living Conditions of People on Health and Welfare) |
| Motallebnejad38 | Iran | Characteristics: participants living in selected clusters (no other criteria stated) | Small media Information brochure on oral cancer facts (hand delivered by students) after brief baseline questionnaire was completed with participants | One-off brochure was delivered in 2005 Data collection: Pre: directly before brochure was given Post: 1 month after intervention | Primary: knowledge about oral cancer Outcome was collected through self-reported questionnaire |
| Saleh40 | Malaysia | Characteristics: registered e-mail address with media company (database of > 2 million contacts) | Mass media (1) 20-s TV ads (aired for 32 days, 2-3× per day on TV3, NTV7); (2) TV talk show (2×) by surgeon at the end of intervention period to address emotional barriers faced by patients in seeking treatment | Intervention was delivered from May 23 to June 23, 2010 (32 days) Data collection: directly before and after intervention | Primary: awareness of oral cancer Outcome was collected through self-reported online survey |

Abbreviations: BSE, breast self-examination; CG, control group; FOBT, fecal occult blood test; IG, intervention group; SMS, short message service (text message).
one exception\textsuperscript{37}). Colorectal and gastric cancer studies included participants between 46 and 74 years of age, and oral cancer studies did not use age as an exclusion criterion. Most studies that aimed to increase screening rates included participants who did not attend screening in the past 1 to 3 years.

**Intervention.** All RCTs of interventions used small media only (Table 3). The most common channel of communication was mailed letters, generally with the purpose of inviting participants to cancer screening. Sometimes the letters were mailed with brochures or other educational materials regarding cancer. Other small media communication channels were telephone calls and text messages (Short Message System). The RCTs included between one and four intervention groups (IGs), either comparing different channels of communication to a control group (CG) or comparing different types of messages delivered through the same channel of communication.

Included QESs used both mass and small media channels, as well as intervention components such as counseling or group education (Table 3). Two studies evaluated the impact of TV advertisements and a TV talk show,\textsuperscript{40} as well as a smartphone application.\textsuperscript{37} Three studies combined mass media (ie, TV ads, billboards, posters, street signs, radio advertisements, and a Web site) and small media communication channels, together with intervention components such as counseling, group education, discounted or free-of-charge screening, and neighborhood meetings.\textsuperscript{19,36,39} Four studies included small media only,\textsuperscript{20,21,38,41} and two studies included small media and other communication channels.\textsuperscript{14,35} Small media channels used in QESs included mailed letters or postcards, mailed coupons, mailed brochures or other educational materials, mailed cartoons, telephone calls, and an educational CD or video.

The few interventions that seemed to be informed by behavior change theory used constructs from the Health Belief Model,\textsuperscript{31,32,35,39} the Transtheoretical Model,\textsuperscript{17,39} and
the Theory of Planned Behavior.26,28 One intervention was based on the Question–Behavior Effect technique,25 and another was developed according to the PRECEDE/PROCEED model.39 Few studies described the involvement of their target population in designing the intervention, although the needs assessment of the target population was described mainly in studies that used a behavior change theory.17,35,39

Small media studies generally targeted people in their homes, with the exception of one study that invited participants to the research center.17 Addresses were commonly obtained from health and population registries targeting large numbers of people (Tables 1 and 3). Other recruitment methods included convenience sampling within housing areas,38,39 hospitals (visiting relatives),31,32 or workplaces,34,36,37 or an e-mail list held by a mass media organization.40

The intervention duration and follow-up period differed among types of studies and outcomes of interest (Tables 1 and 3). Most small media interventions delivered a one-off letter or text message or followed up with a second letter, text message, or telephone call between 1 week and 3 months later and collected data on cancer screening uptake between 5 weeks and 12 months after the intervention. Other interventions posted annual brochures for up to 3 years.34 Small media campaigns focusing on improving cancer knowledge and perceptions conducted evaluations directly after the intervention or 1 month after.38 Mass media campaigns lasted from 1 month for TV only40 to 3 months for a smartphone application intervention only.37

Researchers, staff working in clinics and government screening programs, or students delivered the interventions. Trained nurses, physicians, and other clinicians undertook the screening, which was free of charge with the exception of two studies in which screening was discounted.19,26 Most of the studies were funded by universities and research centers.20,23,26,33,34,37,38,42 Other funding bodies were a pharmaceutical company,19 a national cancer association (nongovernmental organization [NGO]),25 a nursing association,17 a media company,40 a Ministry of Health (government),20,21,26,28,30,41 a health insurance plan, a hospital,31,32 and one campaign was retail-pharmacy sponsored.36 The funding source was unclear in two studies.35,38

**Study Findings**

All findings are reported in Table 4.

**Cancer-related knowledge, attitudes to cancer screening, and self-examination practice.** Change in cancer-related knowledge was assessed in one RCT and four QESs, all of medium quality.31,32,35,38,40 Findings from the RCT conducted by Hou et al31 found no between-groups difference in knowledge regarding cervical cancer and Papanicolau tests at follow-up. Conversely, Park et al39 found that a mixed media campaign (small and mass media plus other components) demonstrated a greater decrease in beliefs about breast cancer–related myths in Korea (non-significant). Furthermore, a before-and-after evaluation of a mass media campaign in Malaysia found an increase in awareness about oral cancer (ie, having heard of oral cancer), but there was no increase in knowledge about symptoms.40 Findings across five studies (two RCTs and three QESs) of attitudes toward screening concerning breast17,37,39 or cervical cancer were mixed.31,32,35 Studies addressing attitudes or beliefs about cancer generally described an underlying theory for the intervention design. For example, Park et al reported that a mixed media intervention based on the Transtheoretical Model, resulted in an increase in the proportion of intervention participants who progressed to the action stage (+23% in the intervention city v−5% in the control city) and an increase in intention to undergo mammography screening in the next 2 years (+14% in the intervention city v+7% in the control city).39 The small media intervention (combined with face-to-face interviews in stage III) that was based on the Health Belief Model did not find a change in beliefs related to cervical cancer and H tests. A small study using a smartphone application did not find a change in breast self-examination practice in general, although there was a significant increase in the number of women 30 years of age or younger conducting breast self-examination (36% to 82%, P = .002).37

**Screening attendance, cancer diagnosis, and downstaging.** Screening uptake was the most commonly reported outcome measure (n = 17) for breast, cervical, and colorectal cancer. Findings from RCTs were mixed for breast (n = 4 [medium quality]) and colorectal cancer screening (n = 3 [medium quality]) and positive for cervical cancer screening (n = 3 [medium to high quality]). Only one RCT looked at gastric cancer screening.27 Ishikawa et al28 reported that a tailored letter about free breast cancer screening was significantly more effective than a non-tailored reminder (odds ratio, 4.02 [95% CI, 2.67 to 6.06]; P < .001). Conversely, a repeated text message screening invitation combined with information about mammograms was as effective as receiving a screening invitation through text message alone.29 Medium- and low-quality QESs reported weak positive effects on breast cancer screening.13,34,36,41 According to one QES, breast cancer screening uptake increased over a 4-year period (not significant).19 and Heymann et al26 reported a small increase, from 3.2% to 3.8%, in another QES. High- and medium-quality QESs reported significant positive effects for cervical cancer screening.20,21,35,41 which were supported by high- and medium-quality RCTs.22,24,31 For example, Abdul Rashid et al22 reported a significantly greater uptake of Papanicolau tests in the IG invited by telephone compared with a mailed letter, a registered letter, or a text message (50.9%, 23.9%, 23.0%, and 32.93%, respectively; P < .05). Similarly, a mailed screening invitation and information followed by a telephone reminder yielded
TABLE 4. Findings Regarding Cancer-Related Knowledge, Attitudes, and Beliefs and Screening Uptake

| First Author                      | Change in Knowledge | Change in Attitudes and Beliefs | Screening Uptake | Cancer Cases Detected | Downstaging of Cancer | Cost Effectiveness |
|-----------------------------------|--------------------|---------------------------------|-----------------|-----------------------|-----------------------|--------------------|
| **Breast cancer**                 |                    |                                 |                 |                       |                       |                    |
| Ishikawa28a                       | —                  | —                               | IG v CGb        | —                     | —                     | IG v CGc           |
| Lakkis29a                         | —                  | —                               | IG1 v IG2c      | —                     | —                     |                    |
| Lin17x                            | —                  | IG v CGb                        | —               | —                     | —                     | —                  |
| Ng30a                             | —                  | —                               | IG v CGb, IG v CGc | —                     | —                     | —                  |
| Seow33a                           | —                  | —                               | IG3 v IG1b, IG3 v IG2b, IG3 v IG2c | —                     | —                     | —                  |
| **Cervical cancer**               |                    |                                 |                 |                       |                       |                    |
| Abdul Rashid22,23x                 | —                  | —                               | IG4 v alla      | —                     | —                     | IG4 v allc         |
| Abdullah24a                       | —                  | —                               | IG1 v CGb       | —                     | —                     |                    |
| Hou31,32a                         | IG v CGd, IG v CG (more pros) | IG v CG (fewer cons) | IG v CGb      | —                     | —                     | —                  |
| **Colorectal cancer**             |                    |                                 |                 |                       |                       |                    |
| Hagoel25a                         | —                  | —                               | IG1 and IG2 v alla | —                     | —                     | —                  |
| Hirai26a                          | —                  | —                               | IG1 v CG3b, IG1 v IG2c | —                     | —                     | Not justifiedd     |
| **Colorectal and gastric cancer** |                    |                                 |                 |                       |                       |                    |
| Hong27a                           | —                  | —                               | IG2 v CGa, IG3 v CGa, IG1 v CGd | —                     | —                     | —                  |
| **Quasi-experimental studies**    |                    |                                 |                 |                       |                       |                    |
| Adib19g                           | —                  | —                               | S3 and S4 v S1 and S2c | —                     | —                     | —                  |
| Gadgil34a                         | —                  | —                               | —               | —                     | —                     | —                  |
| Heymann36a                        | —                  | —                               | IY v other Ys  | —                     | —                     | —                  |
| Park38a                           | IG v CGd           | IG v CGb                        | —               | —                     | —                     | —                  |
| Heo37a                            | —                  | —                               | Pre v postd, Age ≤ 30 yearsd, Age > 30 yearsd | —                     | —                     | —                  |
| **Cervical cancer**               |                    |                                 |                 |                       |                       |                    |
| Guvenc35a                         | After S1d          | —                               | —               | —                     | —                     | —                  |
| Ueda21e                           | —                  | —                               | IY v other Ys  | —                     | —                     | —                  |
| Yagi39a                           | —                  | —                               | IG v CGb       | —                     | —                     | —                  |
| **Breast and cervical cancer**    |                    |                                 |                 |                       |                       |                    |
| Tabuchi41a                        | —                  | —                               | IG v CGb       | —                     | —                     | d                  |
| **Oral cancer**                   |                    |                                 |                 |                       |                       |                    |
| Motallebnajad18a                  | Pre v postb        | —                               | —               | —                     | —                     | —                  |

(Continued on following page)
TABLE 4. Findings Regarding Cancer-Related Knowledge, Attitudes, and Beliefs and Screening Uptake (Continued)

| First Author | Change in Knowledge | Change in Attitudes and Beliefs | Screening Uptake | Cancer Cases Detected | Downstaging of Cancer | Cost Effectiveness |
|--------------|---------------------|---------------------------------|------------------|----------------------|----------------------|-------------------|
| Saleh\(^a\)  | Awareness of oral cancer\(^a\) | —                               | —                | —                    | —                    | —                 |

Abbreviations: CG, control group; IG, intervention group; IY, intervention year; S1, stage I; S2, stage II; Y, year; —, not applicable (not reported).

\(^a\)Medium quality.
\(^b\)Significant positive difference.
\(^c\)Positive difference (not significant).
\(^d\)No difference.
\(^e\)High quality.
\(^f\)Findings not conclusive.
\(^g\)Low quality.
\(^h\)Negative difference.

a significantly higher Papanicolau test uptake compared with no intervention (opportunistic screening; odds ratio, 2.44 [95% CI, 1.29 to 4.62]).\(^{24}\) High-quality QESs found a significant increase in Papanicolau test uptake among IG participants compared with the CG (8.7% v 3.6%; \(P < .001\))\(^{20}\) and an increase in the first-time participation screening rate\(^{21}\) as a result of small media interventions (mailed screening coupons) in Japan. RCT participants who received a telephone call alone or a call combined with mailed information were significantly more likely to attend gastric and colorectal cancer screenings compared with the respective CGs (gastric cancer: telephone, 31.7% v 17.9%, \(P = .01\); telephone plus post, 40.5% v 17.9%, \(P < .01\); Colorectal cancer: telephone, 24.3% v 13.5%, \(P < .01\); telephone plus post, 27.8% v 13.5%, \(P < .01\)).\(^{27}\)

Detected cancer cases were reported in three studies. A medium-quality RCT of a small media intervention found a significant between-group difference in terms of breast cancer cases detected (IG, 4.8 of 1,000 cases v CG, 1.3 of 1,000 cases),\(^{30}\) whereas the interventions in two medium-quality QESs did not increase cancer case detection.\(^{34,37}\) Two medium-quality studies assessed downstaging of detected cancers as an outcome. Ng et al\(^{30}\) demonstrated a significant difference in stage of breast cancer diagnosis as a result of a small media intervention in Singapore (IG, 64% v CG, 26% of cases were stage 0 or 1, \(P < .001\)), whereas Gadgil et al\(^{34}\) reported that the proportion of smaller-sized tumors detected was higher (85.3% v 89.5%, \(P = .390\)) and the proportion of large-sized tumors detected was smaller (14.7% v 10.5%, \(P = .390\)) after the intervention. Furthermore, the proportion of cancer deaths decreased from 8.3% to 0% within 3 years from diagnosis over the study period.

Cost effectiveness. Four studies reported intervention costs, with mixed findings. An intervention using assessment-based, tailored screening reminder letters to improve breast cancer screening was cost effective compared with non-tailored reminders (IG, 30 USD v CG, 52 USD),\(^{28}\) whereas a tailored message condition was not more cost effective than an unmatched message condition for colorectal cancer screening.\(^{29}\) Abdul Rashid et al\(^{23}\) compared different small media campaigns to increase cervical cancer screening and found that a telephone call was the most cost-effective method. An intervention that paid out-of-pocket costs for breast and cervical cancer screenings in Japan improved cancer screening uptake, although the intervention was not cost saving because of the high cost of screening.\(^{41}\)

DISCUSSION

Findings from this systematic review suggest that small media interventions (eg, interventions using mailed materials, text messages, and telephone calls) may be effective in improving screening uptake for breast, cervical, colorectal, and gastric cancer in Asian countries. The number of studies using mass media channels was too small to draw conclusions about their effectiveness. There was also insufficient evidence to indicate that small or mass media campaigns improved knowledge or attitudes toward cancer. The lack of mass media campaigns is likely to be related to (1) the high costs involved in running campaigns using TV and radio advertisements and (2) the lack of campaign evaluation of campaigns run by the government and NGOs. The only nationwide mass media campaigns included here received funding from media channels for TV advertisements.

The findings regarding screening were mainly from studies conducted in high or higher middle-income countries (Japan, South Korea, Taiwan, Singapore, Malaysia, Israel, Turkey, Lebanon, and Iran). The absence of studies in low and lower middle-income countries may be explained by a lack of resources to conduct screening programs, as well as a lack of screening facilities. Most studies reported a one-off follow-up, and only a few studies evaluated the impact of such programs in the long term. Studies from Western countries suggest that screening programs have to be run repeatedly to maintain uptake over time.\(^{43}\)
Surprisingly, the two most common cancers in Asia, lung and liver cancer, were not addressed by any study in the systematic review. The majority of lung and liver cancer programs tend to focus on prevention (ie, smoking cessation and hepatitis B vaccination) instead of symptom education and early detection. However, the high number of lung and liver cancer cases suggests that there is a need for early detection and awareness programs to supplement prevention programs and to detect and treat these cancers early. The under-researched number of cancer cases detected and downstaging of cancer may be related to the poor quality or absence of adequate data collection systems in LMICs. Bhoo-Pathy et al reported that only one in three Asian countries collected data on cancer incidence, and only one in six countries monitored cancer mortality. In turn, inadequate or absent routine data collection is likely to hinder cost-effectiveness analysis of interventions.

Eight studies (40%) reported implementation issues. Findings highlighted that between 21.2% and 34.4% of letters, mailed brochures, or text messages were never received because of incorrect addresses or telephone numbers, and that approximately 43.5% of targeted participants never read the brochure they received. One study using mass and small media highlighted that 50% of participants reported that they had heard about the campaign. Reasons why women refused free cervical cancer screening after the first contact included no time and embarrassment during screening.

Findings presented in this systematic review are in line with the findings of two systematic reviews focused mainly on Western countries. Furthermore, Hou et al concluded that small media were effective in improving screening uptake among Asians (including Asians living abroad). To the best of our knowledge, the systematic review presented in this article is the first review focusing on Asians living in Asia and takes account of the different health care systems and resources in Asian countries compared with Western countries. In addition, the review extracted information about small and mass media campaigns specifically, rather than educational interventions in general; these data will be informative for the design and development of early detection cancer programs that plan to use this mode of delivery.

To the best of our knowledge, this systematic review delivers the best available up-to-date reliable evidence about small and mass media cancer screening interventions in Asia. Most studies in this systematic review were deemed to be of medium quality according to the results of the application of the JBI methodologic checklists. However, a consideration of individual studies in the context of the target interventions might suggest that some may be higher in methodologic quality. For example, the scoring of criteria such as blinding may not be realistic for these types of population-based educational interventions.

Often, data collected from medical records or cancer registries in LMICs are not complete or reliable because of a lack of resources. For example, the cancer registry in Malaysia relies on voluntarily supplied information, and because of the dual-tiered health care system, evidence from private clinics and hospitals is often lacking. Many interventions and campaigns run by governments and NGOs in LMICs are evaluated internally and are not published in scientific journals and, therefore, may be missed.

Few of the studies included offered minimal contact with participants (eg, neighborhood meetings, telephone contact, and so forth) and we do not know the extent to which this personal contact is important for intervention success. Due to the limited number of studies, no conclusions can be drawn about whether interventions that applied a theory were more effective than atheoretical studies or whether there are differences in effectiveness between screening tests. However, a recent systematic review by Senore et al suggested that different colorectal cancer screening methods yielded different results regarding screening uptake.

Because some studies compared one intervention with another intervention (eg, tailored messages v nontailored messages), no conclusions can be drawn from some interventions regarding the effectiveness of the intervention compared with no intervention. Our review covered a limited number of high and higher middle-income countries, and findings may not be applicable to other LMICs in Asia (Fig 2). Furthermore, few studies looked at using different methods to target different age groups. However, it was suggested that younger women may be better disposed to smartphone applications as well as to being influenced by their parents.

Mailed information and an invitation for a free screening, as well as mailed information combined with a telephone reminder, seem to be effective in increasing screening uptake. High-quality studies in this review may serve as important resources to inform screening interventions in Asian countries. A limited number of interventions in this systematic review evaluated screening programs over an extended time period, and future studies should investigate screening engagement in the long term.

Few studies addressed knowledge and attitudes regarding cancer and cancer screening. However, in some LMICs, lack of knowledge, misbeliefs, negative attitudes toward cancer treatment, and distrust in Western medicine are still significant barriers toward screening, and these barriers must be addressed to improve screening uptake in Asia. Understanding barriers toward screening in the target population is a key research goal, and basing interventions on theoretical components may improve effectiveness. The two most commonly applied theories in cancer education programs in Asia are the Transtheoretical Model and the Health Belief Model.
Mass media campaigns are run yearly by NGOs and industry, but they do not seem to be subject to rigorous evaluation. To identify whether mass media are cost-effective and worthwhile to be used by policy makers and public health practitioners for public education in Asia, there would be considerable merit in NGOs and campaigning bodies exploring collaboration with academicians with a view to rigorously evaluating public health improvement programs.

Findings from this systematic review suggest that small media cancer awareness—raising campaigns are effective in increasing cancer screening rates for breast and cervical cancer, and limited evidence is available for colorectal cancer. Evaluation of mass media campaigns is required to improve understanding about the importance (or otherwise) of these campaigns in public health education. Additional research is needed to assess the cost effectiveness of media interventions for cancer screening in Asia.

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AUTHORS’ DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The following represents disclosure information provided by authors of this manuscript. All relationships are considered compensated. Relationships are self-held unless noted. I = Immediate Family Member, Inst = My Institution. Relationships may not relate to the subject matter of the manuscript. For more information about ASCO’s conflict of interest policy, please refer to www.asco.org/wc or ascopubs.org/jco/site/ifc.

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# APPENDIX

**TABLE A1.** Concepts Searched in the Databases

| Concept 1: Cancer, neoplasm |
|-----------------------------|
| Concept 2: Screening, breast health, awareness, knowledge, self-screening, beliefs, attitudes, self-efficacy, self-examination, attendance, health behavior |
| Concept 3: Mass media, small media, campaigns, health promotion, health education, public health, interventions, programs, TV, radio, mail, brochures, (print) advertisement, social media, Internet, online |
| Concept 4: Asia, Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei, Cambodia, China, Cyprus, Georgia, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Laos, Lebanon, Malaysia, Maldives, Mongolia, Myanmar (Burma), Nepal, North Korea, Oman, Pakistan, Palestine, Philippines, Qatar, Russia, Saudi Arabia, Singapore, South Korea, Sri Lanka, Syria, Taiwan, Tajikistan, Thailand, Timor-Leste, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Vietnam, Yemen |

**NOTE.** Search terms for each concept were combined with OR. All four search concepts were combined with AND.