School Based Health Workers in Nepal: Supporting Evidence Based Decision Making

Final Report
May 2018
School Based Health Workers in Nepal: Supporting Evidence Based Decision Making

Nepal Health Research Council (NHRC)
Ramshah Path, Kathmandu
School Based Health Workers in Nepal: Supporting Evidence Based Decision Making

Authors: Meghnath Dhimal, Binaya Chalise, Israt Jahan, Subash Thapa, Tamanna Neupane, Alisa Timsina, Bijay Kumar Jha, Bihungum Bista, Achyut Raj Pandey, Anjani Kumar Jha.

Recommended citation:
ACKNOWLEDGEMENT

I am grateful to the Technical working Group of this study for their efforts and contribution in this study, which consisted of the following members;
Dr Hari Prasad Lamsal, Ministry of Education, Science and Technology
Mr. Badri Bahadur Khadka, Ministry of Health and Population
Ms. Roshani Tuitui, Ministry of Health and Population
Ms. Yeshoda Aryal, Ministry of Health and Population
Ms. Kabita Aryal, Ministry of Health and Population
Dr. Meghnath Dhimal, Nepal Health Research Council
Mr. Achyut Raj Pandey, Nepal Health Research Council
Mr. Bihungam Bista, Nepal Health Research Council
Mr. Binaya Chalise, Nepal Health Research Council

I would like to extend my great thanks to Assistant Research Officer Ms. Tamanna Neupane and Ms. Alisa Timsena for their support in this study. My special thanks are to Dr Subash Thapa, and the fK fellow Ms Israt Jahan, for their scholarly contribution in analyzing the data and writing report. I would also like to acknowledge Mr. Nirbhaya Kumar Sharam, Mr. Subodh Kumar Karna and Mr. Bijay Kumar Jha of NHRC for their coordinative and administrative support for timely accomplishment of this study.

I thank the GIZ Nepal, especially Ms. Valerie Broch Alvarez and Mr. Pushkar Silwal for their technical and financial assistance for this study. Finally, I am grateful to all experts who directly or indirectly contributed to and supported this study.

Prof Dr Anjani Kumar Jha
Executive Chairperson
Nepal Health Research Council
EXECUTIVE SUMMARY

Background and Aim: There is a dilemma of whether and how health workers can be mobilized in a school setting in terms of insuring health and wellbeing of school children in Nepal. Therefore, we conducted a rapid review of existing systematic reviews to develop strategies to mobilize health workers in schools. We also aimed to explain the local applicability of the intervention strategies, using local evidence, to support policy makers better implement the interventions in Nepal.

Methods: A systematic search for systematic reviews that explained the effect of health interventions at school to produce various health outcomes among the school children. Data synthesis and analysis included line by line coding of the extracted data and development of themes. Relationships between themes were sought and that led to the identification of intervention strategies and generative mechanisms. Finally, the strategies and mechanisms were refined based on the local evidence from Nepal.

Findings: Our synthesis revealed five major intervention strategies, in which a health worker can be mobilized. These are: awareness raising; behavior change; health service provision; support provision; and community engagement strategies. Likewise, our synthesis identified three major pathways on how behavior change can be produced via mobilizing health workers. First, health workers can contribute to changing health-related knowledge and behaviors of school children. Second, health workers can contribute to increasing self-efficacy for behavior change especially for vulnerable children. Finally, a health worker can contribute to reducing social barriers for self-efficacy and behavior change among school children.

Conclusions: This synthesis provides a program theory illustrating a more detailed picture of contextual factors and the pathways surrounding the mobilization of health workers in a school setting. Moreover, it builds a greater understanding of the mechanisms that support the adaptation of intervention strategies in terms of the socio-structural and cultural context in Nepal. The envisioned provision of school based dedicated health worker has the opportunity to improve health and academic outcome of children in Nepal. This study reviewed the available systematic reviews to assess the effectiveness of school based health interventions with the provision of health workers in school setting.
### LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
</tr>
<tr>
<td>AMSTER</td>
<td>Assessing the Methodological Quality of Systematic Reviews</td>
</tr>
<tr>
<td>ARI</td>
<td>Acute Respiratory Infection</td>
</tr>
<tr>
<td>EPPI</td>
<td>Evidence for Policy and Practice Information</td>
</tr>
<tr>
<td>FCHVs</td>
<td>Female Community Health Volunteers</td>
</tr>
<tr>
<td>HICs</td>
<td>High Income Countries</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>LMICs</td>
<td>Low and Middle Income Countries</td>
</tr>
<tr>
<td>MoHP</td>
<td>Ministry of Health and Population</td>
</tr>
<tr>
<td>SRH</td>
<td>Sexual and Reproductive Health</td>
</tr>
<tr>
<td>STI</td>
<td>Sexually Transmitted Infections</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

ACKNOWLEDGEMENT ................................................................................................................... iv
EXECUTIVE SUMMARY ................................................................................................................ v
LIST OF ABBREVIATIONS .......................................................................................................... vi
LIST OF TABLES ........................................................................................................................ viii
LIST OF FIGURES ....................................................................................................................... viii
INTRODUCTION .......................................................................................................................... 1
Why to Conduct this Review? ....................................................................................................... 1
STUDY OBJECTIVES .................................................................................................................... 2
METHODS .................................................................................................................................... 3
   Screening and Study Selection ................................................................................................. 3
   Quality Appraisal .................................................................................................................... 3
   Data Extraction ........................................................................................................................ 4
   Data Synthesis .......................................................................................................................... 4
FINDINGS ....................................................................................................................................... 5
   Intervention strategies for mobilizing health workers in school health ................................. 6
   Pathways and contextual factors for mobilizing health workers in terms of changing health behaviors and producing health outcomes ......................................................... 12
DISCUSSION ............................................................................................................................... 15
CONCLUSION ............................................................................................................................... 20
REFERENCES ............................................................................................................................... 21
ANNEX ......................................................................................................................................... 25
   ANNEX 1: Guideline: Searching Systematic Review from Database ........................................ 25
   ANNEX 2: Quality of evidence (all 25 primarily selected reviews) ........................................... 27
   ANNEX 3. Summary of included studies .................................................................................. 28
   ANNEX 4: Type of Health Workers Included in School Health Interventions ....................... 48
LIST OF TABLES
Table 1: Major Themes Identified from the Data Synthesis.................................................................8
Table 2: Contextual Factors Related to School Based Health Worker Program..............................11

LIST OF FIGURES
Figure 1: Systematic Searching and Selection of Studies.................................................................5
Figure 2: Framework Illustrating Intervention Strategies to Mobilize Health Workers in School Setting ........................................................................................................................................10
INTRODUCTION

School based health intervention has the potential to improve health and ultimately academic outcomes at larger scale if school based health interventions, such as disease prevention and health promotion, are integrated with school curricula. Existing evidence demonstrates its capacity in addressing the needs of adolescents and young people especially those ‘at risk’. School health interventions have also been one of the key strategies in Nepal to extend hygiene, sanitation and health education services to the adolescents and young people. Different divisions and centres like Family Health Division, Child Health Division, National Centre for AIDS and STI Control, Population Division and National Health Education Information and Communication Centre under Ministry of Health (MoHP) and other line ministries have been implementing school based activities. However, to intensify the impact, the new National Health Policy 2017 has envisioned for one health worker at secondary level schools solely dedicated to promote health awareness and services to the children, adolescents and young people.

Although evidence highlights the positive impact of school-based health care services through dedicated health personnel on both health and academic outcomes, majority of them presents findings from high-income countries (HICs). Hence, evidence gap remains one of the major concerns regarding the degree of efficacy, cost-effectiveness, feasibility and opportunity of such intervention in low and middle-income countries (LMICs). While Nepal has policies related to school health, evidence gap regarding such interventions, prospects and challenges has raised policy concerns and dilemma on whether or not the health worker led school interventions are implementable. Moreover, the lack of clarity on how such strategies work, or does not work, has been observed as key contributing factors for an untapped potential of such school based health interventions. It was therefore expected that a comprehensive review of existing evidence would provide insights and would be useful in taking the agenda forward in an evidence based way.

Why to Conduct this Review?

The MoHP brought a provision for "One Health Worker per School Policy" in 2017, and started its implementation at private schools of Nepal. The Ministry had an agreement with the Private and Boarding School Association of Nepal to implement the policy in the private schools. The Ministry is currently willing to extend the policy at the public schools of Nepal but the strategies and action plans are still unclear. Although
different partner organizations have experiences of implementing various vertical school based interventions, focused on one or another issue, there are no enough evidences on what works and what doesn’t in case of deploying school health workers. There is also lack of evidence regarding whether school based health worker would be an appropriate choice. Another open question is what should be the profile and respective capacity of the health worker. This evidence synthesis is aimed to address the growing dilemma of whether and how health workers can be mobilized to ensure health and wellbeing of children, adolescents and young people in Nepal. The potential different pathways leading school children to adopt healthy lifestyles and behaviors need to be unpacked. Therefore, this study is conducted synthesizing existing systematic reviews to understand how health workers can be mobilized in order to maximize school health outcomes in a low or middle-income country setting. The ultimate aim is to develop program strategies to uncover the mechanisms operating in school health interventions to increase health and wellbeing in particular contexts in Nepal. Consequently, the underlying mechanisms would guide program managers to design better school health interventions and understand which interventions should be implemented for whom and in which contexts.

**STUDY OBJECTIVES**
The study focused specifically on the following objectives.

- To assess the effectiveness of school based health interventions with the provision of health workers in school setting.
- To identify appropriate strategies for implementing school health workers within the of Nepal.
METHODS

A rapid review of existing systematic reviews (evidence synthesis) was conducted to identify how health workers are mobilized in existing school health interventions. The ultimate purpose of this review was to gather evidence regarding feasibility and effectiveness of school-based health intervention with provision of dedicated health worker in school settings. We applied a stepwise identification; review and appraisal of available evidence to assess the possible applicability and appropriateness of school based dedicated health workers in Nepal.

Screening and Study Selection

A comprehensive literature search was conducted using online databases such as PubMed, Cochrane Library, The Campbell Library, Health System Evidence, Centre for Research and Dissemination, Alliance for Health Policy and System Research, Institute for Health Service and Policy Research, Joanna Briggs Institute, International Institute of Impact Evaluation, International Perspective Register of Systematic Reviews, European Observatory on Health System and Policy and Directory of Open Access Journal. We used a broad spectrum of key terms to maximize the review. Three reviewers independently searched for relevant reviews published between year 1980 and 2018 following structured searching strategy (see Annex 1 for search guideline). Initially title and abstracts were screened of each of the articles and included for detailed review. Once initial screening was completed, two reviewers screened all the included reviews to eliminate duplications and thorough check for relevancy. Once met all inclusion criteria, full articles were retrieved and reviewed for quality appraisal.

Quality Appraisal

Quality of the evidence was appraised following standard and validated guideline AMSTER-2. AMSTER-2 appraises the quality of evidence of a systematic review based on sixteen ‘domains’ of which seven are considered as critical domains. A structured guideline published in their previous publication was adopted to evaluate the overall quality of the evidence.

Two reviewers independently appraised the quality of evidence of each of the included reviews and color coded each ‘criteria’ to green, yellow and red indicating ‘met the domain criteria’, ‘partially met the domain criteria’ and ‘did not meet the domain criteria’ respectively (see Annex 2). Cohen’s kappa coefficient (k) was measured to check
the ‘inter–rater agreement’ of the quality appraisal. Any value less than 0.81 (cut-off value for ‘perfect agreement’ among the reviewers), 10 was discussed among the reviewers for agreement on the coding and quality of the evidence. Once agreed, a summary matrix of the included reviews was developed (see Annex 2).

**Data Extraction**

Two reviewers independently extracted data of the included systematic reviews. A template based on the Lavis et al 2009 11 was opted for data extraction (see Annex 3). Data from few studies was extracted initially into the template on trial and error basis to finalize the template after necessary modification. An excel sheet was maintained to compile the extracted data of all included studies and further analysis to develop the framework and implementation pathways.

**Data Synthesis**

The synthesis was based on realist principles (context-mechanisms-outcome configurations). 12 All the quantitative and qualitative data were analyzed narratively. First, the data extracted from each study, using the data extraction tool, was summarized and organized in one evidence table. Extracted data from each review was coded to identify the themes. Themes are patterns across data sets that are important to understanding a phenomenon. 13 This followed an iterative process, in which connections were looked for across data/themes to build up a cumulative picture of the pathway. The pathways acted as synthesized statements of findings and were confirmed by returning to the original articles. Patterns of similar mechanisms were then compared across local contexts to see if similar outcomes were generated and the preliminary program theory could be improved. All these interpretive processes were performed through the discussion and agreement in the group.
FINDINGS

Figure 1 shows the flow of work processes from database selection through to screening processes and the final selection of the reviews. Searches for articles yielded 73 records that were reduced to 51 records after removing duplicates. Abstracts were appraised for relevance against the inclusion criteria in the initial screening. After the initial screening, 25 articles were considered for a full text appraisal for relevance. These 25 papers were published between 2004 and 2018. The systematic reviews included for quality appraisal (n=25) mostly focused on the impact of school based intervention on health and academic outcome of children. These include, mental health (n=4); provision of health care related services (n=4); academic achievement (n=3); behavioral intervention i.e. smoking cessation, handwashing, personal hygiene, dental care, dietary modification (n=5); self-care and management of chronic disease (n= 3); health care service delivery (n=3); nutrition (n=1) and sexual and reproductive health (n=2). Finally, even papers from LMICs were retained for the analysis and data synthesis to illustrate the intervention strategies, pathways and implication for mobilizing health workers in educational settings in Nepal. The major outcome focused in these seven school based systematic reviews are, mental health (n=2), prevention of smoking (n=1), prevention of dental carries by behavioral interventions (n=1), modification of dietary practices and physical activity (n=1), academic achievement (n=1), and contraceptive behavior (n=1).

Figure 1: Systematic Searching and Selection of Studies
**Intervention strategies for mobilizing health workers in school health**

The synthesis of the included review articles revealed five different interventions strategies that were included in the school health interventions. These strategies were: awareness raising, behavior change, support services, health service provision and community engagement strategy. Each intervention strategies summarized in Table 1, and are briefly outlined below. Evidence from the reviewed studies suggest that various categories of health workers are engaged in school health intervention, ranging from muse practitioner to physician to pharmacist. The type of health workers for school based interventions is contingent upon the nature of intervention itself. Annex 4 depicts they type of health workers engaged school health interventions that we identified while reviewing the evidence from systematic reviews.

**Awareness raising strategy**: The awareness raising strategy includes interventions incorporating fact-based written or verbal information, communication, and education as major components that are provided by the health worker in the school. This strategy is aimed at increasing knowledge, and changing attitude and behaviors of the school children, and is synthesized under the broad category ‘Health education and promotion strategy’. Under awareness raising components, a health worker can contribute in the following activities: delivery of a standardized curriculum on school health topics providing information on various health topics (e.g., dietary habits through leaflets or worksheets); active learning through group discussion or videos and cartoons; using written work, videos, self-monitoring materials and story books; illustrating benefits of health behaviors (e.g., eating fruit and vegetables); and portraying health-related posters (e.g., fruit and vegetables) in the school.

**Behavior change strategy**: The behavior change strategy includes interventions in which a health worker develops communication strategies to promote positive behaviors among the school children, which are appropriate to their settings. This in turn provides a supportive school environment, which will enable children to initiate, sustain and maintain positive and desirable behavioral outcomes. The interventions are: peer-led behaviour change programs, introducing game playing (e.g., providing nutrition knowledge and promoting healthy dietary behaviour); supervision of the health behaviours (e.g. tooth brushing, hand washing; practical food preparation and tasting); and introducing physical activity, exercise and sports interventions.

**Support services**: The support services include a health worker to provide social and psychological support to vulnerable school children through directly contacting them, teaching coping skills, and involving them in any skill building activities or via
increasing access to health care or by providing material support. This strategy includes early childhood development interventions (e.g., providing healthy breakfast at school), providing material support (e.g., supply of soap for hand washing); and providing life-skills training intervention to vulnerable children. The life skills training include informal education (e.g., livelihood skills; psycho educational programs including relaxation and progressive muscle relaxation approaches for bullying victims; increasing empathy and promoting strategies to support to those who want to quit harmful behaviors such as smoking); and providing interpersonal psychotherapy to the children living with mental and developmental disorders (e.g., mindfulness- based cognitive therapy, wellbeing therapy and psycho-educational approaches). ¹⁴,¹⁶,¹⁷

**Health service provision strategy:** The health service provision strategy includes a health worker providing general school health services for the betterment of health of the school children and prevents transmission of health and illnesses. This strategy also reduces barriers related to health service access and logistics. A health worker in a school setting could provide individual-focused health care and counselling services (e.g., first aid, management of acute emergencies, diagnosis and treatment of common childhood diseases etc.), perform general health screening to all the students; referral of physical and mental health disorders to primary health care; and provide psychosocial group interventions and day therapy programs for adolescents with mental health disorders. ¹⁴-¹⁷

**Community engagement strategy:** The community engagement strategy involves a health worker to enhance or provide support to the school health interventions within wider community context in order to raise awareness, change behaviors and provide health service to the school children. This strategy includes two types of interventions: Community-based interventions and Parents-based interventions. In the community-based interventions, a health worker can develop strategies for active engagement of the community people in the school to increase the community awareness and discussion about school health issues. On the other hand, in the parents-based interventions, a health worker can involve parents in the school health initiative. The examples of community engagement strategies may include: parents and community members being provided with health-related leaflets and materials; conducting regular meeting of the teachers and parents or community members; conducting activities for parents and children to do together (e.g., a competition) and parents’ meeting. ¹⁴-¹⁶
<table>
<thead>
<tr>
<th>Intervention Strategies</th>
<th>Intervention Components</th>
<th>Mechanisms</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness Raising strategy</td>
<td>- Delivery of a standardized curriculum on school health topics</td>
<td>- Increased health-related knowledge and change attitudes</td>
<td>Knowledge and behaviours-related to:</td>
</tr>
<tr>
<td></td>
<td>- Providing information around dietary effects through leaflets or worksheets;</td>
<td>- Improved healthy Behaviours (e.g., tooth brushing; food and drink consumption; oral hygiene)</td>
<td>- sexual and reproductive health;</td>
</tr>
<tr>
<td></td>
<td>- Active learning through group discussion, videos and cartoons</td>
<td>- Health care utilization (e.g., dental health care)</td>
<td>- prevention of Eating disorder</td>
</tr>
<tr>
<td></td>
<td>- Written work, videos, self-monitoring materials and story books.</td>
<td></td>
<td>- Tooth brushing and oral health;</td>
</tr>
<tr>
<td></td>
<td>- Benefits of eating fruit and vegetables.</td>
<td></td>
<td>- Physical activity and nutrition (Cardiovascular diseases and obesity prevention)</td>
</tr>
<tr>
<td></td>
<td>- Posters promoting fruit and vegetables were hung in the school cafeteria.</td>
<td></td>
<td>- Hand-washing technique,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Safety and accident prevention</td>
</tr>
<tr>
<td>Behavior Change Strategy</td>
<td>- Peer-led programs</td>
<td>- Increased knowledge and health behaviours</td>
<td>Knowledge, attitude and behaviors-related to:</td>
</tr>
<tr>
<td></td>
<td>- Game ‘Kaledo’ in providing nutrition knowledge and promoting healthy dietary behaviour</td>
<td>- Increased social skills</td>
<td>- Tobacco Use and smoking</td>
</tr>
<tr>
<td></td>
<td>- Supervision of the health behaviours (e.g. tooth brushing, handwashing; practical food preparation and tasting</td>
<td>- Increased health care uptake</td>
<td>- Alcohol and substance use</td>
</tr>
<tr>
<td></td>
<td>- Physical activity, exercise and sports interventions</td>
<td></td>
<td>- Avoid bullying, violence and provocative behaviors</td>
</tr>
<tr>
<td>Support Services</td>
<td>Early (Preschool) childhood development interventions</td>
<td>- Promoting self-esteem</td>
<td>- Mental health service uptake</td>
</tr>
<tr>
<td></td>
<td>- Providing healthy breakfast at school</td>
<td>- Specific refusal skills</td>
<td>- General health services</td>
</tr>
<tr>
<td></td>
<td>- Material support: supply of soap for handwashing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher-led health education and promotion interventions</td>
<td>Teacher’s training</td>
<td>- Increased awareness and involvement and advocacy</td>
<td></td>
</tr>
<tr>
<td>Life skills training intervention to high-risk children</td>
<td>- Informal education: Livelihood skills and reproductive health information and referrals</td>
<td>- Reducing the negative feelings,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- psychoeducational programs including relaxation and progressive muscle relaxation approaches (bullying issues, increasing empathy and promoting strategies to support)</td>
<td>- Managing behavioural problems</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Impact on self-esteem; motivation, and self-efficacy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Addresses barriers to learning</td>
<td></td>
</tr>
<tr>
<td>Health services provision strategy</td>
<td>Community engagement strategy</td>
<td>Parents-based interventions</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------------</td>
<td>-----------------------------</td>
<td></td>
</tr>
<tr>
<td>- Individual and high-risk general health care and counselling</td>
<td>Community-based interventions</td>
<td>- Letters mailed and Parents provided with leaflets and materials</td>
<td></td>
</tr>
<tr>
<td>- Health screening for adolescents</td>
<td>- Community active engagement in the school</td>
<td>- Regular meeting of the teachers and parents</td>
<td></td>
</tr>
<tr>
<td>- Psychosocial group interventions and day therapy programs for adolescents with mental health disorders</td>
<td>- Community awareness and discussion</td>
<td>- Activities for parents and children to do together (e.g., a competition)</td>
<td></td>
</tr>
<tr>
<td>- Referral of physical and mental health disorders to primary health care</td>
<td></td>
<td>- Parents’ meeting organized</td>
<td></td>
</tr>
</tbody>
</table>

- Support to students wanting to quit or reduce smoking
- Behavior change (health service uptake)
- Internalization or acceptance of societal ideals
- Family and social support and removing social problems: early marriage and decreased opportunities for girls
- Reinforce societal norms about individual behaviour
- Reinforcing the adolescent’s self-conception about harmful behaviour

- Sexual and reproductive health service use
- Oral and dental services uptake
- Prevention of harmful behaviours and diseases
- Physical, mental, social and emotional well-being
Figure 2 is a graphical presentation of the intervention strategies and the mechanism by which the proposed strategies influence health and education of the school children, adolescents and young people. For instance, awareness raising strategies improve the health status and education performance of school children by improving their knowledge on diseases/health problems. The framework also outlines contextual factors that help school health workers to implement the strategies. School health workers, for example, need to consider the individual factors, and thus might need to collaborate with parents to implement awareness raising strategies. While a detail description of contextual factors is depicted in table 2, mechanism are described separately in the next section.

![Figure 2: Framework Illustrating Intervention Strategies to Mobilize Health Workers in School Setting](image-url)
<table>
<thead>
<tr>
<th>Contextual factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structural factors</strong></td>
</tr>
<tr>
<td>- Role of a School Health Management Committee involving teachers, students, parents, administrators, and community representatives.</td>
</tr>
<tr>
<td>- Recognition and addressing anti-bullying policy, smoking and alcohol policies in school</td>
</tr>
<tr>
<td>- Local school task force (e.g., rapid response, first aid, child club) be formed</td>
</tr>
<tr>
<td><strong>Institutional factors</strong></td>
</tr>
<tr>
<td>- Primary Health care services be available and accessible</td>
</tr>
<tr>
<td>- Collaboration between specialist health professional (e.g., mental health specialist) and school management</td>
</tr>
<tr>
<td>- School playgrounds and canteens be improved; and physical activity equipment are available at school</td>
</tr>
<tr>
<td>- Health-workers mobilized in the school are trained to provide specialized health services (e.g., youth-friendly sexual and reproductive health services)</td>
</tr>
<tr>
<td><strong>Community factors</strong></td>
</tr>
<tr>
<td>- Increased provision or availability of fruit and vegetables in the community and family; and junk foods and sugary snacks be restricted</td>
</tr>
<tr>
<td>- Parents and community representatives are the part of school health management committee and special task force.</td>
</tr>
<tr>
<td>- Community meetings with parents, religious leaders, local government authorities and women’s groups to inform them about the school health activities</td>
</tr>
<tr>
<td><strong>Individual factors</strong></td>
</tr>
<tr>
<td>- Reinforcement at an individual level are necessary to/for behaviour change (e.g., homework to be done with parents)</td>
</tr>
</tbody>
</table>
Pathways and contextual factors for mobilizing health workers in terms of changing health behaviors and producing health outcomes

We found three different pathways to be operating in school health interventions that are implemented by a health worker in a school setting.

Pathway 1: A health worker can contribute in changing health-related knowledge and behaviors of school children

Several interventions based on awareness raising and behavior change strategies followed ‘pathway 1’ to mobilize health workers in order to increase knowledge, and thus, to adopt new healthy behaviors. The example of specific behaviours could be tooth brushing; food and drink consumption; oral hygiene and health care utilization (e.g., dental health care). The reported outcome in the interventions having awareness raising and behavior change strategies are knowledge and behaviours-related to sexual and reproductive health, prevention of eating disorder, tooth brushing and oral health, physical activity and nutrition (especially, cardiovascular diseases and obesity prevention), hand-washing technique, and Safety and accident prevention.

The major responsibility of a health worker is to contribute in the availability and provision of general health care (e.g., first aid, management of acute emergencies, diagnosis and treatment of common childhood diseases, referral to primary health care etc.) and to be a role model and to practice a skills based approach in a school setting. The provision of health care can clearly play an independent role in increasing health-related knowledge and behaviors via providing health care along with health-related messages among the school children. Most of these interventions are targeted to all the students in the school (generalized approach).

In order to have these interventions produce better outcomes, it is noted in several studies that the school health management committee should be involved. Alongside, each local school task force (e.g., rapid response, first aid, child club) should also be formed in order to insure sustainability and longer-term outcomes. Likewise, primary health care services should be available and accessible. School playgrounds and canteens should be improved; and physical activity equipment are available at school. In the
community, there should be increased provision or availability of fruit and vegetables; and junk foods and sugary snacks should be restricted as much as possible.

**Pathway 2: A health worker can contribute in increasing self-efficacy for behavior change especially for vulnerable children**

Some of the interventions that are targeted to provide support or incorporating support provision strategies can follow pathway 2 to mobilize a health worker to provide support for behavior change among vulnerable children such as those at risk of substance abuse. Health Workers can contribute to create a supportive school environment, which helps the children to reduce the negative feelings and manage behavioural problems by impacting on self-esteem, motivation and self-efficacy. Moreover, health workers can also help these children to address barriers for learning (High-risk approach). Control of tobacco use and smoking, alcohol and substance use, bullying, violence and provocative behaviors, sexual and reproductive health service use are some of the areas where health workers can contribute for increasing self-efficacy and behaviour change of the school children.

Most importantly, the health worker can provide support by creating an enabling school environment, in which students and teachers work together to secure health and wellbeing of the school children. Similarly, providing training to the school teachers encourage then to engage with school health workers for health and wellbeing of school children. In order to sustain the behaviour change among vulnerable children, the school should recognize and address anti-bullying policy, anti-smoking and anti-alcohol policies in the school and also in the community. Moreover, the health-worker mobilized in the school should be trained to provide specialized health services (e.g., youth-friendly sexual and reproductive health services) to the vulnerable children.

**Pathway 3: A health worker can contribute in reducing social barriers for self-efficacy and behavior change among school children**

Self-efficacy is one's belief in one's ability to change their health behaviors in specific situations. A health workers need to work with the community and families to reduce social barriers for self-efficacy and behavior change. Interventions incorporating community and family-based approaches are effective to remove the social barriers for
behavior change among the school children. These interventions would lead to internalization or acceptance of societal ideals, ensure social support, reduce social problems (e.g., early marriage and decreased opportunities for girls); re-enforce societal norms about individual behaviour; and reinforce the adolescent’s self-conception about harmful behaviour (e.g., tobacco use and smoking; alcohol and substance use; suicide). The review also reveals that school health workers need community support, which can be gained through regular interaction with community leaders, local Government leaders, parents, women groups and local health facility.
DISCUSSION

Based on the findings from the review of systematic reviews, we have proposed three potential pathways for implementing school health programs by mobilizing school based health workers in Nepal. The proposed pathways mostly focus on possible opportunities that a health worker can protect and provide health care services among school children in Nepal. We now relate these pathways with available local evidence to discuss their relevance.

‘Pathway 1’ discusses the potential opportunity of a health worker in disseminating health related messages to the students with greater coverage through educational intervention, counseling and other types of communication method. It is evident that inadequate knowledge and lack of awareness contributes to poor perception regarding the risk and consequence hence poor prevention practices and poor health related outcomes (i.e. sexual and reproductive health, hygiene practices, dietary practices etc.) among the young child and adolescents. With provision of close contact with the students while providing services in educational setting, the health worker has the opportunity to reduce the knowledge gap, raise awareness and improve health related practices among the students.

Different studies have previously reported positive impact of such educational interventions, counseling, advocacy and behavioral therapy in improving health related knowledge and practice as well as health outcome (both physical and mental) of children in Nepal. In one school based study, peer-led educational intervention was found to be effective in improving HIV/AIDS related knowledge, attitude and beliefs among adolescents in Nepal. Another school based study conducted in southwestern Nepal found classroom based psycho education along with structured behavioral therapy effective in improving mental health of school children. Similarly, awareness and advocacy on using fluoridate toothpaste was reported effective in reducing dental carries among school children in Nepal. Moreover, educational intervention has also been reported effective in raising awareness and better practice at community level. One study conducted in Nepal utilized both school based and community based awareness raising intervention (i.e. educational sessions at school, community based group discussion with mothers of young children, disseminating messages through communication materials etc.) to promote rationale use of ARI treatment in the community.
raised awareness and improved health care seeking behavior (i.e. consultation with health care providers, FCHVs etc.) of the caregivers of children. 27 Moreover the findings indicate improvement in rationale treatment of ARI in the community (i.e. improved antibiotic prescribing, reduction in treating ARI with antibiotics obtained without prescription etc.). 27 Another study provided educational intervention and skill based training to the rural women in selected areas of Nepal. 28 The findings suggest significant improvement in oral health related knowledge and practice immediately after intervention and at one year post-educational intervention among the participants. 28

However, to engage in healthy behaviors, being knowledgeable regarding the risk factors or consequences alone is not sufficient in many cases. In ‘Pathway 2’ we have discussed the potential opportunity that a health worker can contribute to improving self-efficacy of the vulnerable children and adolescents for healthy behavior. Evidence indicates there is a close relationship between increased self-efficacy and practicing healthy behavior, especially among children and adolescents. There are different strategies found effective in such cases. A study revealed that using ‘role models’ was an effective way to increase self-efficacy and leadership to improve sexual and reproductive health (SRH) related behaviors (e.g. HIV/AIDS related beliefs and attitudes) among Nepalese adolescents. 29 The school health workers can play a significant role in identifying such ‘role modes’ in school setting and utilize them for motivating and increasing self-esteem to discuss SRH issues, resist the peer pressure, develop refusal skill to unhealthy behaviors and adopt healthy behavior. The school health workers also have the opportunity to identify the vulnerable children engaging at risky behaviors. Hence, they can develop strategies, programs and advocate the school administration for creating enabling environment in the school, advocating for school policies and strategies to minimize adverse health and psychological outcome especially for the vulnerable children.

Peer-led intervention is another effective strategy in practice to improve self-efficacy. In one study conducted in Nepal reported significant positive impact of peer-led intervention in increasing self-efficacy and reduce potential risk behaviors related to HIV/AIDS, sexually transmitted diseases among students. 24 The peer educators (volunteer) were the 10th grade students trained by the researchers in school setting. 24 Similar findings were reported in another study conducted among adolescents in Nepal. 29 The findings suggest significant impact of peer-led intervention (i.e. group discussion) in improving STI/HIV related knowledge and reducing normative menstrual restrictions among the adolescents at community level. 29 Moreover, the intervention also improved self-efficacy and the leadership skill of the peer-educators to facilitate
group discussion. The school health worker can play a crucial role in arranging such intervention programs through creating and providing training to peer-educator groups within the capacity of their routine services.

Interventions to improve communication capacity can also have impact on increasing self-efficacy of an individual. Communication skill enables a child to discuss harmful or protective behavior with peers, others in the community, evaluate the belief surrounding a risky behavior, and need for adopting a healthy one. This will eventually increase their self-efficacy to adopt a healthy behavior. Similar intervention has been found to have positive impact in another study conducted in Nepal. The intervention increased participant’s self-efficacy to change the normative behavior surrounding discussion on sexual health with others in the community. This in turn improved their knowledge, attitude and belief regarding sexual and reproductive health (SRH) related behaviors. Similar findings were observed in another study conducted among adults at community level in Nepal. The study showed significant impact of groups discussions (dialogue sessions) on improving SRH related knowledge and self-efficacy of the participants in communicating SRH issues (i.e. family planning, pregnancy related concern) with their spouses. Such practice is expected to improve SRH related behaviors at community level. The school based health worker also has the opportunity to discuss such sensitive and culturally restricted risky behaviors among school children by safeguarding their privacy and using age appropriate communication materials. The health worker can therefore help the children and adolescents in recognizing the unhealthy and risky behaviors and enhance their capacity in refuting such behaviors and adopting healthy behaviors.

In ‘Pathway 2’ we discussed the potential role of school health worker in developing local school task force to sustain healthy behaviors and better health related outcome. Formation of such task forces (e.g. child club) have been reported beneficial in improving children’s health related knowledge, better practice (e.g. hygiene) and health related outcomes (e.g. diarrheal/dysentery infection, worm infections etc.) in school setting previously in Nepal.

In addition to improve knowledge, enhance capacity and self-efficacy of the students themselves, a health worker can also support the students in sustaining the adopted healthy behavior by reducing the social barriers and mobilizing the people in the community and creating an enabling environment for them. The ‘Pathway 3’ mostly focuses on such strategies that a health worker can intervene to improve health related
behaviors and outcome among school children in Nepal. Evidence indicates addressing the barriers at family and community level has the potential to create enabling environment for children to adopt healthy behavior and have positive health related outcomes. Children with special needs can be benefited through such comprehensive support for physical and psychological wellbeing. In one study it was observed that, including both teachers and parents in psycho-educational classes and creating parent support groups in the community had significant impact on reducing children’s behavioral problem. 33 Such interventions to reduce the barriers at societal level have also been found effective.

In one study conducted to improve the hygiene behaviors among people living in mid-western Nepal found that creating an enabling environment can significantly improve hygiene related behaviors among individuals. 34 The innovation of that intervention was adopting multi-diverse mechanism (e.g. group formation, peer-led awareness raising program, demonstration, dissemination of key messages through communication materials, technical and financial support etc.) to address the barriers and mobilizing people in raising awareness and practice healthy hygiene behavior. 34 The school health worker can also create such family and community based approach to provide and enabling environment at societal level and help children in adopting health behaviors.

We were very specific to include studies only having health worker components in school health interventions. Our review may have thus missed to cover some important contextual factors and mechanisms that may have an effect. The mechanisms outlined in this review should therefore be seen as the board, rather than the specific, mechanisms contributing to mobilizing health workers in school health interventions. Despite these limitations, we were able to include and synthesize all kinds of studies, including quantitative, qualitative and mixed-methods, providing information about interventions, contexts, mechanisms and outcomes, surrounding school health interventions. The review of evidence brought together a comprehensive perspective on how school health workers might be effective in improving health and education outcome of school children.

We compared the three different pathways within the context of available local evidence in Nepal. The comparisons demonstrated evidence of effectiveness of these pathways in Nepal. The pathway that we proposed should provide an insight to outline specific roles of school health workers. More specifically, we suggest the following specific actions to consider while implementing health workers in school setting.
• Outline the roles and responsibilities of health workers focusing on the important component of school health programs such as health promotion, behavior change communication, emergency and first aid, minor treatment and referrals.

• Organize consultation meetings with broader stakeholders (such as school management committee, parents, local government, Non Government Organizations, Ministry of Education and other line ministries) to identify the specific interventions, their perspective and position regarding the provision of dedicated health workers. The consultations should be used as an opportunity to reflect and refine the interventions and the suggested pathways for further clarity on strategic direction.

• Evaluate the impact of existing school health programs and the performance of school health workers. The evaluation will provide a basis to design and implement further research/program.

• Consider implementing the School Health Worker policy on trial basis in few schools and scale up later. An intervention study will be needed to measure the impact of policy on piloted school. The package might focus on strategies highlighted in this review.
CONCLUSION

The envisioned provision of school based dedicated health worker has the opportunity to improve health and academic outcome of children in Nepal. This study reviewed the available systematic reviews to assess the effectiveness of school based health interventions with the provision of health workers in school setting. In doing so, we identified strategies for implementing school health worker policy in Nepal. The study findings generated evidence regarding opportunities and contextual factors that need to be considered for designing such extensive intervention in context of Nepal. The proposed intervention strategies and pathways are the reflection of evidence based carefully evaluated interventions that have been proven effective singly or in combined approach previously in other LMICs. These all pathways collectively illustrate the opportunities of health workers to support school children in adopting healthy behavior by improving their knowledge level, self-efficacy as well as in enhancing capacity to sustain the adopted behavior in long term by acting on the social barriers. We believe that this evidence synthesis builds a greater understanding of the contextual factor and pathways that support the adaptation of school health intervention strategies to mobilize a health worker in terms of the socio-structural and cultural context and the population being targeted to improve health and wellbeing of school children in Nepal.
REFERENCES


32. Adhikari RP, Upadhaya N, Satinsky EN, Burkey MD, Kohrt BA, Jordans MJ. Feasibility study of a family-and school-based intervention for child behavior

ANNEX
ANNEX 1: Guideline: Searching Systematic Review from Database

Inclusion Criteria
Please use the following inclusion criteria to identify relevant systematic from electronic dataset
- Studies published between 1980 and 2017
- Studies published in English
- Systematic reviews with or without Meta analysis
- Studies that measure the effect of health workers on health and education outcome of children
- Studies related to school setting

Search Team
Please use the following search terms in combinations to identify relevant reviews
- School health workers
- School health nurse/registered nurse/nurse practitioner/baby sister
- School nurse
- Health worker/health assistant/skilled attendant/ therapist/doctor
- Health promoter
- Health promotion
- Prevention
- Child health/student health
- School health cadre
- Health promoting school
- School health program/intervention/policy
- Health/healthy
- Wellbeing
- Education/ educational
- Academic
- Disease
- Effectiveness/impact

Database
Please search into the following data set to identify the relevant systematic reviews.

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Scope</th>
<th>Web Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health System</td>
<td>Health System</td>
<td><a href="https://www.healthsystemsevidence.org">https://www.healthsystemsevidence.org</a></td>
</tr>
<tr>
<td>Evidence</td>
<td>Arrangement and Health System Issue</td>
<td></td>
</tr>
<tr>
<td>Cochrane Library</td>
<td>Impact of health services, policy, program</td>
<td><a href="http://www.cochranelibrary.com/">http://www.cochranelibrary.com/</a></td>
</tr>
<tr>
<td></td>
<td>and practice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>any issues</td>
<td></td>
</tr>
<tr>
<td>The Campbell</td>
<td>Health and Social</td>
<td><a href="https://www.campbellcollaboration.org/library">https://www.campbellcollaboration.org/library</a></td>
</tr>
</tbody>
</table>
Selection Process

- Please select studies that meet the affirmation inclusion criteria
- Review the abstract of the eligible studies and proceed for quality assessment using Guideline B
- Include at least two independent review to appraise the quality of reviews

Useful Resource

# ANNEX 2: Quality of evidence (all 25 primarily selected reviews)

<table>
<thead>
<tr>
<th>Author</th>
<th>C 1</th>
<th>C 2</th>
<th>C 3</th>
<th>C 4</th>
<th>C 5</th>
<th>C 6</th>
<th>C 7</th>
<th>C 8</th>
<th>C 9</th>
<th>C 10</th>
<th>C 11</th>
<th>C 12</th>
<th>C 13</th>
<th>C 14</th>
<th>C 15</th>
<th>C 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caear et al (2000)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Murray et al (2007)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Best et al (2018)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Das et al (2016)</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Cooper et al (2013)</td>
<td>Y</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Schroeder et al (2016)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Bains et al (2016)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Maughan (2003)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Thomas et al (2013)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Shehnaz et al (2014)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Seidler et al (2017)</td>
<td>Y</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Blank et al (2010)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Brown et al (2008)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Coffman et al (2009)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Gottschalk et al (2014)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>McClanahan et al (2015)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Perman et al (2017)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Mosnaim et al (2016)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Edwards et al (2014)</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Leroy et al (2017)</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Langford et al (2014)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Hung et al (2014)</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Meadows et al (2004)</td>
<td>Y</td>
<td>Y</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Allen-Meares et al (2013)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Lineberry et al (2015)</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>PY</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

*C= Criteria for appraising the quality of evidence (AMSTER-2); **Green box (Y)**= Met the criteria, **Yellow box (PY)**= Partially met the criteria, **Red box (N)**= Did not meet the criteria
# ANNEX 3. Summary of included studies

<table>
<thead>
<tr>
<th>Author/date</th>
<th>Review type</th>
<th>Study aim/objectives</th>
<th>Intervention</th>
<th>Intervention strategies</th>
<th>Study Area</th>
<th>Population</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| Das JK, Salam RA, Lassi ZS, Khan MN, Mahmood W, Patel V, Bhutta ZA; 2016 | Review of systematic reviews | To systematically review the effectiveness of interventions to prevent and manage mental health disorders among adolescents and youth. | **School-based interventions (n =12)**  
School-based mental health promotion interventions (N=5); School-based programs for prevention and early intervention for existing mental health conditions (N=3); School-based programs for suicide prevention (N=4). Component: Cognitive behavioural therapy (CBT) over 8-12 sessions  
**Community-based interventions (n =6)**  
(i) Community-based parent training and social skills training for preventing depression  
(ii) Individually focused mental health promotion efforts  
(iii) Community-based mental health delivery programs  
(iv) Treatment of adolescent mental health disorders in primary care settings  
**Digital platforms (n= 8)**  
(i) Mass media-based behavioural treatments  
(ii) Online youth mental health promotion and prevention interventions  
**Individual-/family-based interventions (n= 12):** Day therapy programs for adolescents with mental health disorders | **School-based interventions**  
Awareness raising strategy, Support provision strategy, Health service provision strategy  
**Community-based interventions**  
Community engagement strategy, Support provision strategy, Health service provision strategy  
**Digital platforms**  
Behavior change strategy, Support provision strategy  
**Individual-/family-based interventions**  
Health service provision strategy, | School-based interventions 11 HICs, 1 also mentioned mostly HICs  
Community-based interventions  
4 HICs, 1 from Tanzania  
Digital platforms  
All HICs  
**Individual-/family-based interventions**  
10 from HICs, one includes study from Thailand, Brazil and HICs, one includes studies from Nigeria and HICs. | Adolescents and youth | School-based interventions  
(i) Mental health promotion rather than on mental illness prevention is effective in promoting adolescent and youth mental health.  
(ii) School-based preventive health care (INTERVENTION) is popular with young people and provides important mental health services.  
(iii) Evidence of existing screening tools to detect mental ill health among adolescents by school nurses in school setting was not found.  
(iv) CBT delivered to young people in secondary schools by mental health professional or graduate student can reduce the symptoms of depression (standard mean difference [SMD]: \(-.16; 95\% \text{ CI: } -.26 \text{ to } -.05\)) and anxiety (SMD: \(-.33; 95\% \text{ CI: } -.59 \text{ to } -.06\)) [24].  
(v) Indicated programs (Targeted approach) are most effective in reducing depressive symptoms (OUTCOME) with effect sizes ranging from .21 to 1.40.  
Community-based interventions  
Review based on 15 studies on community-based parent training and social skills training showed significant reductions in symptom and/or diagnostic measures of depression at follow-up [31]. |
<table>
<thead>
<tr>
<th>Interventions to support parenting</th>
<th>Community engagement strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity and exercise interventions</td>
<td></td>
</tr>
<tr>
<td>Eating disorder programs for adolescents</td>
<td></td>
</tr>
<tr>
<td>Interventions to support parenting</td>
<td></td>
</tr>
<tr>
<td>Early childhood development (ECD) interventions</td>
<td></td>
</tr>
</tbody>
</table>

Individually focused mental health promotion efforts and attempts to help negotiate stressful transitions yield significant mean effects on reducing problems and increasing competencies [32]. Evidence from community-based mental health delivery programs specifically targeting mental health promotion of young people in LMICs suggests positive impacts on mental health outcomes [19]. Treatments by specialist staff working for adolescent mental health disorders in primary care setting were effective. Some educational interventions showed potential for increasing skills and confidence of primary care staff, and few studies reported the actual change in professional behaviour or patient health outcomes [34].

**Digital platforms**
(i) Mass media-based behavioural treatments have a moderate effect (ii) computerized CBT for mental health suggests that such interventions are cost-effective and often cheaper than usual care [36,37].
(iii) Skills-based interventions presented in a module based format can have a significant impact on adolescent mental health; (iv) Significant positive effect of computerized CBT on adolescents’ and emerging adults’ anxiety and depression symptoms [38].
(v) Young people regularly use and are generally satisfied with online mental health resources [40-42].

**Individual/family-based interventions**
(i) Day therapy programs (including anxiety disorders, social phobia, and behavioral issues) suggest that it may be an effective intervention for adolescents with mental health problems.  

disorders. A multimodal and multidisciplinary group-based treatment approach has shown to be most effective.

(ii) Interventions to support parenting offer much scope for improving mental health among children and adolescents later in life [58-62].

(iii) Evidence suggests that early childhood development (ECD) interventions including stimulation in early childhood, preschool level interventions, and ECD consultations have shown to be effective in improving health behaviors, conduct problems, and social skills and are also low-cost interventions delivered in home and at school [63-67].


Cochrane review To assess the clinical effects, in terms of caries prevention, of school-based interventions aimed at changing behavior related to tooth brushing habits and the frequency of consumption of cariogenic food and drink in children (4 to 12 year olds).

(i) Tooth brushing instruction and skill lessons and information on the use of fluoride toothpaste.
(ii) Supervised tooth brushing practice sessions with the children (Worthington 2001; Zanin 2007).
(iii) Information around dietary effects was provided through group discussion (Worthington 2001) or lessons (Zanin 2007), or via instruction (Petrecca 1994) and through leaflets or worksheets (Saied-Moallemi 2009).
(iv) General dental health information and more detailed information around the behavior health link was included.
(v) Disclosing tablets were used as part of the interventions as part of a classroom activity (Worthington 2001).
(vi) Provided parents with leaflets and materials (e.g. brushing charts and worksheets) used in the school to

Awareness raising strategy, Behavior change strategy, Health service provision strategy, Community engagement strategy

Italy, Tehran, UK, Brazil

Children aged 4-10 years attending primary school

(i) This study showed evidence of a reduction in caries increment measured by the difference in decayed missing and filled surfaces preventive fraction (PF) 0.65, 95% confidence interval (CI) 0.12 to 1.18, 1 RCT, 60 participants) (Zanin 2007)

(ii) One study (Zanin 2007) only reported median plaque index (PI). The median PI at the end of the study (15 months) was reported as 0.93 in the control group and 0.60 in the intervention group, with a Mann-Whitney test reported as significant (P < 0.05).

(iii) Saied-Moallemi 2009 reported change in plaque index between pre- and post-intervention examinations. After adjustment for clustering, there was a significant difference in change in plaque score, with the intervention groups showing better oral hygiene (SMD - 0.34, 95% CI -0.67 to -0.01, cluster adjusted effective sample size 186).

(iv) After adjustment for clustering, there was a significant difference in plaque score, with the
replicate the intervention at home (these children did not receive an intervention in school). The remaining intervention arm in this study included a combination of home and school elements, each intended to reinforce the other. (Saied-Moallemi 2009)

(vii) Link to the home with the provision of oral health related home work tasks (along the same theme as the work in schools) lasting around 1 hour. Parents or grandparents were required to complete these with the children (Worthington 2001).

(viii) Age appropriate modified tooth brushing technique to the children through instruction and demonstration. Supervised brushing sessions took place every 3 months. The intervention involved educational elements covering dental hygiene and consumption of cariogenic food and drink. (Zanin 2007)

(ix) Diagrams and plastic models were used to explain caries to the children and to teach them oral (including dietary) hygiene. Children were asked every 30 days if they were following the oral (and dietary) hygiene regimen. Teachers were involved in the delivery of the intervention. A second intervention group had the same educational program plus daily fluoride tablets (1 mg). (Petrecca 1994)

Thomas RE, McLellan J, Perera R. S; 2013 Cochrane review (i) To assess the effectiveness of school-based Pure Prevention interventions (N=49): Cohort studies in which never smokers at baseline were followed and the number remaining never-smokers at the intervention group showing a reduction in plaque (SMD -0.64, 95% CI -0.90 to -0.38, cluster adjusted effective sample size 233) (Worthington 2001)

(v) Worthington 2001 reported few children had problems identifying foods containing sugar with only 15% of the intervention and 19% of control participants reporting they routinely consumed sugary snacks when they arrived home from school. However, snack consumption prior to bedtime was reported by approximately a third of participants at baseline, with this figure showing a non-significant decline across the study period.

(vi) Worthington 2001 reported changes in oral health knowledge and skills following the intervention. Changes were apparent in both the intervention and control groups at the 4-month follow-up (phase one); however, this improvement was greater among the intervention group (34% increase) compared to the control group (15% increase). In phase two, post-intervention measures showed that the new intervention group had a 10% improvement in knowledge and skill and previous increases found in the intervention and control groups were sustained.

| Thomas RE, McLellan J, Perera R. S; 2013 Cochrane review | (i) To assess the effectiveness of school-based | Pure Prevention interventions (N=49): Cohort studies in which never smokers at baseline were followed and the number remaining never-smokers at the | Awareness raising strategy, behavior change strategy, Health service | Pure Prevention interventions: USA, Netherlands, UK, Canada, Germany, Italy, China, Spain, School children aged 5-17 years | Pure Prevention interventions (i) The combined social competence and social influences curricula (six RCTs/seven arms) showed a statistically significant effect |
programs in preventing children and adolescents from starting smoking. (ii) To assess which program elements, if any, are associated with effectiveness.

<table>
<thead>
<tr>
<th>various follow-up intervals was ascertained.</th>
<th>Change in Smoking Behavior over time interventions (N=15): Studies where the smoking behavior was measured as change over time.</th>
<th>Provision strategy, Support provision strategy, Community engagement strategy</th>
<th>Austria, Australia, Belgium, Czech Republic, Denmark, Finland, Greece, Portugal, South Africa, Sweden and Thailand.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point Prevalence of Smoking interventions (N=25): Studies reporting smoking prevalence at baseline and follow-up</td>
<td>Change in Smoking Behavior over time interventions: India, USA and Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point Prevalence of Smoking interventions: USA, Australia, Netherlands, UK, France, Germany, India, Mexico, Norway, Romania and Sweden.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

in preventing the onset of smoking (OR 0.49, 95%CI 0.28 to 0.87; P = 0.01; I² = 0%; Analysis 1.1.3).

(ii) Social competence curricula (five C-RCTs/seven arms) versus control showed a statistically significant result in favor of the intervention (OR 0.52, 95%CI 0.30 to 0.88; P = 0.02; I² = 0%; Analysis 1.2.2),

(iii) Combined social competence and social influences versus control (eight C-RCTs/10 arms) also showed a statistically significant result in favor of the intervention (OR 0.50, 95% CI 0.28 to 0.87; P = 0.01; I² = 0%; Analysis 1.2.4).

(iv) At longest follow-up there were significant overall effects for adult-led interventions (56 arms) compared to the control groups (OR 0.88, 95% CI 0.81 to 0.96; P = 0.002; I² = 17%).

(v) At longest follow-up there were significant effects for two of the four curricula tested: social competence (7 arms) (OR 0.52, 95% CI 0.30 to 0.88; P = 0.02, I² = 0%) and combined social competence and social influences (7 arms) (OR 0.47, 95% CI 0.26 to 0.84; P = 0.01, I² = 0%), but not for social influences or multimodal curricula.

(vi) Curricula focused only on tobacco use prevention (26 arms) compared to controls showed no effect (OR 0.93, 95% CI 0.83 to 1.04) at one year, although there was an effect at longest follow-up (42 arms) (OR 0.88, 95%CI 0.80 to 0.97; P = 0.01; I² = 20%; Analysis 5.4).

(vii) For curricula which included booster sessions, there were no significant differences from controls at one year or less (four arms).
The overall effect size at post-intervention for depression was small (n=74, g = 0.23, 95% CI: 0.19–0.28).

(ii) The effect for depression was small at short-term (n = 41, g = 0.20, 95% CI: 0.14–0.26); medium-term (n = 34, g = 0.12, 95% CI: 0.07–0.17); and long-term (n=14, g = 0.11, 95% CI: 0.04–0.18) follow-up.

(iii) For anxiety, the overall effect size at post-intervention was small (n=49, g=0.20, 95%CI: 0.14–0.25).

(iv) The effect size for anxiety was comparable at the first two follow-up periods, with
in children and adolescents, and to conduct a meta-analysis of intervention effects.

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Program Content</th>
<th>No. of Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicated program (N=25)</td>
<td>Cognitive Behavior Therapy (CBT) (N=22); Interpersonal Psychotherapy (IPT) (N=2); Cognitive Behavior Therapy (CBT) + Interpersonal Psychotherapy (IPT) (N=1); Cognitive Behavior Therapy (CBT) + Creative expressive experiential therapy (CEET) (N=1)</td>
<td>3-20</td>
</tr>
<tr>
<td>Selective prevention program (N=9)</td>
<td>Cognitive Behavior Therapy (CBT) (N=7); Social Skills (SS) (N=1)</td>
<td>4-15</td>
</tr>
<tr>
<td>Blended indicated/selective program (N=2)</td>
<td>Cognitive Behavior Therapy (CBT) (N=2)</td>
<td>2-24</td>
</tr>
<tr>
<td>Blended universal/indicated program (N=1)</td>
<td>Cognitive Behavior Therapy (CBT) (N=1)</td>
<td>13-14</td>
</tr>
</tbody>
</table>

Based on focus of intervention

Depression studies (N=40): 42.5% were universal, 40% indicated, 12.5% selective, 2.5% were blended selective/indicated and 2.5% universal/indicated.

Anxiety programs (N=24): 62.5% were universal, 25% indicated, 8.25% selective, and 4.25% blended.

England, Holland, New Zealand, China, Canada, Nepal

Selective prevention program
America, UK, Holland, Spain, Indonesia

Blended indicated/selective program
America

Blended universal/indicated program
America

Age 14-19 years (25 studies, 31%) conventionally small effects at short-term (n = 11, g = 0.23, 95% CI: 0.09–0.37) and medium-term (n = 20, g = 0.23, 95% CI: 0.13–0.33) follow-up.
selective/indicated.

Mixed depression/anxiety studies (N=17): 71% were universal, 24% were indicated, and 5% selective.

**Brown T, Summerbell C.; 2009**

**Systematic review**

(i) To determine the effectiveness of interventions that focus on improving diet and physical activity (PA) behaviors in school children.

(ii) To identify study characteristics that may affect outcome such as gender, age, socioeconomic status, setting, process indicators and contextual factors.

<table>
<thead>
<tr>
<th>Dietary intervention (N=3): aimed to improve diet in school children</th>
<th>Awareness raising strategy, Service provision strategy, Behavior change strategy, Community engagement strategy</th>
<th>Dietary intervention</th>
<th>School children and adolescents aged 4-18 years</th>
<th>Dietary intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity (N=15): aimed to increase PA levels and were compared with a usual care control group</td>
<td>Diet and physical activity interventions (N=20): aimed to increase PA and improve diet among school children. Three of these studies aimed to prevent cardiovascular disease and two aimed to reduce the risk of developing diabetes.</td>
<td>UK (primary school), Italy (middle schools), Norway (secondary school)</td>
<td>Community engagement strategy</td>
<td>(i) At 12 months, the percentage of overweight and obese children had increased in the control group by 7.5% compared with a decrease in the intervention group of 0.2% (mean difference 7.7%, 95% confidence interval [CI] 2.2%, 13.1%). No difference was observed in mean BMI. However, at 3-year follow-up, the prevalence of overweight had increased in both the intervention and control group and the significant difference between the groups at 12 months was no longer evident. (21, 23)</td>
</tr>
<tr>
<td>Dietary intervention</td>
<td>Physical Activity</td>
<td>Diet and physical activity interventions</td>
<td>Physical Activity</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>France (primary school), Thailand, Secondary school, Croatia, Ireland (primary schools), Sweden (Primary school), Quebec (Primary school), Australia</td>
<td>France (primary school), Thailand, Secondary school, Croatia, Ireland (primary schools), Sweden (Primary school), Quebec (Primary school), Australia</td>
<td>primary schools in Chile, middle schools in the USA, secondary schools in the USA, middle schools in Belgium, Crete, New York public school, primary schools in the USA, primary</td>
<td>France (primary school), Thailand, Secondary school, Croatia, Ireland (primary schools), Sweden (Primary school), Quebec (Primary school), Australia</td>
<td></td>
</tr>
<tr>
<td>(i) Significant reduction in BMI, skinfold thickness, waist circumference and waist-to-hip ratio in intervention children compared with controls. The mean difference in BMI (adjusted for baseline age and sex) was -0.45 kg m(^{-2}) (95% CI -0.73, -0.17; P = 0.002). (36)</td>
<td>(i) Significant more weight gain among controls and significant decreases in skin-fold thickness among intervention children (37).</td>
<td>(ii) Significant reduction in BMI but only among intervention girls compared with control girls (-0.8 kg m(^{-2}) and 0.3 kg m(^{-2}) respectively) (35).</td>
<td>(iii) Significant reduction in BMI but only among intervention girls compared with control girls (-0.8 kg m(^{-2}) and 0.3 kg m(^{-2}) respectively) (35).</td>
<td></td>
</tr>
</tbody>
</table>
| schools in the USA, pre-schools in Israel, US, primary schools in Germany, primary schools in Netherlands (secondary schools) | (iv) A reduction in BMI occurred in both intervention and control groups and was not significantly different between groups. However, the intervention girls had significantly lower mean BMI at 30 weeks than intervention boys \( (P < 0.01) \) and lower likelihood of having an increased BMI slope than the control girls (odds ratio: 0.32; 95% CI: 0.18, 0.56). (46)  
(v) Average BMI remained unchanged overtime; however, there was significant difference between groups for BMI (for both genders and obese and non-obese). The pattern of response to PA intervention was similar in girls and boys although the magnitude of change in anthropometric variables was greater in girls. There was a greater response in obese children than non-obese children. [10]  
(vi) Mean annual change in weight: Intervention: 3.9 kg (1.6) \( n = 49 \); Control: 3.2 kg (1.3) \( n = 50 \) [16,17]  
(vii) Initially greater baseline body weight in intervention group decreased and body weight in control group remained almost unchanged. Dance activities had the most favorable effect on body weight. Change in BMI: I: -0.74 \( n = 115 \); C: +0.47 \( n = 102 \) Initially greater baseline body weight in intervention group [18]  
(viii) % Girls classified as overweight or at risk for overweight (at least 85th percentile BMI 34% both groups) or overweight (at least 95th percentile BMI 17% both groups) did not differ between intervention and control. [38]  

| Diet and physical activity interventions | (i) Nine of the 20 studies that looked into Diet |
and physical activity showed significant improvements in mean BMI in the intervention compared with the control groups (7,8,12,15,20,22,24–28,30).

(ii) Maintained baseline BMI in intervention boys while BMI in control boys increased. This resulted in a significant difference between groups at 6 months for boys only (non-significant difference in BMI at 6 months for girls). (30)

(iii) Significant reduction in BMI in the intervention boys (but not girls) compared with control over two school years (27).

(iv) The intervention significantly reduced the prevalence of obesity (odds ratio 0.47, 95% CI 0.24, 0.93, P = 0.03) and increased remission of obesity in intervention girls compared with control girls over two school years. (28)

(v) In girls, BMI and BMI z-score increased significantly less in the intervention with parental support group compared with the control group (P <0.05) or the intervention-alone group (P = 0.05). (8)

(vi) Significant improvements compared with control at 3 and 6 years for BMI and skin-folds. At 3 years the change in BMI was 0.7 kg m⁻² (standard deviation [SD] 1.5) in the intervention group compared with 1.7 kg m⁻² (SD 1.4) in the control group (P <0.0005) (24, 25).

(vii) At 6 years, the change in BMI (mean and standard error [SE]) was 3.68 kg m⁻² (SE 0.16, n = 356) in the intervention group compared with 4.28 kg m⁻² (SE 0.16, n = 285) in the control group (P <0.05) (26). At 10 years, the mean change in BMI z-score was -0.09 (SD 0.09, n = 85) in the intervention.
group and 0.17 (SD 0.09, n = 91) in the control group (P = 0.042) (22).

(viii) Significant improvement in percentage of body fat and BMI compared with control. (12)

(ix) Significantly reduced the rate of excessive weight gain in children at 2 years, although this may be limited to those not initially overweight. BMI z-score was significantly lower in intervention than in control children by a mean of 0.09 (95% CI: 0.01, 0.18) at 1 year and 0.26 (95% CI: 0.21, 0.32) at 2 years. An interaction existed between intervention group and overweight status (P = 0.029), such that mean BMI z-score was reduced in normal weight (-0.29; 95% CI: -0.38, -0.21) but not overweight (-0.02; 95% CI: -0.16, 0.12) intervention children relative to controls (20).

(x) At 6-months, there was a significant reduction in risk of developing overweight and a 2% reduction in overweight (BMI ≥85% for age and sex) in the intervention group but not the control group. BMI in the intervention vs. control children was 0.16 kg m\(^{-2}\) vs. 0.52 kg m\(^{-2}\) (P = 0.01) at 6 months (15).

(xi) Significant difference in BMI. The BMI remained stable in the intervention children and increased by 0.3 kg m\(^{-2}\) in the control children. (7)

(xii) Significant difference in median BMI at baseline between the groups (lower BMI in control group) (6).

(xiii) Increase in BMI and waist circumference tended to be lower in those undergoing intervention compared with controls (BMI 0.27 kg m\(^{-2}\) vs. 0.66 kg m\(^{-2}\), P = 0.069 respectively) (29).

(xiv) Both programs associated with significant
| Cochrane review | To assess the effectiveness of the Health Promoting Schools (HPS) framework in improving the health and well-being of students and their academic achievement. | • Nutrition intervention  
• Physical activity intervention  
• Physical activity and nutrition intervention  
• Sexual health intervention  
• Multiple risk behavior intervention  
• Hand-washing intervention  
• Oral health intervention  
• Tobacco intervention  
• Alcohol intervention  
• Body image intervention  
• Mental health and emotional well-being intervention  
• Anti-bullying intervention  
• Violence prevention intervention  
• Dating violence prevention intervention  
• Safety and accident prevention intervention  
• Sun safety intervention | Awareness raising strategy, Behavior change strategy, Health service provision strategy, Support provision strategy, Community engagement strategy | USA, Canada, Finland, UK, Belgium, The Netherlands, Norway Switzerland, France, Germany, Spain, and Denmark, Australia, New Zealand, China, Mexico, India, Egypt, Tanzania | Children and adolescents aged 5-15 years (grades one to nine). | Nutrition intervention  
(i) The impact of nutrition only interventions on reducing self-reported fat intake, the effect was in the direction of a slight benefit of the interventions (SMD -0.08) but the 95% CI was also consistent with the null hypothesis of no effect (-0.21 to 0.05; 7 trials, 4216 participants).  
(ii) Nutrition only interventions were effective on average at increasing reported fruit and vegetable intake among students (SMD 0.15, 95% CI 0.02 to 0.29, I² = 83%; 9 trials, 6210 participants).  
Physical activity intervention  
(i) Physical activity interventions were able to reduce BMI in students. These studies showed an average reduction in BMI of 0.38 kg/m² (95% confidence interval (CI) 0.73 to 0.03; 3 trials, 1430 participants) relative to control schools.  
(ii) Only Physical activity interventions showed inconsistent results regarding physical activity level outcome with one (using self reports) favoring the intervention (Simon 2006) and the other (using accelerometer) showing no effect (Kriemler 2010) (I² = 93%).  
(iii) Physical activity only interventions both showed a positive effect on outcome related to physical activity and sedentary behavior of students. The findings suggest that physical activity interventions reduce BMI (3 trials, 1430 participants). This represents a small but
to broadly reflect the make-up of the general population, with no specific emphasis on poorer populations, important shift in BMI at the school population level and is comparable with results from another recent review focusing on the prevention of obesity in childhood (Waters 2011; 34 school-based interventions, including four from this review). The only physical activity intervention reporting an alternative measure of adiposity in children (zBMI) also reported a positive effect.

**Physical activity and nutrition intervention**

(i) Studies targeted physical activity + nutrition and showed an average reduction in BMI of 0.11 kg/m² in intervention schools relative to controls, but with a wide confidence interval that crossed the null value (95% CI - 0.24 to 0.02; 9 trials, 13,628 participants).

(ii) Physical activity + nutrition interventions produced a small increase in physical activity in intervention students relative to control schools (SMD 0.14, 95% CI 0.03 to 0.26; 6 trials, 6190 participants).

(iii) Physical activity + nutrition interventions were effective at increasing fitness levels in students (SMD 0.12, 95% CI 0.04 to 0.20; 3 trials, 4230 participants).

(iv) Physical activity + nutrition interventions also appear to be effective at increasing physical activity and fitness levels in students. This review of 26 studies (of which six were also included in this review) reported an increase of five to 45 minutes of moderate-to-vigorous physical activity per week.

**Multiple risk behavior intervention**

(i) The multiple risk behavior interventions similarly produced conflicting results. The two Positive Action trials both indicated a positive effect of the intervention, but with very wide
(ii) One multiple risk behavior intervention (Beets 2009) found a positive effect on substance use (OR 0.28, 95% CI 0.13 to 0.63; 1714 participants).

(iii) Two other multiple risk behavior interventions also showed effects in favor of the intervention, but in both cases their confidence intervals overlapped the null value (Li 2011; Perry 2003). One multiple risk behavior intervention (Li 2011) reported the effect of their intervention on bullying others and found evidence of a large reduction in this behavior (OR 0.49, 95% CI 0.34 to 0.71; 363 participants).

**Tobacco intervention**

(i) There is good evidence that both tobacco only (odds ratio (OR) 0.77, 95% CI 0.64 to 0.93, $I^2 = 16\%$; 3 trials, 4747 participants) and multiple risk behavior (OR 0.84, 95% CI 0.76 to 0.93, $I^2 = 0\%$; 5 trials, 9992 participants) interventions are effective in reducing smoking in school-aged children, with the estimated effect for the former being slightly larger.

(ii) Reductions in smoking behavior were also apparent from our analyses. Among the studies that focused on tobacco use alone, intervention students were 23% less likely to smoke at follow-up than their control counterparts (3 trials, 4747 participants).

(iii) Tackling tobacco use alongside other health outcomes in a multiple risk behavior intervention was also effective (5 trials, 9992 participants). These effects are smaller in
comparison to those found for social competence curricula (OR 0.52, 95% CI 0.3 to 0.88), and combined social competence and social influences programs (OR 0.50, 95% CI 0.28 to 0.87) at longest follow-up in a recent review of school-based programs for the prevention of smoking (Thomas 2013).

Alcohol intervention
(i) The alcohol intervention (Perry 1996), which also looked at the impact on tobacco use, also showed a positive intervention effect (OR 0.74, 95% CI 0.61 to 0.90; 1901 participants). (ii) The two alcohol only interventions produced conflicting results, with confidence intervals that do not overlap, one suggesting a positive effect of the intervention on alcohol intake (Perry 1996; OR 0.45, 95% CI 0.24 to 0.87; 1714 participants) and the other suggesting no effect (Komro 2008; OR 0.99, 95% CI 0.97 to 1.01; 5580 participants).

Mental health and emotional well-being intervention
(i) The single emotional well-being intervention gave an estimated effect in favour of the intervention (OR = 0.79) but with a wide confidence interval (95% CI 0.59 to 1.06; 630 participants).

Anti-bullying intervention
(i) Anti-bullying interventions showed an average reduction of 17% for reports of being bullied (OR 0.83, 95% CI 0.72 to 0.96, I² = 61%; 6 trials, 26,256 participants), relative to control schools.
(ii) We also found some evidence to suggest that HPS interventions may reduce bullying in schools, with reductions in reports of being bullied.
| Gottschalk LB, Ortayli N.; 2014 | Systematic review | The aim was to conduct a structured review of the literature on contraceptive services and interventions for adolescents in developing countries. Based on element-specific program characteristics:

**a. Adolescent-friendly services:** provision of health services that are accessible, acceptable, equitable, appropriate and effective for adolescents (N=7)

(i) Trained providers and other clinic staff to reduce discomfort associated with serving adolescents, (ii) build better communication skills for working with this age group and (iii) make services more attractive to adolescent users. (iv) Tried to address economic barriers that adolescents face in accessing contraception by providing contraceptive methods and services for free or at a reduced cost [24,25].

**b. Adults:** program element intended to foster connectedness between a close adult and adolescent(s) (N=4)

(i) Parent-adolescent pairs attended simultaneous but separate sexual education classes [22].

(ii) In-school SRH education program, training and encouraging teachers in order to improve connectedness with adolescents

<table>
<thead>
<tr>
<th>Awareness raising strategy, Behavior change strategy, Health service provision strategy, Support provision strategy, Community engagement strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. Adolescent-friendly services:</strong> Nepal, Kenya, Zimbabwe, China, Brazil, Turkey</td>
</tr>
<tr>
<td><strong>b. Adults:</strong> Brazil, Ethiopia, Mexico, Kenya</td>
</tr>
<tr>
<td><strong>c. Community engagement:</strong> Nepal, Kenya, China, Ethiopia, Ghana, Nigeria, India, Mexico</td>
</tr>
<tr>
<td><strong>d. Educational interventions:</strong> Brazil, Kenya, China, Turkey, Mexico</td>
</tr>
<tr>
<td><strong>e. Multimedia:</strong> Zimbabwe, Turkey, Ghana, Nigeria, India, Mexico, Cameroon</td>
</tr>
<tr>
<td><strong>f. Peer education:</strong> Nepal, Brazil, Zimbabwe, Turkey, Ghana, Nigeria</td>
</tr>
<tr>
<td>Married women &lt;20 years old &amp; their husbands, Adolescents ages 10–19 (in-school and out of school), Young people ages 10–24; First year university students, Married and unmarried girls ages 10–19; Unmarried youth aged 15–24; married women ages 15–24 (newlyweds, first pregnancy, with one child) and their husbands</td>
</tr>
</tbody>
</table>

- **a. Adolescent-friendly services:*** provision of health services that are accessible, acceptable, equitable, appropriate and effective for adolescents

(i) Significant gains in ever use of condoms [25].

(ii) Adolescents in Kenya who met with a peer educator were significantly more likely to use a condom at first sex [34].

(iii) Males in the intervention were nearly four times more likely to report condom use at last sex (OR=3.74, 95% CI=1.71–8.17), though females were not [24].

(iv) In intervention group, started to use condoms: OR=5.7+ and Use of modern contraception increased at follow-up period than the baseline 67% vs. 56%, adjusted OR=1.7+ [28]

**b. Adults:** program element intended to foster connectedness between a close adult and adolescent(s)

(i) Mexican adolescents exposed to a safer sex curriculum were also more likely to use a condom [odds ratio (OR)= 1.75, 95% confidence interval (CI)=1.14–2.69] or another method of contraception (OR=1.53, 95% CI=1.00–2.33) at first sex [22].

bullied of 17% (6 trials, 26,256 participants).

**Violence prevention intervention**

(i) The two Positive Action trials both found evidence of a reduction in violent behaviors (Beets 2009 OR 0.32, 95% CI 0.16 to 0.62; 1714 participants; Li 2011 OR 0.38, 95% CI 0.25 to 0.56; 363 participants).
students [26].

(iii) Young parents in the community were trained to counsel adolescents and their parents about SRH issues [24].

c. Community engagement: inclusion of the wider community as a central part of the intervention (N=8)

The aim of these activities was to foster a more supportive environment by breaking through community-level sociocultural barriers that adolescents face in accessing SRH information and services.

(ii) The Yehane Hawan program in rural Ethiopia utilized facilitators to stimulate community dialogues about cultural practices that lead to early marriage and decreased opportunities for girls [20].

(ii) Daniel et al. invited newlyweds’ parents and in-laws to engage in discussions that challenged traditional norms and promoted healthy birth timing and spacing, similar messages were circulated to the wider community through street performances and wall paintings [19].

(iii) In suburban Shanghai, meetings with community members, leaders and parents helped to create awareness about the need for the SRH intervention and address the community’s concerns [25].

d. Educational interventions: delivery of a standardized curriculum that includes topics on contraception

Mexico, Cameroon

(ii) Brazilian adolescents exposed to SRH education in schools were more likely to report use of modern contraception at last sex (OR=1.68, 95% CI=1.04–2.72) [26].

(iii) Males in the intervention were nearly four times more likely to report condom use at last sex (OR=3.74, 95% CI=1.71–8.17), though females were not [24].

(iv) A significant increase between baseline and follow-up for first year university students requesting a contraceptive method during health services visits [27]

c. Community engagement: inclusion of the wider community as a central part of the intervention

(i) Significant gains in ever use of condoms [26]

(ii) Adolescents in Kenya who met with a peer educator were significantly more likely to use a condom at first sex [34].

(iii) Males in the intervention were nearly four times more likely to report condom use at last sex (OR=3.74, 95% CI=1.71–8.17), though females were not [24].

(iv) SRH intervention in Mexico reported that youth in the program’s two intervention areas were less likely to have used contraception at last sex compared to the control group [32].

(v) Intervention versus control: Use of contraception, OR=1.40; Follow-up versus baseline: Use of contraception, OR=1.60, Intervention versus control x follow-up versus baseline: Use of contraception, OR=3.84+ [19]

d. Educational interventions: delivery of a standardized curriculum that includes topics on contraception
(N=7)
(i) These interventions took place during the school day, were several sessions long and included SRH-specific information designed to improve knowledge, attitudes, self-efficacy and utilization of services. General health information and skill building related to coming-of-age were often included alongside SRH education.

(ii) Six hour sexual education and life skills curriculum delivered outside of the school system [22].

(iii) A brief educational intervention through optional lectures and conferences to the first year university students on campus [27].

(iv) Comprehensive SRH education to adolescents in the community through lectures [25].

(v) Out-of-school girls were given informal education, including lessons based on the Ministry of Education's basic curriculum, livelihood skills and reproductive health information and referrals [20].

e. Multimedia: use of a combination of media to communicate messages about health and health services (N=7)

6-month multimedia campaign as the main component of the intervention, which included a range of media seen commonly throughout the literature: posters, leaflets, dramas, newsletters and a radio program [28].

(i) Adolescents in Kenya who met with a peer educator were significantly more likely to use a condom at first sex [34].

(ii) Mexican adolescents exposed to a safer sex curriculum were also more likely to use a condom [odds ratio (OR)= 1.75, 95% confidence interval (CI)=1.14–2.69] or another method of contraception (OR=1.53, 95% CI=1.00–2.33) at first sex [22].

(iii) Brazilian adolescents exposed to SRH education in schools were more likely to report use of modern contraception at last sex (OR=1.68, 95% CI=1.04–2.72) [26].

(iv) A significant increase between baseline and follow-up for first year university students requesting a contraceptive method during health services visits [27].

(v) Males in the intervention community were significantly more likely to report partner's use of pills and intrauterine device using contraception.
f. Peer education: use of peers to deliver information and connect adolescents to services; in some cases, peer educators distribute contraceptives (N=8)

(i) Peer educators provided individual and group counselling about SRH topics as well as referrals to health services. Four programs featured peer educators that distributed condoms and other contraceptives.

(ii) Peer educators in a social marketing program in Cameroon sold condoms for a small fee [30]

(iii) Common topics included in peer educator training were human anatomy, SRH-specific knowledge, guidelines for making proper referrals and counselling skills.

(iv) Peer educators typically received a one-time training/retraining with ongoing supervision

**Multiple elements/components**

Two components (N=5): [a+d (n=1) b+d (n=2) c+e (n=1) e+f (n=1)]

Three components (N=6): [a+c+f (n=1); a+b+c (n=1); a+e+f (n=1); b+c+d (n=1); c+e+f (n=2)]

Four components (N=2): [a+c+d+f (n=1); a+d+e+f (n=1)]

(vi) Started to use condoms: OR=5.7+ and increase in Use of modern contraception: baseline 56%, follow-up 67%, adjusted OR=1.7+ [28]

(vii) Intervention versus control: Use of contraception, OR=1.40; Follow-up versus baseline: Use of contraception, OR=1.60, Intervention versus control x follow-up versus baseline: Use of contraception, OR=3.84+ [19]

f. Peer education: use of peers to deliver information and connect adolescents to services; in some cases, peer educators distribute contraceptives

(i) Females in the intervention area showed a significant increase in condom use for family planning purposes [30]

(ii) Significant gains in ever use of condoms [30]

(iii) Adolescents in Kenya who met with a peer educator were significantly more likely to use a condom at first sex [34].

(iv) In Cameroon, it was reported that adolescents reported greater condom use at last sex [21].

(v) An SRH intervention in Mexico reported that youth in the program’s two intervention areas were less likely to have used contraception at last sex compared to the control group [32].

(vi) A significant increase between baseline and follow-up for first year university students requesting a contraceptive method during health services visits [27]

(vii) Males in the intervention community were significantly more likely to report partner’s use
of pills and intrauterine device (IUDs)/injectable [30].

(viii) Those exposed to the program, which utilized community engagement, creation of safe spaces, adult-to-adolescent education and adolescent friendly services, were 2.9 times more likely to report ever use of contraception [20].

(ix) Peer education intervention in Ghana and Nigeria found an increased use of modern contraception for in-school youths; however, there were no significant changes among out of school youth [29].

(x) Two studies, found significant gains in ever use of condoms [25, 30].

(xi) In one study, females in the intervention area showed a significant increase in condom use for family planning purposes [30].

(xii) Started to use condoms: OR=5.7+ and increase in use of modern contraception: baseline 56%, follow-up 67%, adjusted OR=1.7+ [28]
## ANNEX 4: Type of Health Workers Included in School Health Interventions

<table>
<thead>
<tr>
<th>SL.</th>
<th>Reviewed Systematic Reviews</th>
<th>No of Trials included in the systematic review</th>
<th>Health care provider as program deliverer</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL.</td>
<td>Reviewed Systematic Reviews</td>
<td>No of Trials included in the systematic review</td>
<td>Health care provider as program deliverer</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>11.</td>
<td>Werner-Seidler A, Perry Y, Calear AL, Newby JM, Christensen H. School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. Clinical psychology review. 2017 Feb 1;51:30-47.</td>
<td>81</td>
<td>Mental health professional, School mental health professionals (includes school counsellors, psychologists)</td>
</tr>
<tr>
<td>SL.</td>
<td>Reviewed Systematic Reviews</td>
<td>No of Trials included in the systematic review</td>
<td>Health care provider as program deliverer</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>15.</td>
<td>Gottschalk LB, Ortayli N. Interventions to improve adolescents’ contraceptive behaviors in low-and middle-income countries: a review of the evidence base. Contraception. 2014 Sep 1;90(3):211-25.</td>
<td>15</td>
<td>Health care providers were from the local health facilities, nurses, Adult counsellors, female health counsellor, Health professionals (nurse/physician teams), Counsellors; physicians and nurses</td>
</tr>
<tr>
<td>SL.</td>
<td>Reviewed Systematic Reviews</td>
<td>No of Trials included in the systematic review</td>
<td>Health care provider as program deliverer</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
</tbody>
</table>