

Content analysis of school textbooks on health topics: A systematic review

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Summary

High-quality textbooks and learning materials are especially important for school children, but school textbooks may contain incorrect health information. The objective of this study was to review the findings of analytical studies about the contents of textbooks used in elementary, junior high, or high schools. Of 450 studies we screened, we reviewed 14 that met the inclusion criteria, and summarized information regarding: *i*) authors and publication year, *ii*) target country, *iii*) topics selected, *iv*) school level, *v*) textbook subject(s), *vi*) analytical methods, and *vii*) findings. Of the selected 14 studies, 9 were conducted in the United States and Spain. Health topics focused mainly on sexuality, HIV/AIDS, and nutrition. The reviewed studies were classified according to the amount of topic information they contained, the accuracy of the health information provided, and the health information priorities conveyed. The findings of reviewed studies can be summarized as follows: some current school textbooks provide insufficient content and contain inaccurate or out-of-date health information. This study found through health-related content analysis of the school textbooks that textbooks in the United States and Spain cover sexuality, sexually transmitted diseases, and nutrition more often than do textbooks in other countries. Content quality is sometimes inappropriate and requires improvement.

Keywords: School textbooks, school health, health education, content analysis, systematic review

1. Introduction

School health education has proven to be effective in increasing knowledge and improving attitudes, beliefs, and skills needed to practice healthy behaviors (1,2). School textbooks are essential materials for school health education (3,4). Particularly in resource-limited settings, school textbooks can play an important role as a source of reliable information (5). Because school textbooks can provide health information on disease prevention and essential health skills, the information

they contain must be reliable. The United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasizes improving the quality of textbooks as one of its policy recommendations within the Education For All Framework (6).

Despite the importance of accuracy, however, previous studies have indicated that school textbooks contain incorrect or insufficient health information (7). To reduce the likelihood of students receiving and accepting incorrect information, regular revision and regular improvement of content quality is essential for raising the health levels of students and their family members. Reviews of school textbooks by government authorities and the inclusion of priorities of national health policies are also recommended, yet few studies have assessed textbooks in terms of their health information content or examined their accuracy and frequency of revision.

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The objective of this study was to review the findings of analytical studies of the contents of textbooks used in elementary, junior high, and high schools.

2. Methods

2.1. Search strategy and inclusion/exclusion criteria

We did a search for eligible literature regarding school health and school textbooks. First, we conducted an electronic search of popular academic databases for health and education. Our electronic search strategy was first to look at the PubMed and the Education Resources Information Center (ERIC) Internet databases. PubMed is a service of the U.S. National Library of Medicine from MEDLINE and other life science journals of a biomedical nature. ERIC is an online digital library of education research and information, sponsored by the Institute of Education Sciences of the U.S. Department of Education. Both databases seemed appropriate choices because they are widely used in their respective fields (medicine and education) and cover the key words of the reviewed studies. In both PubMed and ERIC, the key words "schools" AND "textbooks" AND "health" were used

to retrieve articles published between January 1980 and June 2009, with no language restrictions. The search strategy also included a review of the references cited by the identified studies. The process and the number of systematic reviews are shown in Figure 1.

The inclusion criteria were the following: the study must include content analysis of school textbooks; the textbooks examined must be used in elementary, junior high, or high school; the textbooks must include health-related information; and the articles must have been published between 1980 and 2009. As education systems in different countries differ, school levels were classified according to grades or ages, and defined as elementary school, junior high school, or high school. Content analysis is defined as the systematic, objective, qualitative analysis of message characteristics (8). Exclusion criteria were content analysis of content unrelated to health, use of intervention analysis, or use of the textbooks in kindergartens or college/university-level education.

Titles and abstracts of studies were screened primarily using the key words. Two reviewers independently assessed all titles and abstracts retrieved through the electronic searches. An initial relevance screening generated 450 studies in total from the literature search, including 245 studies from PubMed

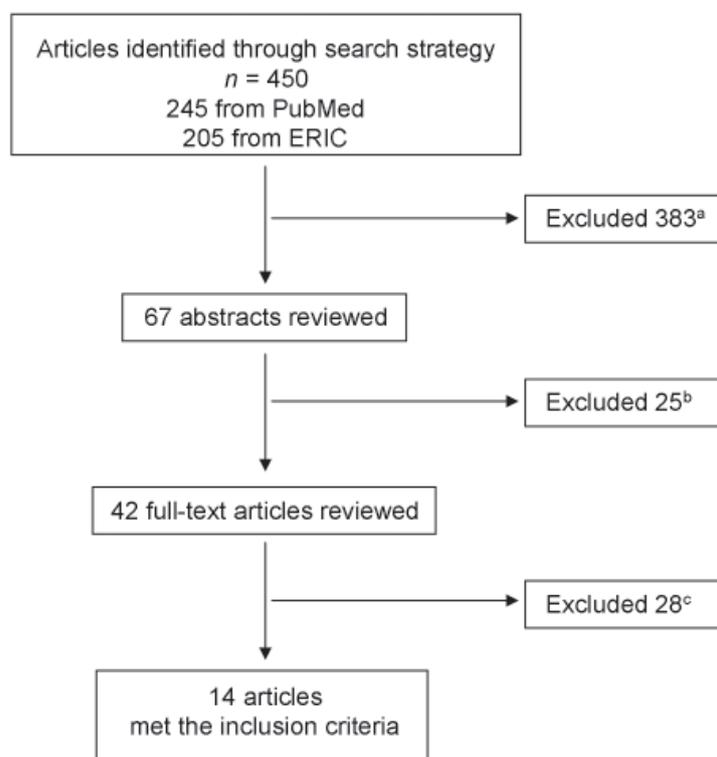


Figure 1. Flow chart of the study selection process. ^a The 383 excluded articles included those with no content analysis or content analysis on other topics. ^b These 25 articles were excluded because target school levels did not meet the inclusion criteria. ^c These 28 excluded articles included intervention studies or content analysis not related to health topics.

and 205 from ERIC.

Of these 450 studies, 383 were excluded due to a lack of content analysis or a suggestion in the titles or abstracts that the content analysis was of non-health-related content. This screening yielded 67 studies that met the initial inclusion criteria. Next, the abstracts of the 67 studies were collected and independently reviewed, and excluded from full-text review if the content analysis was not focused on school textbooks or if the topic was not health-related.

Of the 67 studies, 25 were excluded because their target school levels did not meet our inclusion criteria. The remaining 42 studies returned by the searches were included in the full-text review. Full-text copies of the 42 studies identified as potentially relevant were retrieved; their full texts in English were collected and reviewed; they included 8 non-English studies that had been translated into English. In cases where reviewers disagreed on the eligibility of reviews, a discussion was held in order to obtain consensus. The studies in full-text were included if they met all of the above-mentioned inclusion criteria (use of content analysis, use of textbooks in elementary, junior high, or high school, and focus on health information, including hygiene, infectious diseases, and other health topics). We excluded intervention studies and systematic reviews. The 42 full-text screened studies were reexamined several times by two reviewers.

Of the 42 full-text studies, 28 were excluded because they included intervention studies or systematic reviews, or they analyzed non-health content. Ultimately 14 studies met the inclusion criteria and were examined. Of the 14 studies, 5 were not written in English: 3 were in Spanish (4,9,10), 1 was in Portuguese (11), and 1 was in German (12). We asked native speakers of Spanish, Portuguese, and German to translate the 5 studies into English and reviewed the English translations. Searches were conducted between May and August 2009.

2.2. Assessment

All the studies of content analysis were examined from two aspects: the content of relevant domains, and the total numbers of pages, tables, figures, and pictures/illustrations. All were summarized using a form containing 7 categories for comparison. The 7 categories included: *i*) authors of references and year of publication, *ii*) target country, *iii*) specific health topic, *iv*) school level or grade, *v*) textbook subject(s), *vi*) analytical method(s), and *vii*) findings. This process resulted in a document with tables.

3. Results

We summarized the characteristics of the 14 studies of content analysis we examined in Table 1.

3.1. Target country

Of 14 studies, 12 were conducted in North America or Europe. The target countries were: the United States in 6 studies, Spain in 3, and Brazil, Canada, Mexico, Switzerland, and the United Kingdom in 1 each. Twelve of the studies were conducted in developed countries, 2 in middle-income countries, none in low-income countries.

3.2. Specific health topics covered

Of the 14 studies, 2 evaluated the priorities of the health information content in the textbooks (4,9). The main health topics in 12 studies were sexuality, sexually transmitted diseases (STDs), and nutrition. Of the included studies, 4 focused on sexuality, including reproductive health, gender representation, and STDs (7,13-15), 3 focused on nutrition or diet, including excessive intake of sugar-rich food (12,16,17), and 1 each focused on HIV/AIDS (10), mental health (18), hearing health (19), oral cancer (20), and vaccination (11). Two other Spanish studies identified the priorities of health topics covered. In a study conducted by Catalán in 2003, the priorities were hygiene, followed by eating (9); in the other study conducted by Barrio Cantalejo *et al.* in 2008, they were diet, physical exercise, and the impact of environmental contamination (4).

3.3. Target school levels and textbook subjects

Target school levels and textbook subjects were diverse. Of the 14 studies, 9 studies targeted a single school level: 5 targeted elementary schools, 3 targeted junior high schools, and 1 targeted high schools. The remaining 5 targeted multiple school levels: 1 study each targeted elementary and junior high schools, elementary and high schools, or junior high and high schools; the remaining 2 studies targeted all three school levels. The textbooks examined covered the full range of subjects: health science, language, arts, mathematics, history, science, arithmetic, algebra, and chemistry.

3.4. Analytical methods

All 14 studies examined were descriptive studies of content analysis. Content analysis is an in-depth analysis of messages using quantitative or qualitative techniques. The studies' analytical methods fell into three main patterns: *i*) analysis of the amount of topic information in words, pictures, and/or illustrations (8 studies); *ii*) examination of the accuracy of health information (2 studies); *iii*) identification of health-related topics and their priorities (2 studies). Of the two remaining studies that did not fall into any of the three main patterns, one identified the impact of political and

Table 1. Results of reviews by target country, school grade level, subjects, and methodology

Author, year	Target country	Specific health topics	School level and grades	Subjects of texts	Analytical methods	Findings
Tolan and Lounsbury, 1982	US	Mental health	High school. No information about grades.	Health textbooks	Examination of community mental health ideology presented in high school health textbooks.	Information in high school health textbooks does not adequately represent modern mental health knowledge or practice. It does not meet society's mental health needs.
D'Onofrio and Singer, 1983	US	Nutrition, sugar, sweets	Grades K-3 in elementary school.	Readers, pre-readers, and reading workbooks	Analysis of food-related content in words and pictures in texts.	Food-related content in the texts revealed an excessive emphasis on sweets in both words and pictures. The poor results of nutrition education have been publically decried. Unintended messages may work against the promotion of healthy eating habits. Textbook revision is clearly indicated.
Kroger and Yarber, 1984	US	STD and sexuality	Junior high school. No information about grades.	Health science and sex education	Assessment of potential contribution of textbooks to STD control objectives.	Sex education textbooks contribute to STD control objectives better than do health science textbooks. Health science textbooks may not contribute toward reducing STD incidence. Both types of textbooks present biomedical information without significant errors.
Frager and Kahn, 1988	US	Hearing health and protection	Elementary school. No information about grades.	School health textbooks	Identification of health information on hearing and assessment of its usefulness to prevent hearing loss.	More content regarding the signs and causes for hearing problems was identified than recommendations for avoiding hearing problems. Hearing health mobilizing information is lacking.
Beyer <i>et al.</i> , 1996	US	Gender representation	Junior high and high school. No information about grades.	History, mathematics, science, and reading	Examination of gender inequity in written textbooks.	Illustrations showed greater female representation. Greater male representation included that related to drug use, sexual exploitation, sexual desire, and homosexuality. Greater female representation included that related to body image, diseases of the reproductive organs, and hygiene.
Baysac <i>et al.</i> , 2004	US	Oral cancer	Grades 1-12 in elementary, junior high, and high school.	Health education	Evaluation of quality, completeness, and accuracy of oral cancer information.	Current school health textbooks do not provide adequate information about oral cancer prevention and early detection. To achieve Healthy People 2010 objectives, correct and adequate information about risk factors and examinations for oral cancer are needed.
Gavdia Catalán, 2003	Spain	All health information	Elementary, junior high, and high school. No information about grades.	All subjects	Identification of 1) presence or absence of education for health, 2) inclusion of health-related topics, 3) degree of health covered, 4) inclusion in the subject or dealt with on a transversal basis, 5) methodological aspects.	Sixty-three percent of the texts analyzed included topics on health education. Most topics were related to hygiene and eating. Health-related concepts most often dealt with are those of being disease-free and in a state of well-being. Current school textbooks are not sufficient either as a point of reference or as an adequate resource.
Barrio Cantalejo <i>et al.</i> , 2008	Spain	All health information	Elementary and high school. No information about grades.	No information about subjects.	Identification of 1) health priorities defined by health organizations, 2) messages on health, 3) extent to which these messages fit the priorities established.	The priorities most frequently covered in the textbooks were diet, physical exercise, and the impact of environmental contamination. The health messages contained in school textbooks are not well adapted to the priorities defined by health organizations.

Abbreviations: STD, sexually transmitted diseases; STI, sexually transmitted infection.

(to be continued)

Table 1. Results of reviews by target country, school grade level, subjects, and methodology (continued)

Author, year	Target country	Specific health topics	School level and grades	Subjects of texts	Analytical methods	Findings
de Irala <i>et al.</i> , 2008	Spain	Sexuality, human reproduction, and STIs	14-15-year-olds in secondary school	Biology	Evaluation of the extent to which textbooks on sexuality and human reproduction promote healthy reproductive lifestyles as well as avoidance of risk behavior among adolescent students.	All textbooks presented inaccurate information and incomplete perception of sexuality or risky behavior. On average, 12.6 incorrect messages were identified in each textbook. Eleven of 12 textbooks examined provided misleading statements on condom use for contraception and STI prevention and on family planning methods. The textbooks were neither appropriate nor sufficiently comprehensive for adolescent education on issues of sexuality. Results suggest a need for alternative textbooks based on better scientific evidence. Teenage sexual activities described in the textbooks are not supported by epidemiological data from the Spanish National Institute of Statistics.
Succi <i>et al.</i> , 2005	Brazil	Vaccines	Grade 1-8 in elementary school	Science and biology	Evaluation of content of textbooks with regard to concepts and information on vaccination.	Despite Ministry of Education recommendations, 34% of elementary-level textbooks did not include the subject of vaccination. More than half of the textbooks with content on vaccines presented some erroneous information on vaccination, errors in vaccination schedules, out-of-date information, omission of content, or inadequate illustrations.
Baron, 1990	Canada	Nutrition	Grade 1-6 in elementary school	Language, arts, and mathematics	Detection of nutrition messages in words and pictures.	A large proportion of references were to sugar-rich foods. Unintended information may influence nutritional habits of children.
Granados-Cosme <i>et al.</i> , 2007	Mexico	HIV/AIDS prevention	Grade 5-6 in elementary and 1-3 grade in junior high school	Natural science, biology, civics, and ethics education	Clarification of social actors' positions and interests and their influence on the content of textbooks.	Those actors whose beliefs are based on tradition and are contrary to modernization oppose the inclusion of topics on sexuality and HIV/AIDS in the school curriculum. The deficiencies and decline in HIV/AIDS prevention education were caused by actions from opposition groups.
Eichholzer-Helbling <i>et al.</i> , 1984	Switzerland	Nutrition	Grade 1-4 in elementary school	Reading, arithmetic, and language	Examination of contents regarding nutrition in the textbooks.	Educational information regarding nutrition can be found in all textbooks, but it was not adjusted to today's perceptions.
Reiss, 1998	UK	Sexuality	14-15-year-olds in high school	Biology and science	Analysis of health topics related to human sexuality in school science textbooks.	Some science textbooks are sensitively written, comprehensive, and helpful. Others fail to tackle personal issues dealing with menstruation, ignore lesbian and gay issues, and either omit or fail to deal adequately with cultural issues in spite of the regulations of the UK Government's own Circular.

Abbreviations: STDs, sexually transmitted diseases; STI, sexually transmitted infection.

social ideology on the content of HIV/AIDS education (10), another identified gender representation and examined gender inequity in textbook descriptions (14).

As the objective basis of analyses, 4 studies cited the country's national health policies or recommendations as a standard, and compared them with the content of health information in the textbooks. The 4 studies cited Healthy People 2010 in the United States, health priorities defined by health organizations or authorities in Spain, or recommendations of the Ministry of Education in Brazil. Other studies had no standards by which to evaluate the contents.

3.5. Findings

To summarize the quality of the school textbooks examined in findings, we chose the amount, the accuracy, and the currency of the health information on target health topics. We showed the results using the "+" symbol in Table 2. Of 14 studies reviewed, 11 reported that the school textbooks examined provided insufficient content or lacked information regarding the target topics; 5 studies reported that the health information in textbooks included inaccuracies or false information; and 5 studies reported that the health information was not current or was out-of-date and needed revision. In total, the authors of 13 of the 14 studies indicated that the textbooks they examined needed further improvement or revision.

In comparisons of the contents with national health policies or priorities, 4 studies cited the target country's health policy or Ministry of Health/Education recommendations as standards. For example, they cited Healthy People 2010 objectives (20), the guidelines of Ministry of Education (MEC) (11), the UK Government's own Circular, the Local

Government Act, and the Education Act (15), 24 priorities defined by the World Health Organization, the European Union, the Spanish Ministry of Health and Consumer Affairs, and the Spanish Society of Public Healthcare Administration (4).

4. Discussion

Content analysis of school textbooks often focused on sexuality/reproductive health and STDs; 4 out of 14 studies focused on these topics. These topics are important because unintended pregnancy is one of the main reasons why female students drop out of school (21,22). Furthermore, young people are particularly vulnerable to HIV infection: 15-24-year-olds account for 50% of new cases worldwide (23). They must be provided with essential skills and information before they become sexually active (24). The authors of these studies examined textbooks used in elementary and junior high schools (targeting 14-15-year-old students).

Although sex education is known to be difficult to deliver in school settings (25), previous studies have reported that school children in many countries identify textbooks or school as their primary source of health information (26-29). The importance of information delivered in school settings has also been demonstrated by its long-term impact on healthy behaviors (30,31). Thus, the contents of school textbooks require regular revision to provide students with accurate health information regarding sexuality, STDs, and reproductive health.

Three studies highlighted the over-representation of graphical information presenting sugar-rich food in the textbooks (12,16,17). The authors suggested the potential impact on school children of the over-representation of unhealthy eating behaviors. As

Table 2. Quality of the school textbooks examined

Author, year	Specific health topics	Quality		
		Insufficient information	Lack accuracy	Out-of-date information/ need revision
Tolan and Lounsbury, 1982	Mental health	+	+	+
D'Onofrio and Singer, 1983	Nutrition		+	
Kroger and Yarber, 1984	STD and sexuality	+		
Fragar and Kahn, 1988	Hearing health and protection	+		+
Beyer <i>et al.</i> , 1996	Gender representation	+		
Baysac <i>et al.</i> , 2004	Oral cancer	+	+	
Gavidia Catalán, 2003	All health topics	+		
Barrio Cantalejo <i>et al.</i> , 2008	All health topics	+		
de Irala <i>et al.</i> , 2008	Sexuality, human reproduction, and STIs	+	+	+
Succi <i>et al.</i> , 2005	Vaccines	+	+	+
Baron, 1990	Nutrition			
Granados-Cosme <i>et al.</i> , 2007	HIV/AIDS prevention	+		
Eichholzer-Helbling <i>et al.</i> , 1984	Nutrition			+
Reiss, 1998	Sexuality	+		

+: include the comment shown at the top of the column.

unintended messages conveyed in textbooks may counteract efforts to promote healthy eating habits, those responsible for textbook selection should draw up health content guidelines.

In the 14 studies we reviewed, none focused on tobacco use, injury prevention, or alcohol/substance abuse, which have been emphasized as central to health education curricula in school settings (32,33). Our results also revealed that the researchers paid little attention to these topics in content analysis. However, educational interventions using various approaches including peer-education and linkage with supportive communities and policies have been intensively utilized in the school setting (34-36). Nonetheless, these studies emphasized the importance of comprehensive approaches and of basic curricula as principal components of health education.

The findings examined by the studies we reviewed were summarized as follows: most of the reviewed articles consistently reported insufficient health information provided by the textbooks. This tendency was particularly evident in the studies dealing with sexuality or STDs (7,13,15). However, 13 out of 14 studies reviewed also reported a wide range of variation among publishers in content insufficiency, inaccuracy, or out-of-date information.

In comparisons of content with national health policies or recommendations, only 4 studies cited the country's national health policy or recommendations as a standard. To evaluate the quality of school textbooks objectively, some standard of comparison is needed.

We also found that studies were mostly confined to developed nations: the target countries of 13 of the 14 studies were the U.S., Spain, Canada, Switzerland or the United Kingdom. This might be due to wider availability of textbooks in developed countries. However, 80% of the world's children live in developing countries where resources for textbook development are more likely to be limited than in developed countries (37,38). School textbooks used in developing countries also need to be examined with a view to improving the contents of health information.

To regularly and reliably provide sufficient and accurate health information in school textbooks to school children, we need to assess the adequacy of all school textbooks, whether they are used in developed or in developing countries.

5. Conclusion

In conclusion, this study showed that health-related content analysis of school textbooks is done mostly in Spain and the United States and most frequently examines content related to sexuality, STDs, and nutrition. The quality of the content is sometimes inappropriate and requires improvement.

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References

1. Bartlett EE. The contribution of school health education to community health promotion: What can we reasonably expect? *Am J Public Health*. 1981; 71:1384-1391.
2. WHO. WHO information series on school health. Healthy Nutrition: An Essential Element of a Health-Promoting School. WHO, 1998. http://who.int/school_youth_health/media/en/428.pdf (accessed May 8, 2009).
3. UNESCO. Textbook quality improvement programme: Support to basic education in Iraq. UNESCO, 2005. <http://unesdoc.unesco.org/images/0013/001394/139428e.pdf> (accessed May 8, 2009).
4. Barrio Cantalejo IM, Ayudarte Larios ML, Hernán García M, Martínez Tapias J, de Haro Castellano JM, Simón Lorda P, Sánchez García M. Presence of current child adolescent health priorities in school textbooks. *Gac Sanit*. 2008; 22:227-231. (in Spanish)
5. Mohammad RF, Kumari R. Effective use of textbooks: A neglected aspect of education in Pakistan. *J Educ Int Dev*. 2007; 3:1.
6. UNESCO. A Comprehensive Strategy for Textbooks and Learning Materials. UNESCO, 2005. <http://unesdoc.unesco.org/images/0014/001437/143736fb.pdf> (accessed May 8, 2009).
7. de Irala J, Urdiain IG and López Del Burgo C. Analysis of content about sexuality and human reproduction in school textbooks in Spain. *Public Health*. 2008; 122:1093-1103.
8. Perrin AJ. Book review: The content analysis guidebook. *Soc Sci Comput Rev*. 2002; 20:365-366.
9. Gavidia Catalán V. Health education in the Spanish school manuals. *Rev Esp Salud Pública*. 2003; 77:275-285. (in Spanish)
10. Granados-Cosme JA, Nasaiya K, Brambila AT. Social actors in HIV/AIDS prevention: Opposition and interests in educational policy in Mexico, 1994-2000. *Cad Saude Publica*. 2007; 23:535-544. (in Spanish)
11. Succi Cde M, Wickbold D, Succi RC. Evaluation of school-books content on the subject of vaccines. *Rev Assoc Med Bras*. 2005; 51:75-79. (in Portuguese)
12. Eichholzer-Helbling M, Ackermann-Liebrich U, Ritzel G. Nutritional references in primary-school textbooks used in Basle and Berne. *Soz Praventivmed*. 1984; 29:82-87. (in German)
13. Kroger F, Yarber WL. STD content in school health textbooks: An evaluation using the worth assessment procedure. *J Sch Health*. 1984; 54:41-44.
14. Beyer CE, Ogletree RJ, Ritzel DO, Drolet JC, Gilbert SL, Brown D. Gender representation in illustrations, text, and topic areas in sexuality education curricula. *J Sch Health*. 1996; 66:361-364.
15. Reiss MJ. The representation of human sexuality in some science textbooks for 14-16 year olds. *Res Sci Technol Educ*. 1998; 16:137-149.
16. D'Onofrio CN, Singer R. Unplanned nutrition education

- in the schools: Sugar in elementary reading texts. *J Sch Health*. 1983; 53:521-526.
17. Baron V. Nutrition messages in language arts and mathematics textbooks used in English elementary schools in Montreal. *J Sch Health*. 1990; 60:452-454.
 18. Tolan PH, Lounsbury JW. Community mental health ideology presented in high school health textbooks: A content analysis. *Community Ment Health J*. 1982; 18:286-296.
 19. Frager AM, Kahn A. How useful are elementary school health textbooks for teaching about hearing health and protection? *Lang Speech Hear Serv Sch*. 1988; 19:175-181.
 20. Baysac MA, Horowitz AM, Ma DS. Oral cancer information in health education textbooks. *J Cancer Educ*. 2004; 19:12-16.
 21. Allen JP, Philliber S, Hoggson N. School-based prevention of teen-age pregnancy and school dropout: Process evaluation of the national replication of the Teen Outreach Program. *Am J Community Psychol*. 1990; 18:505-524.
 22. Grant MJ, Hallman KK. Pregnancy-related school dropout and prior school performance in KwaZulu-Natal, South Africa. *Stud Fam Plann*. 2008; 39:369-382.
 23. Monasch R, Mahy M. Young people: The centre of the HIV epidemic. *World Health Organ Tech Rep Ser*. 2006; 938:15-41; discussion 317-41.
 24. WHO. WHO technical report series 938. Preventing HIV/AIDS in young people. WHO, 2006. http://www.unicef.org/files/PREVENTING_HIV_AIDS_IN_YOUTH_PEOPLE_A_SYSTEMATIC_REVIEW_OF_THE_EVIDENCE_FROM_DEVELOPING_COUNTRIES_WHO_2006.pdf (accessed May 8, 2009).
 25. Pokharel S, Kulczycki A, Shakya S. School-based sex education in Western Nepal: Uncomfortable for both teachers and students. *Reprod Health Matters*. 2006; 14:156-161.
 26. Persson E, Sandström B, Jarlbro G. Sources of information, experiences and opinions on sexuality, contraception and STD protection among young Swedish students. *Adv Contracept*. 1992; 8:41-49.
 27. Yoo H, Lee SH, Kwon BE, Chung S, Kim S. HIV/AIDS knowledge, attitudes, related behaviors, and sources of information among Korean adolescents. *J Sch Health*. 2005; 75:393-399.
 28. Edson F, Kayombo EJ. Knowledge on malaria transmission and its prevention among schoolchildren in Kyela District, south-western Tanzania. *Tanzan Health Res Bull*. 2007; 9:207-210.
 29. Teitelman AM, Bohinski JM, Boente A. The social context of sexual health and sexual risk for urban adolescent girls in the United States. *Issues Ment Health Nurs*. 2009; 30:460-469.
 30. Griffin KW, Botvin GJ, Nichols TR. Long-term follow-up effects of a school-based drug abuse prevention program on adolescent risky driving. *Prev Sci*. 2004; 5:207-212.
 31. Patil V, Solanki M, Kowli SS, Naik VA, Bhalerao VR, Subramanian P. Long-term follow-up of school health education programmes. *World Health Forum*. 1996; 17:81-82.
 32. Stephen JB, James JN, Selene SH, Walter DS. *Teaching health science*. Massachusetts, Jones and Bartlett Publishers, Sudbury, MA, USA, 1997.
 33. Tones K, Tilford S. *Health promotion: Effectiveness, efficiency and equity*. Nelson Thornes Publishers Ltd, Gloucester, UK, 2001.
 34. Faggiano F, Galanti MR, Bohrn K, Burkhart G, Vigna-Taglianti F, Cuomo L, Fabiani L, Panella M, Perez T, Siliquini R, van der Kreeft P, Vassara M, Wiborg G; EU-Dap Study Group. The effectiveness of a school-based substance abuse prevention program: EU-Dap cluster randomised controlled trial. *Prev Med*. 2008; 47:537-543.
 35. Resnicow K, Reddy SP, James S, Gabebodeen Omardien R, Kambaran NS, Langner HG, Vaughan RD, Cross D, Hamilton G, Nichols T. Comparison of two school-based smoking prevention programs among South African high school students: Results of a randomized trial. *Ann Behav Med*. 2008; 36:231-243.
 36. Azeredo R, Stephens-Stidham S. Design and implementation of injury prevention curricula for elementary schools: Lessons learned. *Inj Prev*. 2003; 9:274-278.
 37. UNICEF. *The state of the world's children 2003*. UNICEF, 2003. <http://www.unicef.org/sowc03/contents/pdf/SOWC03-eng.pdf> (accessed May 8, 2009).
 38. UNESCO. *Overcoming inequality: Why governance matters*. UNESCO, 2008. <http://unesdoc.unesco.org/images/0017/001776/177683E.pdf> (accessed May 8, 2009).

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