

		Department			WDP, Ranasinghe RAD, Sriyalatha KVN, Kumara KDB, Ratnatilaka AAL, Silva ADAD, Ranatunga S, Ariyasingha K, Siriwardhana AWA, Jayaratne HTCG, Disanayaka LADIS, Adamlebbe J		
Zambia	English (2)	Cambridge Press	University	Cape Town, South Africa	Londt C, Morrison K, Tonkin S	2006	-
	English (4)	Longman Zambia Ltd.		Lusaka, Zambia	Chisense W, Gondwe ES, Mupinde C, Mundambo LM, Shipota M	2007	-
	English (7)	Longman Zambia Ltd.		Lusaka, Zambia	Chisense W, Gondwe ES, Mupinde C, Mundambo LM, Shipota M	2007	-
	English (9)	Macmillan Zambia Ltd	Publishers	Lusaka, Zambia	Hurry B, Zimba S	2003	-
	Environmental science (5)	Juta & Co. Ltd.		Cape Town, South Africa	Mashambe CM, Lupele JK, Hamooya BM, Shiyanda J	1996	-
	Environmental science (8)	Zambia Publishing House	Educational	Lusaka, Zambia	Banda AJ, Mudenda VJ, Chengo A, Tindi E, M'hango IY, Ziwa AJ	1990	1994
	Social and development studies (2)	Maiden Publishing House		Lusaka, Zambia	Mushiko ECB, Zulu S, Tembo CM	2005	-
	Social and development studies (7)	Longman Zambia Ltd.		Lusaka, Zambia	Musonda M, Simasiku S, Mayondi C	2007	-
	Integrated science (3)	Longman Zambia Ltd.		Lusaka, Zambia	Chisala FC, Phiri D, Sakala E, Shampile L	2006	-
	Integrated science (7)	Longman Zambia Ltd.		Lusaka, Zambia	Chisala F, Phiri DS, Shampile L, Sikapizye A	2007	-
	Creative and technology	Cambridge	University	Cape Town, South	Wakumelo M	2006	-

	studies (6)	Press	Africa			
Niger	Science (5)	National Institute for Pedagogical Documentations Research and Promotion	Niamey, Niger	Adamou A, Arouna M, Biba M, Gaoh DR	2009	-
	Reading and writing (2)	National Institute for Pedagogical Documentations Research and Promotion	Niamey, Niger	Dembel DA, Abba M, Tinga D, Semandi O, Hamadou M, Foumakoye AN	2009	-
	Reading and writing (5)	National Institute for Pedagogical Documentations Research and Promotion	Niamey, Niger	Dembel DA, Maïromēya H, Maïnassara C, Ousmane S	1994	-
	Biology (7)	Bordas	Paris, France	Djakou R, Thanon YS	1991	1996
	Biology (9)	Bordas	Paris, France	Djakou R, Thanon YS	1991	1996
Benin	Science (4-5)	Nathan	Paris, France	Not indicated	1999	-
	Life and earth science (7)	Hatier International	Paris, France	Panaf	2002	-
	Biology (7)	Bordas	Paris, France	Djakou R, Thanon YS	1991	1996
	Biology (9)	Bordas	Paris, France	Djakou R, Thanon YS	1991	1996
Ghana	Citizenship education (4)	Unimax Macmillan Ltd.	Accra, Ghana	Otu C, Quartey SM, Skelt J	2008	-
	Citizenship education (5)	Unimax Macmillan Ltd.	Accra, Ghana	Otu C, Quartey SM, Skelt J	2008	-
	Social studies (5)	EPP Books Services	Accra, Ghana	Nkansah B, Palm H, Awuku A, Tahil M, Benkyi GO, Fomena A	Not indicated	2010

Social studies (9)	Adwinsa Publications Ltd.		Accra. Ghana	Amoah EA, Baabereyir A, Cobbinah JA, Dake GY, Ngaaso CK	2005	2008
Integrated science (8)	Sedco-Longman Publishing Ltd.	Sedco	Accra. Ghana	Wiredu MB, Doku T, Joe-Adjei EC	2008	-
Integrated science (9)	Sedco-Longman Publishing Ltd.	Sedco	Accra. Ghana	Wiredu MB, Doku T, Joe-Adjei EC	2008	-

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

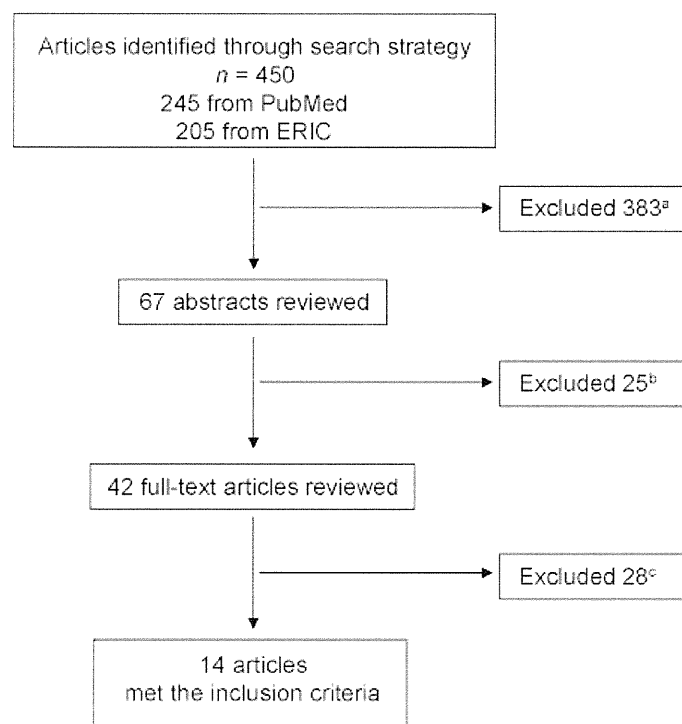


Figure 1. Flow chart of the study selection process. ^a The 383 excluded articles included those with no content analysis or content analysis on other topics. ^b These 25 articles were excluded because target school levels did not meet the inclusion criteria. ^c These 28 excluded articles included intervention 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.
Gavidia 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	Switzer-land	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	+		
Frager 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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Title:

The need to improve school textbooks to prevent tobacco use among adolescents in developing countries

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The need to improve school textbooks to prevent tobacco use among adolescents in developing countries

Introduction

Tobacco use is a significant public health issue among adolescents. In developing countries, approximately 68,000 to 84,000 adolescents start smoking every day, which accounts for 80% of all adolescents taking up smoking daily across the world (World Bank, 1999).

To prevent adolescents' tobacco use, various efforts have been made in developing countries. Efforts including raising the taxation on tobacco products have been advanced by the WHO Framework Convention on Tobacco Control (FCTC), which has been signed by 168 countries by the end of 2009 (WHO, 2010). In addition, the Global Youth Tobacco Survey (GYTS) has been conducted worldwide and has collected the content of anti-tobacco education in schools in many developing countries, as well as information about adolescents' behavior, knowledge and norms (Warren et al., 2008). Despite such efforts, little has been known about the effectiveness of school-based prevention education in these countries. School textbooks, in particular, have been overlooked as a potential tool to prevent tobacco use among schoolchildren.

School textbooks are the most common and crucial educational resources (Mohammad

& Kumari, 2007), and school-based education can reach large numbers of adolescents at the time that they begin to smoke (Park et al., 2010). Especially in developing countries, the net enrollment ratio has been increasing rapidly. In sub-Saharan Africa, for example it increased from 56% in the 1990s to 70% in 2006 (UNESCO, 2009). While various textbooks contain information related to health, in some cases it might not be supported by scientific evidence (Barrio-Cantalejo et al., 2011). UNESCO also proposed “quality development” of school textbooks as one of the strategies to achieve “Education for All” by 2015 (UNESCO, 2005). However, little has been done to examine the content of school textbooks related to tobacco use prevention in developing countries where educational resources are limited.

The WHO has proposed guidelines containing six components to prevent adolescents’ tobacco use through school-based education (WHO & UNESCO, 1999). The components include: consequences of tobacco use, social norms, reasons to use tobacco, social influences, resistance skills, and life skills. The school-based programs that contain these components have been effective in reducing adolescents’ tobacco use over the short-term (Botvin, 2000). If the programs were to have booster program sessions that included high school, then they might also have long-term effects (Dijkstra et al., 1999; Botvin, 2000).

The objective of this study was to evaluate if the information within these textbooks covered the components that are necessary for preventing tobacco use in developing countries.

Methods

Textbook collection

The methods for textbook collection between January 2009 and March 2010 are described in detail elsewhere (Nonaka et al., in preparation). In brief, we collected a total of 474 textbooks that were designed for primary and junior secondary school students from 9 developing countries where the tobacco control is still limited despite being a party of FCTC and where the authors have established relationships with local collaborators (WHO, 2011; Cambodia, 2011; Sri Lanka, 2006; Benin, 2006; Bangladesh, 2005). These countries were Bangladesh, Cambodia, Laos, Nepal, Sri Lanka, Benin, Ghana, Niger, and Zambia. The textbooks that we collected covered all grades from 1 to 9 in the designated countries. In countries where there were multiple textbook publishers, the textbooks that were most commonly used in public schools were collected based on opinions from government experts in the education sector.

Textbook examination

Each of the textbooks was reviewed by 2 public health experts - who identified content regarding substance abuse such as use of alcohol, tobacco or drugs. In cases where the content was written in French or local languages, it was translated into English. When a content or translation discrepancy was identified between the 2 reviewers, textbooks were re-examined for clarification. Finally, content related to tobacco use was selected for analysis. We considered descriptions about general substance use as tobacco use descriptions only when an explanation was given within the chapter that specifically mentioned tobacco use.

Content analysis

We categorized the textbooks descriptions using 5 components defined according to WHO guidelines: (a) *consequences of tobacco use* (consequences such as heart disease and cancer); (b) *social norms* (norms to decrease social acceptability and correct overestimation of peers' smoking habits); (c) *reasons to use tobacco* (reasons such as a desire for acceptance and stress reduction); (d) *social influences* (influences that promote tobacco use through peers, family and the media); (e) *resistance skills* (skills to resist such social influences) (WHO & UNESCO, 1999). The WHO guidelines "Information Series on School Health, Tobacco Use Prevention" provide 6 components that summarize school-based strategies for preventing tobacco use among adolescents. Out of these, one component about life skills was excluded

from this study as we targeted content that was directly related to tobacco use. After categorizing the descriptions according to the 5 components, we developed sub-categories based on the WHO guidelines and evidence from previous research, then divided the descriptions into each sub-category.

In addition, we analyzed content in textbooks that contained interactive and non-interactive educational approaches (Tobler et al., 2000). We categorized the descriptions including instructions for discussing the issue in peer discussion groups as an interactive approach. All other descriptions including interrogative sentences were considered to be non-interactive approaches.

Results

Characteristics of the target textbooks

Among the 474 textbooks from 9 countries, 41 textbooks (8.6%) contained descriptions about prevention of tobacco use. Of these, 35 (85.4%) were for science-related subjects and 6 (14.6%) were for language or religious subjects (Table 1). In each country, at least one subject included content about tobacco use prevention, ranging from one subject in Sri Lanka (Health) to 4 subjects in Zambia (Science, Sociology, Technology, and English). Among the 41 textbooks, 4 (9.8%) applied interactive approaches in their descriptions of tobacco use

prevention, for example: discussion groups for discussing *the consequences of tobacco use* and *social norms* component in Zambian textbooks. Sixteen of the 41 textbooks (39.0%) contained descriptions outside the scope of 5 components, such as cessation of tobacco use.

The grade in which tobacco use prevention education was initiated varied widely among the target country. The median was grade 3, but ranged from grade one in Cambodia and Zambia to grade 8 in Sri Lanka (Table 2). While the *consequences of tobacco use* component was taught in more than 2 grades in all countries except for Sri Lanka, there was limited teaching of other components across multiple grades. The *social norms* component was taught in multiple grades in 5 countries, while *reasons to use tobacco* and *resistance skills* were each taught across multiple grades in only one country.

Characteristics of the textbook content

Among the 5 components of tobacco prevention education (Table 1), the average number of components referred to in any textbook was 3, ranging from 1 in Sri Lanka to 5 in Laos. The *consequences of tobacco use* component was contained in at least 1 textbook in all 9 countries; other components were only covered in some of the target countries. Regarding the distribution of each of the 5 components (Table 3), the *consequences of tobacco use* component was covered in 30 textbooks (73.2%) and the *social norms* component was covered in 19 textbooks (46.3%). The other 3 components were described in less than one-fifth of the