



TECHNICAL REPORT

A rapid evidence review of interventions for improving health literacy

Insights into health communication

ECDC TECHNICAL REPORT

A rapid evidence review of interventions for improving health literacy

Insights into health communication



**Clínica
Universidad
de Navarra**



This rapid evidence review was commissioned by the European Centre for Disease Prevention and Control (ECDC) as one of the outputs of the Framework Partnership Agreement Grant /2009/007 'Establishing a programme for dissemination of evidence-based health communication activities and innovations on communicable diseases for country support in the EU and EEA/EFTA, 2009–12', with a consortium of universities comprised of the Health Promotion Research Centre at the National University of Ireland Galway, as the lead coordinating centre, and the Institute for Social Marketing, University of Stirling, Scotland, and the University of Navarra Clinic, Pamplona, Spain.

This review was produced by Maureen D'Eath, Margaret M. Barry, Jane Sixsmith, Health Promotion Research Centre, National University of Ireland Galway.

The project was overseen by Ülla-Karin Nurm, Piotr Wysocki, Andrea Würz and Susana Barragan, Public Health Capacity and Communication Unit, ECDC.

Suggested citation: D'Eath M, Barry MM, Sixsmith J. Rapid Evidence Review of Interventions for Improving Health Literacy. Stockholm: ECDC; 2012.

Stockholm, May 2012

ISBN 978-92-9193-332-7

doi 10.2900/20189

© Copyright is held jointly by the members of the Translating Health Communications Project Consortium, 2012
Reproduction is authorised, provided the source is acknowledged.

Contents

Summary	1
Background.....	1
Aims.....	1
Findings.....	1
Conclusions.....	1
Introduction	2
Typology of interventions	3
Measurement	3
Methodology	5
Aims of the review	5
Scope of the review	5
Databases.....	5
Search strategy	5
Findings	6
Contexts	10
The studies	10
Quality assessment.....	11
Study design	11
Country	12
Study participants.....	12
Measures of literacy levels.....	12
Provider-focussed interventions	13
Disadvantaged/minority groups	13
Interventions.....	13
Health concerns	14
Outcomes	14
Reviewers' conclusion on studies.....	16
Cochrane review 2011	16
Conclusions.....	18
Identification of gaps in the evidence and recommendations for further research	18
References.....	19
Appendix	22
Three studies focussing on a communicable disease	22

Summary

Background

The promotion of health literacy is critical to active and informed participation in health and healthcare [1] and is identified as a key action to reduce health inequalities within the European Union [2]. Health literacy may be defined as a multi-level concept encompassing basic/functional literacy, communication/iterative literacy and critical literacy [3]. This paper reports on a rapid review of the evidence on the effectiveness of interventions to improve health literacy with a specific focus on communicable diseases and interventions for disadvantaged populations within the European region.

Aims

This review of reviews seeks to: identify and synthesise review-level evidence on effective strategies for improving health literacy, highlight gaps in the evidence and provide recommendations.

Findings

Five evidence reviews, published between the years 2000 and 2010, were identified. The vast majority of the intervention studies concerned written health information and/or use of other formats such as audiovisual material. The studies reviewed were predominantly located in North America and encompassed a very broad range of health concerns. No studies fell within the categories of low-literacy initiatives or targeted mass media campaigns. The only studies included in the reviews that referred to communicable diseases concerned HIV, and all three of these had medication adherence as an outcome of the intervention. The review exposed a paucity of research concerning disadvantaged or hard-to-reach groups.

Most interventions identified in the reviews focus on the functional level of health literacy and work at the traditional health education level. There is little evidence of interventions targeted at the interactive or critical levels of health literacy. Not all reviews identified whether the study results were stratified across literacy levels, but from those that did, it is clear that few of the studies provided this analysis. Without such information it is impossible to measure impacts on people with varying levels of health literacy and to effectively target interventions to reduce disparities and inequalities. Two of the five reviews reported on the quality assessment of the included studies. In one, only half the studies achieved the 'good' benchmark, while four of five did so in the other review. The lack of information from the other reviews leaves the issue of quality of evidence subject to uncertainty.

Conclusions

There are considerable gaps in the evidence reviewed concerning which interventions are most effective in improving health literacy, particularly with regard to communicable diseases and studies conducted in Europe. Further research is needed on the impact of health literacy interventions in the public health field, paying particular attention to evaluating communication about communicable diseases, and determining the most effective strategies for meeting the needs of population groups with low literacy levels, and those who are vulnerable, disadvantaged and hard to reach.

Introduction

Health literacy has been defined as the degree to which individuals have the capacity to obtain, process and understand the basic health information and services needed to make appropriate health decisions [4]. Health literacy is clearly linked to general literacy skills [5] but general literacy skills do not necessarily equip an individual for the complexity of literacy demands in the context of healthcare [6]. Health literacy also incorporates health numeracy which impacts a wide range of competencies from counting pills and counting calories to decision making with regard to risk and benefit [7]. The earliest definitions of health literacy focussed on the ability to read and understand information and instructions given in a medical context – a functional, clinical definition. However, definitions have evolved to reflect a broader and more empowering conceptualisation of health literacy. Nutbeam outlines a three-level definition expressing health literacy as not simply a measure of reading and writing skills but also as a strategy for empowerment [3]. Thus, Nutbeam proposes that health literacy comprises:

- **Basic/functional literacy** — sufficient basic skills in reading and writing to be able to function effectively in everyday situations;
- **Communicative/interactive literacy** — more advanced cognitive and literacy skills which, together with social skills, can be used to actively participate in everyday activities, to extract information and derive meaning from different forms of communication, and to apply new information to changing circumstances;
- **Critical literacy** — more advanced cognitive skills which, together with social skills, can be applied to critically analyse information and use this information to exert greater control over life events and situations [3].

Health literacy, therefore, can impact on disadvantage and health inequalities by empowering active and informed participation in healthcare [1].

Health literacy is dynamic, requiring an individual to discard outdated information and learn new information on an ongoing basis, and demands continuous involvement between the individual, healthcare providers and other community resources [5, 8]. An individual's health literacy may also change over their life course as their skills set becomes subject to different information processing demands. To reflect this, a recent Canadian Expert Panel adopted the following definition of health literacy:

The ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course [9].

Thus, health literacy demands not just the ability to read but the skills of listening, analysing and decision making and the ability to apply these skills in the health context [10]. The broader, more evolved definition of health literacy also locates the issue of health literacy not just with an individual but also with healthcare professionals, politicians and other policy makers, and with society. The US Department of Health and Human Services label the ability of healthcare professionals and organisations to enhance positive health outcomes by recognising 'the cultural beliefs, values, attitudes, traditions, language preferences, and health practices of diverse populations' as cultural competence [11]. Such cultural competence includes communication which is linguistically and culturally appropriate.

Rudd illustrates the limitations of enhancing an individual's functional health literacy without addressing the broader public health issues with regard to asthma prevention and management [12]. A functional approach to low health literacy may help an individual to manage their medication regime optimally, yet it leaves unaddressed the wider social and environmental triggers of the asthma. Thus, she argues:

Becoming aware of new findings, gathering information, participating in tenants' associations and involvement in community action groups require skills related to research, discussion, analysis, decision-making and action. Thus, as we explore this area and define needed skills, we must be sure to move beyond the realm of medical care and include action taken at home, at work, in the community and in the policy arena [12].

Inadequate health literacy limits the ability to access and use health information and act on public health alerts, and is associated with worse health outcomes [13]. Bankson argues that 'the inability to read and process health information is a matter of grave importance, not only to the patient, but to the state of public health' [14]. The importance of health literacy for health outcomes was equally emphasised by the European Commission in 2007 when it identified the promotion of health literacy as a key action to reduce health inequalities within the EU [15]. In response to the importance of health literacy, a number of countries have incorporated health literacy objectives into strategic national policies [16]. Expert respondents within a Scottish scoping study recommended that the concepts which underpin health literacy should be built into existing health improvement initiatives and programmes, because to pursue a separate policy would be counterproductive due to the complexity and diffuseness of the issues underpinning health literacy [16].

Much of the research on health literacy to date, has sought to measure levels of health literacy and, to a lesser extent, correlate levels of health literacy with health status. Identified consequences of low health literacy are manifold and include: lower health status; more frequent hospital visits and longer hospital stays; greater utilisation of emergency departments; poorer medication adherence and more frequent medication errors; less use

of preventative service and engagement in health-promoting behaviours; and a decreased ability to make appropriate health decisions, to communicate with health professionals and to share decision making [1; 5]. Although low health literacy impacts across the age, education and socioeconomic spectrums, minority and disadvantaged groups are particularly vulnerable. Low health literacy also extorts a high economic cost from individuals, healthcare systems and society as a whole.

Typology of interventions

The US Institute of Medicine identified three broad factors that contribute to health literacy and suggested that each of these factors could be utilised as potential settings for health literacy [4]. The factors were: health systems, culture and society, and the education system. Coulter & Ellins [1] used the 'health system' and 'culture and society' categories to classify health literacy interventions into four types, and give examples in each category:

- **Written health information interventions** include those designed to make written information more accessible to consumers by the use of plain language, targeted information, increased accessibility and increased readability. Coulter & Ellins give the example of a toolkit for producing patient information designed to offer practical advice, checklists and templates for providing written information for patients. This collaboration between the UK Department of Health, the Patient Information Forum, the Royal National Institute for the Blind and the Plain English Campaign is available from: www.nhsidentity.nhs.uk/patientinformationtoolkit.
- **Alternative format interventions** include those which use technologies such as computers, videos and/or audio tapes to support and enhance consumers' knowledge, as well as decision-making and problem-solving skills. Coulter & Ellins give the example of the Comprehensive Health Enhancement Support System (CHESS) a computer-based system developed in the University of Wisconsin-Madison's Center for Health Enhancement Systems Studies. It provides reliable, tailored, personalised health information and social support, as well as decision-making and problem-solving tools, in language that can be understood by most people. CHESS has been installed in community centres, health centres, workplaces and college dormitories, and individuals who are taking part in the project and who do not have a computer are lent one for a period of up to one year (http://chess.wisc.edu/chess/projects/about_chess.aspx).
- **Low-literacy initiatives** which may target specific populations or which may cover geographical areas. Coulter & Ellins give the example of the California Health Literacy Initiative, which describes itself as a 'groundbreaking, national model for health literacy' and the most complex state-wide health literacy initiative ever undertaken. It provides web-based health literacy resources to anyone wanting a clear understanding of health information (<http://literacyworks.org>).
- **Targeted mass media campaigns** are often designed around specific health behaviours such as sexual health promotion, alcohol intake or utilisation of health screening. In the UK, Developing Patient Partnerships was a collaboration between the Department of Health and the British Medical Association to design and conduct health education campaigns. Unfortunately it was forced to close down in 2008 when the Department of Health withdrew funding.

Health literacy can be framed in terms of the discipline from which it emerges and is often framed in a health-focussed approach such as the above. However, health literacy can also be approached from other perspectives, such as that of adult education or business. In 2006, the Canadian Public Health Association (CPHA) recognised that health literacy had become a component of the adult education curriculum in some US states and beyond, and noted the trend away from direct health content and towards the development of literacy skills required for health-related action [17]. Health literacy is also the focus of some corporate initiatives. The Centre for Corporate Responsibility (CSR), a European business network of more than 70 multinational corporations and 27 national partner organisations, established an initiative in October 2010 which embarked on a collaboration to explore ways of actively contributing to improving health literacy in Europe. Improved health literacy, CSR states, will help the private sector develop various programmes in this field in order to empower not 'only their employees, but society as a whole' [18].

Measurement

A number of countries – including Canada, the United States of America, the United Kingdom and Ireland – have conducted population-level surveys of health literacy. The first international survey has recently taken place in eight European countries as part of the European Health Literacy Survey (HLS-EU) (2010). The HLS-EU project includes in its objectives the development of a conceptual-based measurement instrument for health literacy and the development of national and regional structures that would translate the survey findings into political action (www.health-literacy.eu). However, most of the existing research in health literacy has taken place in clinical settings in North America, and at this level the most frequently used health literacy measurement tools are the Rapid Assessment of Literacy in Medicine (REALM) [19] and the Test of Functional Health Literacy in Adults (TOFHLA) [20]. Such measures are subject to criticism, including that they do not actually measure health literacy, only give an approximation of reading skills [9] and that they are incapable of assessing other important aspects of

health literacy, such as understanding, motivation and the ability of individuals to access or use information concerning health and healthcare [21]. The CPHA argues that reviews of interventions that focus on trials using a literacy measure eliminate from consideration the large body of work carried out with respect to chronic disease prevention and management. Waterton describes the work on measuring wider aspects of health literacy as being in its infancy [16].

Methodology

Aims of the review

This report comprises a review of reviews which aims to:

- identify and synthesise review-level evidence on strategies for improving health literacy; and
- highlight gaps in the evidence, and provide recommendations for research.

Scope of the review

This review initially sought to identify evidence reviews on health literacy interventions in Europe focusing on communicable diseases, including assessments and evaluations of programmes and interventions. A database search identified the absence of relevant literature, necessitating a widening of the search to reviews of health literacy interventions and activities internationally.

Databases

- **SCOPUS** – the world’s largest abstract and citation database of peer-reviewed literature and quality web sources
- **Web of Knowledge** – a citation indexing and search service covering the sciences, social sciences, arts and humanities
- **EBSCO** – the following databases, selected from the EBSCO database: Academic Search Complete, CINAHL, Health Source, Medline, Psychology and Behavioural Sciences Collection, SocIndex and ERIC
- **DARE** – the Database of Abstracts of Reviews of Effects
- **HealthComm Key** – a database containing comprehensive summaries from published peer-reviewed studies related to health communication
- **The Cochrane Library**.

Search strategy

- **Search terms included:** ('health literacy' OR 'health literacy activities' OR 'health communication') AND ('communicable disease' OR 'public health' OR 'health communication' OR influenza OR 'sexually transmitted diseases' OR HIV OR evidence OR campaign OR initiative OR pandemic OR infectious OR intervention)
- **Languages consulted:** English
- **Geographical spread:** initially Europe, latterly worldwide
- **Time frame:** 2000 –2011
- **Types of literature:** peer-reviewed literature from the databases above; the archives of the Journal of Health Communication were searched, as were the websites of ECDC and WHO. In addition, the reference lists and the citations of the retrieved documents were searched. The Agency for Healthcare Research and Quality (AHRQ) has commissioned an update of their 2004 systematic review of the impact of health literacy on health outcomes and of interventions implemented to improve health outcomes, to be published in 2011. A search was carried out of their preliminary list of citations for the review.
- **Relevance:** following the second, refined search, the relevance criteria was that it reviewed health literacy activities or interventions.

In response to the absence of literature pertaining to health literacy and communicable diseases, an additional search was undertaken using search terms specific to a particular infectious disease to test whether this strategy would identify literature which had not been identified in the earlier searches. Pubmed and Psyclit were searched using the terms 'health literacy' and 'immunisation/immunization', and 'health literacy and 'vaccination'. Six results were saved for review; none was relevant to this review.

Findings

Five relevant reviews, the summary details of which may be found in Table 1, were identified by the search:

- Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009) [22].
- DeWalt DA, Hink A (2009) [23].
- Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005) [24].
- Santo A, Laizner AM, Shohet L (2005) [25].
- Schaefer CT (2008) [26].

Table 1: Summary of reviews identified

Authors	Santo A, Laizner AM, Shohet L (2005). [25]	Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009). [22]	Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005). [24]	Schaefer CT (2008). [26]	DeWalt DA, Hink A (2009). [23]
Study aims	'Evaluate the efficacy of audiotapes as a health information exchange intervention, specifically looking for use with the 'hard-to-reach' population'.	'To evaluate the published literature of the effects of complex interventions intended to improve the health-related outcomes of individuals with limited literacy or numeracy'.	Systematic review of interventions designed to improve health outcomes for persons with low literacy.	To examine the effectiveness of experimental design intervention strategies related to health literacy.	'To review the relationship between parent and child literacy and child health outcomes and interventions designed to improve child health outcomes for children or parents with low literacy skills'.
Studies included	28 (only 24 listed in review without explanation, all 28 referred to in the discussion)	15	20	16 (but 17 listed in review)	Five reviews of interventions in a review that sourced 24 studies of related question
Study design	Randomised control trial (RCT) on efficacy of audiotapes (n=17). Non-randomised trial (n=1). Tandem assignment (n=1). Surveys (n=9).	Complex interventions: randomised and quasi-randomised. Randomised control trials (n=11). Quasi randomised control trials (n=4).	Randomised controlled trials (n=9). Non-randomised control trials (n=8). Uncontrolled single-group trials (n=3)	Randomised control trials (n=11). Non-randomised trial (n=1). Exploratory pilot intervention (n=1). Quasi experimental (n=1). Prospective observational (n=1). Quasi-experimental (n=1). Correlational descriptive (n=1).	Randomised control trial (n=2). Non-randomised control trial (n=2). Uncontrolled trial (n=1).
Dates of included studies	1976–2003	1997–2006	1992–2002	19972006	1996–2008
Number participants in study	34–632; Plus CAN_DIAL with 68 700 calls	40–2046	28–1 744	26–445	Not specified

Authors	Santo A, Laizner AM, Shohet L (2005). [25]	Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009). [22]	Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005). [24]	Schaefer CT (2008). [26]	DeWalt DA, Hink A (2009). [23]
Age of participants	Age not part of the criteria.	Included reviews whose participants were adults or adults consulting on behalf of dependents.	Not part of criteria.	Included reviews whose subjects were '12 years and older'.	Included interventions that focussed on paediatric health outcomes. Four of five included studies were with parents, one was with children.
Language exclusion criteria	Does not specify	No language restriction (one study Nepal but seems to be in English)	English only	English only	English
Geography as review criteria	Not specified.	Did not exclude developing countries.	Excluded developing world countries.	Not specified.	Studies had to be conducted in a developed country defined as the US, Canada, Western Europe, Japan, Australia or New Zealand.
Geographic spread of studies in review	Not specified	13/15 from North America	18 from USA, one from UK, one from Nepal	Not specified	All five from North America
Required a literacy measure to have been used	No	Not specified	Yes	Yes	Yes
Type of study required for review	RCTs 'given priority' also included descriptive articles and articles with a quasi-experimental design.	Review confined to complex interventions.	Used a controlled or uncontrolled experimental design.	Used a control and experimental group.	Used a controlled or uncontrolled experimental design.
Specified outcomes of interest for inclusion in review	Not specified	Yes, specified seven (including self-efficacy)	Yes, eight identified health outcomes	Did not specify	Yes, seven identified
Duration of interventions and follow-up	Not specified (in some studies, patients took recording home with them therefore it would appear that the intervention was as long as they made it).	In most studies (9/15) outcomes were measured in the intervention session or immediately afterwards. One study did not specify its follow-up period. The other five studies reported follow-up periods ranging from one week to 10.5 months with a median 5.5 months.	In most studies, interventions and outcome measurement took place in a single session.	Educational sessions which range from a single session to a year-long, intensive program with one-to-one session.	One study required children to attend a two-hour class weekly for six months and a five-day camp.
Studies which included numeracy	Not specified	Three	Not specified	Not specified	Not specified
Review assessment of quality of studies included	Not specified	Nine quality criteria set: five studies (of 15) met six or more five studies met three or fewer	Good: n=10 Fair: n=9 Poor: n=1	Not specified	Good: n=4 Fair: n=1

Authors	Santo A, Laizner AM, Shohet L (2005). [25]	Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009). [22]	Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005). [24]	Schaefer CT (2008). [26]	DeWalt DA, Hink A (2009). [23]
Focus of included studies	Audiotapes to record consultations and health-related information in specific health situations.	Those directed at health professionals (n=2) Literacy education (n=1) Health education/management interventions (n=12)	Easy-to-read printed materials (n=4) Video/ audiotapes (n=4) Computer-based programmes (n=3) Individual or group instructions (n=9)	Personal contact intervention (n=7) Multi-prong approach (n=2) Written material intervention (n=4) Computer intervention (n=3)	Directed at parents (n=4) Directed at children (n=1)
Health issues	Chemotherapy; cancer consultation recall; anxiety before sigmoidoscopy; anxiety – COPD; asthma self care; breast care exam; lower extremity reconstruction; stroke prevention; cardiac discharge information; cancer education; ocular malignancy; consultations advanced cancer; empowerment – prostate cancer; breast cancer; 'bad news' consultations; various cancer information/communication/recall; outpatients consultations	Hypertension; heart failure; colorectal cancer screening; nutrition education for cancer; cardiovascular disease prevention; medication adherence (chronic condition); understanding of medication; diabetes disease management; HIV medication adherence and knowledge; depression; hearing screening in newborns	Polio vaccine; cancer trial consent form; prostate cancer; colorectal cancer; cervical cancer screening; sleep apnea; labelling-emergency contraception; self-care cancer; breast self-exam; nutrition; medication adherence; mammography uptake; Head Start programme	Diabetes (n=3); HIV (n=3); breast cancer (n=1); congestive heart failure (n=1); prostate cancer (n=1); orthopaedic surgery (n=1); cancer screening (n=2); elderly (n=2); low income (n=2)	Polio vaccination; asthma; medication adherence
Outcomes measured	Knowledge/recall (n=12); behavioural change (1); anxiety (n=7); self-care (n=3);satisfaction (n=17)	Clinical outcomes (n=8); health knowledge (n=9); health behaviours (n=9); self-reported health status/QoL (n=2); health-related self-efficacy/confidence (n=7); utilisation of health care (n=4); health provider behaviour/skills (n=2)	Knowledge and comprehension (n=8); health behaviours (n=4); biochemical or biometric markers (n=2); preventative care (n=1); measures of disease incidence, prevalence or severity (n=2); health outcome (n=1)	Self-care (n=2); medication adherence and self-confidence re same; providers use of literacy strategies and perceptions of their effectiveness and impact on biomedical marker and screening; health knowledge; comprehension; behaviour change; discussion re vaccine; screening uptake	Recall of consent information; comprehension of vaccine information (n=2); caregivers medication errors, preparation and instrument use; asthma-related health service utilisation and improved self-efficacy re emergency department visits
Synthesised results of studies	Qualitative synthesis	Reviewers concluded that the diversity of measures and the range of time periods to follow-up rendered statistical aggregation of the findings, inappropriate. Therefore, narrative analysis was applied.	Qualitative synthesis	Qualitative synthesis	Qualitative synthesis

Authors	Santo A, Laizner AM, Shohet L (2005). [25]	Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009). [22]	Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005). [24]	Schaefer CT (2008). [26]	DeWalt DA, Hink A (2009). [23]
Hard-to-reach/ disadvantaged groups included	Initially review to focus on hard-to-reach groups but found no studies – studies systematically excluded hard to reach groups.	Not specifically discussed. Four studies limited to those with low levels of literacy/numeracy. Latino Spanish-speaking adults with HIV (n= 1). Hispanic adults enrolled in English as a second language classes (n=1). African-American adults (n=1).	One included study targeted older people and one targeted African Americans. However, reviewers commented that they found: ‘no studies examining whether interventions for patients with low literacy affected health disparities based on race, ethnicity, culture, or age’.	Review specifically excluded studies that ‘included subjects with physical or mental impairments’.	The review stated that many of the 24 studies reported attempting to adjust for age, socio-economic status, race/ethnicity; however no other reference was made.
Stratification across literacy levels	Does not specify (only two of the studies included participants with ‘low literacy’).	Four studies reported a sub-group analysis by literacy level.	Five of the controlled trials stratified.	Not specified	Only identifies that two of the five did. (Results demonstrate improvements across all levels of literacy but not a reduction in disparities).
Settings	Not specified	Outpatients (n=5). Community (n=3). Telephone and/or mail intervention with recruitment on outpatients (n=3). Maternity unit (n=1). Hospital pharmacy (n=1). Recruited in outpatients for intervention in community (n=1). Recruited in community for intervention in out-patients (n=1).	Not specified	Not specified	Not specified
Key findings	Apart from enhanced patient satisfaction, the benefits of audio taped messages: ‘remain unclear’.	Primary outcomes: statistically significant in 13/15 trials though 8 of these 13 had mixed results across primary outcomes. Two trials showed no significant positive finding in primary outcomes: One failed to show a significant improvement in health knowledge. One failed to show significant changes in cholesterol and blood pressure changes.	Diversity of range of outcomes limits conclusions about effectiveness though effectiveness ‘appeared mixed’. Limitations in research quality also hamper the drawing of conclusions. The five articles which concerned the interaction between literacy level and the effect of the intervention reported mixed results.		Improvements reported in health knowledge and health behaviours. No study reported a reduction ‘in the disparity between parents with low and higher literacy’ (p.272).

Authors	Santo A, Laizner AM, Shohet L (2005). [25]	Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009). [22]	Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005). [24]	Schaefer CT (2008). [26]	DeWalt DA, Hink A (2009). [23]
Review recommendations	With respect to health literacy, a large percentage of the population may be disadvantaged and health care practices must be inclusive of them. However, particular attention must be paid to populations with communication barriers and focussed research should investigate the value of recording health information and medical consultations.	Health related improvements were reported across all four intervention types, however, all interventions were complex interventions and it is not known which components of each initiative were effective. This, combined with the fact that some of the interventions were resource intensive, demands that future initiatives are carefully designed and based on sound theoretical and empirical underpinnings. The wider empowerment and community participation aspect of some of the interventions represent a welcome, broader approach to health literacy.	Research is needed to establish whether the link between low literacy and poor health outcomes is direct or indirect so as to most efficiently direct interventions. Results of interventions should be stratified by literacy level. Future studies should focus on intermediate or longer term outcomes rather than short-term knowledge outcomes or health behaviours. There is no research which has considered how interventions may impact on health disparities or care costs based on race, ethnicity, culture or age. Multi-component interventions should be analysed to establish efficacy and effectiveness.	Too little is yet known to establish 'best practice' in health literacy strategies and further research is needed to determine the effectiveness of interventions and to maximise their impact.	Too little is known about the relationship between health knowledge and behaviours to target interventions towards those most associated with positive health outcomes. Interventions should seek to reduce the outcome disparity between those with high and low health literacy as well as improve the outcomes for all.

By its nature, the investigation in a review of reviews is confined to the review reports and its quality is constrained by the quality of the reviews. A number of inconsistencies were noted in some of the reviews: one stated that it included 16 studies but listed 17 and another stated that it included 28 studies but tabled only 24 without explanation. In the report of another study, it was stated that the outcome was patient discussion of the pneumococcal vaccine with a physician, however, the intervention was listed as a nutritional sheet versus an information sheet on pneumococcal vaccine which would be an intuitively unlikely comparator. However, the confines of a review of reviews preclude drilling into these inconsistencies.

The findings will be presented under the heading of contexts, interventions, and outcomes, each with a number of subheadings. A closer examination of the only three studies that focussed on a communicable disease (HIV) is also presented in the Appendix.

Contexts

The studies

Four of the five reviews [22, 23, 24, 25] were described as systematic reviews; the fifth review was described as an integrated review. The studies included in the reviews were dated between 1976 and 2008 – a span of 32 years. The articles included in the five studies totalled to 84 (however, 81 studies were charted in the reviews), 13 were included in two or more reviews, and two of these were included in three of the five reviews.

Three of the five reviews used the English language as an inclusion criteria for the selection of studies included in their review and one did not specify. One review did not use a language criterion and includes a study from Nepal,

though this was published in English. Two of the reviews excluded studies conducted in the developing world and although one explicitly included such countries, only one study from the developing world is apparent.

Quality assessment

Two of the five reviews [25, 26] did not report what, if any, quality criteria were used to assess the studies included in the review. Three of the five reviews reported the quality criteria. The criterion used by two of the reviews was the same. These criteria and that of the third of the reporting reviews can be seen in Table 2 below.

Table 2: Review quality criteria

Pignone, et al. (2005) [24]	DeWalt, et al. (2009) [23]	Clement, et al. (2009) [22]
Adequacy of study population	Adequacy of study population	Method of randomisation performed
Comparability of subjects	Comparability of subjects	Treatment allocation concealed
Validity of the literacy measurement	Validity of the literacy measurement	Groups similar at baseline regarding important prognostic indicators
Reliability of the literacy measurement	Reliability of the literacy measurement	Eligibility criteria specified
Maintenance of comparable groups	Maintenance of comparable groups	Outcome assessor blinded for all primary outcomes
Appropriateness of the outcome measure	Appropriateness of the outcome measure	Point estimates and measure of variability given for all primary outcomes
Appropriateness of statistical analysis	Appropriateness of statistical analysis	Intention-to-treat analysis
Control of confounders	Control of confounders	<i>A priori</i> sample size calculation included
		Participant flow diagram included

- **Clement, et al. (2009):** Of the 15 studies in the review, three studies met five or more criteria and five met three or less. The least likely criteria to be met were blinding of outcome assessors and concealment of treatment allocation [22].
- **Pignone, et al. (2005):** Of the 19 studies included in the review, 10 were rated 'good', nine were rated 'fair' and one was rated 'poor' [24].
- **DeWalt & Hinks (2009):** Of the five studies in the review which were of relevance to this review, four were rated to be of 'good' quality and one was rated to be of 'fair' quality [23].

Study design

Three of the reviews only included studies that used a control and experimental group, another 'gave priority' to Randomised Control Trials (RCTs) but also included descriptive articles and articles with a quasi-experimental design. One review focussed only on complex interventions.

The designs of the studies included in the reviews were identified as:

- randomised control trials n=50;
- non-randomised control trials n=12;
- survey n=9;
- quasi-randomised control trials n=4;
- uncontrolled single group trials n=3 and n=1 tandem assignment trial;
- as well as exploratory pilot intervention, prospective observational trial, quasi-experimental trial, correlational descriptive study and uncontrolled study.

Three reviews required that specific outcomes should have been measured in the studies in order to be included in the review (see Table 3), two of these are almost identical and the other has a high level of overlap.

The intensity of the interventions covered by the reviews ranged widely. In many studies, such as those comparing adapted or low literacy-level written materials, or imparting information, there was only one contact point and no follow-up. Other interventions included numerous contact points and varying contact points within the intervention – the range of contact within one mental health intervention was between 0 and 72 hours. Some interventions

took place in a one-to-one format and some in a group session, and whereas many comprised a single session, others comprised intensive input over periods of time (12 months).

Table 3: Review study outcome criteria

Pignone, et al. (2005) [24]	DeWalt, et al. (2009) [23]	Clement, et al. (2009) [22]
Health knowledge, assessed by objective scale	Health knowledge, objectively assessed	Health knowledge
Health behaviours	Health behaviours	Health behaviours
Biochemical or biometric outcomes	Biochemical or biometric outcomes	Physical or psychological clinical outcomes
Measures of disease incidence, prevalence, morbidity and mortality	Measures of disease incidence, prevalence, morbidity and mortality	Self-efficacy/confidence relating to health/health behaviour
Self-reported general health status	Self-reported general health status	Self-reported health status/quality of life
Health service utilisation	Health services utilisation	Health service utilisation
Cost of care	Cost of care	Health professional behaviour
Interventions to reduce disparities in health outcomes on the basis of race, ethnicity, culture or age		

Country

A UK study relating to hearing screening for newborns in the UK and a study from Nepal relating to an intervention at a hospital pharmacy for patients with low literacy were included in the reviews. However, almost all the included studies emanate from North America, with most from the USA.

Study participants

Four of the five studies reported sample sizes for the included studies and these ranged from 26 to 2 046. One other study included 68 700 calls received to CAN-DIAL, a phone line for health education and cancer control, and included the use of audiotapes [27]. The review of paediatric interventions did not give participant numbers.

Two studies included in the reviews focussed on healthcare providers rather than, or as well as, users of the health services.

One review focussed only on children and the parents of children, whereas the other four specifically excluded studies whose participants were aged less than 18 years of age.

Measures of literacy levels

Three of the reviews required eligible studies to have used a literacy measure within the intervention. In another there was no such requirement, although most (11/16) of the interventions did use such a measure. The fifth review focussed on interventions that used audiotapes, and such interventions had outcome variables that included increased knowledge or recall, behaviour change and/or reductions in anxiety, rather than changes in literacy as measured by literacy measures. The literacy measures used in the interventions in the reviews were:

- the **Rapid Estimate of Adult Literacy in Medicine** (REALM) – a word recognition screening test of common medical words or lay terms for parts of the body or illnesses – cited in 25 of the reports of the interventions (overlaps not counted);
- the **Test of Functional Health Literacy in Adults** (TOFHLA) and the truncated version of this test (s-TOFHLA) – cited in 10 articles;
- the **Wide Range Achievement Test** (WRAT), which has a version applicable to 5–11 year olds – cited in six; and
- the **Adult Basic Learning Examination** (ABLE) – cited in three studies.

Seven other measures were cited in studies included in the reviews. Although many studies used the same measure, the comparability of these studies is reduced due to the lack of a consistent threshold to define low health literacy.

Provider-focussed interventions

Two of the reviews included studies focussing on healthcare providers [26, 22]. Schaefer reports that:

- in a RCT wherein the intervention group providers were informed of their patients' health literacy levels, they were more likely to use low health-literacy management strategies and less likely to feel that they were effective during the consultation [28];
- a RCT identified a significantly increased rate of adherence to colorectal cancer screening among patients whose healthcare providers attended workshops and training on colorectal cancer screening including enhancing communication with patients with low health literacy [29].

Disadvantaged/minority groups

People with low levels of literacy may be considered a disadvantaged group *per se*, however, there is little evidence of the specific inclusion of disadvantaged or hard-to-reach groups in any of the reviews. Schaefer excluded studies that included people with mental or physical disabilities [26]. Santo, et al. designed their review to focus on the use of audiotapes with 'hard to reach' groups but broadened their review after failing to find any relevant studies [25]. Indeed, Santo, et al. reported that such 'hard to reach' groups were often excluded from the interventions. DeWalt & Hink identified that some of the 24 studies in the review attempted to adjust for age, socioeconomic status and/or race/ethnicity, but it is not clear whether this was the case in the five studies that were relevant to this review [23]. Pignone, et al. stated that they found no studies which examined whether interventions delivered to individuals with low literacy impacted health disparities based on race/ethnicity, culture or age [24].

Within the studies included in the reviews, some specifically indicate that the target group involved in the interventions had defining characteristics such as 'African-American' or 'Latino-speaking' or 'Hispanic adults'. However, there is no indication that these target groups have been chosen because they were perceived to be disadvantaged.

Interventions

The types of interventions included in the reviews were diverse and are presented in Table 4 according to the focus ascribed to them in each review.

Table 4: Types of interventions included in the reviews

	Santo A, Laizner AM, Shohet L (2005) [25]	Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009) [22]	Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005) [24]	Schaefer CT (2008) [26]	DeWalt DA, Hink A (2009) [23]
Focus of included studies	Audiotapes to record consultations and health-related information in specific health situations	Those directed at health professionals (n=2) Literacy education (n=1) Health education/management interventions (n=12)	Easy-to-read printed materials (n=4) Video/audiotapes (n=4) Computer-based programmes (n=3) Individual or group instructions (n=9 studies)	Personal contact intervention (n=7) Multi-prong approach (n=2) Written material intervention (n=4) Computer interventions (n=3)	Easy-to-read brochures for parents/care-givers (n=2) Modified print, video and computer information for parental consent purposes (n=1) Picture-based instructions and teach-back counselling for parents of children taking medication (n=1) Classes and summer camp for asthmatic children (n=1)

The intensity of the interventions ranged considerably from a one session intervention to an intensive education programme over one year, and from group interventions to one-to-one interventions.

Two studies were directed at health professionals, four studies at parents, and one study was directed at children. The interventions included in the reviews spanned a range of strategies. One review focussed exclusively on the use of audiotapes and another included interventions that used video/audiotapes, others included individual and group instructions, health education/management interventions and easy-to-read printed materials.

If the studies included in the reviews are considered within the framework suggested by Coulter and Ellins, it is clear that some types of interventions are absent and others are notable for their diversity [1]. None of the studies fall within the categories of 'low literacy initiatives' as exemplified by Coulter and Ellins or within the 'targeted mass media campaign' category. Many studies can be placed within the 'written health information category' including:

- one designed to assess the differential comprehensibility of a consent form taken from a 16th grade reading level to a seventh grade reading level [30]; and
- one focussing on the labelling on an over-the-counter emergency contraception package [31].

Likewise, many studies fall within the Alternative Format Responses category, with one review focussing exclusively on these. Studies within this category include:

- a study which focussed on the impact of information given in an oncology outpatient clinic through handouts and audiotapes, versus handouts alone and usual care [32]; and
- the knowledge impacts of a CD-ROM for patients newly diagnosed with prostate cancer [33].

Health concerns

The reviews encompassed a very broad range of health concerns, presented below in Table 5.

Table 5: Health topics addressed in the reviews

	Santo A, Laizner AM, Shohet L (2005) [25]	Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G (2009) [22]	Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN (2005) [24]	Schaefer CT (2008) [26]	DeWalt DA, Hink A (2009) [23]
Health areas	chemotherapy; cancer consultations: recall, breaking bad news & communication, information; anxiety due to sigmoidoscopy; anxiety due to chronic obstructive pulmonary disease (COPD); asthma self care; breast care exam; lower-extremity reconstruction; stroke prevention; cardiac-discharge information; prostate cancer; outpatient consultations	Hypertension; heart failure; colorectal cancer screening; nutrition education for cancer; cardiovascular disease prevention; medication adherence (chronic condition); understanding of medication; diabetes disease management; HIV medication adherence and knowledge; depression; hearing screening in newborns	polio vaccine; cancer-trial consent form; prostate cancer; colorectal cancer; cervical cancer screening; sleep apnea; labelling-emergency contraception; self-care cancer; breast self-exam; nutrition; medication adherence; mammography uptake; family support programme	Diabetes; HIV; breast cancer; congestive heart failure; prostate cancer; orthopaedic surgery; cancer screening; elderly; low income	polio vaccination; asthma; medication adherence

Cancer was the focus of many of the interventions but with a multiplicity of approaches including screening, preparation for screening and consultations about cancer. Chronic diseases such as asthma and diabetes also featured frequently as did medication adherence for such conditions. No reviews included interventions for communicable or infectious diseases. In fact, the reviews only included three studies focussing on communicable disease – all three studies are concerned with HIV and all are included in the same review. Details of these three interventions are presented in the Appendix.

Outcomes

The outcomes of the interventions are categorised according to those outcomes that were measured in four of the five reviews, and an overview of the findings are presented below:

- **Health knowledge/recall or comprehension assessed by objective scale:** the review of interventions of audiotapes reported that of the 12 studies included in the review, 10 found some significant results. Across the other reviews, the results were mixed. Clement, et al. state that health knowledge and health-related self-efficacy were the outcomes that were most likely to show improvement. Four of the nine

studies in that review reported that the intervention group had significantly better outcomes than the control group, with another four reporting no significant outcomes and one reporting mixed outcomes [22]. The four studies showing significant results for this outcome included:

- a one-contact hospital pharmacy-delivered intervention in Nepal [34];
 - a six-month (11 contacts) heart failure self-management education intervention delivered by a clinical pharmacist and a health educator [35];
 - a 12-month (17 contacts) intervention addressing the barriers experienced by adults with poorly controlled diabetes, which was delivered by a pharmacist and a diabetes care coordinator [36,37]; and
 - an 18-week (12 contacts) low fat nutrition education intervention delivered to adults attending an adult education class and delivered by nutrition professionals [38].
- **Health behaviours/self care:** 19 studies in the reviews considered this outcome and most reported mixed outcomes. The studies that reported positive findings included:
 - following a low-literacy pamphlet intervention, women performed more accurate breast examinations on silicone breast models [39];
 - a six-month (11 contacts) heart failure self-management education intervention delivered by a clinical pharmacist and a health educator [35];
 - an intervention utilising picture-based instructions and counselling which reported that participants were significantly more likely to use a standardised dosing instrument, and were significantly less likely to report incorrect medication preparation or to make dosing errors [40];
 - informational audiotapes significantly improved self-care behaviours of patients having radiotherapy [41];
 - the recovery outcomes after coronary artery bypass surgery were significantly enhanced in an intervention group who received their discharge information by audiotape [42];
 - an instructional audiotape significantly improving women's breast examination proficiency [43];
 - men, newly diagnosed with prostate cancer, who received both written and audio-taped instructions took a significantly more active role in their treatment [44];
 - participants with low literacy reduced the contribution of fats to their overall calorie intake following six specially designed nutrition classes [38].
 - **Biochemical or biometric outcomes:** one review included two studies which demonstrated small or no improvement in blood pressure, cholesterol or lipids levels after nutrition interventions. Eight studies were included in another review – four studies reported no significant outcomes, two studies reported mixed outcomes and two reported significant outcomes:
 - A six-month (11 contacts) heart failure self-management education intervention delivered by a clinical pharmacist and a health educator [35].
 - A 12-month education programme for adults with depressive symptoms comprising one contact plus varying contact between 0 and 72 extra hours [45].
 - Nutrition education for African-American women with limited literacy comprising eight contacts over 12 months with follow-up at 4, 8 and 12 months [46].
 - A one-on-one intensive diabetes management education intervention reported significant improvements in diabetic biochemical markers in patients with lower health literacy [36].
 - **Measures of disease incidence, prevalence, morbidity and mortality:** one study compared a comprehensive family support service with the standard Head Start¹ provision and reported improved parental reading skills and reduced prevalence of parental depression [47].
 - **Self-reported general health status/quality of life:** two studies reported this outcome and neither reported significant results [35, 48].
 - **Cost of care:** the reviews contained no studies that reported cost of care as an outcome.
 - **Health services utilisation:** four studies reported a significant outcome under this heading:
 - Mammogram uptake was significantly higher in an intervention group that received a video-based coaching tool in addition to verbal recommendation or verbal recommendation plus brochure. However, this significance was only found at six months but not at 24 months [49].
 - Male veterans who received simplified brochures, simplified instructions and a video, plus an 18-month follow-up, had significantly higher rates of colorectal screening [29].
 - Weekly two-hour literacy and education classes over six month, plus a five-day camp for children with asthma, significantly reduced their asthma-related visits to Emergency Departments [50].
 - Older people with chronic health conditions who were given information at fifth grade reading level were significantly more likely to discuss pneumococcal vaccination [51].

¹ In the US, Head Start is a federally funded, comprehensive support programme to boost the school readiness of low-income children. It provides medical, dental, and mental healthcare alongside family support and pre-school education (US Department of Health and Human Services, Administration for Children and Families, January 2010).

- **Interventions to reduce disparities in health outcomes on the basis of race, ethnicity, culture or age:** the reviews contained no studies that reported on these outcomes.
- **Self-efficacy/confidence relating to health/health behaviour:** one review included one study reporting such outcomes and one review included seven studies of which three reported significant outcomes:
 - Weekly two-hour literacy and education classes over six months plus a five-day camp improved the self-efficacy of children with asthma [50].
 - A six-month (11 contacts) heart failure self-management education intervention delivered by a clinical pharmacist and a health educator [35].
 - An 18-week (12 contacts) low-fat nutrition education intervention delivered to adults attending an adult education class and delivered by nutrition professionals [38].
 - A 24-month (12 contacts) telephone intervention directed towards veterans with hypertension [52].
- **Health professional behaviour/skills:** two studies reported this outcome:
 - Patients of professionals who attended a workshop, and four group sessions on colorectal screening and communication with people with low literacy, were significantly more likely to present for colorectal screening [29].
 - In a study in which physicians were alerted to a diabetic patient's low literacy status, the physicians reported significantly less satisfaction with the consultation than the control group physicians [28].
- **Satisfaction or helpfulness of the intervention:** of the 24 studies in the review of audiotape interventions, 17 tested satisfaction as an outcome and four reported the significance level [53, 41, 54, 55].

Most commonly, the evidence reviewed reported effects on knowledge and comprehension as an outcome with fewer including health behaviours or health service utilisation or health/clinical outcomes.

Reviewers' conclusion on studies

The review which focussed on audiotapes concluded that 'with the exception of positive patient satisfaction, the benefits of audio taped messages remain unclear' [25]. The review reported consistently high levels of patient satisfaction but inconclusive evidence as to whether audio-taped messages improved either health knowledge or health behaviour.

Pignone, et al.'s review concluded that the effectiveness of the interventions 'appeared mixed' but noted that the variable research quality and the heterogeneity in outcome measures limit the scope for drawing firm conclusions regarding the effectiveness of the intervention strategies [24]. The reviewers assessed 10 of the included interventions as of good quality, nine as of fair quality and one as of poor quality.

The review that focussed on interventions to improve health outcomes for children identified improved health knowledge and behaviours across all levels of literacy, but did not identify a reduction in the disparity between participants with high levels of literacy and those with low levels [23]. The review assessed four of the five interventions as of good quality and one as of fair quality.

Clement, et al.'s review of complex interventions concluded that 'a wide variety of complex interventions for adults with limited literacy are able to improve some health-related outcomes' and identified that knowledge and self-efficacy were the outcomes most likely to show significant improvement [22].

Schaefer concluded that there is a need for further research to assess the effectiveness of health literacy strategies and determine best practice [26].

Cochrane review 2011

In June 2011, after the literature search for this review was concluded, the Cochrane Collaboration published a systematic review of 'Interventions for enhancing consumers' online health literacy [56]. Although it is not possible to incorporate this research into this current review, it will be referred to here in order to maximise completeness. The objective of the Cochrane review was to assess the effects of interventions designed to enhance online literacy in terms of the skills required to search, evaluate and use online health information. Following a search strategy that returned 41,225 citations, only two studies met the criteria for inclusion in the review:

- Cortner D (2006) [57].
- Kalichman SC, Cherry C, Cain D, Pope H, Kalichman M, Eaton L, et al. (2006) [58].

Both interventions were located in North America and both sought to enhance online health literacy through adult education classes. Key characteristics of the studies are listed in Table 6 below:

Table 6: Characteristics of Cochrane review on interventions for online health literacy

	Kalichman SC, et al. (2006) [57]	Cortner D (2006) [58]
Design	Randomised control trial	Two-group controlled before and after study
Participants	HIV-positive adults Intervention: n=217 Control: n= 231	Adults with basic internet knowledge aged 60+. Intervention: n=11 Control: n=11
Literacy measure	TOFHLA	None
Intervention	Skills-based educational intervention 8 X two-hour session	Adult education internet classes 4 X 90-minute classes
Outcome measured	Self-efficacy for information seeking Health information evaluation skills Use of the internet Information seeking coping Social support Affective depression	Individual readiness to adopt the internet as a tool for preventive health information as measured by a self-report questionnaire

Car, et al (2011) [56].

The Cochrane review [56] concluded that there was:

Low quality evidence that these interventions improve aspects of online health literacy, specifically regarding the outcomes of 'self efficacy for health information seeking', 'health information evaluation skills', 'number of times the patient discussed online information with a health care provider' and 'readiness to adopt the internet as a tool for preventive health information'.

The lack of studies in the area, and the variable methodological quality of the two included in the review, precluded any conclusions about the effects of such interventions for online health literacy. The authors recommended that high-quality studies, particularly a randomised control trial, should be designed to investigate the effects of such interventions.

Conclusions

The diversity of interventions included in the reviews, the categorisation of outcomes, and the information provided within, intrinsically limits the potential to draw firm conclusions; however, some points can be made.

There is a paucity of studies that reported on interventions relating to communicable disease. The only studies included in the reviews that referred to communicable diseases concerned HIV and all three had medication adherence as an outcome of the intervention. Medication adherence has been documented as a serious issue in communicable diseases such as HIV and TB and these studies may, therefore, have particular relevance. However, this focus is limited and only one of the three studies reported significant benefits deriving from the intervention.

Although all reviews include interventions that indicate positive and/or significant improvements, the outcome measured was often that of knowledge rather than health outcomes. Clement, et al. [22] and Pignone, et al. [24], argue that although health knowledge and health behaviour are important, it is also the case that improvements to these do not always translate into improvements in health, health services utilisation or in disease prevalence. Pignone, et al. [24] also conclude that:

No research to date has examined how interventions affect the general health status of persons with low literacy or whether interventions can affect health care costs or health disparities based on race, ethnicity, culture, or age.

It is also the case that most of the interventions identified in the reviews focus on the functional level of health literacy and work at the traditional health education level. There is little evidence of interventions targeted at the interactive or critical levels of health literacy with skill development and opportunities based, for example, in schools or communities.

Not all reviews identified whether the study results were stratified across literacy levels but, from those that did, it is clear that few of the studies provided this analysis. Without such information it is impossible to measure impacts on people with varying levels of health literacy and to effectively target interventions to reduce disparities and inequalities.

Given that such a large majority of the trials were located in North America, and more specifically in the USA, the reviews may only be generalised in a limited way to other contexts and health systems.

Three of the five reviews reported on quality assessment of the studies included. In one of these, only half the studies achieved the 'good' benchmark while in another only one third of the studies met six or more of the nine criteria and the same number met three or less. In the third review, four of the five studies received a rating of 'good'. These results, and the lack of information from the other reviews, leave the issue of quality subject to uncertainty and render conclusions invidious.

The review exposed a paucity of research involving disadvantaged or hard-to-reach groups and there is some evidence that some such groups may have been specifically excluded from interventions.

Identification of gaps in the evidence and recommendations for further research

Clearly, there are considerable gaps in the research evidence concerning which interventions are most effective in improving health literacy, particularly with regard to communicable diseases and studies conducted in Europe. There is a need for European research to study the issues of health literacy in a European context, and to explore how possible it is to generalise existing North American research to a European context. Even within the North American context, there is an almost complete absence of published research on interventions concerning communicable diseases, and the significance of health literacy in this realm demands that this should become a priority research issue. The development of measures of health literacy at a level other than that of functional literacy is fundamental to any progression of health literacy beyond the limits of the conceptualisation of health literacy as reflected in this review.

In addition, future research is needed on the following research areas:

- the impact of health literacy interventions in the public health field, paying particular attention to evaluating communication about communicable diseases
- evaluating the most effective strategies for meeting the needs of population groups with low literacy levels
- the most effective way of delivering health information and education to vulnerable, disadvantaged and hard-to-reach groups
- reliable measures of the impact of health literacy on health status, health behaviours and knowledge, health motivation and self-efficacy, and health service utilisation
- studies evaluating the relative effectiveness of different approaches to improving health literacy, including mass media campaigns combined with other strategies
- the cost-effectiveness of health-literacy strategies.

References

1. Coulter A, Ellins J. Patient-focussed interventions. A review of the evidence. London: Picker Institute Europe 2006.
2. Commission of the European Communities. Together for Health: A Strategic Approach for the EU 2008-2013. Brussels: European Union; 2007.
3. Nutbeam D. Health literacy as a public health goal: a challenge for contemporary health and education and communication strategies into the 21st century. *Health Promotion International* 2000;15(3):259-67.
4. Institute of Medicine. Health Literacy: A prescription to end confusion. Washington; 2004.
5. Kickbusch I, Wait S, Maag D. Navigating health: The role of health literacy: Healthy Choices Forum; 2008.
6. Ishikawa H, Kiuchi T. Health literacy and health communication. *Biopsychosocial Medicine*. 2010;4(18).
7. Hackney J, Weaver T, Pack A. Health literacy and sleep disorder: A Review. *Sleep Medicine Reviews*. 2008;12:143-51.
8. European Health Policy Forum. Recommendations on Health Information. Brussels; 2005.
9. Rootman I, Gordon-El-Bihbety D. A Vision for a Literate Canada. Ontario: Canadian Public Health Association; 2008.
10. Glassman P. Health Literacy. 2010 [cited 12 January 2010]: Available from: <http://nrlm.gov/outreach/consumer/hlthlit.html>.
11. U.S. Department of Health and Human Services. National Standards for Culturally and Linguistically Appropriate Services in Health Care. Washington, DC: Office of Minority Health; 2001.
12. Rudd RE. A maturing partnership. Focus on the basics [serial on the Internet]. 2002: [cited March 2011] Available from: <http://ncsall.gse.harvard.edu/fob/202/rudd.html>.
13. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. National Action Plan to Improve Health Literacy. Washington, DC: Author; 2010.
14. Bankson H. Health literacy: an exploratory bibliometric analysis, 1997-2007 *Journal of the Medical Library Association*. 2009;97(2).
15. Commission of the European Communities. Together for Health: A Strategic Approach for the EU 2008-2013 2007 [cited 23 February 2011]: Available from: http://ec.europa.eu/health/ph_overview/Documents/strategy_wp_en.pdf.
16. Waterton JW. Consultancy. Health Literacy - A Scoping Study Final Report. Edinburgh: The Scottish Government; 2009.
17. Canadian Public Health Association. Health Literacy Interventions. 2006 [cited 9 February 2011]: Available from: http://www.cpha.ca/uploads/portals/h-l/interventions_e.pdf.
18. Centre for Corporate Responsibility. 2011 [cited 9 February 2011] Available from http://www.csreurope.org/pages/en/health_literacy_improving_health_knowledge_among_our_employees_and_our_communities.html.
19. Davis T, Long S, Jackson R, Mayeaux E, George R, Murphy P, et al. Rapid Estimate of Adult Literacy in Medicine: A Shortened Screening Instrument. *Journal of the National Cancer Institute*. 1993;90:668-74.
20. Baker DW, Williams MV, Parker RM, Gazmararian GA, Nurss J. Development of a brief test to measure functional health literacy. *Patient Education and Counseling*. 1999;38:33-42.
21. Easton P, Entwistle V, Williams B. Health in the 'hidden population' of people with low literacy. A systematic review of the literature. *BMC Public Health* [serial on the Internet]. 2010 [cited 15 December 2010]; 10(459): Available from: <http://www.biomedcentral.com/1471-2458/10/459>.
22. Clement S, Ibrahim S, Crichton N, Wolf M, Rowlands G. Complex interventions to improve the health of people with limited literacy: A systematic review. *Patient Education and Counseling* 2009;75(3):340-51.
23. DeWalt DA, Hink A. Health Literacy and Child Health Outcomes: A Systematic Review of the Literature. *Pediatrics*. 2009;124:S265-S74.
24. Pignone M, DeWalt DA, Sheridan S, Berkman N, Lohr KN. Interventions to Improve Health Outcomes for Patients with Low Literacy. *JGIM: Journal of General Internal Medicine: Springer Science & Business Media B.V.* 2005;20:185-92.
25. Santo A, Laizner AM, Shohet L. Exploring the value of audiotapes for health literacy: a systematic review. *Patient Education and Counseling*. 2005;58(3):235-43.
26. Schaefer CT. Integrated Review of Health Literacy Interventions. *Orthopaedic Nursing*. 2008 Sep-Oct;27(5):302-17.
27. Wilkinson G, Mirand E, Graham S. CAN-DIAL An experiment in health education and cancer control. *Public Health Rep*. 1976;91:218-22.
28. Seligman HK, Wang FF, Palacios JL, Wilson CC, Daher C, Piette JD. Physician notification of their diabetes patients' limited health literacy. A randomised, controlled trial. *Journal of General Internal Medicine*. 2005;20(11):1001-7.
29. Ferreira MR, Dolan NC, Fitzgibbon ML, Davis TC, Gorby N, Ladewski L. Health care provider-directed intervention to increase colorectal cancer screening among veterans: Results of a randomised controlled trial. *Journal of Clinical Oncology*. 2005;23(7):1548-54.
30. Davis T, Berkel H, Arnold C, Nandy I, Jackson R, Murphy P. Intervention to Increase Mammography Utilisation in a Public Hospital. *Journal of General Internal Medicine*. 1998;13(4):230-3.

31. Raymond E, Dalebout S, Camp S. Comprehension of a prototype over-the-counter label for emergency contraceptive pill product. *Obstetrics and Gynaecology*. 2002;100:342-9.
32. Reynolds PM, Sanson-Fisher RW, Poole AD, Harker J, Byrne M. Cancer and communication: information-giving in an oncology clinic. *British Medical Journal*. 1981;282:1449-51.
33. Kim SP, Knight SJ, Tomori C, Colella KM, Schoor RA, Shih L, et al. Health literacy and shared decision making for prostate cancer patients with low socioeconomic status. *Cancer Investigation*. 2001;19:684-91.
34. McKellar A, Rutland-Brown W. Using community medical auxiliary trainees to improve dose understanding among illiterate hospital outpatients in rural Nepal. *Tropical Doctor*. 2005;35:17-18.
35. DeWalt DA, Malone RM, Bryant ME, Kosnar MC, Corr KE, Rothman RL, et al. A heart failure self-management program for patients of all literacy levels: A randomised, control trial. *BMC Health Services Research* 2006;6(30).
36. Rothman RL, DeWalt DA, Malone R, Bryant B, Shintani A, Crigler B, et al. Influence of patient literacy on the effectiveness of a primary care-based diabetes disease management program. *Journal of the American Medical Association*. 2004;292:1711-6.
37. Rothman RL, Malone R, Bryant B, Shintani A, Crigler B, DeWalt DA, et al. A randomized trial of a primary care-based disease management program to improve cardiovascular risk factors and glycated hemoglobin levels in patients with diabetes. *Journal of the American Medical Association*. 2005;118:276-84.
38. Howard-Pitney B, Winkleby MA, Albright CL, Bruce B, Fortnam SP. The Stanford Nutrition Action Program: a dietary fat intervention for low-literacy adults. *American Journal of Public Health*. 1997;87:1971-6.
39. Coleman EA, Coon S, Mohrmann C, Hardin S, Stewart B, Gibson RS, et al. Developing and testing lay literature about breast cancer screening for African American women. *Clinical Journal of Oncology Nursing*. 2003; Jan-Feb;7(1):66-71.
40. Yin HS, Dreyer BP, van Schaick L, Foltin GL, Dinglas C, Mendolson AL. Randomized controlled trial of a pictogram-based intervention to reduce liquid medication dosing errors and improve adherence among caregivers of young children. *Archives of Pediatrics & Adolescent Medicine*. 2008;162(9):814-22.
41. Hagopian G. The effects of informational audiotapes on knowledge and self-care behaviors of patients undergoing radiation therapy. *Archives of Family Medicine*. 1996;23:697-700.
42. Moore S. The effects of a discharge information intervention on recovery outcomes following coronary artery bypass surgery. *International Journal of Nursing Studies*. 1996;33(2).
43. Jones JA, Eckhardt LE, Mayer JA, Bartholomew S, Malcarne VL, Hovell MF et al. The effects of an instructional audiotape on breast self-examination proficiency. *Journal of Behavioral*. 1993;16(2):225-35.
44. Davison B, Degner L. Empowerment of men newly diagnosed with prostate cancer. *Cancer Nursing*. 1997;20(3):187-96.
45. Weiss BD, Francis L, Senf JH, Heist K, Hargraves R. Literacy Education as a treatment for Depression in Patients with Limited Literacy and Depression: A Randomized Controlled Trial. *Journal of General Internal Medicine*. 2006;21(8):823-8.
46. Kumanyika S, Adams-Campbell L, Horn BV, Have TT, Treu J, Askov E et al. Outcomes of a Cardiovascular Nutrition Counseling Program in African-Americans with Elevated Blood Pressure of Cholesterol. *Journal of the American Dietetic Association*. 1999;99(11):1380-8.
47. Poresky R, Daniels A. Two-year comparison of income, education, and depression among parents participating in regular Head Start or supplementary family service center services. *Psychological Report*. 2001;88:787-96.
48. van Servellen G, Carpio F, Lopez M, Garcia-Teague L, Herrera G, Monterrosa F et al. Program to Enhance Health Literacy and Treatment Adherence in Low-Income HIV Infected Latino Men and Women. *AIDS Patient Care and STDs*. 2003;17(11):581-94.
49. Davis T, Berkel H, Arnold C, Nandy I, Jackson R, Murphy P. Intervention to Increase Mammography Utilisation in a Public Hospital. *Journal of General Internal Medicine*. 1998;13(4):230-3.
50. Robinson L, Calmes D, Bazargan M. The impact of literacy enhancement on asthma-related outcomes among underserved children. *Journal Natural Medicine Association*. 2008;100(8):892-6.
51. Jacobson T, Thomas D, Morton F, Offutt G, Shevlin J, Ray S. Use of Low-Literacy Patient Education Tool to Enhance Pneumococcal Vaccination Rates. *JAMA: The Journal of the American Medical Association*. 1999;282(7):646-50.
52. Bosworth HB, Olsen MK, Gentry P, Orr M, Dudley T, McCant F, et al. Nurse administered telephone intervention for blood pressure control: a patient-tailored multifactorial intervention. *Patient Education and Counseling*. 2005;57(1):5-15.
53. Dunn S, Butow P, Tattersall M, Jones Q, Sheldon J, Taylor J, et al. General information tapes inhibit recall of the cancer consultation. *Journal of Clinical Oncology*. 1993;11(11):2279-85.
54. Bruera E, Pituskin E, Calder K, Neumann C, Hanson J. The addition of an audiocassette recording of a consultation to written recommendations for patients with advanced cancer. *John Wiley & Sons Inc*. 1999.
55. Ong LML, Visser MRM, Lammes FB, Velden Jvd, Kuenen BC, Haes JC. Effect of Providing Cancer Patients with the Audiotaped Initial Consultation of Satisfaction, Recall and Quality of Life: A Randomised, Double-Blind Study. *Journal of Clinical Oncology*. 2000;18(16):3050-60.
56. Car J, Lang B, Colledge A, Ung C, Majeed A. Interventions for enhancing consumers' online health literacy. *Cochrane Database of Systematic Reviews* 2011, Issue 6. Art. No.: CD007092. DOI: 10.1002/14651858.CD007092.pub2.
57. Cortner D. Stages of Internet adoption in preventive health: an exploratory diffusion of a community-based learning venues for 50+ adults. United States: Capella University;2006.

58. Kalichman S, Cherry C, Cain D, Pope H, Kalichman M, Eaton L, et al. Internet-based health information consumer skills intervention for people living with HIV/AIDS. *Journal of Consulting and Clinical Psychology*. 2006;74(3):545-54.
59. Kalichman S, Cherry J, Cain D. Nurse delivered antiretroviral treatment adherence intervention for people with low literacy skills and living with HIV/AIDS. *Journal of the Association of Nurses in AIDS Care*. 2005;16:3-15.
60. Holzemer WL, Bakken S, Portillo CJ, Grimes R, Welch J, et al. Testing a nurse-tailored HIV medication adherence intervention. *Nurse Research*. 2006;55(3):189-97.

Appendix

Three studies focussing on a communicable disease

The earliest intent of this evidence review was to focus on interventions for communicable disease but the absence of such studies in the literature necessitated a widening of the focus of the review. In acknowledgement of this earlier intent, data from the three studies within the reviews that concerned a communicable disease are presented below.

Table 5: Three studies focussing on a communicable disease

	Van Servellen, et al. (2003) [48]	Kalichman, Cherry & Cain (2005) [59]	Holzemer, Bakken, Portillo, Grimes, Welch, Wantland & Mullan (2006) [60]
Intervention	<p>Pilot study.</p> <p>Culturally sensitive HIV group education programme for Latino, Spanish-speaking HIV positive adults.</p> <p>Programme targeted: functional health literacy, social network support, mastery of adherence management and communication with health providers.</p> <p>Delivered, in Spanish, by treatment advocates and a nurse practitioner.</p> <p>Comprised a five-week, one-day-a-week, instructional support modular program with follow-up at six weeks and six months</p>	<p>Pilot study.</p> <p>Medication adherence counselling intervention for HIV positive men and women with lower health literacy.</p> <p>Two sessions plus a booster session:</p> <p>session 1: understanding HIV and HIV medications;</p> <p>session 2: Medications and Your Health;</p> <p>session 3: Stick to it: maintenance of adherence behaviours.</p> <p>Delivered in a motivational interviewing style by nurses.</p>	<p>RCT of a tailored nurse-delivered HIV medication adherence intervention programme.</p> <p>Interventions related to: medication knowledge, adherence and managing side effects.</p> <p>Repeated measures over a six-month period.</p>
Theoretical base reported	No	<p>Yes</p> <p>The Information, Motivation and Behavioural skills model (IMB)</p>	<p>Yes</p> <p>The Ickovics and Meisler framework for adherence in clinical research and clinical care</p>
Results	<p>At six-week follow-up the intervention group had significantly greater knowledge about HIV treatment.</p> <p>The intervention group had greater levels of recognition of and understanding of HIV terms.</p> <p>There were no significant differences between the intervention and control group in their understanding of prescription medication instructions, on medication adherence or in medication behaviours.</p> <p>The control group reported significantly greater quality of patient-provider communication at base line and at six-week follow-up.</p>	<p>Participants significantly increased their level of AIDS related knowledge at one month, two months and three months post intervention.</p> <p>Significantly more participants indicated understanding their viral load and their CD4 counts at all three post-intervention measurements.</p> <p>Motivational indicators showed significant increase (all three measurement points) in intention not to miss any medication doses and in intention to keep medication to hand.</p> <p>Behavioural indicator of self-efficacy for understanding HIV, taking medications on time and without missing any doses increased at all three follow-ups.</p> <p>Medication adherence outcomes demonstrated a significant reduction in missed doses at the two-month and three-month follow-up; a significant reduction in off-schedule medication taking at the two-month follow-up.</p>	<p>No significant differences between the control and interventions groups were reported over time on any of the five medication adherence measures.</p> <p>Minimal correlation with clinical markers was reported and little correlation between the five adherence measures.</p>
Authors' conclusions	<p>The lack of change in medication adherence and mastery might be expected in the short term and would be more meaningful if analysed over time.</p> <p>'The significance of the program seems to be in its ability to enable and empower participants to more fully participate in their care'. (p592)</p>	<p>The result of this pilot study was encouraging and 'brief counselling intervention warrants further research'. (p14)</p>	<p>The measures of medication adherence may not have performed as they were expected to and may not be adequate to measure medication adherence.</p> <p>Otherwise it is unclear why the intervention did not succeed in improving adherence.</p>