Journal of Public Health and Development
Vol. 13 No. 1 January - April 2015

ORIGINAL ARTICLE

Health literacy of village health volunteers in Municipalitiy, Nakhon Ratchasima, Thailand

Sawitree Visanuyothin[1], Chanudda Chatanuluk[2], Sureeporn Saengsuwan[3], Amorn Rojanavarapong[4] and Pinyada Pornchanya[5]

[1] *M.P.H.M., Social Medicine Department, Maharatnakhonratchasima Hospital, Nakhon Ratchasima Province, Thailand*
[2] *B.P.H. Nakhon Ratchasima city municipal*
[3] *M.N.S., Joho PCU, Social Medicine Department, Maharatnakhonratchasima Hospital, Nakhon Ratchasima Province, Thailand*
[4] *B.N.S.,Huetalae PCU, Social Medicine Department, Maharatnakhonratchasima Hospital, Nakhon Ratchasima Province, Thailand*
[5] *M.Sc.Social Medicine Department, Maharatnakhonratchasima Hospital, Nakhon Ratchasima Province, Thailand*

Corresponding author: *SawitreeVisanuyothin* ***Email:*** *Sawitreem3@gmail.com*
Received: *2 June 2015* ***Revised:*** *4 July 2015* ***Accepted:*** *6 July 2015*
Available online: *July 2015*

Abstract

Visanuyothin S, Chatanuluk C, Saengsuwan S, Rojanavarapong A and Pornchanya P.
Health literacy of village health volunteers in Municipalitiy, Nakhon Ratchasima, Thailand.
J Pub Health Dev.2015;13(1)37-54

Health literacy is an important health determinant because a person who has low health literacy always gets the poor health and dies earlier than usual. Although Thai's village health volunteers (VHV) have been continuously training in order to take care of community health, the VHVs in urban of Thailand have never been measured the level of their health literacy. This study aims to measure of VHVs' health literacy and to classify VHVs by levels of their health literacyfor planning to improve VHVs' health literacy in urban area. A cross-sectional study was conducted during April 2013-October 2014. The data were collected by self-administered questionnaire. Of total 1,731 VHVs from 3 municipalities,1,710 answered the questionnaire; the response rate was 98.8 %. It was divided into 1,402 of Nakhon Ratchasima city municipal (NH) VHVs, 201 of Joho municipal district (JM) VHVs, and 107 of Huatalae municipal district (HM) VHVs. Descriptive statistics and cluster analysis (K-Mean procedure) were applied to analyze data.

Overall participants were 1,710 VHVs whom met inclusion criterion. The ratio male:female was 1:6. The mean age was 54.4 (11.0) years and the mean duration of working as VHVs was 8.3 (5.9) years. They graduated as elementary school level as 45.9%. The main income was from private business. Of those, 57.1% had chronic disease. Literacy and the ability of VHVs were good level except writing message for other to understand, reading comprehension, seeing things clearly,and overall health status, which were moderate level. For all 14 aspects of health literacy, VHVs obtained 7.8-8.9 points from total score of 10, which was higher than general population. The 4 aspects of lowest score were herbs and supplementary foods, exercise for health, health information criticizing, and community health support. Cluster analysis based on K-Mean procedure used some variables to classified VHVs' health literacy (literacy, VHVs'potential, health status, age, main income, educational level, and duration working as VHVs) into 3 groups: high level (8.8-9.6) including 783 VHVs, moderate level (7.2-8.6) including 651 VHVs, and low level (5.6-6.8) including 168 VHVs.

Although VHVs'health literacy was higher than general population, the policy to improve VHVs' health literacy should be promoted. The appropriated programs for each group of VHVs' health literacy should be set to raise health literacy level especially the issues about herbs and supplementary foods, health information criticizing, and exercise for health. The further research should evaluate the effectiveness of the different programs for improving VHVs' health literacy.

Keywords: Health Literacy, Village Health Volunteers, Municipality

วารสารสาธารณสุขและการพัฒนา
ปีที่ 13 ฉบับที่ 1 มกราคม - เมษายน 2558

ความแตกฉานทางสุขภาพของอาสาสมัครสาธารณสุขในเขตเทศบาล จังหวัดนครราชสีมา ประเทศไทย

สาวิตรี วิษณุโยธิน[1], ชนัดดา ชาติอนุลักษณ์[2], สุรีพร แสงสุวรรณ[3], อมร โรจนวราพงษ์[4] และภิญญดา พรจรรยา[5]

[1] *M.P.H.M. กลุ่มงานเวชกรรมสังคม โรงพยาบาลมหาราชนครราชสีมา*
[2] *B.P.H. เทศบาลนครนครราชสีมา*
[3] *M.N.S. ศูนย์สุขภาพชุมชนจอหอ กลุ่มงานเวชกรรมสังคม โรงพยาบาลมหาราชนครราชสีมา*
[4] *B.N.S. ศูนย์สุขภาพชุมชนหัวทะเล กลุ่มงานเวชกรรมสังคม โรงพยาบาลมหาราชนครราชสีมา*
[5] *M.Sc.กลุ่มงานเวชกรรมสังคม โรงพยาบาลมหาราชนครราชสีมา*

บทคัดย่อ

สาวิตรี วิษณุโยธิน ชนัดดา ชาติอนุลักษณ์ สุรีพร แสงสุวรรณ อมร โรจนวราพงษ์ และภิญญดา พรจรรยา ความแตกฉานทางสุขภาพของอาสาสมัครสาธารณสุขในเขตเทศบาล จังหวัดนครราชสีมา ประเทศไทย ว.สาธารณสุขและการพัฒนา. 2558:13(1)37-54

ความแตกฉานทางสุขภาพถือเป็นปัจจัยกำหนดสุขภาพที่สำคัญ ผู้ที่มีความแตกฉานทางสุขภาพต่ำมักมีสภาวะสุขภาพที่ไม่ดีและเสียชีวิตเร็วกว่าที่ควรจะเป็น แม้ประเทศไทยได้ฝึกอบรมอาสาสมัครสาธารณสุข (อสม.) เพื่อดูแลสุขภาพประชาชนในชุมชนแต่ยังไม่มีการวัดระดับความแตกฉานทางสุขภาพของอสม.ในเขตเมือง จึงได้ทำการศึกษาครั้งนี้เพื่อวัดระดับความแตกฉานทางสุขภาพของอสม. และการจัดกลุ่มความแตกฉานทางสุขภาพของอสม.เพื่อนำผลมาวางแผนพัฒนาความแตกฉานทางสุขภาพของอสม.เขตเมือง การศึกษาครั้งนี้เป็นการวิจัยแบบภาคตัดขวางในช่วงเดือน เมษายน พ.ศ. 2556 จนถึง เดือน ตุลาคม พ.ศ. 2557 เก็บข้อมูลโดยให้อสม.ตอบแบบสอบถามด้วยตนเอง อสม.ทั้งหมดจำนวน 1,731 คน ตอบแบบสอบถาม1,710คน คิดเป็นอัตราการตอบร้อยละ 98.8 อสม. ที่ตอบเป็นของ เทศบาลนครนครราชสีมา 1,402 คน เทศบาลตำบลจอหอ 201 คน และเทศบาลตำบลหัวทะเล 107 คน วิเคราะห์ข้อมูลโดยสถิติเชิงพรรณนาและ Cluster Analysis ด้วยวิธีการจัดกลุ่มแบบ K-Mean

ผลการศึกษาพบ อสม.ที่ผ่านเกณฑ์เลือกมีจำนวนทั้งสิ้น 1,710 คน เป็นเพศหญิง 1,467 คน เพศชาย 243 คน อัตราส่วนชายต่อหญิงเท่ากับ 1:6 อายุเฉลี่ย 54.4 (11.0) ปี ระยะเวลาเฉลี่ยการเป็นอสม. 8.3 (5.9) ปี ระดับการศึกษาจบชั้นประถมร้อยละ 45.9 รายได้หลักมาจากประกอบอาชีพค้าขาย/ธุรกิจส่วนตัว เป็นโรคเรื้อรังคิดเป็นร้อยละ 57.1 การรู้หนังสือและศักยภาพของอสม.อยู่ในระดับดียกเว้นการเขียนข้อความให้ผู้อื่นเข้าใจ อ่านหนังสือได้เข้าใจ มองเห็นสิ่งต่างๆได้ชัดเจนและภาวะสุขภาพโดยรวมอยู่ในระดับปานกลาง ผลคะแนนเฉลี่ยความแตกฉานทางสุขภาพทั้ง 14 ด้าน (7.8-8.9, คะแนนเต็ม=10) สูงกว่าประชาชนทั่วไป คะแนนเฉลี่ย 4 อันดับต่ำสุดได้แก่ สมุนไพรและอาหารเสริม ออกกำลังกายเพื่อสุขภาพ การประเมินความน่าเชื่อถือของข้อมูลสุขภาพและการสนับสนุนสุขภาพในชุมชน ผลการศึกษาสามารถจำแนกความแตกฉานทางสุขภาพของอสม.ออกเป็นสามกลุ่มได้แก่ 1) ระดับสูง (8.8-9.6) มีจำนวน 783 คน 2) ระดับปานกลาง (7.2-8.6) มีจำนวน 651 คน 3) ระดับต่ำ (5.6-6.8) จำนวน 168 คน กำหนดกลุ่มโดยใช้ความแตกต่างของคะแนนการรู้หนังสือ ศักยภาพอสม. สถานะสุขภาพ อายุ รายได้หลัก ระดับการศึกษาและระยะเวลาการเป็นอสม.

แม้อสม.มีความแตกฉานทางสุขภาพสูงกว่าประชาชนทั่วไปแต่ควรส่งเสริมนโยบายการพัฒนาความแตกฉานทางสุขภาพให้กับอสม.อย่างต่อเนื่องโดยจัดโครงการหรือกิจกรรมให้เหมาะสมกับระดับความแตกฉานทางสุขภาพของอสม.โดยเน้นด้านสมุนไพรอาหารเสริม การประเมินความน่าเชื่อถือของข้อมูลและออกกำลังกายเพื่อสุขภาพและควรศึกษาวิจัยเพื่อประเมินประสิทธิผลโปรแกรมหรือกิจกรรมที่แตกต่างกันในการพัฒนาความแตกฉานทางสุขภาพอสม.

คำสำคัญ: ความแตกฉานทางสุขภาพ อาสาสมัครสาธารณสุข เทศบาล

Introduction

Health and Literacy are an important asset for a living[1]. The words "Health literacy" has shown in the literature review since early 1990 for studying and spread using around the world until nowadays. The studies found that the ones who were low expert in health often had the low understanding and the low health service utilization. They had less chance for a good health and more health risk behaviors. They lesser take care themselves and they were more admitted in the hospital than who had higher health literacy. The low health literacy person had worse health status and pass away faster than it should be.[1-4]. Reviewing literatures found that the meaning of health literacy was similar to the ability of people in accessibility, understanding, evaluation and applying the information for making decision in health care, promote health and prevent the diseases[1-6]. Likewise, Health Education Division, Department of Health Service Support of Thailand defined health literacy as the ability and skills of information accessibility, understanding, analyzing, practice evaluation, self-management and ability to advice individual, family, and community for good health[7].

However, the conceptual models, measurements and instruments were different and various[1, 6]. The health literacy was divided in to 3 types; 1) functional health literacy 2) interactive health literacy 3) critical health literacy[4, 8]. Health literacy was categorized into 3 dimensions ; 1) conceptual foundation 2) critical skills 3) civic orientation[9], whereas another literature reviews concluded that an overview of the health literacy concept was antecedents composes of population demographic, psycho and social, culture, literacy, personal characteristic, experiences that relate to illness and health care system. And consequences consists of having the health literacy leads to the better health condition of persons, the decrease of health expenses, the increment of healthy knowledge, the decrease average length of admission in the hospital, the decrease frequency of health service access[6, 10, 11]. Although the different concepts of health literacy resulted in the several of measurements and instruments[8, 12, 13], the study of many countries revealed that the related-factors of health literacy were age, sex, education and socioeconomic status and the health literacy of their population needed to be improved[12, 14-18]. Therefore, health literacy was one in many factors that affects to the results of health and social[8].

Urban have many unique opportunities more than rural, but at the same time densely population leads many health risks and health hazards. More than a half of people are in the cities in 2010 and this proportion will increase to 70% by 2050[19]. Similarly, Thailand has wider lifespan of population, more urbanization, and more western culture contamination than former time. These bring the increase of new emerging diseases incidence and chronic diseases prevalence. Thai VHVs who work in urban areas are being challenged by urbanization. VHVs have had important roles in Thai public health more than 30 years and Ministry of Public Health announced the regulation of village health volunteer 2011 aiming to protect population and support VHVs to participate in taking care of community health. Although VHVs who were selected had to be trained the core program and special program[21, 22], they need to develop for their better capacity in order to confront the context change[20]. Also, there were many reports and studies

which tried to explore demographic, roles, duties, skills, potentials, and empowerment of VHVs[20, 23-27]. In addition, Thailand did the research based on ground theory and used psychometric method to test validity for tool establishment to test health literacy in general population, chronic disease patients and disability people. The tool is useful to evaluate, develop program or policy of health literacy for Thai people[28]. Likewise, the 14 items of health literacy in this tool are important issues in public health which relate to VHVs roles of community health care. Whereas there were only two studies of the VHVs' health literacy level in rural area of Thailand. These studies reported that most VHVs had the good health literacy level and their health literacy level were higher than general population. However, VHVs' health literacy needed improvement in some areas[29, 30]. There have been few research of the of VHVs' health literacy especially in urban area where is a complex society. Evaluation by health literacy test tool will provide comprehension of health literacy in individual, group, and community level. This information leads the efficiency of health problems solution[28]. Therefore, study of urban VHVs' health literacy level and analyzing the cluster of their health literacy are imperative to plan for VHVs' health literacy improvement in urban area. Changing of VHVs' health literacy for the better will improve urban health as a result.

Methods

Population and sample

The population in this study was the VHVs in urban area of Muang district, Nakhon Ratchasima, Thailand during 2014 fiscal year. They worked as VHVs in responsible area of Primary Care Units (PCUs) in NM, JM, and HM. Since Nakhon Ratchasima city municipal cooperated very well by giving budget and human resource, total number of VHVs aged ≥ 18 years were recruited if they were willing to participate in this study. Total number of VHVs was 1,731 and 1,712 answered the questionnaire.There were 2 VHVs who did not meet criteria because their age were 15 years old. Thus the number of participants were 1,710.The response rate was 98.8%.

Research instruments

A cross-sectional study was conducted during April 2013-October 2014. A self-administered questionnaire was modified by permission from Health Systems Research Institute (HSRI). This questionnaire was constructed based on ground theory and it was tested the validity by psychometric method in order to be an appropriated tool for measuring Thai's health literacy level[28]. The questionnaire was reviewed the content and language by 6 health care workers from 3 municipalities. Then 47 VHVs answered questionnaire. After that the results were consulted to the experts of HSRI before using.

The questionnaire comprised 2 parts. The first part was socio-demographic, the duration of working as VHV, literacy, potential, and health status. The total score of literacy and potential was 4 (1.1 - 2.0 = poor, 2.1 - 3.0= fair, and 3.1 - 4.0= good), and for health status was 5 (1.1 - 3.0 = poor, 3.1 - 4.0= fair, and 4.1 - 5.0= good). The second part consisted of 2 subsets of health literacy questionnaire. The questionnaire was formed of 11 score levels from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9,and 10. 0 means absolutely disagree and 10 means absolutely agree. Respondents write √ to choose the level of their agreement.Subset 1, for all

VHVs, had 14 questions as following; 1) basic right perception, 2) community health support, 3) health care accessibility, 4) communication skills to get what you want from health professionals, 5) family health, 6) health information accessibility, 7) reliable health information, 8) self-health responsibility, 9) healthy food accessibility, 10) exercise for health, 11) stress, 12) traveling barriers and ability, 13) medicine using, 14) herbs and supplementary foods. Subset 2, for VHVs who had chronic disease, had 2 questions as following; 15) experience sharing, and 16) self-observation. The subset 2 was included because of data from primary care health workers showed that roughly a half of VHVs were chronic patients.

The research proposal was submitted to Institutional Review Board of Maharatnakhonratchasima Hospital and Ethics permission was approved. Permission from study site was also granted.

A research core team composed of a researcher, research assistants from municipalities and PCUs. A meeting was conducted to explain about rationale objectives, process, and individual's right. Data collection of each municipality was held during VHVs' monthly assembling. The research assistants of each municipality instructed procedures before the respondents were asked to give their informed consents. The purpose, the process and confidentiality were explained before each participant completed the self-administered questionnaire. After completion of each data collection, the researcher and assistant checked data for completeness. Two research assistants checked data again. Then data were entered into epidata 3.0 software in order to screen, clean, and code before analysis.

Statistical Analysis

Descriptive statistics were used to describe percentage, mean, and standard deviation (SD) in this study. Due to the size of sample ≥ 200, K-Mean Cluster Analysis was applied to classify VHVs' health literacy into three levels.

Results

A total of 1,710 VHVs participated in this study, which were 1,467 female (85.8%) and 243 male (14.2%) as shows in table 1.The ratio of male: female was 1: 6 for all 3 municipalities, and for NM, JM, and HM were 1: 5, 1: 21, and 1: 25 respectively. The average age was 54.4 (11.0), which ranged from 18 years and 84 years. The average duration of working as VHV was 8.3 (5.9) years, which the longest duration of being VHV was 33 years. VHVs answered the questionnaire by her/himself 95.1%. Of those 45.9% graduated as elementary school. Most of them did not live alone. Their main income 37.2% was from trader/private business.

The percentage of VHVs who rated each literacy and each potential at level 3 and 4 as following; 56.0% (writing message for other to understand), 70.1% (reading comprehension), 81.8% (talk to other understandable), 84.5% (hearing voice clearly), 73.9% (seeing things clearly), 83.5% (daily activities), and 86.4% (going out by her/himself ability). VHVs who perceived their health status as level 4 and 5 were 63.5%, and for NM, JM, and HM were 63.3%, 71.6%, and 50.4% respectively. The percentage of VHVs who had chronic disease was 57.1%, and 42.8%, 35.0%, and 59% for NM, JM, and HM consecutively.

Table 1 Characteristics of VHVs.

Characteristics (Demographic and Literacy)	NM Number (%)	JM Number (%)	HM Number (%)	Total Number (%)
Sex				
Male	230 (16.4)	9 (4.5)	4 (3.7)	243 (14.2)
Female	1172 (83.6)	192 (95.5)	103 (96.3)	1467 (85.8)
Age (year)				
Mean (SD)	54.5 (11.3)	52.4 (9.8)	57.5 (9.4)	54.4 (11.0)
Minimum-Maximum	18-84	22-74	36-78	18-84
Duration of working as VHV				
Mean (SD)	8.3 (5.9)	8.2 (5.8)	9.4 (6.1)	8.3 (5.9)
Minimum-Maximum	1-33	1-30	0-23	0-33
To provide information				
By her/himself	1326 (94.8)	197 (99.0)	96 (90.6)	1619 (95.1)
Other read for	26 (1.9)	2 (1.0)	8 (7.5)	36 (2.1)
Other read & write for	46 (3.3)	0 (0.0)	2 (1.9)	48 (2.8)
The highest education				
No education	49 (3.5)	0 (0.0)	3 (2.9)	52 (3.0)
Elementary school	630 (45.0)	96 (47.8)	59 (55.1)	785 (45.9)
High school	445 (31.8)	69 (34.3)	29 (27.1)	543 (31.8)
Diploma	149 (10.6)	19 (9.5)	9 (8.4)	177 (10.4)
Bachelor	128 (9.1)	17 (8.5)	7 (6.5)	152 (8.9)
Living status				
Live alone	83 (5.9)	13 (6.5)	8 (7.5)	104 (6.1)
Live with the other	1316 (94.1)	188 (93.5)	99 (92.5)	1603 (93.9)
Main income from				
Unemployment/other	226 (16.2)	26 (13.0)	15 (14.1)	267 (15.7)
Farmer/ labour	437 (31.3)	71 (35.3)	20 (18.9)	528 (31.0)
Trader/private business	518 (37.1)	80 (39.8)	36 (34.0)	634 (37.2)
Employee/civil servant/retired	215 (15.4)	24 (11.9)	35 (33.0)	274 (16.1)
Writing message for other to understand				
Cannot	25 (1.8)	1 (0.5)	2 (1.9)	28 (1.6)
Can do	595 (42.5)	75 (37.3)	54 (50.5)	724 (42.4)
Well done	586 (41.8)	99 (49.3)	39 (36.4)	724 (42.4)
Very Well done	195 (13.9)	26 (12.9)	12 (11.2)	233 (13.6)
Reading comprehension				
Cannot	10 (0.7)	0 (0.0)	2 (1.9)	12 (0.7)
Can do	419 (29.9)	47 (23.4)	34 (31.8)	500 (29.3)
Well done	699 (49.9)	117 (58.2)	50 (46.7)	866 (50.7)
Very Well done	273 (19.5)	37 (18.4)	21 (19.6)	331 (19.4)
Talk to other understandable				
Cannot	5 (0.4)	0 (0.0)	0 (0.0)	5 (0.3)
Can do	272 (19.4)	20 (10.0)	14 (13.1)	306 (17.9)
Well done	799 (57.0)	123 (61.2)	65 (60.7)	987 (57.8)
Very Well done	325 (23.2)	58 (28.9)	28 (26.2)	411 (24.0)
Seeing things clearly				
Cannot	4 (0.3)	0 (0.0)	0 (0.0)	4 (0.2)
Can do	378 (27.0)	41 (20.4)	23 (21.5)	442 (25.9)
Well done	770 (55.0)	108 (53.7)	65 (60.7)	943 (55.2)
Very Well done	249 (17.8)	52 (25.9)	19 (17.8)	320 (18.7)
Hearing voice clearly				
Cannot	5 (0.4)	0 (0.0)	0 (0.0)	5 (0.3)
Can do	227 (16.2)	24 (11.9)	9 (8.4)	260 (15.2)
Well done	813 (58.0)	105 (52.2)	62 (57.9)	980 (57.3)
Very Well done	356 (25.4)	72 (35.8)	36 (33.6)	464 (27.2)

Table 1 Characteristics of VHVs. (cont.).

Characteristics (Potential & Health Status)	NM Number (%) (n=1402)	JM Number (%) (n=201)	HM Number (%) (n=107)	Total Number (%) (n=1710)
Daily activities				
Cannot	4 (0.3)	0 (0.0)	0 (0.0)	4 (0.2)
Can do	249 (17.8)	20 (10.0)	9 (8.4)	278 (16.3)
Well done	778 (55.5)	111 (55.2)	69 (64.5)	958 (56.1)
Very Well done	370 (26.4)	70 (34.8)	29 (27.1)	469 (27.4)
Going out by her/himself ability				
Cannot	7 (0.5)	0 (0.0)	0 (0.0)	7 (0.4)
Can do	203 (14.5)	13 (6.5)	10 (9.3)	226 (13.2)
Well done	709 (50.6)	91 (45.3)	54 (50.5)	854 (50.0)
Very Well done	482 (34.4)	97 (48.3)	43 (40.2)	622 (36.4)
Overall health status				
Bad/very bad	10 (0.8)	3 (1.5)	1 (0.9)	14 (0.8)
Fair	503 (35.9)	54 (26.9)	52 (48.6)	609 (35.7)
Good	766 (54.7)	122 (60.7)	53 (49.5)	941 (55.1)
Very good	121 (8.6)	22 (10.9)	1 (0.9)	144 (8.4)
Having chronic disease				
Yes	797 (57.2)	130 (65.0)	43 (41.0)	970 (57.1)
No	597 (42.8)	70 (35.0)	62 (59.0)	729 (42.9)

VHVs obtained good level of talking to other understandable, hearing voice clearly, daily activities ability, and going out by her/himself ability (Table 2). They had fair level of writing message for other to understand, reading comprehension, seeing things clearly. The average score of overall health status was 3.7 which was moderate level. VHVs' scores who had no chronic disease were higher than those who had chronic disease all items.

The average score of literacy, potential, health status of older age group tended to be lesser than the younger age group. For all age group about literacy and potential, going out by her/himself ability had the highest average score but writing message for other to understand had the lowest average score. The higher education is more likely to have higher literacy, more potential, and the better health status than the group of lower educational level. All educational levels except bachelor/higher than bachelor had writing ability as the lowest score.

Table 2 The average scores of VHVs by literacy, potential, and health status.

Literacy, Potential, and Health status	All VHVs	VHVs who had	
		chronic disease (n=970)	no chronic disease (n=729)
Writing message for other to understand	2.7	2.6	2.8
Reading comprehension	2.9	2.8	3.0
Talk to other understandable	3.1	3.0	3.1
Hearing voice clearly	3.1	3.0	3.2
Seeing things clearly	2.9	2.8	3.0
Daily activities	3.1	3.0	3.2
Going out by her/himself ability	3.2	3.1	3.3
Overall health status	3.7	3.5	3.9

The total score of literacy and potential was 4 (1.1 - 2.0 = poor, 2.1 - 3.0= fair, and 3.1 - 4 .0= good), and for health status was 5 (1.1 - 3.0 = poor, 3.1 - 4.0= fair, and 4.1 - 5 .0= good).

Table 3 shows that an average of 14 aspects of VHVs' health literacy scores were between 7.8-8.9. Such 14-aspects average score were arranged in ascending order as the first order was the basic right perception 8.9 (1.2) and medicine using 8.9 (1.1); the second order was self-health responsibility and travel ability 8.8 (1.1); the third order was communication skills to get what you want from health professionals 8.7 (1.2); the fourth order was healthy food accessibility and stress 8.6 (1.2); the fifth order was health care accessibility 8.5 (1.3); the sixth was family health 8.4 (1.3) and health information accessibility 8.4 (1.2); the seventh order was community health support 8.3 (1.2); the eight order was reliable health information 8.2 (1.3); the ninth order was exercise for health 8.1(1.3); the tenth order was herbs and supplementary foods 7.8 (1.6). Two specific aspects for case of VHVs' chronic disease displayed ability of self-observation by 8.7 (1.2), higher than experience sharing 8.5 (1.4). As mentioned above, there were 16 aspects of health literacy. In consideration of municipal level, were found that most 16-average scores of HM was higher than 2 municipalities.

Table 3 The average health literacy scores of VHVs' by three municipalities

Health Literacy	NM Mean (SD) (n=1402)	JM Mean (SD) (n=201)	HM Mean (SD) (n=107)	Total Mean (SD) (n=1710)
General health literacy				
1) Basic right perception	8.8 (1.2)	9.0 (1.0)	9.3 (0.8)	8.9 (1.2)
2) Community health support	8.3 (1.3)	8.3 (1.1)	8.3 (1.1)	8.3 (1.2)
3) Health care accessibility	8.4 (1.3)	8.5 (1.2)	8.7 (1.1)	8.5 (1.3)
4) Communication skills to get what you want from health professionals	8.7 (1.2)	8.7 (1.1)	9.1 (0.8)	8.7 (1.2)
5) Family health	8.4 (1.3)	8.4 (1.2)	8.5 (1.2)	8.4 (1.3)
6) Health information accessibility	8.4 (1.2)	8.3 (1.1)	8.5 (1.1)	8.4 (1.2)
7) Reliable health information	8.3 (1.3)	7.8 (1.3)	8.3 (1.1)	8.2 (1.3)
8) Self-health responsibility	8.8 (1.1)	8.8 (1.0)	9.1 (0.8)	8.8 (1.1)
9) Healthy food accessibility	8.6 (1.2)	8.5 (1.1)	8.7 (1.1)	8.6 (1.2)
10) Exercise for health	8.1 (1.3)	8.0 (1.3)	8.0 (1.4)	8.1 (1.3)
11) Stress	8.6 (1.2)	8.6 (1.1)	8.9 (0.9)	8.6 (1.2)
12) Traveling barriers and ability	8.8 (1.2)	9.0 (1.0)	9.0 (0.9)	8.8 (1.1)
13) Medicine using	8.9 (1.2)	9.0 (1.0)	9.2 (0.9)	8.9 (1.10
14) Herbs and supplementary foods	7.8 (1.6)	7.6 (1.4)	7.5 (1.7)	7.8 (1.6)
Self-care of chronic patients				
15) Experience sharing	8.5 (1.5)	8.4 (1.4)	8.9 (1.0)	8.5 (1.4)
16) Self-observation	8.7 (1.3)	8.7 (1.2)	8.9 (0.9	8.7 (1.2)

Table 4 shows that age 18-25 and 36-45 had the lowest health literacy score, and the average scores were likely increase in the higher age group, for 11 aspects of 14 aspects except medicine using, communication skills to get what you want from health professionals, and exercise for health. Of all age groups, herbs and supplementary foods, exercise for health, reliable health information were 3 bottom scores, whereas medicine using, traveling barriers and ability, self-health responsibility were 3 top scores.

Table 4 The average scores of VHVs'health literacy by age group.

Health literacy	VHVs' age group (years)					
	18-25 (n=14)	26-35 (n=74)	36-45 (n=251)	46-55 (n=564)	56-65 (n=527)	≥ 66 (n=280)
1) Basic right perception	8.4	8.9	8.7	8.9	8.9	8.9
2) Community health support	8.1	8.4	8.1	8.3	8.4	8.4
3) Health care accessibility	8.2	8.4	8.3	8.4	8.5	8.6
4) Communication skills to get what you want from health professionals	8.6	8.5	8.5	8.8	8.8	8.8
5) Family health	8.1	8.4	8.2	8.4	8.5	8.5
6) Health information accessibility	8.3	8.6	8.4	8.4	8.4	8.4
7) Reliable health information	8.0	8.4	8.1	8.2	8.2	8.2
8) Self-health responsibility	8.7	8.9	8.7	8.8	8.8	8.8
9) Healthy food accessibility	8.4	8.5	8.3	8.5	8.7	8.7
10) Exercise for health	8.0	8.0	7.8	8.1	8.2	8.3
11) Stress	8.4	8.6	8.4	8.6	8.6	8.7
12) Traveling barriers and ability	8.8	9.0	8.7	8.8	8.8	8.8
13) Medicine using	8.9	8.8	8.7	8.9	8.9	9.0
14) Herbs and supplementary foods	7.8	7.8	7.7	7.8	7.8	8.0

Table 5 illustrates that the average health literacy scores of 14 aspects of duration of working as VHV had the highest scores in group of ≥26 years. In contrast, group of 21-25 had the lowest scores. The other groups were moderate scores. The 4 bottom scores of all groups were herbs and supplementary foods, exercise for health, reliable health information, and community health support. The 4 top scores were medicine using, basic right perception, traveling barriers and ability, and self-health responsibility.

Table 5 The average scores of VHVs'health literacy by duration of working as VHV.

Health literacy	Duration of working as VHV (years)					
	1-5 (n=628)	6-10 (n=601)	11-15 (n=238)	16-20 (n=99)	21-25 (n=59)	≥ 26 (n=24)
1) Basic right perception	8.8	8.9	8.8	8.9	8.6	9.2
2) Community health support	8.4	8.3	8.2	8.4	8.0	8.7
3) Health care accessibility	8.4	8.5	8.4	8.6	8.2	8.8
4) Communication skills to get what you want from health professionals	8.7	8.7	8.7	8.8	8.4	8.8
5) Family health	8.4	8.4	8.4	8.5	8.1	8.6
6) Health information accessibility	8.5	8.4	8.3	8.5	8.2	8.5
7) Reliable health information	8.3	8.1	8.2	8.3	7.8	8.3
8) Self-health responsibility	8.9	8.7	8.8	8.9	8.4	9.0
9) Healthy food accessibility	8.6	8.6	8.5	8.7	8.2	8.9
10) Exercise for health	8.1	8.1	8.0	8.1	7.8	8.2
11) Stress	8.7	8.6	8.6	8.7	8.2	8.5
12) Traveling barriers and ability	8.9	8.8	8.8	8.8	8.5	8.9
13) Medicine using	8.9	8.9	8.8	8.9	8.5	9.3
14) Herbs and supplementary foods	7.9	7.7	7.7	7.8	7.7	7.8

Table 6 presented that group of bachelor/higher than bachelor had the highest score of 14 health literacy aspects. The second of the highest score for 14 aspects was group of no education/not finished elementary school. The others were nearly similar scores level. The 4 bottom scores of all groups were herbs and supplementary foods, exercise for health, community health support, and reliable health information. The 4 top scores were traveling barriers and ability, medicine using, basic right perception, and self-health responsibility.

Table 6 The average scores of VHVs'health literacy by educational level.

Health literacy	Educational level				
	No education/ not finished elementary school	Elementary school	High school	Diploma	Bachelor/ higher than bachelor
1) Basic right perception	9.1	8.8	8.9	8.9	9.3
2) Community health support	8.6	8.3	8.4	8.2	8.9
3) Health care accessibility	8.9	8.4	8.5	8.4	9.0
4) Communication skills to get what	9.0	8.7	8.8	8.7	9.3
you want from health professionals	8.7	8.4	8.5	8.3	8.9
5) Family health	8.8	8.3	8.6	8.5	9.1
6) Health information accessibility	8.6	8.0	8.3	8.3	9.0
7) Reliable health information	9.0	8.7	8.9	8.9	9.3
8) Self-health responsibility	8.7	8.6	8.7	8.5	8.9
9) Healthy food accessibility	8.4	8.0	8.2	8.1	8.6
10) Exercise for health	9.0	8.5	8.7	8.6	9.2
11) Stress					
12) Traveling barriers and ability	9.2	8.7	9.0	8.9	9.5
13) Medicine using	9.2	8.9	9.0	8.8	9.3
14) Herbs and supplementary foods	8.3	7.7	7.9	7.8	8.6

After determined having chronic disease as label cases, then variables were entered into software program (Sex, Age, Educational level, Writing message for other to understand, Reading comprehension, Talk to other understandable, Hearing voice clearly, Sight ability, Daily activities, Going out by her/himself ability, Overall health status, Duration of working as VHV, Main income, Living status, Basic right perception, Community health support, Health care accessibility, Communication skills to get what you want from health professionals, Family health, Health information accessibility, Reliable health information, Self-health responsibility, Healthy food accessibility, Exercise for health, Stress, Traveling barriers and ability, Medicine using, Herbs and supplementary foods), the data were iterated 10 cycles for 3,4,5,6 clusters analysis.

Table 7 Characteristics of Final 3 Cluster Centers

Characteristics	Cluster		
	1 (n=783)	2 (n=651)	3 (n=168)
Sex	female	female	female
Age (years)	56	53	54
Educational level	high school	high school	high school
Writing message for	well done	well done	can do
other to understand	well done	well done	well done
Reading comprehension	well done	well done	well done
Talk to other understandable	well done	well done	well done
Hearing voice clearly	well done	well done	well done
Seeing things clearly	well done	well done	well done
Daily activities			
Going out by	well done	well done	well done
her/himself ability			
Overall health status	good	good	fair
Duration of working as VHV(years)	8	8	9
Main income	private business	private business	labor
Living status	live with other	live with other	live with other
Health literacy scores	8.8-9.6	7.2-8.6	5.6-6.8

Table 7 presents the final cluster centers which were divided into 3 groups: the first group defined as high level of health literacy with 783 VHVs and score between 8.8-9.6; the second group defined as middle level of health literacy with 651 VHVs and score between 7.2-8.6; the third group defined as low level of health literacy with 168 VHVs and score between 5.6-6.8. The characteristics of the low health literacy VHVs was female age 54 years who has been VHV for 9 years, graduated high school, can writing message for other to understand, had fair health status, and worked as a labor.

Conclusion and Discussion

Health literacy is an important health determinant and Thai VHVs have been continuously training. However, Thailand have never been measured the level of their health literacy especially in urban areas. The objectives of this research were to measure of VHVs' health literacy level and to analyze the cluster of their health literacy in urban area during April 2013-October 2014. The data were collected by self-administered questionnaire. Overall participants were 1,710 which were female 85.8%. The ratio male:female was 1:6. The mean age was 54.4 (11.0) years and the mean duration of working as VHVs was 8.3 (5.9) years. They graduated as elementary school level as 45.9%. Their main income was from private business. Of those, 57.1 % had chronic diseases. Literacy and the potential of VHVs were good level except writing, reading, and seeing. These were moderate level as well as overall health status. All 14 aspects of health literacy got 7.8-8.9 point from 10. The VHVs who had no chronic disease were more likely to have the better literacy, potential, and health status than VHVs who had chronic disease. Similarly, the VHVs who had higher education were more likely to have the better literacy, potential, and health status than VHVs who had lower education. Age, educational level, writing message for other to understand, reading comprehension, talk to other understandable, hearing voice clearly, sight ability, daily activities, going out by her/himself ability, overall health status, duration of working as VHV, main income, and 14 aspects of health literacy were significant for 1- way ANOVA cluster analysis. Cluster analysis based on K-Mean of VHVs' health literacy presented 3 groups as 783 of VHVs had a high level (8.8-9.6), 651 of VHVs had a moderate level (7.2-8.6), and 168 of VHVs had a low level (5.6-6.8). Group was categorized by the difference of score in literacy, potential, health status, age, main income, educational level, and duration of working asVHV. The characteristics of the low health literacy VHVs was female age 54 years who has been VHV for 9 years, graduated high school, can writing message for other to understand, had fair health status, and worked as a labor.

The mean (SD) age of VHVs was 54.4 (11.0) years, which was higher than a Thai study, national level, Nakhon Ratchasima provincial level, the health literacy survey report in Thailand, which were 47.8 (10.3), 46.0 (9.9), 45.1 (9.1), and 43.0 (14.1) years respectively)[23, 25, 28, 30]. The mean age was not found in foreign studies[15, 16, 31] and the studies of VHVs in Thailand[29]. However, the range of age was 18-84 years that was near to Nakhon Ratchasima provincial level (15-82 years), the health literacy survey report in Thailand (17-82 years), and the foreigner studies. The ratio of male: female (1:6) was lesser than national level (1: 2.8) but higher than Nakhon Ratchasima provincial level (1: 9.1)[23]. For the ratio of male: female NM, JM, and HM were 1: 5, 1: 21, and 1: 25, which the male VHVs in NM were retired/higher education and usually be the key persons of community. The duration of working asVHVs (8.3 (5.9) years) was nearly equal to Nakhon Ratchasima provincial level (10.1 (6.8) years)[26]. VHVs who had educational level higher than elementary school was 51.1%. This educational level was lesser than in the health literacy survey report in Thailand (57%), but higher than national level (20.8%)[23, 28]. Since, in municipality, the mean age of VHVs was higher, male: female ratio was lesser than the other as

mention above. The health education level was lesser than in the health literacy survey report in Thailand. Thai's social value about not support female to get high education may be reason of this phenomenon. But this social value faded out in urban area, which explain that why the health education level of this study higher than national level. Main income of this study was from trader/private business whereas the main income of national survey was from farmer/labor. It can be concluded that the older age, higher educational level, and working as trader/private business, this was the appearance of urban VHVs. Literacy and the ability of VHVs were good level except writing, reading, and seeing. These were moderate level as similar as overall health status.These were the same to European population, about 15% to 20% of them had literacy problem[1]. Therefore using books, pamphlet, and others materials for reading and writing to communicate with VHVs may be not the effective way to increase their health literacy level of urban VHVs. The VHVs who had no chronic disease, was younger, and had higher educational level were more likely to have the higher literacy, more potential, and better health status than VHVs who had chronic disease, was elder, and had lower educational level. This result was nearly similar to some studies[5, 15, 16].

The questionnaire in this study was similar to the health literacy survey report in Thailand and the study in Phayao province, therefore both were mainly the comparative studies[28, 29]. The overall of average health literacy scores of either who had chronic disease or who had no chronic disease in this study (7.8-8.9) were higher than in general population (5.0-8.5) and chronic patients (3.9-8.5) of the health literacy survey report in Thailand[28]. This phenomenon is similar to a study VHVs'health literacy in Thai rural area, which VHVs had higher health literacy level than the population[29]. Additionally, VHVs in Thailand have been developed continually more than 30 years. They were not only trained by the core programs and special programs but they also have been continuously practicing and applying their knowledge and skills to improve their community health[21, 22]. More than that VHVs in this study had the good literacy level and a half of them were chronic patients. Thus they had ability, experiences and had more chance to apply the trained knowledge and direct experiences into practice. That is why they had more health literacy scores than general population. However, there were the 4 aspects of lowest score as herbs and supplementary foods, exercise for health, health information criticizing, and community health support, which are needed to be improved. Similarly, both general population and chronic patients of the health literacy survey report in Thailand, the bottom 3 scores of health literacy aspects were herbs and supplementary foods, health information criticizing, and exercise for health, which are needed to be improved. Whereas the 3 top scores were self-health responsibility, traveling barriers and ability, and medicine using[28]. Although age, duration of working as VHVs, and educational levels differentiated health literacy level of the 14 aspects, it cannot be used to predict the tendency of health literacy. Because the results were not show the same direction of the trend in each age group, each duration of working asVHVs group, and each educational level.

Results of cluster analysis based on K- Mean for health literacy in 3 municipalities that can be divided into 3 groups as high level, middle level,

and low level of health literacy. Importantly, the results of cluster analysis were compared to results of VHVs' health literacy based on F testing which variable has more F-value, is extremely exposed to differ between 3 groups. The F-value of 14 items of health literacy had extremely higher than the F-value of literacy, potential, health status, age, main income, educational level, and duration of working as VHVs. Therefore there were very different health literacy scores among 3 clusters. While categorization of 3 clusters by the characteristics of literacy, potential, health status, age, main income, educational level, and duration of working as VHVs may be not much effect the difference scores of health literacy in each cluster. However, the characteristics of VHVs who had low level of health literacy can be identified as female age 54 years who has been VHV for 9 years, graduated high school, can writing message for other to understand, had fair health status, and worked as a labor.

Recommendations

Government should promote and support the policy about improvement of VHVs' health literacy. The core program should include the health literacy topic especially herbs and supplementary foods, health information criticizing, and exercise for health. The program should be designed to be appropriate for 3 groups of VHVs' health literacy level. Especially, the low health literacy group who has fair ability of writing message for other to understand. Therefore, designed-intervention to increase their health literacy should select talking and listening rather than writing and reading techniques. SoVHVs can use health information, herbs and supplementary foods appropriately and safely. They can exercise not only for promote and prevent disease but they also choose the suitable exercise program for chronic patients. Sequentially, they can transfer their knowledge and practice to their family and community. Therefore Municipalities, health care units, and communities should cooperate to evaluate health literacy level together and develop appropriate intervention to increase not only individual health literacy but public health literacy also. Consumer Protection Division had important roles of herbs and supplementary foods and health information criticizing. So they should work with community too. VHVs who are chronic patients should be strengthen to do self-care, set network, distribute their knowledge and skills, and share their technique to care themselves. Eventually, community health will be improved.

Research should be conducted to compare health literacy between VHVs in rural and urban area. And an experimental study should be performed in order to identify which activities increase health literacy in VHVs.

Funding

This research was supported by external grant from Nakhon Ratchasima city municipal, Nakhon Ratchasima, Thailand

Acknowledgements

The authors express their sincere gratitude to all VHVs and all municipalities and all PCUs where the research conducted for their cooperation.

References

1. Mayagah K, Wayne M. A working document for discussion at the 7th Global Conference on Health Promotion, "Promoting Health and Development: Closing the Implementation Gap", Nairobi, Kenya, 26-30 October 2009. WHO; 2009 [cited 2014 200314]; Available from: http://www.who.int/healthpromotion/conferences/7gchp/Track1_Inner.pdf.
2. Andrew P. Health Literacy Around the World: Part 1 Health Literacy Efforts Outside Of the United States: Institute of Medicine Roundtable on Health Literacy; 2012.
3. Kickbusch I, Pelikan JM, Apfel F, Tsouros AD, World Health Organization. Regional Office for Europe. Health literacy : The solid facts. Copenhagen: WHO Regional Office for Europe; 2013. 86 p.
4. Nutbeam D. Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. Health promotion international. 2000;15(3):259-67.
5. UNESCO. Understandings of Literacy. Paris, France: The United Nations Educational, Scientific and Cultural Organization, 2005 Contract No.: 6.
6. Sorensen K, Van den Broucke S, Fullam J, et al. Health literacy and public health: a systematic review and integration of definitions and models. BMC public health. 2012;12:80. Epub 2012/01/27.
7. Development Definition and Meaning. Keawdumkerng K. SN, editor. Nonthaburi, Thailand: Health Education Division, Departmrnt of Health Service Support; 2011. 70 p.(Thai)
8. Kwan B, Frankish J, Rootman I. The Development and Validation of Measures of "Health Literacy" in Different Populations, Vancouver. Centre for Population Health Promotion Research; 2006 Available from: www.ihpr.ubc.cahttp://blogs.ubc.ca/frankish/files/2010/12/HLit-final-report-2006-11-24.pdf.
9. Freedman DA, Bess KD, Tucker HA, Boyd DL, Tuchman AM, Wallston KA. Public health literacy defined. American journal of preventive medicine. 2009;36(5):446-51. Epub 2009/04/14.
10. Rootman I. BDGE, Frankish J. HH, Kaszap M. LL, Quantz D. RB. National Literacy and Health Research Program Needs assessment and Environmental scan. 2002 [cited 2014 23/03/14]; Available from: http://www.cpha.ca/uploads/portals/h-l/needs_e.pdf.
11. Understanding and Promoting Health Literacy (R01). Department of Health and Human Services (DHHS) U.S.A.; 2004 [200314]; Available from: http://grants.nih.gov/grants/guide/pa-files/PAR-04-116.html.
12. Rudd R.E. AJE, Oppenheimer S., Nath C. Health Literacy: An Update of Medical and Public Health Literacy. In: Comings J.P. GB, Smith C., editor. Review of Adult Learning and Literacy. London: Lawrence Erlbaum Associates; 2007. p. 175-203.
13. Baker DW. The Meaning and the Measure of Health Literacy Journal of general internal medicine. 2006;21:878-83.
14. Sorensen K, Broucke S.V., Pelikan J.M., Fullam J., Doyle G., Slonska Z., et.al. Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). BMC public health. 2013;13(948):1-10.

15. van der Heide I, Rademakers J, Schipper M, et al. Health literacy of Dutch adults: a cross sectional survey. BMC public health. 2013;13:179. Epub 2013/03/01.
16. Health Literacy in Canada: Initial results from the International Adult Literacy and Skills Survey 2007. Ottawa, Ontario: Canadian Council on Learning; 2007. Available from: www.ccl-cca.ca.
17. Mitic W. RI. An inter-sectoral approach for improving health literacy for Canadians. The Public Health Association of British Columbia, 2012.
18. Berkman ND SS, Donahue KE, Halpern DJ, Viera A, Crotty K, et.al. Health Literacy Intervention and Outcomes: An Updated Systematic Review. Agency for Healthcare Research and Quality; March 2011.
19. Hidden cities: Unmasking and overcoming health inequities in urban settings. Switzerland: The WHO Centre for Health Development, Kobe, and United Nations Human Settlements Programme (UN-HABITAT) 2010 15/06/2515]. Available from: http://www.who.int/kobe_centre/publications/hiddencities_media/who_un_habitat_hidden_cities_web.pdf?ua=1.
20. Chuengsatiansup K. Health Volunteers in the Context of Changes : Potentials and Development Strategies. HSRI. 2006;1(3):268.(Thai)
21. The regulation of village health volunteer 2011 Ministry of Public Health; 20/03/2011 [20/03/2013]; Available from: http://www.esanphc.net/vhv/files/ProcedureMophAboutVHV2554.pdf.(Thai)
22. Village Health Volunteer. [20/03/2013]; Available from: http://www.esanphc.net/vhv/vhv.htm. (Thai)
23. Village Health Volunteers. Division of Public Health Advocate, Department of Health Service Support; 2013 [20/03/2013]; Available from: http://www.thaiphc.net/phc/main/index.php?option=com_wrapper&view=wrapper&Itemid=54.(Thai)
24. Komwong D. ST. Factors affecting drug use behaviors of village health volunteers. Thai Pharmaceutical and Health Scince Journal. 2012;7(3):121-6.(Thai)
25. Sararuk M. Empowerment of Village Health Volunteers (VHV). Journal of Ubon Ratchathani University. 2510;12(2).(Thai)
26. Sukkamnerd S. Village Health Volunteers' database summarization 2010 2010 20/10/2013]. Available from: www.thaiphc.net/doc53/summary-vhv2553.doc.(Thai)
27. Thai Thesis Database. Available from: http://www.thaithesis.org/search.php?fld=keyword&p=2&search_mode=simple&s=HEALTH%20VOLUNTEER.(Thai)
28. Health Literacy Survey Report in Sample for Using Psychometric of Method to Test Validity Dhuraku Pundit Research Service Center, 2013. (Thai)
29. Pansakun N. VA. Comparative Study of Health Literacy in the Village Health Volunteers and General Population Group in Chaiang-Kham District, Phayao Province. Graduate School Journal Chandrakasem Rajabhat University. 2014;27/04/2015:158-66.(Thai)
30. Ngousangsai P. SP, Puttrabenjapol S. A Case Study of Health Literacy of Village Health Volunteers. Isan Journal of Pharmaceutical Sciences. January 2014;9 (Supplement):82-7.(Thai)
31. Keleher H. HV. Health Literacy in Primary Health Care. Australian Journal of Primary Health. 2007;13(2).