



Evaluation of Self-Reported Population Health Status in Burji District, Southern Ethiopia

Melese Chego^{1*}, Mirkuzie Wolde² and Negalign Birhanu²

¹Department of Public Health, College of Health Sciences, Wollega University, P.O. Box: 395, Nekemte, Ethiopia

²Department of Health Planning and Management, College of Public Health and Medical Sciences, Jimma University, Jimma, Ethiopia

Abstract	Article Information
<p>Health status of a population can be influenced by social, economic, environmental and behavioral factors of individuals. Without taking into account the existing gap of health status of a population, public health interventions will have limited impact on improvement of the health status of a population. Although there are studies on disease morbidities and mortalities in Ethiopia, there is lack of data showing self reported/perceived health status of the population mainly in our study setting. The objective of the research is to evaluate self-reported population health status in Burji district in southern nations nationalities and populations of Ethiopia. Community based cross sectional study was employed in the district on sample size of 845 adult individuals with multistage and systemic sampling methods. The tool to measure health status was the short form thirty-six health survey questionnaire (3SF-36) containing 36 questions. Data were analyzed using SPSS window version 20.0 and Principal component analysis (PCA) method was used to summarize the population health status in to different extracts or dimensions. Five hundred three (60.5%) of the respondents were females and the mean age of the study participants was 35.9 (SD ± 9.8) years and majority of them were housewives and farmers. About half of the respondents get drinking water from unsafe sources (surface water, river, unprotected well and spring). About 40.0% of the respondents have no any type of latrine in their compound and Sixty-six (9.9%) of them were suffering with an acute illness within the past two weeks. Half of the respondents who reported to experience an acute illness did not seek any form of modern medical care. Regarding to Self-reported population health status, two basic summary components that can explain the self-reported population health status were identified. The two components/constructs identified were Physical component summary and mental component summary (PCS and MCS). The mean scores for perceived self-reported population health status was below 50% which indicate poor population health status in all dimensions of population health status in the district. The population in Burji district has poor access to safe living environment and facilities such housing, latrine coverage, safe drinking water, electricity and media. The PCA analysis of Self-reported population health status in the district explained two main constructs (physical and mental).</p>	<p>Article History:</p> <p>Received : 02-01-2017</p> <p>Revised : 24-03-2017</p> <p>Accepted : 26-04-2017</p> <hr/> <p>Keywords:</p> <p>Self-reported</p> <p>Health status</p> <p>Burji</p> <p>Ethiopia</p> <hr/> <p>*Corresponding Author:</p> <p>Melese Chego</p> <p>E-mail:</p> <p>melesegershom@gmail.com</p>

Copyright©2017 MHSR Journal, Wollega University. All Rights Reserved.

INTRODUCTION

The definition and concept of health and health status have been challenging and different scholars and authors approached it from different perspectives and dimensions. In spite of this World Health Organization (WHO) operationalized the concept of health, which is being used all over the world. World health organization defines health as “complete physical, mental and social wellbeing not merely absence of infirmity”. Unlike to previous practice these days emphasis of medical and health care has been addressing the improvement in the health-related quality of life in addition to decrease in mortality and increase in longevity. These days globally many efforts are being made for the improvement and

standardization of methods to assess non-fatal health status reflecting the conclusion that disease indicators and mortality alone do not provide a complete picture of population health (Abay Asfaw, 2003; Mesganaw Fantahun, 2003 and Jeffrey D. Sachs, 2001).

As WHO and many literatures show there is three key dimensions of health which combine to form the “health status” of individuals or groups. These dimensions are: Physical health, Social health and mental health. The mental and social dimensions of health are often overlooked and the more visible dimension – physical health and its factors are focused in health status

measures. Thus describing health status and state of wellbeing should address all these dimensions of health (Jeffrey D. Sachs, 2001; Debbie and Joseph, 2005).

As indicated in different studies, Summary measures of population health status are used to evaluate overall health status. These measures attempt to measure disease, death, and disability compressively, which usually reflect perceived quality of life. Different dimensions and constructs used to measure population health status and quality of life include, physical, mental, emotional and social functioning, general health, energy and/or vitality and pain. Today there is growing interest in socio-medical indicators, which assess health in terms of 'quality of life. An individual's perception of his or her own health status is seen as an essential supplementary to the traditional indicators like morbidity and mortality in the assessment of health needs of a certain population (Vera Etches *et al.*, 2005; Joseph Theodore Young, 2005).

Self-reported health status is among the most common health status measures used in public health surveys in the world mainly in developed countries. It represents how people feel about their own health status and well-being in all dimensions and it is a good indicator of the burden of disease, and mortality rates and this study used self reported health status measures to measure the health status of the population. Quality-of-life measures like QALYs and DALY can be applied especially for conditions that cause suffering chronically. they are not appropriate for acute cases and settings like our study area which lack complete and quality data on different health indicators (Worknesh *et al.*, 2008; Audrey R. Chapman, 2010).

As to the study population in literatures, it is recommended to use household surveys that provide individual or household based health information rather than health data obtained through routine health services or disease records, which are incident or occasion based. Self-reported responses in household or other types of interview based survey data are therefore widely used for assessing the health status of populations (Ritu Sadana *et al.*, 2002).

Population health and development status in Ethiopia are among the lowest in the world even among low-income countries, including Sub Sahara Africa. Different studies and national survey reports show that, Ethiopia is burdened mostly by communicable diseases and nutritional deficiencies which are attributed to poverty, poor sanitation and living conditions (CSA, 2012).

In Ethiopia although there are many studies on disease morbidities and mortalities, there is lack in data showing the individual level perceived health status and quality of life studies which is one of the best indicator of population health status and wellbeing considering different dimensions of health. Burji district is one of the most remote rural districts in southern Ethiopia. As known for most of the rural areas in Ethiopia, the district has low coverage of basic infrastructure and facilities like electricity, transport and communication services. In addition, there is no scientific compressive community based study in the area showing morbidity, mortality, population health status level and utilization of health service in the district population apart from routine health service data. (CSA, 2012; Dessalegn Fufa, 2008; Feven Surafel, 2012).

Thus to propose policy options that enable the country to improve population health status, it would be useful to better understand self reported population health status since this will assist in designing targeted measures to enhance population health in the district and similar settings. Therefore, this study aims at providing scientifically sound data on self reported population health status among the district population. The objective of the study was to evaluate self-reported population health status among population in Burji district, Southern Nations, Nationalities and Peoples Regional State (SNNPRS) of Ethiopia, from March 1-15 2013.

MATERIALS AND METHODS

Burji is one of the districts in the Southern Nations, Nationalities and Peoples Regional State (SNNPRS) of Ethiopia. The study was conducted from March 1-15 2013.

Study Design

A community based cross sectional study design was employed for the study.

Population

The source population for this study was composed of all adult populations in Burji district and study population was sample of respondents from 8 selected kebeles (peasant associations) of the district.

Sample Size

A single finite population proportion formula with 95% confidence interval ($\alpha=5\%$) was used to determine the sample size for the study.

$$n = \frac{(Z_{\alpha/2})^2 P(1-q)}{d^2}$$

Where P=proportion of poor self-rated health status (50%)
 d = margin of error (desired precision)
 $Z_{\alpha/2} = 1.96$
 n = sample size

$$n = \frac{(1.96)^2 (0.5) (0.5)}{(0.05)^2} = 384$$

Finally, considering possible non-response rate of 10% and design effect, the total sample size was determined to be 845.

Sampling Procedure

Multistage sampling method was used where 8 kebeles were randomly selected from the 25 kebeles of the district and the households to be included in the study were identified by systematic random sampling. From each of the households one individual (18 years or older) was randomly taken and interviewed on his/her own general health state.

Data Collection Procedures

The data collectors were BSc degree holders (nurses and public health professionals) and data collection process supervisors were Masters level public health professionals. Two days training was given for the data collectors and supervisors prior to actual data collection process by principal investigator. Data were collected using interviewer administered structured questionnaire. The questions were prepared in English language and translated into local language (Amharic). Measurement tool used was one of the most frequently used health

related quality of life measures, the short form thirty-six health survey questionnaire (3SF-36) containing 36 questions to measure the different dimensions of health. The questionnaire was adapted from Rand Corporation's questionnaire. The questions include physical function (10 item), role limitations due to physical health problems (4 items), bodily pain (2 items), general health (5 items), vitality (4 items), social functioning (2 items), role limitations due to emotional problems (3 items) and emotional wellbeing (5 items). Thirty-five questions in these 3F-36 questionnaires were included in the summary scales and one question did not contribute in the summary scale. (http://www.rand.org/health/surveys_tools/mos/mos_core_36item).

Data Management and Analysis

Data was entered into computer using Epi-data version 3.1 and was analyzed using SPSS window version 20.0. The functional health status questionnaire was analyzed using Principal component analysis method (PCA). The scores of the observations were summarized in to eight scales and the eight scales were summarized in to two component measures: Physical component summary and Mental component summary scores.

To check the adequacy of analysis method, test assumptions were done using the Kaiser-Meyer Olking (KMO) statistic and Bartlett's Test of Sphericity. KMO is used for assessing sampling adequacy and evaluates the correlations and partial correlations to determine if the data are likely to coalesce on components (i.e. some items highly correlated, some not). This measure varies between 0 and 1, and values closer to 1 are better. A minimum value 0.600 was used in this analysis.

Furthermore, communality (h^2) which is the sum of the squared component loadings represents the amount of variance in that variable accounted for by all the components. Reports of the variance explained by each component as well as the cumulative variance explained by all components were reported.

After descriptive measures were observed for all the eight sub-scales, the data were subjected to factor analysis method with principal components extraction using Varimax rotation. Components that showed Eigen

value greater than one were retained for subsequent analysis.

Ethics Approval and Consent to Participate

The ethical approval was obtained from Jimma University College of Public Health and Medical Sciences ethical approval committee (Office of Post Graduate Studies). To ensure individual rights, informed verbal consent was obtained from all participants before participation in the research process. The study participants were informed that they have full right to participate or not to participate in the study and even they can quit responding in the middle of interview if they desire to do so. Furthermore, the objective of the study, benefits and harm of the research process was clearly communicated with the study participants. In addition, they were told that their responses are kept confidential and no name specification in the interview and reports.

RESULTS

Socio-demographic Characteristics of the Respondents

Eight hundred thirty one study participants aged 18 years or older were addressed making a response rate of 98.3%. Five hundred three (60.5%) of the respondents were females. The mean (\pm SD) age of the study participants was 35.9(\pm 9.8) years. Regarding their religion, 385(46.3%) and 264 (31.8%) of the respondents were Orthodox and Protestant, respectively and, 794 (95.5%) and 35 (4.2%) of the respondents were Burji and Kore respectively. Six hundred ninety eight (84.0%) and 100 (12.0%) of the respondents were married and single, respectively. As to educational status, 584 (70.3%) and 144 (17.3) were illiterate and attended grades 1-8, respectively. Two hundred sixty four (31.9%) and 402 (48.4%) were farmers and house wives by occupation, respectively. The mean (\pm SD) family size of the study participants was 5.05 (\pm 2.0).

Household Related Factors

Concerning to source of drinking water, 32 (3.9%) and 299 (36.0%) of the of the respondents use pipe in dwelling and public tap respectively and about half of the respondents use drinking water from unsafe sources such as surface water, un protected well and spring. Figure 1 below shows the source of drinking water among households in percentage.

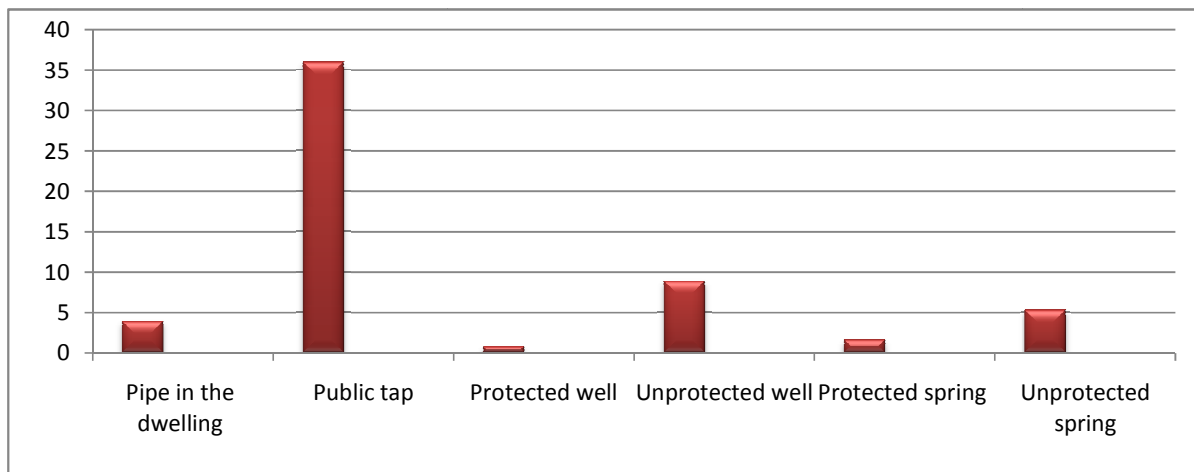


Figure 1: Percentage of Source of drinking water among households in Burji district, March 2013.

Regarding to source of energy for cooking, 812 (97.7%) and 19 (2.3%) of the study participants use wood and charcoal respectively. In addition to this, 40.8% of them reported that they had no a separate kitchen with their home.

As to latrine coverage, 330 (39.7%) had no any type of latrine in their compound and of those who owned latrine 278 (33.5%) of them had a pit latrine without slab. Out of 501(61.3%) of those who had any form of latrine, 90 (10.8%) share their latrine with some others households.

Health Services Related Factors

Regarding to the visit of public health services in the last one year, 109 (13.1%) of the respondents had ever visited health facilities. Among those who had visited public health facilities, 19(17.3), 71(64.5%) and 20(18.2%) perceived the quality of health services as very low, good and excellent, respectively. Five (4.5%), 20 (18.2%) and 85(77.3%) of them perceived the cost of health services as very expensive, expensive and medium, respectively.

Regarding to the availability of emergency transport for health care seeking, almost all of study participants (98.0%) included in this study concluded that they could not get the services as per their need. In addition to that 52(6.3%) were unable to get health services while they were in need of health care in the last one year. The commonest reasons identified for not getting health services were lack of money 48(92.3%) and distance from health facilities 4(7.7%). Furthermore, findings from this study indicated that about 104(12.5%) were unable to purchase the medicine prescribed by their health care providers in the past time.

Individual Behavior Related Factors

Among the study participants 22(2.6%) responded they were smoking during the survey period of which 20(90%) smoked 5 or more cigarettes per day. Regarding to the alcohol consumption, 426(51.3%) used any form of alcohol and majority of them 271(33.5) drank katakana as the primary (main) drink.

As to the prevalence of acute illness, 66(9.9%) of them reported that they were suffering from acute illness within the past two weeks prior to the survey and abdominal pain plus headache, diarrhea and febrile illnesses were commonly reported acute illnesses making 22(33.33%), 20(30.30%) and 15(18.18.1%) respectively. Concerning health seeking behavior of those who were acutely ill,

32(48.5%) did not seek any form of modern medical service and the main reasons for not seeking health care were the individuals claim that the disease was not serious 22(68.75%) and lack of money for service charge 8(25%).

Self-reported population health status:

According to this study, the mean score for general population health status was 45.52. Similarly, the mean scores for the rest of sub-scales ranged from 39.67 to 55.39. Table 1 below summarizes the mean scores for the eight sub- scales, which were used to measure the population health status.

Table 1: Mean scores for the eight sub- scales among respondents on self-reported population health status in Burji District, Southern Ethiopia, and April 2013.

Sub scales	Mean	Std. deviation
General health	45.5	28.7
Pain	50.4	19.7
Role limitation due to emotional	39.7	48.8
Social functioning	43.3	24.0
Emotional functioning	55.4	18.9
Physical functioning	47.3	36.0
Role limitation due to physical	53.8	46.0
Energy/Fatigue	55.1	13.6

According to the principal component analysis (PCA), two meaningful components were extracted and renamed based on their factor loadings as physical component summary and mental component summary. The physical component summary explained about 67.55% whereas the mental component summary explained 14.72% of the total variance and the cumulative variance explained by the two components was 82.27% as displayed in table 2 below.

Concerning to their pattern of loadings, role limitation due to physical, pain, general health and physical functioning were mostly loaded on physical component summary whereas the emotional wellbeing, role limitation due emotional and energy/fatigue were mainly loaded on Mental component summary. Social functioning, general health and physical functioning were loaded on both components summary as displayed in table 3 below.

Table 2: Variance explained by the eight sub-scales, among respondents on self-reported population health status in Burji District, Southern Ethiopia, March 2013

Component	Total variance explained					
	Initial Eigen values			Extraction sums of squared loading		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative percentage
1 (PCS)	5.404	67.552	67.552	5.404	67.552	67.552
2(MCS)	1.178	14.725	82.277	1.178	14.725	82.277
3	0.586	7.330	89.607			
4	0.317	3.962	93.570			
5	0.192	2.396	95.966			
6	0.150	1.870	97.836			
7	0.118	1.473	99.309			
8	0.055	0.691	100			

The internal consistency (reliability) of the eight SF-36 subscales was examined using the Cronbach's alpha. The overall Cronbach's alpha values (internal consistency coefficients) for physical component summary and mental

component summary were 0.904 and 0.858, respectively. Furthermore, the reliability coefficients (Cronbach's alpha) for the eight sub scales ranged from 0.651 to 0.997.

Table 3: Factor loading of the eight sub-scales on the components among respondents on self-reported population health status in Burji District, Southern Ethiopia, March 2013

Sub scales	Component	
	1 (PCS)	2(MCS)
Role limitation due to physical	0.878	
Pain	0.854	
General health	0.828	0.418
Physical functioning	0.822	0.423
Social functioning	0.754	0.600
Emotional wellbeing		0.894
Role limitation due to emotional		0.825
Energy/ Fatigue	0.545	0.734

DISCUSSION

Self-reported health status is now among the most common measures used in public health surveys in the world. It represents how people feel about their own physical, emotional, and social aspects of health and well-being and is seen as a good indication of the burden of disease, future health-care use and of mortality rates (Vera Etches *et al.*, 2006).

Out of 831 respondents participated in this study, only fifty-eight (7.0%) had electricity in their residence areas where as the majority (93.0) of them had not the services in their home and this finding is far lower than the 2011 EDHS where about 25% of rural households had electricity (CSA, 2012).

Concerning to sources of drinking water for the study participants, only 32 (3.9%) and 331 (39.9%) of the of the respondents use water from improved or safe sources. And, sadly the rest respondents used drinking water from unsafe sources such surface water, un protected well and spring. This is comparable with 2011 national survey report in which (42 percent) of rural households have access to an improved source of drinking water (CSA, 2012).

As to the latrine coverage 330(39.7%) had no any type latrine in their compound and of those who had 278 (33.5%) of them had a pit latrine without slab. This figure is lower than study in Jimma zone, in which Out of the surveyed population, 54.0% had private pit latrines with shading while the remaining 35.7% and 10.2%, households dispose excreta in private pit latrines without shading and on the open field respectively (Bruce P. Kennedy *et al.*, 1998).

In addition to that 52 (6.3%) of them were unable to get services while they were in need of health care in the last one year. mentioning lack of money 48 (92.3%) and distance from health facilities 4 (7.7%) as main reasons not to get service. Furthermore, 104 (12.5%) of them were unable to purchase the medicine prescribed by their health care providers in last one year.

Furthermore, the prevalence of acute illness reported during the survey period was about 10% and about half of them did not seek any medical care. The commonest

reasons for not seeking health services during the illness were the respondents claim that the disease was not serious and financial problem. This finding is in line with the studies in rural Ethiopia and Amara region (Marilyn Bergner, 1987)

In another study conducted on assessing and improving Ethiopians health care services, access and use of medical services almost half percent of the population reported that they visit health institution if the disease is severe. According to the same study distance and financial difficulties were the main problems not to get services. Study in Bangladesh in the sample of rural individuals, also showed that almost 15 % of the people had suffered from illness or injury during the last 4 weeks prior to the survey. Of those 15 % ill or injured, 66 % sought care which is higher than our study result.

The prevalence of smoking among the study participants during the survey period was 22(2.6%). This is lower than the national prevalence of smoking which is 6%. In respective of type alcohol was consumed among 426(51.3%) of the study participants and the majority of them 271(33.5) drank katikala as the primary (main) drink. As 2011 National survey in Ethiopia, Forty five percent of women and 53 percent of men reported drinking alcohol at some point in their lives (CSA, 2012).

Regarding to Self-reported population health status, this study pointed out that there are two basic summary components that can explain the self-reported health status. The two components/ constructs identified were PCS and MCS. This result is in line with most previous studies conducted elsewhere in developing and developed countries using 3SF-36 tool (Pekka Singh-Manoux, *et al.*, 2006; Eleonora Dal Grande *et al.*, 2005; Darja Maslić Seršić and Gorka Vuletić, 2006).

In contrary to our study, study conducted by Darja M. *et al* on Psychometric Evaluation and Establishing Norms of Croatian by using SF-36 Health Survey identified only one component or latent construct that explained self-reported health status (Darja Maslić Seršić and Gorka Vuletić, 2006).

The two components (PCS and MCS) extracted in this survey explained 67.55% and 14.73% variability in the

population health status with total variance of 82.27%. This finding is quite comparable with study conducted in nine European countries and USA, which was recorded as 76 % to 85% and 82% respectively (John E. Ware *et al* 1998).

CONCLUSIONS

The mean scores for perceived self-reported population health status were below 50% which indicate poor population health status in all dimensions of population health status in the district. Populations in the district are in living environments and facilities such housing, latrine coverage, safe drinking water, electricity and communication medias. Self-reported population health status in the district can be explained in two main components (physical and mental).

- Burji district administration and health offices should strengthen strong intersectoral collaboration amongst governmental and non-governmental originations in order to alleviate low literacy level and poor living conditions and facilities among the population.
- District health office should strengthen health promotion and disease prevention activities through enhancing community participation by health care professionals, Health extension workers and other health promoters.
- The government of Ethiopia should ensure community based health insurance mechanisms for the district population to improve access to health services socioeconomic status.
- Political and religious leaders in the Burji District should work hard towards strengthening organization of the community through full community participation in transformation and development.

Conflict of Interest

None declared.

Acknowledgements

We extend our appreciation to the office and staffs of department of health service planning and management of Jimma University for compressive support. Our gratitude also extends to Burji woreda administration and health offices for their cooperation in provision of data and other necessary supports for the research.

REFERENCES

- Abay Asfaw, (2003). How poverty affects the health status and the health care demand behavior of households? The case of rural Ethiopia , centre for development research (ZEF) University of Bonn.
- Audrey R. Chapman (2010). The social determinants of health, health equity, and human rights. *Health and Human Rights Journal* 12(2): 17-30.
- CSA (2012). Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International.
- Darja Maslić Seršić., Gorka Vuletić (2006). Psychometric Evaluation and Establishing Norms of Croatian SF-36 Health Survey: Framework for Subjective Health Research. *Croatian Medical Journal* 47:95-102
- Dessalegn Fufa (2008). Socioeconomic Determinants of Health Status in Ethiopia, Faculty of Business and Economics, Addis Ababa University, AAU digital library.
- Eleonora Dal Grande., Anne Taylor., Britt Catcheside (2005). Health Related Quality of life in South Australian Health

- Regions as measured by the SF-36, Population Research and Outcome Studies Unit Department of Health South Australia. ISBN 0730894045, 9780730894049.
- Feven Surafel (2012). Assessing and Improving Ethiopia's Health Care Services Thesis: Barrett Honors College Arizona State University.
- Idler, E.L., Benyamini, Y. (1997). Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies, *Journal of Health and Social Behavior* 38(1): 21-37.
- Jeffrey D. Sachs, (2001). Macroeconomics and health: investing in health for economic development commission on macroeconomics & health, World Health Organization. Debbie Bradshaw, Determinants of health and their Trends, South African Medical Research Council.
- John, E. Ware., Kosinski, M., Gandek, B., Aaronson, N.K., Apolone, G., Bech, P., Brazier, J., Bullinger, M., Kaasa, S., Leplège, A., Prieto, L., Sullivan, M. (1998). The Factor Structure of the SF-36 Health Survey in 10 Countries. *Journal of Clinical Epidemiology* 51(11): 1159-1165.
- Jong-Ling Fuh, Wang, S.J., Lu, S.R., Juang, K.D., Lee, S.J. (2001). Psychometric evaluation of a Chinese (Taiwanese) version of the SF-36 health survey amongst middle-aged women from a rural community. *Quality of Life Research* 9(6): 675-683.
- Joseph Theodore Young (2005). Health in the developing world: health status and Healthcare utilization in Matlab, Bangladesh, University of Colorado, Boulder, Bibliogr.
- Marilyn Bergner, (1987). Health status measures: An Overview and Guide for Selection. *Annual Review of Public Health* 8:191-210.
- McCallum, J., Shadbolt, B and Wang, D. (1994). Self-reported Health and Survival: A 7-year Follow-up Study of Australian Elderly. *American Journal of Public Health* 84(7): 1100-1105.
- Mesganaw Fantahun., Getu Degu (2003). Health Service Utilization in Amhara Region of Ethiopia *Ethiopian Journal of Health Development* 17(2): 141-147.
- Ritu Sadana., Ajay Tandon., Christopher, J.L.M., Irina Serdobova., Yang Cao., Wan Jun Xie., Somnath Chatterji., Bedirhan L. Ustün (2002). Describing population health in six domains: comparable results from 66 household surveys. Global Program on Evidence for Health Policy Discussion Paper No. 43, World Health Organizations.
- Shunichi F., Ware, J.E. Jr, Kosinski, M., Wada, S., Gandek, B. (1998). Psychometric and Clinical Tests of Validity of the Japanese SF-36 Health Survey. *Journal of Clinical Epidemiology* 51(11): 1045-1053.
- Singh-Manoux, A., Martikainen, P., Ferrie, J., Zins, M., Marmot, M., Goldberg, M. (2006). What does self rated health measure? Results from the British Whitehall II and French Gazel cohort studies. *Journal of Epidemiology and Community Health* 60:364-372.
- The Conference Board of Canada, (2012). Self-Reported Health Status, the percentage of the population, aged 15 years or older, who report their health to be "good" or "very good, Canada.
- Vera Etches., John Frank., Erica Di, R., Doug Manuel (2006). Measuring population health: A Review of Indicators. *Annual Review of Public Health* 2006. 27: 29-55.
- Worknesh Amdino Chali Jira and Mirkuzie Wolde (2008). Socioeconomic determinants of health in kersa district, Jimma zone, southwest Ethiopia. *Ethiopian Journal of Health Sciences* 18(3): 71-78.