

DOES AGING COMMUNITY VULNERABLE TO NON-COMMUNICABLE DISEASES IN SLUMS IN MUMBAI?

Dr. V. M. Sarode

Associate Professor of Statistics, Head, Department of Mathematics and Statistics, Mulund College of Commerce, *Mulund (West), Mumbai – 400 080, India.*

ABSTRACT: *This study uses primary data, collected using cluster sampling of sample size of 302 of elderly suffering with Hypertension, Diabetes, TB, Throat infection, HIV, Joint pain from Rafi Nagar slum in Mumbai. The paper examines chronic diseases related to aged slum dwellers and the utilization of health services available to these elderly people in the slum. The findings using logistic regression reveals highly significant disorders among elderly men related to Diabetes and Joint pain–Knee and untreated bacterial pharyngitis; acute rheumatic fever who had Hypertension where as among elderly women who had hypertension showed highly significant disorders such as Diabetes and Joint pain–Knee and Respiratory disorders. Besides there was evidence of unimaginable low level of treatment seeking behavior which goes without adequate care taken amongst the poorest stratum of these aged slum dwellers. The need for care services is suggested at younger age for such elderly slum dwellers particularly low income category women in such slum.*

KEYWORDS: Chronic diseases; Aging; hypertension, treatment; Mumbai Slums

INTRODUCTION

Diabetes is a common non-communicable disease in India, as well as the rest of the world. The estimates of prevalence of diabetes suggested that nearly 3% of adults were diabetic in the year 2000, and this figure is projected to be nearly doubled by the year 2030 (Wild S , 2004). Diabetes also contributes to 5% of the total mortality (Geneva , 2005, Roglic G et al., 2000).

The most important demographic transition in India, as well as in the world, is due to increase in the number of aged persons, leading to an increase in the prevalence of hypertension and diabetes. Recently, India has witnessed this demographic transition, with a reduction in crude birth rate and increase in life expectancy (Registrar General, 2001, Health Information of India 2003).

In spite of its high prevalence, and being a major cause of mortality, diabetes remains highly undiagnosed. Undiagnosed diabetes is associated with increased risk of all-cause mortality (Wild SH et al., 2005). Delayed diagnosis and inadequate or improper treatment result in poor disease outcomes.

Low-socioeconomic status is associated with development of diabetes (Ross NA et al. , 2010). Elderly persons living in urban slums are more vulnerable to various non-communicable diseases and their complications due to lack of basic amenities, poor health-seeking behavior and stress due to lack of social support.

Hypertension is the most prevalent risk factor for development of cardiovascular and kidney disease (KDOQI. KDOQI clinical practice, 2007, Stamler J et al., 1993). The prevalence of

hypertension is estimated at about 30% of the adult population in developed countries and is predicted to increase by almost 60% in the next 2 decades. (Hajjar I et al., 2003, Kearney PM et al., 2005).

Diabetes is a major risk factor for cardiovascular disease and the most common cause of kidney failure in the Western world. (KDOQI. KDOQI clinical practice, 2007, Buse JB et al., 2007). Moreover, cardiovascular mortality and morbidity is increased substantially in the presence of diabetes. (Nag S et al., 2007) More than 75% of adults with diabetes have blood pressure (BP) levels $\geq 130/80$ mm Hg or are using antihypertensive medication. (KDOQI. KDOQI clinical practice, 2007).

In the natural history of type 1 diabetes, development of an elevated BP (ie, $>130/80$ mm Hg) is a major predictor of nephropathy and future declines in kidney function. (KDOQI. KDOQI clinical practice, 2007,). In contrast, hypertension is already evident in most patients with type 2 diabetes at the time of diagnosis. The implications of hypertension on cardiovascular risk, however, are similar in both types of diabetes. (KDOQI. KDOQI clinical practice, 2007, Sarafidis PA et al., 2008). Mortality is increased 7.2-fold when hypertension is present in patients with diabetes. (KDOQI. KDOQI clinical practice, 2007). Since the publication of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7), several important observations regarding BP management and glycemic control in patients with diabetes are now apparent. (George L. Bakris et al., 2008).

Hypertension in people with type 2 diabetes is associated with an increased risk of macrovascular complications. (Alastair Gray, 1998). The systolic hypertension in the elderly programme showed the effectiveness of improved blood pressure in reducing the incidence of stroke and myocardial infarction in a diabetic subgroup of elderly patients (mean age 70 years) with type 2 diabetes, but no data on microvascular complications or on younger patients were available. (SHEP Cooperative Research Group, 1991). The cost effectiveness of treatments based on antihypertensive drugs and education has been estimated for different general population groups, but these analyses have mainly been based on models and lack information on effectiveness and use of resources from long term trials, and none has considered hypertensive patients with type 2 diabetes. (Johannesson M, 1995, Edelson JT, 1990, Nissinen A, 1986).

Sitthi-amorn C and others have investigated the prevalence and factors associated with hypertension in 976 residents of Klong Toey Slum and 909 residents of government apartment houses, aged 30 and above, selected by probability sampling after systematic household surveys with an average response rate of over 80%. Hypertensives were those who had, on at least three measurements, average diastolic blood pressure equal to or above 95 mmHg and/or systolic blood pressure equal to or above 160 mmHg or had blood pressure below 160/95 mmHg but were currently on antihypertensive medication. The prevalence of total hypertensives were found to be 17.3% and 14.0% for residents of slum and government apartment houses respectively. Men and women had more or less equal mean blood pressure and similar prevalence of hypertension. The mean systolic blood pressure increased with age while the mean diastolic blood pressure, after an initial rise with age in lower age groups, tended to level off from the age group 55–64 years upwards. Only one quarter to one third were aware of their illness and less than 15% were receiving treatment. Significant risk factors include age, duration of smoking, duration of alcohol intake, high body mass index, high Cholesterol, high Triglyceride, high Low Density Lipoprotein Cholesterol (LDLC), low

High Density Lipoprotein Cholesterol (HDL), high Total Cholesterol (TC) to High Density Lipoprotein ratio (TC/HDL), high LDL to HDL ratio and diabetes mellitus. They have suggested that hypertension was an important public health problem in low socioeconomic groups in Bangkok. Some of the risk factors were related to an unhealthy lifestyle which should receive due consideration in planning for appropriate control. (Sitthi-amorn C et al, 1989).

cross-sectional, population-based studies were conducted by S Chaturvedi, and others (2007) to assess the prevalence, awareness, treatment and control of hypertension, among people aged 20-59 years and those over 60 years in Delhi. Study 1 (20-59 years): in total, 1213 subjects from 120 clusters spread across Delhi having age 20-59 years were studied. The prevalence of hypertension was 27.5%. Of the hypertensives, 53.3% were aware of their diagnosis; 42.8% were taking treatment and only 10.5% had controlled blood pressure. About 9.0% of the hypertensives had coexisting diabetes mellitus and 8.4% were suffering from coronary disease. The prevalence of hypertension was significantly higher in urban areas, but there was no significant difference in levels of awareness, treatment and control between urban and slum areas. The prevalence of hypertension was comparable in both sexes. Women, however, were more likely to be aware of their condition.

Study 2 (60 years and above): in total, 1105 subjects from 110 clusters were studied. Prevalence of hypertension was 63.8%. Isolated systolic hypertension (ISH) was found in 15.3% of the subjects. About 54% of the hypertensives were aware of their diagnosis; 43.4% were taking treatment and only 8.5% had controlled blood pressure. Prevalence of hypertension and ISH were comparable among sexes. Women were more aware and better treated. About 21.3% hypertensives had coexisting diabetes mellitus, and 14.3% were suffering from coronary disease. There was no significant difference between sexes. Urban and slum areas were also found to be comparable. Over 3% of the elderly were controlling their raised blood pressure by non-pharmacological measures. They belonged to the 'aware' category yet could not be labelled as 'hypertensives', highlighting an operational fault in the Joint National Committee definition.

In 2001, 28% of the total population in India was living in urban areas, which was projected to increase to about 50% (605– 618 million) by 2021–25 (Planning Commission, 2002). Demographic trends show that while the urban average growth rate stabilized at 3% over the past decade (1991–2001), the slum growth rate doubled. An alarming feature of the growth of the urban population is the proportion of people living in poverty; official estimates place it at 32%. Projections suggest that while the urban population will double in the next 10 years, the urban poor will double in just 5 years (Catley-Carlson M, 1996). It is evident that the urban poor have the worst of both worlds—they adopt a more urbanized lifestyle which places them at a higher risk for NCDs and have poor access to healthcare, partly related to their poor purchasing ability (K. Anand et al, 2007).

Recently, a few studies have been conducted mainly to explore the prevalence of non-communicable diseases among aged persons in slums (Kevin W. Ongeti et al., 2013; P Kowal, et al., 2012), but negligible attempts were made to examine the determinants of such diseases among aged persons in slums. Hence it is necessary to impart knowledge about the prevalence of non-communicable diseases and to understand the root cause of generating such diseases among such poor aged persons in slums. Besides, aged persons in the urban slums are unaware of the existing health facilities and even though these facilities are

available, it has not been adequately utilized. Thus, keeping in view of the above research work, an attempt is made, to evolve a suitable strategy for knowing

- i) the prevalence of non-communicable diseases among aged persons in slums
- ii) utilization of existing health facilities available in the study area, and
- iii) the determinants influencing non-communicable diseases among men and women in the slum in Mumbai.

Background of the study area

According to a UNESCO document, “a slum is a building, a group of buildings, or area characterized by overcrowding, deterioration, insanitary conditions or absence of facilities, or amenities which, because of all these conditions or any one of them, endanger the health, safety or morals of its inhabitants or the community (Anderson N., 1960). “Slums may be characterized as areas of substandard housing condition within a city. A slum is always an area. A single, neglected building even in the worst stage of decoration does not make a slum”(Bergel E. E., 1955). Apart from these definitions, slum is an area of darkness, an area of poverty and thus poverty is the prime characteristic of slum.

According to Census of India 2001, about 49 percent of population of Mumbai lives in slums. About 28 percent and 21 percent of total population is male and female respectively who lives in slums. These slums household people have low income. These people consists even recent migrants who do odd jobs and cannot afford to pay any rent nor can they leave the city for fear of losing whatever source of income they have. Such people have occupied a space where ever they could find a place even in the face of stringent laws of encroachment. These slums have no basic health facilities like safe drinking water, toilets etc., in fact they have open drainage. They have strong impact of religion and culture and practices of doing early marriages. According to 2001, Census of India, the slum sex ratio of Mumbai is 929 and slum literacy rate is 83.13 where as slum female literacy rate is 75.17 and slum male literacy rate is 89.08. This rate is above the national level.

MATERIALS AND METHODS

For the present investigation, two stage sampling procedure has been adopted. In the first stage, the slums in Greater Mumbai according to their population size were listed using the “Directory of Slums” published by office of the additional collector (ENC), Mumbai & Mumbai Sub. Dist. (see reference). Two lists were prepared, one for plain area slums and other for hilly area slums. From plain area slum list, one slum was selected at random. This plain area slum was Rafi Nagar slum located at Deonar, Mumbai which comes under M/E-ward of Brihan Mumbai Municipal Corporation. The population of this slum (study area) was 8000.

In the second stage of sampling, from this selected slum area, using cluster sampling, two clusters were selected at random. From these two clusters of Rafi Nagar slum area, 302 households were selected, which represents the slum population in Greater Mumbai. The survey was conducted by the trained graduate/undergraduate girls who normally work with

the supervision of doctors/ANMs for the pulse-polio programme. This survey was conducted from December 2012 to January, 2013.

The study instrument were included questions related to **Chronic non-infectious diseases** such as Hypertension, Diabetes, Asthma, Ignored injuries Mental illnesses (intentional or unintentional), **Chronic infectious diseases** such as Tuberculosis, latent TB infection, HIV infection, **Acute infectious disease with chronic outcomes** such as Skin lesion and super infection, Throat Infection, Joint pain (knee), Untreated bacterial pharyngitis; acute rheumatic fever. The questions on **Behavior and habits** such as Tobacco Use, Alcohol abuse, Illicit drug use, also were included. Besides the questions on morbid conditions among elderly people, whether were suffering from the illness such as Senile cataract, Hearing loss, Musculoskeletal disorders, Respiratory disorders, Gastrointestinal system, Sick (past two weeks), and any Other. At end the questions on health facilities and their utilization also were included.

Method of analysis

Logistic regression analysis was used to assess the effect of elderly health problems having hypertension on non-communicable diseases controlling for other variables included in the model. For the logistic regression analysis purpose, the elderly slum dwellers who were residing in the slum for the past 20 years prior to survey were interviewed.

RESULTS AND DISCUSSION

Table 1 shows the elderly people living in the Rafi Nagar slum, Mumbai according to the selected background. Most of them stay in a joint family (73%), are Muslims in majority (90%), with OBC (35%), having Mother tongue as Hindi (91%), of which 37% were residing in Kachha house, had owned house (71%), and had one room (79%), thus had no separate kitchen (79%), and no electricity (16%) and were using public toilet facility (85%).

Table 1: Percentage of Selected background Characteristics in Rafi Nagar Slum, Deonar, Mumbai.

	Number	Percentage
Type of family		
Joint	222	73.5
Nuclear	38	12.6
Extended	42	13.9
Total	302	100.0
Religion		
Hindu	26	8.6
Muslim	273	90.4
Buddhist	1	.3
Christian	1	.3
Other	1	.3
Total	302	100.0

Caste		
SC	2	.7
ST	71	23.5
OBC	107	35.4
General	65	21.5
Other	57	18.9
Total	302	100.0
Mother tongue		
Marathi	18	6.0
Hindi	275	91.1
South language	5	1.7
Other	4	1.3
Total	302	100.0
Type of house		
Kachcha	111	36.8
Semi-pacca	57	18.9
Pacca	134	44.4
Total	302	100.0
Whether the house is?		
Rented	86	28.5
Own	215	71.2
On govt.land	1	.3
Total	302	100.0
No. of rooms		
One	238	78.8
Two	60	19.9
More than two	4	1.3
Total	302	100.0
	Number	Percentage
Do you have separate kitchen		
Yes	64	21.2
No	238	78.8
Total	302	100.0
Availability of electricity in the house		
Yes	253	83.8

No	49	16.2
Total	302	100.0
Toilet facility		
Inside the house	14	4.6
Public	258	85.4
Open	30	9.9
Total	302	100.0

In order to see the net effect of independent variables (description of the variables is provided in Table 2 for Rafi nagar slum area) on the dependent variable which is dichotomous, logistic regression technique has been adopted.

Table 2. Measurement of variables used in the logistic regression analysis for Rafi nagar slum area, Deonar, Mumbai.

Category Variables Code

Category	Variables	code
	Dependent variables	
Hypertension	No (Ref)	0
	Yes	1
	Independent variables	
Diabetes	No (Ref)	0
	Yes	1
Asthama	No (Ref)	0
	Yes	1
Tuberculosis, latent TB infection	No (Ref)	0
	Yes	1
Skin lesion and super infection	No (Ref)	0
	Yes	1
Throat Infection	No (Ref)	0
	Yes	1
Joint Pain (Knee)	No (Ref)	0
	Yes	1
Untreated bacterial pharyngitis; acute rheumatic fever	No (Ref)	0
	Yes	1
Senile cataract	No (Ref)	0
	Yes	1
Musculoskeletal disorders,	No (Ref)	0
	Yes	1
Respiratory disorders,	No (Ref)	0
	Yes	1
Gastrointestinal system	No (Ref)	0
	Yes	1

DETERMINANTS OF CHRONIC DISEASES AMONG ELDERLY MEN IN SLUM: A LOGISTIC REGRESSION ANALYSIS

Table 3 shows the influence of hypertension of aged men and women on self reported chronic non-infectious diseases like Diabetes, Asthma, Ignored injuries, Mental illnesses (intentional or unintentional), **Chronic infectious diseases** such as Tuberculosis, latent TB infection, HIV infection, **Acute infectious disease with chronic outcomes** such as Skin lesion and super infection, Throat Infection, Joint pain (knee), Untreated bacterial pharyngitis; acute rheumatic fever. Besides the table also shows the influence of hypertension of aged men and women on morbid conditions among elderly male and women persons suffering from the illness such as Senile cataract, Hearing loss, Musculoskeletal disorders, Respiratory disorders, Gastrointestinal system.

Table No. 3: Percentage of chronic diseases among elderly men and women in Rafi Nagar Slum, Deonar, Mumbai.

Chronic diseases	Elderly Male		Elderly Female	
	Yes	%	Yes	%
Hypertension	47	15.6	85	28.1
Diabetes	36	11.9	46	15.2
Asthama	17	5.6	23	7.6
Ignored injuries	7	2.3	7	2.3
Mental illnesses (intentional or unintentional)	10	3.3	21	7.0
Tuberculosis, latent TB infection	4	1.3	6	2.0
HIV infection	2	0.7	3	1.0
Skin lesion and super infection	3	1.0	7	2.3
Throat Infection	9	3.0	13	4.3
Joint pain (knee)	93	30.8	135	45.4
Untreated bacterial pharyngitis; acute rheumatic fever	11	3.6	11	3.6
Senile cataract	33	10.9	57	18.9
Musculoskeletal disorders,	128	42.4	162	53.6
Respiratory disorders,	85	28.1	100	33.1
Gastrointestinal system	112	37.1	145	48.0

Table 4 reveals that the elderly men in the study area who were suffering from hypertension showed highly significant influence in causing the chronic diseases like Diabetes, ($P < .001$) Joint Pain (Knee) ($P < .10$), Untreated bacterial pharyngitis; acute rheumatic fever ($P < .10$) among the elderly men where as elderly men suffering from Asthama, Tuberculosis, latent TB infection, Skin lesion and super infection, Throat Infection showed insignificant related to hypertension elderly men had.

Table No. 4: Odds ratios from logistic regression examining the effect of Hypertension of elderly men on Chronic diseases in Rafi Nagar Slum, Deonar, Mumbai.

Chronic diseases	Sig.	Exp(B)
Diabetes	.000	.152***
Asthama	.780	.828
Tuberculosis, latent TB infection	.203	.202
Skin lesion and super infection	.879	1.246
Throat Infection	.695	.682
Joint Pain (Knee)	.059	.485*
Untreated bacterial pharyngitis; acute rheumatic fever	.096	7.278*
Constant	.000	7.199

*** P < 0.000, ** P < 0.05, * P < 0.10

DETERMINANTS OF CHRONIC DISEASES AMONG ELDERLY WOMEN IN SLUM: A LOGISTIC REGRESSION ANALYSIS

Table 5 reveals that the elderly women in the study area who were suffering from hypertension showed highly significant influence in causing the chronic diseases like Diabetes, (P< .05), Asthama (P< .05) and Joint Pain (Knee) (P< .10), Respiratory disorders

(P< .10) among the elderly women where as elderly women suffering from Ignored Injuries, Mental Illnesses, Tuberculosis, latent TB infection, HIV infection, Skin lesion and super infection, Throat Infection, Untreated bacterial pharyngitis; acute rheumatic fever , Senile cataract, Musculoskeletal disorders, Gastrointestinal system, showed insignificant related to hypertension elderly men had.

Table No. 5: Odds ratios from logistic regression examining the effect of Hypertension of elderly women on Chronic diseases in Rafi Nagar Slum, Deonar, Mumbai.

Chronic diseases	Sig.	Exp(B)
Diabetes Q302F(1)	.012**	.359
Asthama Q303F(1)	.002***	.169
Ignored Injuries	.814	1.266
Mental Illnesses	.459	.649
Tuberculosis, latent TB infection	.508	.324
HIV infection	.999	.000
Skin lesion and super infection	.635	.434
Throat Infection	.494	.577
Joint Pain (Knee)	.014**	.430

Untreated bacterial pharyngitis; acute rheumatic fever	.330	.368
Senile cataract	.610	.830
Musculoskeletal disorders	.307	.649
Respiratory disorders	.089*	.548
Gastrointestinal system	.987	1.006
Constant	.000	9.662

*** P < 0.01, ** P < 0.05, * P < 0.10

Health facilities and Treatment seeking behavior among elderly in the study area

Health facilities available in the study area and the utilization of such facilities among elderly in the Rafi Nagar slum area concluded that 49% of elderly male have not sought treatment where as 45% of elderly female even not sought treatment.

Only 93% and 92% of elderly male and elderly female respectively have taken treatment from Govt. hospital, where as 94% of both elderly male and elderly female were found satisfied with the treatment from Govt. Hospital.

Those elderly male who have taken treatment from Private Hospital were only 50% where as treatment taken by elderly female were 45%. Even after taking treatment from private hospital, 11% and 10% of elderly male and elderly female respectively were found unsatisfactory.

CONCLUSION AND POLICY IMPLICATIONS

Elderly people living in slums have a high risk of developing hypertension (Whelton et al., 2004). Furthermore, the results indicate that awareness and treatment of hypertension in urban slum dwelling is inadequate. Generally, in developing countries, prevalence of hypertension appears to be rising rapidly and the societal response is fragmented with very low levels of awareness, treatment and control (Whelton et al., 2004). This is worse in the densely populated poor urban dwellings.

The results discussed above have important implications both for clinicians and public health professionals. Moreover there is need for public education concerning management of hypertension starting early in life and regular screening of people at risk in the urban slum dwellings. The high prevalence of risk factors for non-communicable diseases across elderly age groups in this urban slum community indicates the likelihood of a high future burden of illness. Immediate action for prevention and control is required to prevent the situation from worsening.

REFERENCES

Alastair Gray,1998. Cost effectiveness analysis of improved blood pressure control in hypertensive patients with type2 diabetes : UKPDS40, BMJ 1998; 317 doi : <http://>

[dx.doi.org /10.1136/ bmj. 317.7160.720](https://doi.org/10.1136/bmj.317.7160.720) (Published 12 September 1998) Cite this as: BMJ 1998;317:720, UK Prospective Diabetes Study Group Correspondence to: Dr Alastair Gray, Health Economics Research Centre, Institute of Health Sciences, Oxford University, Oxford OX3 7LF.

- Anand K, Shah B, Yadav K, Singh R, Mathur P, Paul E, *et al.* Are the urban poor vulnerable to non-communicable diseases? A survey of risk factors for non-communicable diseases in urban slums of Faridabad. *Natl Med J India* 2007;20:115-20. †
[PUBMED].
- Arvind Kumar Singh, Kalaiyani Mani, Anand Krishnan, Praveen Aggarwal, and . Sanjeev Kumar Gupta. 2012. Prevalence, Awareness, Treatment and Control of Diabetes Among Elderly Persons in an Urban Slum of Delhi. Indian J Community Med. 2012 Oct-Dec; 37(4): 236–239. doi: 10.4103/0970-0218.103472 PMID: PMC3531017
- Bakris GL. The importance of blood pressure control in the patient with diabetes. *Am J Med.* 2004;116(suppl 5A):30S–38S.
- Buse JB, Ginsberg HN, Bakris GL, *et al.* Primary prevention of cardiovascular diseases in people with diabetes mellitus: a scientific statement from the American Heart Association and the American Diabetes Association. *Circulation.* 2007;115(1):114–126.
- Catley-Carlson M, Silimperi D. Health and environment in urban poor areas: Avoiding a crisis through prevention–environmental health program. Capsule Report, March 1996. Available at http://www.dec.org/pdf_docs/pnaby450.pdf (accessed on 24 October 2005).
- Edelson JT, Weinstein MC, Tosteson ANA, Williams L, Lee TH, Goldman L .Long-term cost-effectiveness of various initial monotherapies for mild to moderate hypertension. *JAMA* 1990; 263:407–413 Abstract/FREE Full Text
- Geneva: World Health Organization; 2005. Preventing chronic diseases: A vital investment: WHO global report; p. 2.
- George L. Bakris, MD; James R. Sowers, MD; ASH Position Paper: Treatment of Hypertension in Patients With Diabetes—An Update on behalf of the American Society of Hypertension Writing Group THE JOURNAL OF CLINICAL HYPERTENSION VOL. 10 NO. 9 SEPTEMBER 2008 doi: 10.1111/j.1751-7176.2008.00012.x
- Hajjar I, Kotchen TA. Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. *JAMA.* 2003;290(2):199–206.
- Health Information of India 2003; Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India. [Last accessed on 2009 Oct 11]. Available from:<http://cbhidghs.nic.in/hii2003/chap2.asp> .
- Johannesson M, Agewall S, Hartford M, Hedner T, Fagerberg B .The cost-effectiveness of a cardiovascular multiple-risk-factor intervention programme in treated hypertensive men. *J Intern Med* 1995; 237:19–26 [MedlineWeb of Science](#)
- K. ANAND, BELA SHAH, KAPIL YADAV, RITESH SINGH, PRASHANT MATHUR, ELDHO PAUL, S. K. KAPOOR Are the urban poor vulnerable to non-communicable diseases? A survey of risk factors for non-communicable diseases in urban slums of Faridabad, THE NATIONAL MEDICAL JOURNAL OF INDIA VOL. 20, NO. 3, pp 115-120, 2007.
- KDOQI. KDOQI clinical practice guidelines and clinical practice recommendations for diabetes and chronic kidney disease. *Am J Kidney Dis.* 2007;49(2 suppl 2): S12–S154.
- Kearney PM, Whelton M, Reynolds K, *et al.* Global burden of hypertension: analysis of worldwide data. *Lancet.* 2005;365(9455):217–223.

- Kevin W. Ongeti, Julius A. Ogeng'o, Anne N. Pulei, Beda O. Olabu, Catherine N. Gakara: Blood pressure characteristics among slum dwellers in Kenya *Global Advanced Research Journal of Microbiology* (ISSN: 2315-5116) Vol. 2(4) pp. 080-085, April, 2013, Available online <http://garj.org/garjm/index.htm>.
- Nag S, Bilous R, Kelly W, et al. All-cause and cardiovascular mortality in diabetic subjects increases significantly with reduced estimated glomerular filtration rate (eGFR): 10 years' data from the South Tees Diabetes Mortality study. *Diabet Med.* 2007;24(1):10–17.
- Nissinen A, Tuomilehto J, Kottke T, Puska P. Cost-effectiveness of the North Karelia hypertension program: 1972-1977. *Med Care* 1986; 24:767–780 [CrossRefMedlineWeb of Science](#)
- P Kowal, P Arokiasamy, R Lopez Ridaura, J Yong, N Minicuci, S Chatterji: Hypertension in developing countries, *The Lancet*, Volume 380, Issue 9852, Page 1471, 27 October 2012, doi:10.1016/S0140-6736(12)61840-6 [Cite or Link Using DOI](#), Copyright © 2012 Elsevier Ltd All rights reserved.
- Planning Commission. 9th Five-Year Plan (Vol. 2). New Delhi:Government of India; 2002.
- Registrar General and Census Commissioner of India, Census of India. 2001. [Last accessed on 2009 Oct 10]. Available from: <http://www.censusindia.gov.in>.
- Roglic G, Unwin N, Bennett PH, Mathers C, Tuomilehto J, Nag S, et al. The burden of mortality attributable to diabetes: Realistic estimates for the year 2000. *Diabetes Care.* 2005;28:2130–5. [[PubMed](#)]
- Ross NA, Gilmour H, Dasgupta K. 14-year diabetes incidence: The role of socio-economic status. *Health Rep.* 2010;21:19–28. [[PubMed](#)]
- S Chaturvedi, M Pant, Neelam, G Yadav Hypertension in Delhi: prevalence, awareness, treatment and control, *Tropical Doctor*, The Royal Society of Medicine Journal, doi: 10.1258/004947507781524593 *Trop Doct* July 1, 2007 vol. 37 no. 3142-145
- Sarafidis PA, Bakris GL. State of hypertension management in the united states: confluence of risk factors and the prevalence of resistant hypertension. *J Clin Hypertens (Greenwich).* 2008;10:130–139.
- SHEP Cooperative Research Group. Prevention of stroke by antihypertensive drug treatment in older persons with isolated systolic hypertension. Final results of the Systolic Hypertension in the Elderly Program (SHEP). *JAMA* 1991; 265:3255–3264 [Abstract/FREE Full Text](#)
- Sitthi-amorn C (Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand), Chandraprasert S, Bunnag S C and Plengvidhya C S. The prevalence and risk factors of hypertension in Klong Toey Slum and Klong Toey government apartment house. *International Journal of Epidemiology* 1989, 18: 89–94.
- Stamler J, Stamler R, Neaton JD. Blood pressure, systolic and diastolic, and cardiovascular risks. US population data. *Arch Intern Med.* 1993;153(5):598–615.
- Whelton PK (1996). Primary prevention of hypertension: rationale, approaches, realities and perspectives. *J Hum Hyperten* 1996; 10 (Suppl 1): S47–S50.
- Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care.* 2004;27:1047–53. [[PubMed](#)]
- Wild SH, Smith FB, Lee AJ, Fowkes FG. Criteria for previously undiagnosed diabetes and risk of mortality: 15-year follow-up of the Edinburgh Artery Study cohort. *Diabet Med.* 2005;22:490–6. [[PubMed](#)]