

Nodes Centrality in Urban Road Network, Aizawl City with Network Centrality Measures

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Abstract : This paper attempts to develop quantitative measures of node (junction) centrality in urban road network located in hill area using centrality measures for node centrality. The paper focuses on identification of critical nodes over the networks, proving an idea that 'some points are more important than others because they are more central'. The study also adopted geospatial technology to present and analyze the spatial distribution of node centrality in Aizawl city. The results from this analysis can be used to develop urban road network design guidelines that can be used to address current transportation problems and socio-economic development.

Keywords : Centrality Measures, Geospatial Technology, Spatial Distribution of Nodes Centrality, Correlation of Centrality

The interaction of one space to another in a certain degree at a definite stage creates a complex network system and forms an intricate spatial organization. The notion of centrality is resolute by the arrangement of network at certain level over the space. The science of network and its mathematical tools have been providing ambiguous results for measurements of centrality in the fields of social science, spatial science, economic, and biological science etc. The idea of centrality in social science was firstly proposed by Bavelas who hypothesized the structural centrality and influence on communication in a small group (Bavelas 1948).

Network structure and topology inherently determine the efficiency

of node accessibility, which is the product of movement pattern, direction and flow pattern etc. Simply, topology and structure of network affect attributes of the node and edge centrality. In larger picture, the concept of centrality exposes role and identity of the node and edges in the network system, considering the nodes existed in the network as common resources, which is accessible from any point through edges. In this context, the network system represents the mode of communications and node is recognized as the center of diffusion. Also central place refers to node which has a relative surplus of meaning due to its fulfillment of central functions for the surrounding areas (Christaller 1933).

The characterizations of

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complex network systems using statistical and computational techniques have attracted considerable attentions in literature in recent years. Complex systems are composed of numerous components; interacting in such a manner that collective behavior is no longer an ordinal function of their individual behaviors. Centrality is the principal properties in a complex network system that transformed the surrounding geographical space in a form of point, linear and spatial centrality. Similarly, node, linear and spatial centrality is a dynamic concept and not mutually exclusive, that differs from one perspective to another at different stages. The centrality possibly determines the attributes of the node or some attributes relatively stronger than those of the other spatial units in the region. It may also be considered to possess strong centrality, and this centrality is based on scale of attributes (Li *et al.* 2017). Considerably, the centrality of a node is determined by its attributes and the distance from other nodes, based on geographical proximity and distance from the spatial unit.

Earlier studies on urban network are mostly confined on the shortest pathway analysis minimizing the time and cost of movement (Yang and Sam 1995, Girvan and Newman 2002, Holme 2003). The different form of study emerged as emphasis on the

resilience of transportation networks, to model the traffic flow between municipalities, clusters and commuters perception (Guimer *et al.* 2005, Boccaletti *et al.* 2006, Scheurer and Porta 2008, Berche *et al.* 2009). Recently, the paradigm of urban network study shifted towards centrality measures. Centrality represents the fundamental concept; if one look into the role and identities of central nodes. Centrality measures are essential for the conception of node identities, node attributes, network structural attributers and network topological attribute. Centrality or central places appear to have spatial privileges that habitat communities further luxuriate in transportation and socio-economic amenities or facilities. Recently the emphasis is shifted to the distribution of centrality values through all nodes (Crucitti *et al.* 2006).

In urban network entity, road transport network plays a pivotal role in the complex urban networking system. Transport networks support the efficiency of movement of the people and goods at various directions and also accessibly of each node in the chain of network. The study of urban network implies the distribution of centrality and its attributes over the space in different dimensions and argued that some places are more important than others because they are more central (Wilson 2000). The

study primarily focuses on centrality measures for analysis of nodes, spatial distributions and arrangement of nodes which have a significant role for local and global attraction.

Materials and Methods :

Materials and methods of study are primarily divided on three main steps namely, database design, network centrality measures and applications of geospatial technology.

Database Design :

The road network was obtained from Aizawl city, located in Aizawl district of Mizoram. This city is situated on the top of Aizawl range, the topography of the region makes the arrangement of road networking system more complicated. Extraction of network data set is an important task for database design. It is extracted from open-source data domain like Google Earth and Open-Street Map. The extracted data are employed for generations of nodes and edges in the study area. The extracted roads and junctions were transformed and converted from .kml to .shp file to performed further manipulations and analysis, with the help of suitable GIS techniques. In this study, street intersections represent nodes and linear connections turn into edges. The whole network comprises of 183 junctions (nodes/vertex) and 242 streets (edges) segments in this network. Each of the roads and

junctions were checked and modified for limiting topological error. Further, Toposheet No. 84 A/9, 84 A/10 and 84 A/14, issued by Survey of India 1990 and Aizawl Municipal Road Map is also integrated for the accuracy assessment and ground thought verifications in doubtful areas. For further analysis the extracted data are stored in ArcGIS database.

Centrality Measures :

The study employed network centrality measures for examining each point on the network which is directly or indirectly associated with the road network topology and network arrangement. The centrality of a place is that component of its functional magnitude (Christaller 1933). In this case, nodes represent functional phenomena, the street junctions where two or more streets intersect represented node and denoting edges as street segments. The method used for this study is solely based on simple directed graph, and the adjacency matrix was developed to measure point centrality. The centrality of each node was calculated based on the mathematical equations using the centrality measures; Degree of Centrality (C_D), Closeness Centrality (C_C), Betweenness Centrality (C_B) and Eigenvector Centrality (C_E) are calculated. Further to provide lucid result, comprehensive spatial distributions of nodes centrality are graphically represented by making

use of geospatial analysis software. The study analyzed the spatial distribution of node centrality and changes therein to visualize the changing pattern of centrality in general and in order to identify the important nodes. Classificatory approach is adopted to describe the changes of centrality pattern. The calculated values of centrality measures are classified into five centrality classes based on natural break method (Figs. 1, 2, 3 and 4). The study adopted GEPHI network analysis software for the centrality calculation and ArcGis 10.3 software is employed for spatial analysis.

Result Definitions and Analysis :

In degree of centrality every connected node has some degree of centrality. On the other hand, a node is more important rather than the others if it is linked with other important nodes. Centrality measures depicted the hierarchical arrangement of the points and network structure.

Degree of Centrality :

The degree of centrality is a simple mathematical representation of the degree of point on concept of adjacency matrix (Niemiens 1974, Freeman 1979). Degree of centrality is the idea that important nodes have the largest number of ties to other nodes in the graph (Porta et al. 2006). This measurement is widely adopted for centrality measures, directly related to the

neighborhood and considered as local measured (Koschutzki et al. 2005, Tisiotas and Polyzos 2013, Jayaweera et al. 2017). The degree of centrality (C_D) is expressed as;

$$C_D = \frac{1}{|V| - 1} \cdot \sum_{j=1}^{|V|} a_{ij} = \frac{deg(i)}{N - 1} \dots 1$$

where, $|V| = N$ represents the number of vertices, i the reference node, a_{ij} the number of the adjacent edges that originate from a node and $deg(i)$ the degree of a node. In this analysis, the degree of centrality ranges from two to ten degree in the entire network. The degree with 2 degree of centrality represented lowest degree of intersection, which has limited direct connection through the surrounding nodes. The high degree of centrality likes 10 (Bawngkawn, Vaivakawn and ITI junction), 9 (Dakinpui and Sikulpuikawn junction), and 8 (Kulikawn, Ramhlu North, Khatla and Saikhamakawn junction etc.) are more attractive than low scoring nodes (Fig. 1). The degree of centrality is influenced by the local and it doesn't depict its position in the entire network.

Closeness Centrality :

The centrality of a point measured by summing the geodesic distances from one point to all other points in the graph is called closeness centrality (Sabidussi 1966). Closeness centrality quantifies to what extent a node (i) is close to all of the other nodes along the shortest paths of the network

(Wang *et al.* 2018). Closeness centrality evaluates centrality through geodesic distance from a given vertex to all the other vertices and assess to which extent a selected vertex *i* is close to all the other vertices along the geodesic

paths (Tisiotas and Polyzos 2013). Then, the Closeness centrality (C_c) is expressed as;

$$C_c = \frac{N - 1}{\sum_{i=1; j \neq 1}^N d_{ij}} \dots 2$$

where, *N* is the total number of

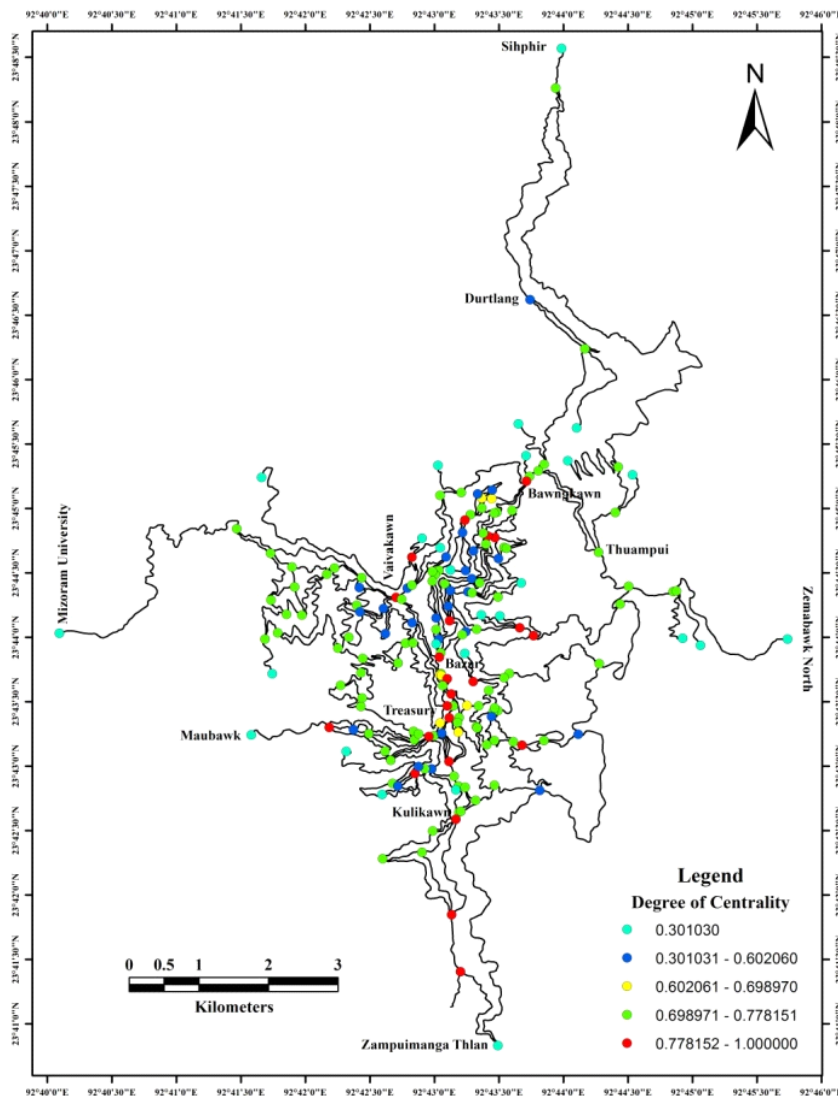


Figure 1: Spatial Distribution of Degree of Centrality (C_D)

nodes in the network, d_{ij} is the shortest path length between node i and j . The study revealed closeness centrality of nodes ranging from 0.078105 to 0.147224. In the entire network Laipuitlang junction score the lowest closeness centrality which means the junction represented the isolated nodes

amongst the entire nodes. Bazar Bungkawn junction is the highest closeness centrality. Based on the calculated value, Vaivakawn (0.142412), Chhingaveng (0.143192) and SaronVeng (0.146988) nodes are also the easiest accessible nodes with shortest path from each of the nodes (Fig. 2).

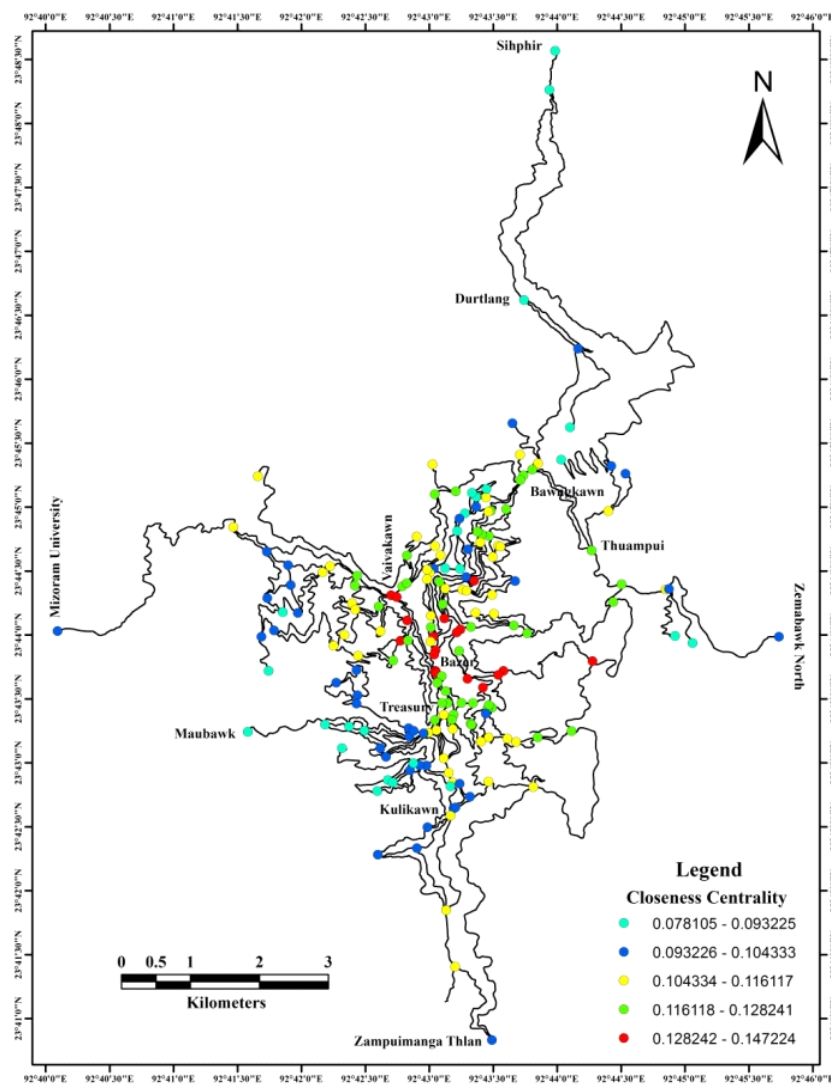


Figure 2: Spatial Distribution of Closeness (CC)

Betweenness Centrality :

In the network system, some of the nodes are more central rather than spatial distance, subject to their positions. A node that falls on the communication paths between other nodes exhibits a potential for control of their communication (Freeman 1979). Betweenness describes the influence of the nodes in the network on the transmission of information and belongs to the global features of the network (Wang and Fu 2017). The shortest edge distances between all pairs of vertices in the network are considered in this equation (Batista and Bazzan 2015). This equation defines the significance of node location in the network system, which corresponds to influence and control on the other. The same principle is also applied by scholars, Wasserman and Faust 1994, Crucitti et al. 2006, Oluwajana et al. 2012, Jayaweera et al. 2017 and Wang et al. 2018 etc., the following equation explained Betweenness Centralit (C_B);

$$C_B = \sum_{s \neq v \neq t \in V} \frac{d(s,t|v)}{d(s,t)} \dots 3$$

where, $d(s,t|v)$ is the number of shortest paths between s and t passing through node v and, $d(s,t)$ is the total number of shortest paths between s and t . According to the calculated results, betweenness centrality ranges from 0 to 3.937. In the entire network, 30 nodes

scored 0 betweenness centrality, meaning they are irrelevant to commute each other. The scores of betweenness centrality ranging from 0 to 3.937. The low scoring nodes are positioned at the fringes of network like Sihphir, Zuangtui, Zemabawk and Maubawk etc. Meanwhile, high scoring nodes like, Bazar Bungkawn(3.937782), SaronVeng (3.851355) Vaivakawn (3.852721), and Bawngkawn (3.784672) play a significant role to control flow of information in the network (Fig. 3).

Eigenvector Centrality :

Eigenvector centrality measures the centrality of a node in a network based on the weighted sum of centralities of its neighbors (Jayaweera et al. 2017). In this measure, localized factors and surrounding nodes intuitively determine the eigenvector centrality. It defines the importance of a node through its connectivity to important nodes. The centrality of a vertex is proportional to the sum of the centralities of the vertices to which it is connected (Turker 2018). The following equation describes Eigenvector centrality (C_E);

$$\lambda x = \sum_{j=1}^N a_{ij} x_j \dots 3$$

where, A be the adjacency matrix for this graph; $a_{ij} = 1$ if vertices i and j are connected by an edge and 0 if not, $Ax = \lambda x$, $i = 1, \dots, n$. Then, λ denote the largest

eigenvalue of A and n is the number of vertices (Bonacich 2007). This calculation assessed Dakinpui junction as the highest eigenvector with 1 degree of eigenvalue, followed by Saikhamakawn (0.932691),

Kulikawn (0.874130) and Sikulpuikawn (0.847242). The lowest eigenvector is represented by Laipuitlang (0.043440) and Zemabawk (0.065758) junctions (Fig. 4).

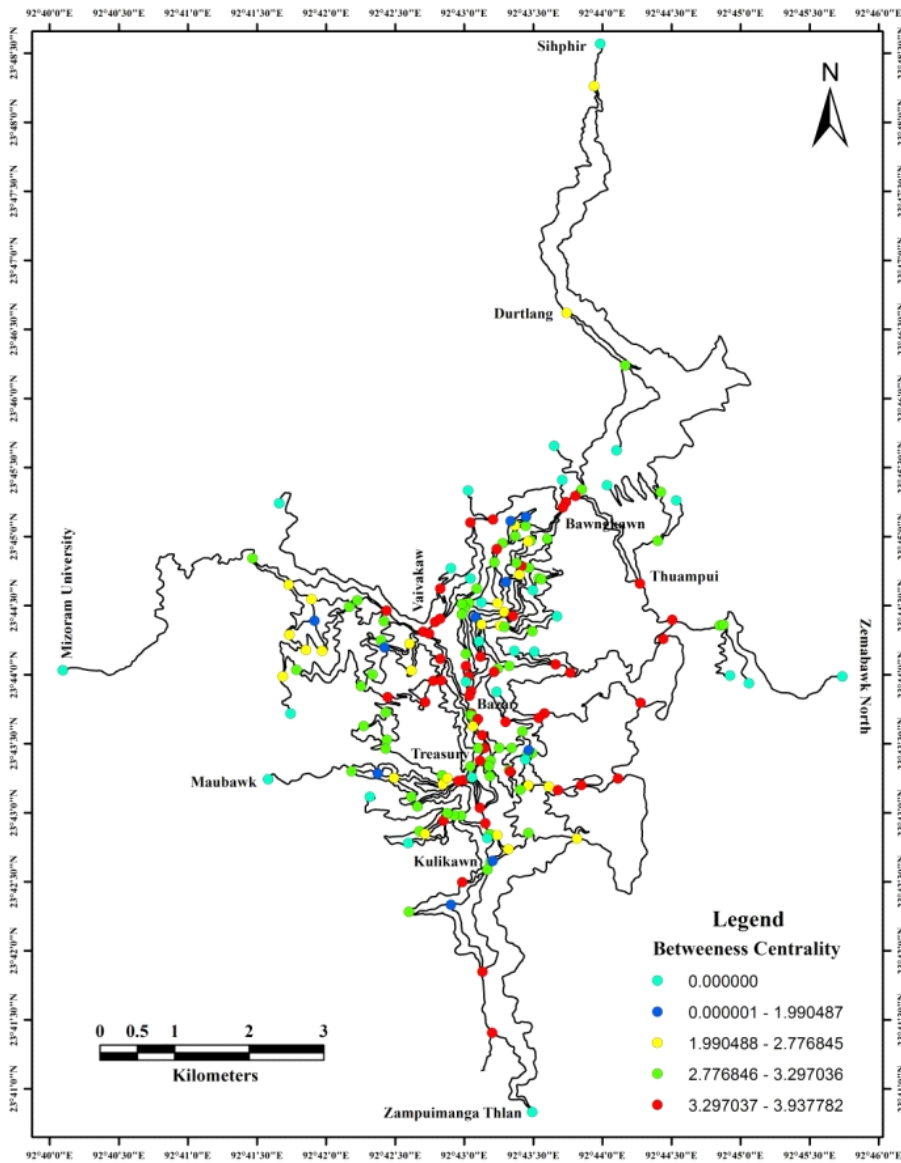


Figure 3: Spatial Distribution of Betweenness Centrality (C_B)

Spatial Analysis of Nodes Distribution :

Geographic Information System (GIS) allowed us to represent spatial distributions of nodes over the space; which is very crucial for representing nodes centrality pattern and identification of crucial nodes in the entire network system. Natural classification scheme is accomplished to maximize the variance between classes and minimize the variance within classes (Lin, 2013). The five color-coded schemes are applied in this study, representing five classes of node centrality - Very High, High, Medium, Low and Very Low centrality.

The nodes having Very High C_D (0.778152 - 1.000000) are located along the main axial roads (edge between Bawngkawn to Kulikawn) and, mainly confined in the central part of the network. Bawngkawn, Ramhlun North Bazar Bungkawn, Dakinpui, and Kulikawn junctions are important nodes in this network. Generally, Very High values C_D are arranged in linear pattern due to the influence of geographical factors on the arrangement of road network. High values of C_D (0.698971 - 0.778151) are scattered around the entire network and intertwined with Very High C_D . Very low centrality nodes (<0.301030) represent dead-end connection, mainly located in the outskirts of the network (Fig.1).

The distribution of nodes with Very High (0.128242 - 0.147224)

and High (0.116118 - 0.128241) C_C are significantly associated with the entire network. Figure 2 highlighted the very high and high scoring nodes confluent on the axial roads and central region of the network. Moderate (0.104334 - 0.116117) C_C class is diverging out from the center towards north, south and east direction. Thus, western section and portion of the northern part of the network is associated with Low (0.093226 - 0.104333) and Very Low (0.078105 - 0.093225) C_C classes. The figure illustrated the eastern portion of the network more highly accessible than the western section of the network, meaning each of the nodes is closer and nearer (Fig. 2).

The nodes with High (3.297037 - 3.937782) C_B are mainly scattered all over the network. There are mainly concentrated in Bawngkawn, Chanmari, Vaivakawn and Khatla. Among these the most influential node is Bazar Bungkawn with 3.93778. Figure 3 shows that the eastern half of the network is dominated by Very High C_B node and is the result of the existence of World Bank road in the eastern section of the network. It has significant influence on distribution of C_B over eastern part of the network. Similarly, the western part of the network is governed by High (2.776846 - 3.297036) and Moderate (1.990488 - 2.776845) C_B . The least influential nodes, Low (0.000001 - 1.990487) and Very Low

(< 0.000001) C_B are scattered north and eastern slopes of the network (Fig. 3).

Very High (0.644876 - 1.000000) C_E category occupied central part of the network and the northern and southern tip of the network. High C_E (0.484198 - 0.644875) nodes are also arranged in longitudinal direction along with the edges. The southern and western part of the network is dominated by Moderate C_E (0.354991 - 0.484197) nodes. In this network, Low (0.213293 - 0.354990) and Very Low C_E (0.043440 - 0.213292) scoring nodes are frequently found on northern and eastern section (Fig. 4).

Correlation of Centrality Measures :

The correlation coefficient of centrality measures specified in the study has positive correlation in case of urban network in Aizawl city. It is clear to argue that centrality measures are closely associated with node centrality. Table 1 depicted that centrality measures are positive correlation with each other. But, in the presented network system some of the centrality measures are more associated than the other. For example, the relationship between

C_D and C_B accounts for 0.870, between C_D and C_E has 0.769 of positive relationship. Thus, vertices with higher degree of centrality tend to have high betweenness and eigenvector centrality. The lowest degree of correlation is observed between C_D and C_C (0.391), which signifies that C_D has less significance for C_C or vice versa. The coefficient of correlation illustrated as C_C has least amount of significance over the C_B and C_E having 0.512 and 0.420 correlation respectively (Table -1).

Conclusion :

The study signifies that the different concepts and measures of centrality are appropriate for identification and analysis of the node centrality. It provides the reliability of directed graph concept and construction of adjacency matrix for node centrality measures and network analysis, thus, proving that different centrality measures C_D , C_C , C_B and C_E provide different nature of centrality. GIS technology is proved to be a useful and efficient tool for spatial data management and manipulation. The study identified geographical, historical, economic and social factors as

Table - 1: Correlation Coefficient of Centrality Measures

Degree	CD	CC	CB	CE
CD	1			
CC	0.391	1		
CB	0.87	0.512	1	
CE	0.769	0.420	0.598	1

important factors for existence of road network which are very crucial for location of nodes centrality and they also determined the quantity of node centrality. Nodes centrality explains the nature of geographical centrality, namely, global, local, isolated unit of centrality. For example, all the Very High and High centrality value nodes are confined to the central part of the network excluding C_B . It means the nodes laying the central parts of the network is more influential and have ability to control flow of information throughout the network system rather than those nodes laying in the outer part of the network. The result of this study revealed C_D , C_B and C_E as significantly correlated in network centrality measures. The integration of centrality measures and GIS technology provide the graphical presentation of centrality measures which is very crucial for identification of important nodes and spatial distributions of nodes. Very High D_C and D_E are distributed in longitudinal fashion which is influenced by the arrangement of the edges. The study found out less influential nodes, Low and Very Low degree classes are located in irregular fashion, which means the low scoring nodes are diverse in nature due to the influence of the local and global factors. For further work, the present study can be extended to cover spatial centrality analysis through node and edges centrality analysis which is not

covered in this study. Above that, more detailed node and edges density analysis can also be taken up via GIS and image processing techniques to arrive at relevant result.

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Rural-Urban and Spatial Pattern of Literacy in Mizoram

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Abstract : Literacy is considered as one important yardstick in measuring a region's development. This paper deals with the spatial pattern of the literacy levels prevailing among the rural-urban population of Mizoram state. It also analyzed the key factors responsible for the higher or lower literacy rates in particular region or any individual areas of the study region. On the basis of the study the region is divided into three (3) areas classifying the region based on their literacy level. Mizoram occupies a high position in terms of literacy in the country. However, mild areal variations can be seen within the state. Urban literacy rates remain high in all districts (more than 90%). However, observable differences are seen between districts both in the overall and rural literacy.

Keywords : Literates, Rural, Urban, Urbanization, Awareness.

Introduction :

Literacy is one of the important indicators of social development and closely associated with the indispensable characteristics of modern civilization. It also helps in the improvement of economic condition and of developing human resource without which progress of any society nation will be paralyzed. The level of development of man power resources in a society is indicated by the literacy rate (Chopra, 2005).

The Population Commission of United Nations considers the ability to both read and write a simple message with understanding in any language a sufficient basis for classifying a person as literate. The Indian Census has adopted this definition. In Census of India terminology, a person aged 7 years

and above who can both read and write with understanding in any language is treated as literate and the percentage of literates in the age of seven years and above is called Literacy rate (census 2011). The children below 7 years of age are not enumerated.

As per population census 2011, the literacy rate of Mizoram is 91.58 % comprising 84.31 % in rural and 98.10 % in urban areas. Mizoram state occupies the third position after Kerala (93.91%) and Lakshadweep (92.28%) in the country.

The term "Rural" in respect to Census Operations indicates all the villages in the state. Villages have been defined in different ways by various authors. According to Richthofen, "They (Villages) are groups of families, united by common

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descent, or at least having rites in common, who cleave to one another because of the necessity for cooperating in the cultivation of the same crops." To quote Bruhnes, "Village is a term applied to a geographical fact – the collection of houses and residents of the most numerous aggregations" In India, officially a village stands for the area demarcated as amauza meaning "parcel of ground with definite boundaries for revenue purposes without clear and consistent regard for its population". A revenue village is a definite administrative unit and includes one or more clusters of dwellings together with the land territory under its possession (Khullar, 1999). According to 2011 census there are 704 inhabited villages in Mizoram.

The term 'Urban' has been defined by different scholars and institutions in different ways. A town (urban) is dominated by distinctive secondary and tertiary functions which includes manufacturing, trading and other professional services. At least two-thirds of urban inhabitants follow non-agricultural occupations (Mandal, 2000). The term "Urban" stands for notified towns and cities according to Census of India. In the urban areas, towns and cities are categorized into – Municipal Corporation, Municipality, Nagar Panchayat, Contonment Board and Census Towns. According to the criteria given by the government,

the first four are statutory towns while Census Town is not a statutory town and is declared as 'Census Town' only for a census concept where there is no Notified Town. The census of India defines an urban unit as:

- a) All places with a municipality, corporation, cantonment board or notified town area committee etc.
- b) All other places which satisfied the following criteria:
 - i. A minimum population of 5000;
 - ii. At least 75% of the male working population engaged in non-agricultural pursuits; and
 - iii. A density of population of at least 400 per sq.km.

As for Mizoram there is only one Municipal Corporation, it is also categorized as Notified Town. Altogether, there are 23 Notified towns in the state and there is no Census Town.

Methodology :

The data and information have been obtained from the secondary sources (i.e. the 2011 census report and some other published literature). The data have further been compiled to get required figures for analysis. District wise Rural and Urban literacy rates – sex and male-female gap in 2001 and 2011, growth rate in literacy are discussed in this paper. Finally, the study area have been divided

into three categories on the basis of areal variation in literacy level. Each category has been discussed separately so as to assess the causative factors behind higher or lower level of literacy.

The Study Region :

The state of Mizoram lies between 21°56'N to 24°31'N latitudes and 92°16' E to 93°26'E longitudes (Pachau, 2009). Under the British administration, it was known as Lushai Hills district of Assam. After the India Independence the name was changed to Mizo Hills District in 1954. It was carved out of Assam as a Union Territory of Mizoram on 21st January 1972 and it became the 23rd full-fledged state of India on 20th February 1987. It is bounded in the east and south by Myanmar, in the

west by Bangladesh and Tripura state and in the north by the Cachar district of Assam and Manipur; which is the southern-most state in North East India. The geographical area is 21,087 Sq.km and contains a total population of 1,091,014 in 2011 census.

Rural - Urban Literacy :

Literacy rate in Mizoram accounts for 91.58% which is much higher than the national average of 74.04% (2011). The literacy rate of rural is 84.31% and urban is 98.10%. The term 'Rural' in respect of census operations indicates all the villages in the state and the term 'Urban' stand for notified towns and cities. (Census 2011). Mizoram state is divided into 8 districts. According to the 2011

Table 1. District Wise Literacy Rates by Residence in Mizoram – 2001 & 2011

Name of the districts	Literacy rates in 2001			Literacy rates in 2011		
	Total	Rural	Urban	Total	Rural	Urban
1	2	3	4	5	6	7
Mamit	79.14	76.07	93.73	85.96	84.52	92.63
Kolasib	91.34	86.53	95.09	94.54	91.49	96.83
Aizawl	96.51	94.20	97.21	98.50	97.52	98.78
Champhai	91.15	90.33	92.40	93.51	90.29	98.70
Serchhip	95.18	94.17	96.28	98.76	98.43	99.09
Lunglei	84.17	75.10	96.04	89.40	82.60	98.99
Lawngtlai	67.16	61.86	92.28	66.41	59.87	94.95
Saiha	82.90	74.95	93.41	88.41	84.66	92.96
Mizoram	82.27	72.47	93.48	91.58	84.31	98.10

Source: Provisional Population Totals, Mizoram 2011 (Census of India)

census there are 23 notified town and 704 inhabited villages.

The above table shows the district-wise literacy rates by residence for the decade 2001 – 2011. In all the districts of Mizoram urban literacy rate is higher than the rural areas. This is due to the better education facilities and economic opportunities of urban areas than the rural areas. The highest gap between rural and urban literacy is found in Lawngtlai

district i.e. Rural 59.87 and Urban 94.95. It reveals that during 2011, the highest rural literacy rate of 98.43 % has been found in Serchhip district and the lowest of 59.87 % which has been found in Lawngtlai district while in case of urban literacy in 2011, the highest position has again been occupied by Serchhip district with 99.09 % followed by Lunglei (98.99 %) and Aizawl (98.78%) and the lowest literacy has been recorded in Saiha

Table 2. District wise rural-urban literacy rates by sex in Mizoram – 2001 & 2011

Districts		Literacy rates in 2001		Literacy rates in 2011	
		Rural	Urban	Rural	Urban
Mamit	Males	80.58	94.81	89.41	93.63
	Females	70.90	92.58	79.14	91.56
Kolasib	Males	87.52	96.18	92.99	97.41
	Females	85.40	93.91	89.88	96.23
Aizawl	Males	95.20	97.23	98.11	99.28
	Females	93.12	97.19	96.91	98.29
Champhai	Males	93.52	92.53	91.85	99.63
	Females	86.99	92.26	88.69	97.78
Serchhip	Males	95.09	97.47	99.02	99.45
	Females	93.19	95.09	97.85	98.71
Lunglei	Males	80.73	96.24	88.07	99.31
	Females	68.92	95.83	76.80	98.65
Lawngtlai	Males	68.16	94.52	69.78	96.11
	Females	54.85	89.91	49.32	93.71
Saiha	Males	80.85	95.34	88.44	94.08
	Females	68.77	91.35	80.84	91.82

Source: Provisional Population Totals, Mizoram 2011 (Census of India)

district (92.96 %). During the decade 2001–2011, among all the districts in the state, Mamit district has the highest increase in rural literacy with 8.45 percent and the lowest with negative growth of -1.99 percent points has recorded in Lawngtlai district. In case of urban areas, the highest increase of 6.30 percent point has been observed in Champhai district and the lowest with negative growth of -1.10 percent points in Mamit district. In the absolute term, during the period of 2001 – 2011, Mamit district has shown the highest increase of 6.82 percent point and Lawngtlai district has occupied the lowest position with negative growth of -0.75 percent point. The gender gap during 1991 – 2011 decreased for all rural and urban areas in national level but in the state of Mizoram slightly increased for both rural and urban areas.

Gossal (1967) considers the problem of rapid rise in population as '*a stumbling block in the way of achieving even modest goals in education and literacy*'. Highest population growth among districts in Mizoram are found in areas where lowest literacy rates prevail. The two least literate districts Mamit and Lawngtlai are the ones that registers highest population growth of about 35% and 60% respectively in 2011 census. Though male-female gap of urban literacy is considered to be more or less marginal in all districts (Table 2), the picture is

significantly different in the case of rural literacy. High gap of 20.46 in Lawngtlai, 11.27 in Lunglei and 10.27 in Mamit are registered in 2011 census. Davis (1951) has rightly remarked in the national context that the stunted growth in female literacy is the result of the prejudice against the education of women and their employment outside the home.

Spatial Pattern of Literacy :

Literacy of Mizoram accounts for 91.58 % which is much higher than the national level 74.04 percent (2011). The highest literacy rate is found in Serchhip district (98.76) and the lowest is Lawngtlai district (66.41). On the basis of this variation, the districts of the study region have been divided into three categories (Fig. 1).

(i) Areas having High Literacy rate (Above 90%)

Four districts namely Serchhip, Aizawl, Kolasib and Champhai district fall into this category. These entire districts are lying in the central and eastern part of Mizoram. Rural as well as urban literacy rate is high in these areas. Rural (98.43) and urban (99.09) literacy is very high in Serchhip district. Male-female gap in rural areas is very low in Aizawl (1.20) and Serchhip (1.17) districts while in urban areas Serchhip (0.74) and Aizawl (0.99) is also very low.

These four districts have some important advantages. They are lying in the core areas of the state.

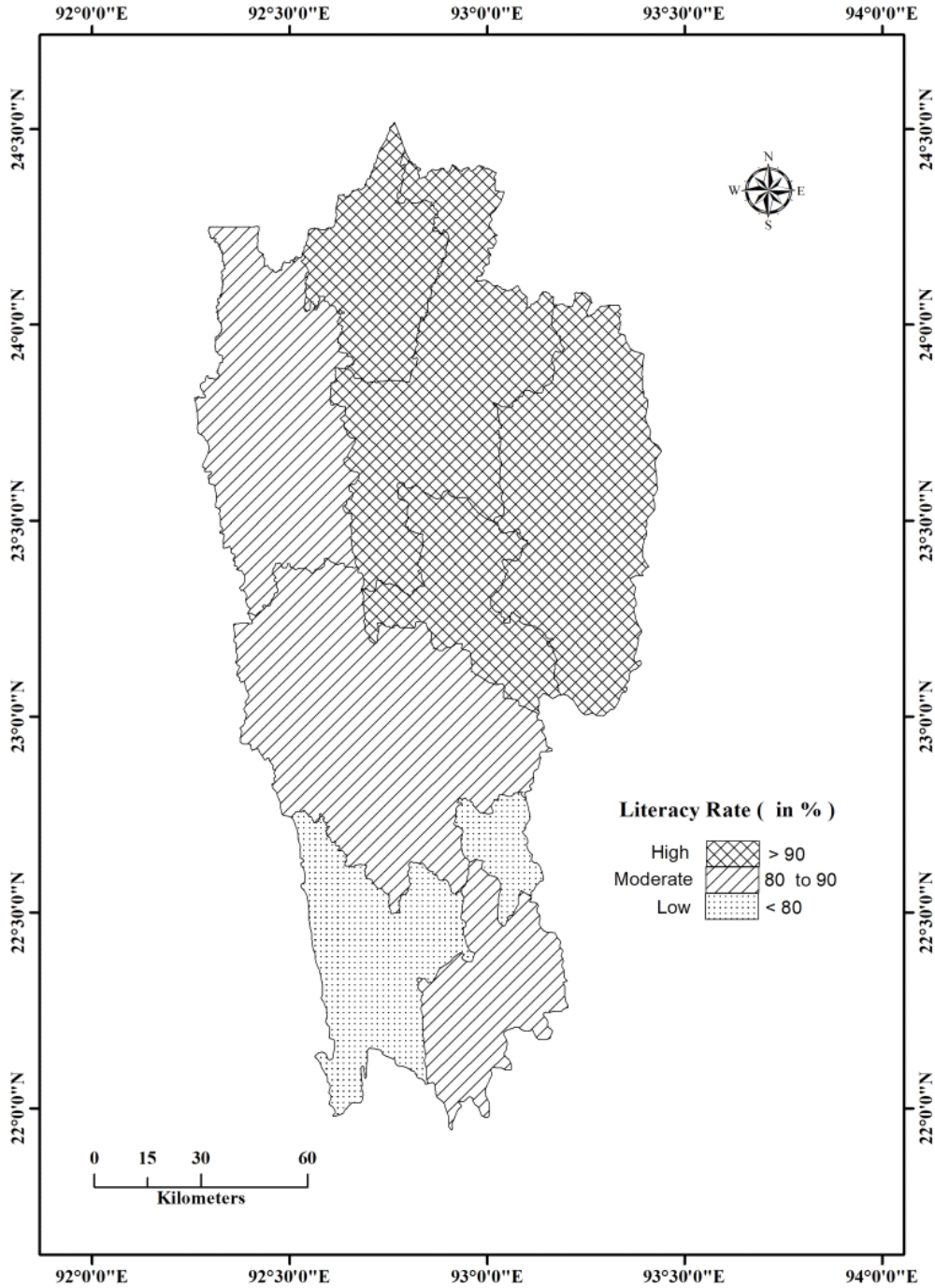


Figure 1: Spatial Pattern of Literacy in Mizoram (2011)

Most of the fertile agricultural areas fall within these districts, and more than half of urban centers of the state are seen to be located within these districts which provide ample job facilities to the literate. There exist a number of educational institutions facilitating a good all-round education to the aspirants. More than 60 percent of the total populations of these districts are urban. Urban people are acutely aware and financially more capable of imparting educational facilities to their children. Migration and rural literates to find employment in urban areas also result in considerable rise in urban literacy rate.

(ii) Areas Having Moderate Literacy rate (80 - 89.99%) :

The districts of Mamit, Lunglei and Saiha located in western, southern and central part of the state have literacy rates of 85.96, 89.40 and 88.41 per cent respectively. Urban literacy rate in Lunglei district is highest (98.99 %) in the study region. It is followed by Saiha district (92.96 %) while the urban population of Lunglei District is 39.90 % and Saiha District is 44.47%. Thus, majority of the people dwelling in these districts are rural and the rate of literacy among them is moderate (Fig. 2). The male-female differential in urban population is very low (Mamit 2.07, Lunglei 0.66, Saiha 2.26) while in rural areas are Mamit (10.27), Lunglei (11.27) and Saiha (7.60)

respectively. A high percentage of migratory tribes like Riang (Tuikuk) and Chakma population living mostly along Indo-Bangladesh border areas prove to be a major growth of obstacle to the growth of literacy as they have traditionally been least aware towards education. The proportion of non-agricultural workers are also relatively low.

(iii) Areas of Low Literacy Rate (Below 80%):

The district of Lawngtlai falls in this category (Fig. 2). Lawngtlai district falls under the eight schedule area of Chakma Autonomous District Council and Lai Autonomous District Council. The Indo-Bangladesh International border in the western region of Lawngtlai district is Chakma Autonomous District Council. There is only one notified town which is Lawngtlai, the district headquarters in this region. The literacy rate of this region is only 66.41 % which is much lower than the state literacy rate 91.58 %. The urban literacy rate of Lawngtlai district is 94.95 % and rural area is only 59.87%. The male-female gap of literacy rate is also highest in the state (20.46 rural and 2.40 urban). The main causes of low literacy rate are due to illegal immigrants of Chakma to the area from Bangladesh and economic backwardness. The decadal growth rate of Chawngte RD Block (i.e. Chakma Autonomous District Council) is 31.21% while the state

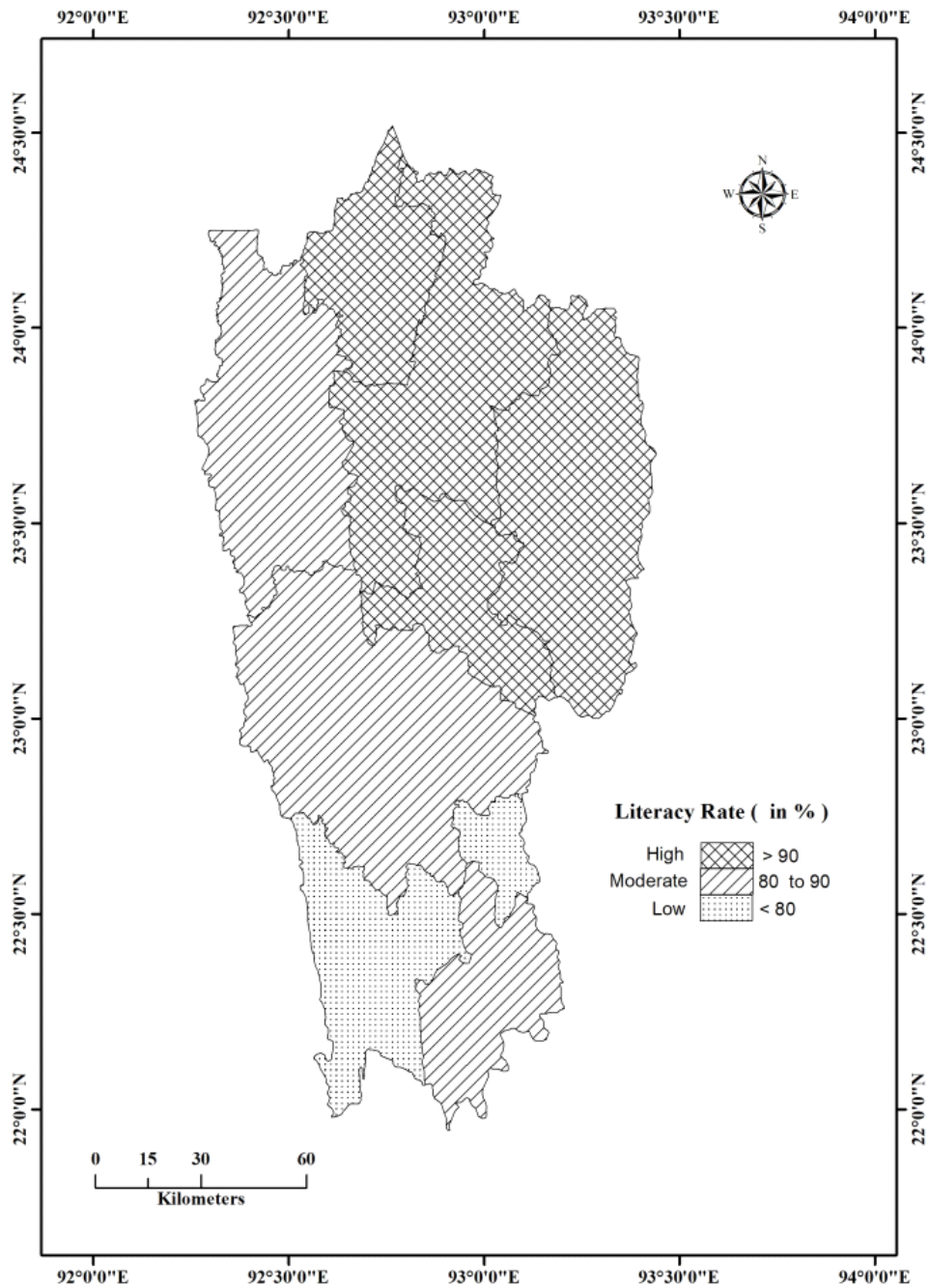


Figure 1: Spatial Pattern of Rural Literacy in Mizoram (2011)

growth rate is only 22.78. The growth rate of Chakma population is much higher than the natural growth rate of the state. In Chawngte RD Block, according to 2001 census Literacy is 47.8 % (Male 53.37 & Female 41.77), during one decade they have negative growth according to 2011 census literacy rate is only 46.38 % (Male 60.45 & Female 31.30). According to the 2011 census, there are 159 inhabited villages and one notified town. More than half of the villages in this region are difficult to approach even with motor vehicles during rainy season and many villages are yet not connected by road. Village electrified as on 1st March 2012 is 116 and un-electrified is 44. More than 90 % of rural populations are engaged in subsistence agriculture. In Lawngtlai district, literacy is not considered as an occupational necessity as the prevalent traditional agricultural practices can easily be learned without reading and writing a script. Children in such societies are treated as helping hands to their parents. Children below 14 years of age are often compelled to bring fortune to their parents.

Conclusion :

The empirical evidences discussed above clearly shows that among the various determinants of literacy rates, the type of economy prevalent in an area plays the most effective role. The level of literacy in

urban areas differs greatly from that of rural areas. The rate of literacy increases with an increase in the level of urbanization. Urbanized localities with their improved employment prospects attract sufficient number of educated and skilled person. Various institutions of acceptable standard in urban centers are capable of imparting diversified educational facilities to the aspirants. Majority of urban people are socially more aware and financially more capable of bearing the expenses on their children's education. Generally the western parts of the state are economically backward than the central and eastern part of the state. This economic backwardness influences their literacy especially female literacy. This low level of female literacy may be attributed as the result of poverty, social and religious traditions and lack of awareness prevailing in rural areas. A rapid growth in population especially within Chakma Autonomous District Council and growing gap between demand and supply of food grains has resulted in mass poverty and backward socio-economic condition.

From the comparison of the district-wise literacy level we can conclude that except Mamit district in the north-western part of the region, the northern and the central part of the state display the highest degree of literacy rate while

relatively low level of literacy (66.41%) is found in Lawngtlai district located in the south-western part of the state. In general the western districts Mamit and Lawngtlai display the lowest level of literacy rate. This can be attributed to the existence of the literacy ignorant population groups- Rieng (Bru) population in Mamit district and Chakma population in Lawngtlai

district which contributes a substantial figure of illiterate population to these districts. After classifying the state's districts into three categories based on literacy percentage, it is found out that both rural and the state shares a common picture in the geographical distribution pattern of literacy (Fig. 1 & 2), while in all districts urban literacy is fairly high.

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Distribution and Growth of Population and Settlement in North Mizoram

(A case study of impacts of MNF led Insurgency 1966-1986)

- V. Lalnunmawia

Abstract : Mizoram hi kum 1972 kma lam chuan Lushai Hills District hming puin Assam State hnuaia district pakhat a ni a. India sawrkat awpbehna hnuaiah hmasawna a kal chak loh avang leh chanvo dinhmun leh nihna tur hmuphak lova inhriat avangin tam do tura din hmasak Pu Laldenga kaihhruai pawl chu Mizo National Front (MNF) hming puin Mizoram inrelnawl dan buaipuiin an phusa ta zawk a. He pawl MNF hi India sawrkar chuan thurualpui thei lovin hel pawlah a puang ta zawk a. MNF chuan Mizoram chu Independent puangin Mizoram chhungah buaina nasa tak a awm chho ta a. Mizoram buai avanga nunphung, khawsak, ei leh bar zawn leh inthenawm khawvenna thlengin nghawng nasa tak a nei a. Mizoram buai hian 1966 atanga 1986 a awm e. 1966 atanga 1972 hi Mizoram buaizua hun, hunthim ber laia sawi theh a ni awm e. He paper in a luhkhung tur ber chu Mizoramin kum 20 chhung teh meuh Rambuai a lo tawn khan engtiang chenin nge ni a mipuite chenna leh chetvelna te leh lo pun zel dan te a nghawng tih a ni.

Thuhmahruai :

Mizo hnam hrang hrangte hi tuma thuhnuaia awm lova, mahnia ro inrelin Lal chi hrang hrang hnuaiah kum tamtak chhung Mizoram leh a velah hian an lo khawsa tawh thin a. Khawvel lo changkang zelah an aia tam leh thil tithei zawkte hnuaiah tihluhna a hnuhlun an lo nita a. British Colony hnuaia India ram chhungah, chutah India a lo Independent hnu pawhin India ram bung pakhat anga Mizoram chu rinluh a lo ni ta a. Amaherawhchu, tu thuhnuaiah maha awm ngailo leh mahnia ro inrela thuneihna tawp nena ram bial bik neia lo khawsa thin kha, hnam fing leh tam zawk ten finrawl chhuaha min thuhnuaia ta mai leh, kan hnam thatna leh dinchhuahna tur lam vei tak tak si lova, fahrah enkawl chauhva min enkawl si te,

kan harsatna leh min ngaihsak tak tak silote an han hmuh in, Pu Laldenga leh a hoten Mautam lo thleng tur atana an din Tamdo pawl chu Politics lamah a in her chhova, chu chuan India ram laka inlakhnan tumna rawn thlenin March, 28, 1966 atangin tharum thawhna a lo thleng tan ta a. March Ni 1 atangin Independent puangin, Mizo fate chenna, hetih hun laia Mizo Hills district chu Rambuaiah kum 1966 – 1986 chhung puan a lo ni ta a ni. He hun chhung hian Mizoram chu, Indona, Intihhlum tawna, Tamna, Inrikrap leh Mihringte Zalenna kawng hrang hranga rahbehna ram a lo ni ta. Mipui ang mangang a, an tap a, thihnain hmun tinah thla a zar a, dan hrang hrangin mi a phuarbet a, mahni hna takngial pawh thawk hlei thei lovin a siam a, khaw

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tamtak mipui khawdangah sawn an ni a, pawilo sawilo tamtakin nunna an chan a, tihluhna a sipaite hna thawhsakin patlingin mahni hna an thawk hman lova, hetiang boruak rip tak hian a bik takin kum 1966 – 1972 chhung khan Zoram hi a tuam hneh hle. Heng buaina tein Mizoram leh Mizo mipuite a nghawng dan hi mi tamtakin an lo zir tawh a, khawtlang nun a nghawng dan te, ei leh bar a nghawng dante, hnam rilru sukthleh leh hnam bing hrang hrangte tuarna te, Kohhran leh sakhua thlenga a nghawngte an lo chhui fo tawh thin. Amawherawhchu, tuna kan han chhui bik tur erawh chu, hmun hrang hranga mihring awm leh lo pungchho zel (distribution & growth), pemkual (migration) leh khaw hrang hrang awmdan leh awmna (number & location of Village & Settlement) ah te nghawng a neih dante an ni.

Zirna huamchin (Study Area) :

He zir bingna in a huam chin chu Mizoram hmar lam, Aizawl District thendarh a nih hma a a huam chin, tuna district panga-Aizawl, Mamit, Kolasib, Champhai leh Serchhip District te a thendarh lo ni ta hi a ni a. Hemi huamchung hi Rural Development Block hrang 16 ah then mek a ni a. Khawchhak lamah Myanmar-in a ri a, Hmar lamah Assam State leh Manipur leh Thlang lamah Tripura State leh Bangladesh ram te awmin Chhim lamah Lunglei district in a hual baw a ni. Geographical Location

ang chuan 21°56'N- 23°25'N latitudes leh 92°16'E – 93°26' E longitudes huamchungah awmin sq.km. 12592 a zau a ni.

Zir chhuah tum (Objectives) :

- He zirbingna in a tum ber chu –
- 1) Kum 1966-1986 chhunga Mizoram buaina in engtiang chen chiahin nge mihring lo pun zel dan a nghawng a, engtiang nge mipui a chetvel tir (migration) tih leh Buai rahchhuah mipuite chet veltirtu chu engte nge tihte, Block Level chin atanga bihchian.
 - 2) Khaw hrang hrang engzatin nge thanlen phah a, engzatin nge ral phah, tih leh khawthar engzat nge a lo pian phah tih te, in leh lo din dan a nghawng dan te a ni.

Thu lakna hnarte leh kalpui dan(Data Base & Methodology) :

He kan zirchianna a kan inngahna ber chu Census of India in a kum sawm dan zela ramchhunga chhiarpui a neih record te an ni a. Heng bakah hian Rambuai lai chungchang ziakna lehkhabu hrang hrang leh Mizoram politiks chungchang a rambuaiin a nghawngdan lehkhabu hrang hrang te, Khaw hrang hranga he hun tawng hrephak mi hrang hrang kawmna te chu kan thu leh data lakna te an ni ber.

Tin, sawi tawh angin tuna kan zir bingna in a huam chin, Mizoram District pathum chauha then a nih laia Aizawl district ni thin, tuna district pariat a lo in then darhta hi, heng rambuai kan tih hun lai hi

chuan district pakhatah awmin, Block area pawh tun anga thensawm a la ni lova. Amaherawhchu, vawiin ni a block thendan area leh khua a huamdan ang zelin a hmalam hun a mi te pawh kan then dawn a ni, hei hian chiang zawkin hmun hran hrana hun hrang hranga mihring pun dan leh kiam dan te, kan chet kual vel dan te a tilang chiang zual dawn a ni. Entirnan, kum 1971 chhiarpui hun lai khan block hrang hranga a la awm lova, amaherawhchu, tuna block area huamchhung angin khatih hun laia khaw hrang hrang awm leh mihring leh in awm zat te kha lakhawmin kan belh khawm a,

chu chuan data mumal tak kan siam(compile) thei dawn a ni.

Rambuai nghawng (Impact of Insurgency) :

Rambuaiin a nghawng hi kawng hnihin chhui ila - (a) Mipui (population) ah leh (b) In leh lo (settlement) ah.

A. Mipui (Population) :

(1) Mipui pun dan leh chenna (Growth and Distribution) :

Rambuai han tih hian a hun chung tak chu kum 20 (1966-1986) chhung zet a ni a. Amaherawhchu, mipui vantlangin an tawrh nasat leh a thim zual hun lai ber chu kum 8 (1966-1972) chhung angin a sawi

Table-I : North Mizoram huamchhung Block hrang hranga mihring awm zat (1961-2011)

Sl. No	Name of R.D.Blocks	TOTAL POPULATION					
		1961	1971	1981	1991	2001	2011
1	AIBAWK	9660	8562	11875	14429	15987	17128
2	DARLAWN	13607	11751	17273	19967	24166	26048
3	E.LUNGDAR	12037	13231	15319	16895	19202	20804
4	KHAWBUNG	11275	11803	13565	15449	19598	22134
5	KHAWZAWL	15092	14261	19029	23449	31904	35931
6	NGOPA	7098	6327	9411	10881	16520	18730
7	PHULLEN	7275	8073	11070	10856	12337	13303
8	REIEK	8669	8438	10973	12128	13415	17867
9	SERCHHIP	11219	22087	24135	30526	36119	44242
10	THINGDAWL	7710	10796	13901	13927	18002	19840
11	THINGSULTHLIAH	14981	16731	20922	27569	35196	37897
12	TLANGNUAM	25653	46023	93069	170667	247703	317359
13	W.PHAILENG	3231	5017	12480	17350	16464	21309
14	ZAWLNUAM	7188	16856	29173	35521	32173	44730
15	BILKHAWTHLIR	6945	13912	21452	30906	43302	58487
16	CHAMPHAI	8944	12499	16910	26920	34118	43040

Table –II : Kum 10 dan zela mihring pun dan (North Mizoram 1961 – 2011)

Sl. No	Name of RD Blocks	DECADAL GROWTH OF POPULATION (in %)				
		1961 - 1971	1971 - 1981	1981 - 1991	1991 - 2001	2001 - 2011
1	AIBAWK	- 11.36	38.69	21.51	10.8	7.13
2	DARLAWN	- 13.64	46.99	15.6	21.02	7.79
3	E.LUNGDAR	9.92	15.78	10.28	13.65	8.34
4	KHAWBUNG	4.68	14.93	13.89	26.86	12.94
5	KHAWZAWL	-5.51	33.43	23.22	36.06	12.62
6	NGOPA	-10.86	48.74	15.62	51.82	13.38
7	PHULLEN	10.97	37.12	- 1.93	13.64	7.83
8	REIEK	-2.66	30.04	10.53	10.61	33.19
9	SERCHHIP	96.87	9.27	26.48	18.32	22.49
10	THINGDAWL	40.02	28.76	0.19	29.26	10.21
11	THINGSULTHLIAH	11.68	25.05	31.77	27.67	7.67
12	TLANGNUAM	79.41	102.22	83.38	45.13	28.12
13	W.PHAILENG	55.27	148.75	39.02	- 5.11	29.48
14	ZAWLNUAM	134.5	73.07	21.75	-9.43	39.03
15	BILKHAWTHLIR	100.32	54.19	44.07	40.1	35.06
16	CHAMPHAI	39.75	35.29	59.2	26.74	26.15

Table I & II : Compile from various series of Census data.

theih awm e. Hetih chhung hian rambuui vanga tawrhna leh buaina tam ber thlengin mi tam tak mahni inlûm râuhsanin an kawia, hei hian a nghawng chhuah chu Chhiarpui-Mihring zat leh kum 10 dan a pun/kiam dan, rambuui hma 1961, buai zual lai-1971 leh a hnulam te, Table I & II aţang te hian lo en ta ila.

A chung a Table-I & II te ngun taka kan en a, rambuui hma chhiarpuia Block hrang hranga

mihring awmzat te, rambuui zuallai leh a hnu lam kum 2011 thleng kan thlir chuan rambuui lai a danglamna nasa tak awm bik te kan hmu thei awm e. Leilung kalphung pangai ah chuan mihring te hi a kum tela pung chho hret hret zel kan ni a. Kum 1961 aţanga 2011 kan en chuan, kum 1961 leh 1971 inkar chhung hian Mizoram hmar lam R.D.Block 16 zinga Block 5 laiah hian mihring an punglo mai nilovin

an kiam (negative growth) zawk a. Block 4 ah hian tlem (12% aia hniam) in an pung chauh a, Block 4 ah erawh chuan nasa takin (70% chung lam) an pung thung. Heng kan han sawi takte baka hun dang ang kan han thlir chuan Block tinah pangai takin mihring kan pung chho hret hret zel niin a lang a. Amaherawhchu, heng – Phullen R.D.Block (1981-1991) leh Zawlnuam leh W.Phaileng Block (1991-2001) mihring tam lam tlahniam kan hmuh leh te hi chu, HPCD Armed Movement leh Bru (Tuikuk) raltlante Mizoram chhuahsana nasa taka Tripura a an tlanluh vang niin a lang. Rambuai laia hetiang taka nasa a Block thenkhat mipui an kiam nasat viau a, thenkhat nasa taka an punna chhan te lo chhui chiang ila.

2) Hmun hrang hranga mihring pun leh kiam chhan :

(a) Khawkhawm :

March ni 2 a Mizoram chu 'Rambuai' (Disturbed Area) a puan a lo nih tak hnu chuan, Ramhnuai mi (MNF) te ei bar dapna dan pinna hmanruaah leh Sawrkar inrelbawlina (Adminis-tration) awlsam zawkna beiseiin Mizoram thingtlang khaw hrang hrangte chu dahkhawm (group) turin ruahman a lo ni chho ta a, heng grouping center te awp turin Administrative Officer (A.O) dah theuh an ni bawk a. He hmalakna hi thuangli a kalpui a ni a.

i) *Proptective and Progressive Village (PPV)* : Khawkhawm

thuang hmasa ber chu Central Govt. Liaison Officer for Mizo Hills District thupekin 14th January, 1967 ah tan a ni a. Hei hian Vairengte – Aizawl – Serchhip-Lunglei tlangdung huamin hemi kawngpui dung atanga Kilometer 10 huam chhunga khua 92 te chu kawngpui dung khaw 18 ah dahkhawm an ni a.

ii) *New Group Center (NGC)* : Thuang hnihna, NGC hi 1969 ah kalpui leh nghal niin, hetah hian Tripura ramri, Bangladesh ramri, Lunglei - Tlabung, Lunglei - Lawngtlai, Seling - Champhai, Darlawn - Khawbung leh Sechhip-N.Vanlaiphai huam chhunga khaw 182 te chu khaw 40 ah sawikhawm an ni.

iii) *Voluntary Grouping Center (VGC)* : Thuang thumna hi 1970 ah kalpui niin hetah hian khaw 110 te chu hmun 26 ah sawikhawm an ni.

iv) *Extended Loop Area (ELA)*: Manipur leh Myanmar(Burma) ramri hrul khaw 63 te chu khaw 17 ah dahkhawm an ni.

Heng khaw sawikhawm atang ringawt pawh hian Mizoram mipui te chu mahni inlum leh khawbu pawh luahlum thei lovin suan kawi an nih nasat zia a lang thei awm e. Thuang khatna ah mi 30241 vel, thuang hnihna ah mi 54465 vel, thuang thumna ah mi 18276 vel, thuang lina ah mi 23435 vel Mizoram pumah sawi kual an ni a.

(b) Migration :

Hei hi kawng hnihin a thliar theih – (i) State (a hun laia District Council) chhung (Internal) leh (ii) State pawn (External).

(i) State Chhung (Internal Migration - District Council/Mizoram chhungah) :

(1) *Thingtlang* – Thingtlang: Chhungkaw tamtak, an in hal a nih avangin mahni chhungte leh lam hnai deuhte, khaw thenawm hnaiah belin an insawn a, khaw ralmuang deuh zawk ni a langah te an insawn hlawm a ni. Hetianga thingtlang aṅanga thingtlang veka pem kual hi tam tak an awm a, tin, mahni khua an khawmna tura lut duh lo a hmundang, laina hnai deuhte awmna lam pan ta zawk chhungkaw tam tak an awm bawk. Entirnan, Kum 1967 kum bulah Mualcheng (N) an hal avangin Bawktlang khuaah in 36 lai an insawn lut (Lalawnliaana, 1998).

2) *Khawpui - Thingtlang* : Khawpui zawk aṅanga thingtlang lama chhuaka inbengbel zui ta ang hi tamlo mahse, March ni 3 leh 4, 1966-a Aizawl khawpui Jet Fighter-in a han kah a, a han bomb leh India Sipai leh MNF lam te an han in kah nasat chhoh lai chuan Aizawl khawpui hi rauhsan deuh thaw niin mitinten khawpui pawn leh thingtlang lam chhungte leh ram lam te panin an tlan chhuak a, karkhat hnulamah erawh mi engemaw zat an let leh na in mi tamtak erawh chu hun rei deuh hnu ah te an kir leh chauh a ni.

3) *Thingtlang – Khawpui* : Mizoram buaiin a nghawng lianber pakhat

chu thingtlang aṅanga khawpui a pemluh phah, a bik takin Aizawlah, an tam em em hi a ni. Hengte hi a chhan langsar deuhte chu-Thingtlang lam aiin khawpui leh lian zawkte muanawm leh him zawka a lan vang te, Ei leh bar dap chungchanga awlsam zawk leh ziaawm zawka a lan vang te, khawkhawm vanga khawdanga luh rau rau aia khawpui thlang zawk te, Sipai leh MNF lam te an in luling nep deuha a lan vang te, Mizo Union mi leh sa MNF hlauh avanga himna zawng te an ni.

Hetianga mi tamtak Aizawla an pem luh avang hian Aizawl khawpui pawh nasa takin a lo ṅang chhova, mipui lo tam chho chuan Veng (Village Council) 12 awm mek bakah veng thar a rawn pian chhoh tir ta mawlh mawlh mai a, kum 1966 aṅanga 1971 chhung pawh hian heng Ramhlun, Electric Veng, Tuikual, Tuikhuahtlang, Dinthar, Republic Veng leh Bethlehem Veng te hi an rawn pian belh ta a ni. Tin, Rambuai avanga pemlut an awm zut zut avangin veng a lo lian zel a, indang thar an awm zung zung a, 1981 kumah phei chuan Veng 26 lai a lo ni ta a ni. Rambuai avanga Aizawl khawpuia mihring an pemluh nasatzia, a hun laia a taka tawngtute sawi ngei hi a tifiyah turin tlem lo thliir ila. *'Buai ṅantirh 1966-67 chhungah chauh pawh khan ramhnuai mün man an tumte, an man tlan chhuak te Aizawl-ah mi tamtak an lo tlanlut a, Electric veng-ah pawh hian chhungkaw 100 dawn lai an lo lut'* (Lalawmpuia, 2014). *'Electric*

veng kawngpui phei saw field turin Pu Bawihchhuaka khan a ti a, Bulldozer-in a lai duai tawh a. Rambuai laia thingtlang atanga rawn tlanchhiate kha he laiah hian Refugee camp i siam mai ang u ka ti a' (C.Pahlira in Lalnunchanga, 2011). *'Union raltlante kha Aizawlah an lo lut renga, an tana a ral̄it zia report a lo thleng zel a'* (Hmingthanga in Dehloh sakei Huai). *'Buainaa vanga Aijal-a Refugee a rawn tlan lutte camp tur kan vengchhungah pawh ngaihtuah ngai niin a lang a, hotute pawh hriattir nise'*. (Minute of the Ramhlun Village Council Sitting, Dt.7.3.1967). Tuna Ramhlun Vengthar ti a vuah tak pawh hi a tirah chuan Rambuai avanga Aizawl lo lutte din leh dahkhawmna niin Ramhlun VC hnuaiah a awm thin a, Ramhlun Village Council Sitting Minute, Dt. 31.1.1972 ah pawh hetiang hian ziah a ni, *'Refugee Vengah Primary School neih ve an duh thu Pu Vaivenga EM i/c Education hnenah thlen tura rel a ni. DC atangin TR Rs. 3500 hmuh a ni a, Sikul sak nan hman tura rel a ni'*, tiin.

Heng kan han tarlan atang ringawt pawh hian Aizawla Rambuai avanga tlanlut an tamzia a Chiang tawh hle awm e. Table-I & II hi ngun taka en pawhin Tlangnuam R.D.Block (Aizawl awmna) chu mihring punna a kum sawmbi telin, rambuai huamchhung chuan a sang em em tih kan hmu thei a ni. Heng bakah hian Aizawl pawnlam khawpui te deuhah te pawh mi an tlan lut nasa in mihring punna a sang hle. A bik

takin heng, Champhai, Serchhip, Kolasib khawpuite hi rambuain a tihlen tih theih hial niin, mi an pmluh nasat avangin an lo len phah ta a ni.

ii) *State Pawn (External Migration)*: Rambuai buai avang hian mi tam takin Mizoram (a hun laia Mizo Distric Council) an tlan chhuah san a, Boruak muanawm, himna zawng te, zirna chhunzawm zel duh leh eibara harsatna te chu an chhuah chhan langsar deuh te an ni. Thenkhat chu boruak a muanawm deuha let leh mai te an awm a, tam tak erawh chu awm rei deuh leh in bengbel zuitate an awm bawk. Mizoram chhuahsan dan hi kawng hnihin then ila, hetiangin-

- 1) Mizoram atanga India ram chhung tho - Assam, Tripura, Manipur & Meghalaya lama pem lut leh tlan chhiate.
- 2) Mizoram atanga ramdang- East Pakistan (tuna Bangladesh) & Myanmar (Burma) a pem leh tlan lutte.

Hetih hunlaia hmun danga pemchhuak zat chiah record awmla mahse ziaktute ziaka a landan thenkhat lo en ila. *'Chhungkaw tam tak chu khawsak awlsam beisein Tiau ralah te, Manipur-ah te, Halflong leh Pakistan-ah te an pem a, a nei deuh Shillong-ah an tla thla a...'* (Lalawmpuia, 2014). *'.....kan khua chu kan pemchhuak nasa ta mai a, pem tam ber chuan Kawlphai an pan hlawm a..... khua min khawm khan in 58 kan ni a, kum 1972 a kan let leh meuh chuan in 18 chauh kan ni ta a ni'* (Lianvela, 2015). Hnahlan khua

hal a niha a nghawng hetiang hian kan hmu, 'Hetih hun lai hian in 223 vel chiah an ni a, in kanglo hi 56 vel a ni ang,Hnahlan khaw mipuite chu khaw dangah an pem darh ta chum chum a, Burma, Manipur leh Mizoram hmun hrang hrangah an pem darh a..... thla khat chung lek in khawbu chu an luahfel leh thei ta a. Hmun dangah tam tak an pemdarh avangin Hnahlan chu in za nufa emaw chauh a tling thei ta a ni' (Hluna, 2008). Rev. Chalhnuna (2014) chuan heti hian a ziak baw, 'Burma Independent hnu kum thum/li lekah Mizoram leh Manipur atangin mi tam tak an pemlut leh a. Kum 1966 Mizoram buai avang khan tam tak an pemlut leh bawka. Tahan, Khompat leh Tamu ngawpui thiata leileta siam darh vek tu kan ni', ti in. Tin, Pu Hmingthanmawia, Rambuai avanga Burma a pem lut, Mizorama lo lut leha tuna Lungleia awm mek chuan hemi chungchang hi hetiang hian a sawi, 'Zoram Buai khan Farkawn khua atangin Chungkaw 30 vel zet chu Burma ramah pem chhovin Changkhan khuaah kan awm a, Buai a lo ziaawm khan chungkaw engemaw zah chu Zoramah lolut lehin Aizawl leh Lunglei khawpuiah te kan lut a, chungkaw 7 bawr vel chu an tangkhang hlen ta a ni'. R. Lallianzuala (2012) chuan R. Thanhlira chanchin a ziah naah heti hian a ziak. 'Kum 1966 ah rama a lo buai a, Mizo thahnem taw, tak Shillong-ah an tlanchhia a. Mizoram-ah School leh College class-a mumal thei baw, si lova, Shillong-a Mizo thalai lehkha zir duh, matric la pass

lote tan High School din tulin an hre ta a. Pu R. Thanhlira baw, kha a sulsutu ah atang a, Nongrim Hills ah High School din zai an rel ta a, a hming Mizo Modern High School tih pawh hi ama phuah a ni nghe nghe" tiin.

Heng ziak leh thusawi hrang hrang kan han en pawh hian Mizoram buai chuan chungkua leh mimal tamtak, Zoram pawn leh India ram pawn thleng pawhin a nawr chhuak a. Awm hlenta tam tak leh an thlah kal zelte, waviin thleng hian an lo awm ta a ni.

(c) Mithi an pung (High death rate) :

Rambuai, a bik takin Buai zual lai (1966-1972) chung hian Mizote zingah thih tluangtlam (natural death) nilo thihna a tam em em a, a chhan hrang hrang te hetiang hian a then theih ang.

(i) Sipai (Indian Army) kut tuara thihna :

Mi tam tak pawl sawilo leh rinhlelh vang te, chhuanlam ho tete avanga tihlum an ni a, khawtlang hotu tam tak nunna in a tuar baw. Entirna tlem lo tarlang ila. Baktawngah Ni 1.4.67 zana Pu Chana pawl Pu Roliana nu damlo kantute sipaiin pawnlam atangin an kah chilh a, mi 5 lai an boral (Lalrawnlina, 1997). Ni 25.4.1968-a Pamchung-ho bungrua phurhpui tura kal Tualcheng khua leh khaw thenawm te,vai sipai an lo kal a, mipa ho zawng school-ah an khungkhawm a, kawng an khar hnan a, pawn atangin an kap ta chiam a, mi 8 an kap hlum a, engemaw zat an hlum (Zama, 2008). Ni 14.1.1967-ah Champhai

leh Kelkang inkarah Sipai kalte MNF in an lo kap a, sipaite chuan an kuli hruai mizote chu kap chiamin mi 18 an kaphlum a, 3 an hliam (Darlun, 2014). Ni 23.7.1967 ah Rullam VCP leh khaw pa te 4 leh MNF 1 te India Sipaiin manin an kaphlum (Lalrawnliana, 1999). Hetianga Khawtual (Civil) mi pawng kah leh tihlum hi Mizoram hmun hrang hrangah sawi tur tam tak a awm. Hei bakah hian Mizo National Front (MNF) mi leh sa, inkahna hrang hranga thi tam tak an awm baw a, Report-a a lan danin March 1, 1966 leh December 31, 1967 inkarah chhung ringawt pawhin mizo 491 thah ni a zia a ni (Nibedon, 1980). Heng kan tarlan chin atang ringawt pawh hian Sipai kut tuara thihna a tam theih zia kan hmu thiam ang.

ii) Mizo Sipai (MNF) kut tuara thihna :

Mizo Sipai (MNF) lam pawh Mizote lakah an thikthu a chhia in tam tak chu an kut a rang hle. Pawisawi lo leh India lam awn ni a langte, an thupek zawmlo te leh Mizo Union party mi leh sa tam takin nunna an chan a. 1966-67 chhungin mi an tihlum leh dahthat zawng zawng hriattheih chinah chuan Mizo 300 vel, vai 40 (sipai telin) vel ni a hriat a ni (Lalruata, 2016). *'Mizo Union party mi leh sate tuardan bikah CID ten an chhinchhiah dan chuan Zoram hmun hrang hrangah Mizo Union mi 241 vel an that a, Pu Ralkapchhunga chuan 268 niin a sawi thung'* tiin C.Lalruata hian a zia baw a ni. Pu H. Raltawna (2007) chuan hetiang

inthahna hluardan heti hian a zia a - *'MNF ho khan kawngdal chu dahthat tur, an ti a..... an dahtha hmiah hmiah hlawm mai a, Hmuizawl leh Kelzam inkar phei chu mithi uih rimin a uih vung vung mai a ni'* tiin. Heng kan tarlan takte en ringawt pawh hian khuarel thihna (natural death) piah lamah mi tam takin hunlo takah an nunna hlutak an chan tih a hriat awm e.

iii) Tam leh eichhiat avanga thihna :

Mizo Hills district hmun tam ber chu Rambuai hunlai hian an tam a. Ei tur a awm lova, mi tam tak ram hnim leh kamram in inhnawh puarna an zawng a, Eitur neih loh leh eichhiat lutuk avangin khawtinah mi an thi zawih zawih a ni ber mai. A bikin tar leh naupang lam ten an tuar nasa bik hle.

Heng tam (famine) lo thlen chhan berte chu hetiang hian lo sawi ila -

- 1) Khaw tam berah Sipai leh MNF puakphurh (Kuli) leh Khawkhawmna hmunah khaw hung hna tihluhna a thawhtir an ni a, mahni hna thawhna hun a awm mang lo.
- 2) Khaw tam takah Curfew, chhun zan zawma puan a ni ngun em em a, kar khat te, kar hnih te, a zawna thla hnih dawn te mipui pawn chhuah Sipaiten an khap a, hna thawhna hun a tlem phah a. Tin, heng curfew chhungte hian lo lam thlaite a lo zuva in ramsaten an lo tlan nasa thin hle. A tifiyah tur entirna pakhat chauh lo pe ila.

Tualbung-a India Sipai leh MNF te inkah zawh hnu chiah ah Ngopa Grouping Center-ah chuan India Sipaite chuan ni thum lai mipui khalhkhawma an sawisak hnuah an haw tir a, mahse khawchhung aṅanga hmundanga kalchhuah an phal lova,.....thla hnih leh ni nga a rei an curfew zui ta a ni. (Zama, 2008).

- 3) Khawkhawmna hmunah khua hung vek a ni a. Hnathawka feh turte zing dar 9 te, 10 te hma a chhuah phal a ni lova, chawfun phal a ni lova, tlaiah nitlak hma a haw leh ngei a ngai a, hna thawhna hun a tawi. Tin, hemi avang hian miin ram hla an nei thei lova, daihnai leh rambua mai mai te neiin thlai a puitling hlei thei lo.
- 4) Khaw tamberah in hal a ni a, hei mai bakah ram lama chhekin te pawh sipaiin '*MNF in an hmang ṅangkai ang*' tih chhuanlamin an hmuh apiang an hal mai ṅin.
- 5) Sawilan tawh angin khaw tam tak khawm a ni a. Tamtak an haklai leh bungrua an ken theihtawk chauh te ken phalsak an ni a. An va luhna khua te lo ṅam bawk nen. Hei mai bakah Lo neih tur ram ṅhain a daihloh avang tein buh an thar tlem a, hei hian ṅam a ti zual.
- 6) Sawrkar hmalak vena phailam aṅanga buhfai lo lut ve te chu Convoy-in kawng lakah muang em em arawn phurh chhoh a

ni a, Aizawl leh Silchar inkar ringawt pawh karkhat aia tam te an thang ṅin. Buhfai chhia leh uih, ei hleih theihloh te a tam a, mipuiten an hnem hnanpui nep hle.

Heng te avang hian Mizo mipuite khaw tam berah leh khawkhawmna hmun tinah an ṅam em em a, eitur an tla chham a, a awm chhun pawh a to em em a. Damlo tan kawng a ral ṅit em avangin a nei deuh tan pawh damdawiin pan ngam a ni mang lova. Hmun tinah an thi zawih zawih ni ber a sawi a ni. Khawzawl Grouping Center chungchang a ziah ah Lalpara (2010) chuan '*nitin mi pahnih zel thi anga chhut theih khawpin thlahnih chung kan inphum a ni*', tiin a ziak. Kawlkulh Grouping Centre ah pawh 1968-69 chhung khan mi 60 lai an thi bawk (Chalhnuna, 2014). Tin, Col. C. Lalrawnliana (1999) chuan Grouping Centre hrang hrangte tamzia leh thihna a tamzia a ziak a, Phuldungsei khua chungchang ti hian a ziak, '*Ei chhe lutuk tuar lovin mitamtak an thiin an dam lova, tar leh naupang pian ṅha lovin an thih hma pah niin an hria*'. Baktawng Center chungchangpawh ti hian a ziak kan hmu, '*Ei a chhiat lutuk vangin mi an thi zawih zawih zawih a, hetih hun lai hian mitthi an zing hle*'.

Hetiang hian Zoram hmun tam berah tharum thawhna leh ṅam te avangin thihna a tam em em a, mitthi zawng zawng zat mumal taka chhinchhiah nilo mahse, hemi hun laia Mizoram Hmarlam mipui nuai

hnih vel lek aṅanga teh leh Block Level-ah phei chuan mi a sing bi vel awrh awmna ah chuan thahnemtham tak a ni awm e.

B. In leh Lo (Settlement) :

Rambuai chhunga mipuite chet kual nasat dan leh a chhan hrang hrang te kan sawi tawh a. In leh lo dinna kawng leh hmun te, a zat te thlenga a nghawng dan lo bih chiang leh ila.

(a) In leh lo zat leh awmhmun (Number of settlement and distribution):

Sawi tawh angin Rambuai in a nghawng kan hmuh langsar em em chu khawkhawm (grouping of villages) hi a ni a. He tih hun laia Mizoram dinhmun chu a hnuaiia Table-III aṅang hian han en ta ila.

Table-III a kan hmuh ang hian kum 1967-1970 chhunga khaw hrang hrang khawm (grouped) in R.D. Block area hrang hrang a

Table-III :R.D.Block hrang hrang huamchhunga khaw awmzat (North Mizoram) 1961- 2011

Sl. No.	Name of R.D.Blocks	Khaw awm zat					
		1961	1971	1981	1991	2001	2011
1	AIBAWK	19	14	21	23	22	22
2	DARLAWN	29	6	29	28	30	28
3	E.LUNG DAR	20	5	19	17	18	17
4	KHAWBUNG	22	5	23	24	25	26
5	KHAWZAWL	27	7	28	29	34	31
6	NGOPA	13	5	14	15	15	15
7	PHULLEN	11	5	11	12	12	12
8	REIEK	42	8	28	25	23	23
9	SERCHHIP	23	6	21	19	19	19
10	THINGDAWL	15	5	20	15	14	12
11	THINGSULTHLIAH	26	5	26	27	29	30
12	TLANGNUAM	30	14	29	19	20	19
13	W.PHAILENG	13	4	24	24	22	21
14	ZAWLNUAM	27	8	61	52	40	40
15	BILKHAWTHLIR	22	5	23	20	23	19
16	CHAMPHAI	19	4	16	11	11	11
TOTAL		358	106	393	360	357	345

khaw awm zat a tlem phah zia chu 1971 chhiarpuih hian a lang thei awm e. A pumpui thuin Mizoram hmar lamah khawkhawm hma a khaw 358 lai awm kha khaw 106 chauh a lo awm ta a ni. Khaw 259 lai rauhsan a ni a, hetih rual hian a hma a khua nilo hmun 7 laiah khawkhawmna hmun khawthar siam belh a ni thung a ni. Amaherawhchu kum 1972 ah sawrkar lam chuan khawtinte an duh chuan an mahni khaw hlui lama an let leh theih thu a chhuah ta a. He miin a nghawng zel lian tak kan hmuh chu -

- a) Chhungkaw tam tak mahni khuaa let leh lovin Grouping Centre-ah an awm tlang nghal.
- b) Khaw 194 laiin mahni khaw hmun hlui an luah leh a, mahse mi an let kim lova, tin, heng khua te hi khawpui tling anga puan nilovin 'Thlawhbawk' ti a sawi an ni a, Village Council hrang pawh nei lovin Grouping Centre atanga engemaw chen awp an ni.
- c) Khaw tam tak mahni khua ah let lovin Grouping Centre-ah an awm tlang a, khua a ram hlen. Hetianga Rambuai hma a khua ni si, tun thlenga ram hlen ta hi khaw 74 lai a lo awm ta a ni.
- d) Khaw thenkhat chu din that leh ni mahse mi leh sa an tlem tak avang leh kalpawh te a lo harsa bawk nen luahlum hlen lova rauhsan an ni leh. Entirnan, Bungtlang-a khawm khuate, Khawnglung leh Lungsai chu mi

engemaw zat an khaw hmun hluih an let leh a, mahse a hnu ah an pendarh zo ta.

- e) Khaw tam tak chu mahni khawbu ngai luah lovin a hnai leh remchang zawk, kawngpui kaltlangna lamah an in bengbel ta zawk a, khaw thar enge maw zah a lo piang ta thung a ni. Entirnan, Chawngtleng atanga khawm te chuan an hmun hluih let leh lovin an khaw ram tho kawngpui kam Keitum-ah hmun an bengbel ta zawk a ni. Hetianga khaw thar hi Mizoram hmar lamah hian khaw 88 zet hmuh tur a awm a ni.

(b) Kawthler leh In inremdan leh awmkhawm dan (Pattern and Type of Settlement) :

Mizoram buai hian khaw awmdan leh awm zat te, an awmna hmunte a nghawng mai ni lovin khawchhung in leh lo inrem dan leh awm dan leh nihphung (types and pattern of settlement and house type) thlengin zoram hmun hrang hrangah nghawng a nei nasa em em a ni.

Rambuai vanga thingtlang khaw hrang hrang te sawikhawm an nih dan kan sawi tawh a, hengah te hian tlem deuh awm darh (dispersed & semi-dispersed) te awm khawm (compact) tira khua te a theih ang ang a hung vek an ni a. Heng bakah pawh hian khaw khat chhung rau rauah pawh darh sarh leh daifem deuha in awm ang chi te, kawngdung zuia awm fan deuh te (linear pattern) te pawh sawikhawm

a, hmun laili deuhah te in hnaih te te (circular & semi-circular) a awmkhawm tir an ni a. Khua hung a rem theihna leh Sipaite tana chet awlsam theihna tura ruahman an ni. Hemi chungchang tifiyah tur tlem han tarlang leh ila. *'Bawktlang khua hi an awmkhawm lova, an darh sarh avangin veng hmawr in zawng zawng chu venglaiah an khawm vek mai a. Vai sipaiten ven harsa an tih vang maia khawm an ni'* (Lalrawnlina, 1998). Vairengte khua pawh hi an

awm darh lutuk chu an sawikhawm ve tho a. Veng hmawra in awmte, venglai lamah an sawn a. Volunteer-te tana chet remna tur chi reng reng chu an thiat vek a, mipuite bit takin an dahkhawm vek mai a ni. (Lalrawnlina, 1997).

(c) Insak phung (Type of Houses):

Rambuai hian khawchhung in inrem dan pianzia (pattern) leh khua leh in tam leh awmkhawm dan (types) mai bakah in sakdan phung (house types) pawh nasa

Table-IV : Mizoram Buailai a Block hrang hrang chungha tawrhndan.

Sl. No.	Name of R.D.Blocks	RAMBUAI LEH KHAWKHAWM VANGA					
		In hal	Inthiah	Pemsan	Avaiin	Khaw ram hlen	Khaw thar din
1	AIBAWK	364	226	5	595	1	0
2	DARLAWN	399	786	66	1251	4	6
3	E.LUNG DAR	618	984		1602	2	0
4	KHAWBUNG	293	1381	73	1747	3	4
5	KHAWZAWL	1306	937	135	2378	5	3
6	NGOPA	265	451		716	1	1
7	PHULLEN	288	272	106	666	0	0
8	REIEK	976	332	27	1335	16	2
9	SERCHHIP	1136	793	35	1964	3	1
10	THINGDAWL	847	110		957	1	6
11	THINGSULTHLIAH	784	236	259	1279	5	4
12	TLANGNUAM	811	410	92	1313	9	0
13	W.PHAILENG	191	209	29	429	10	13
14	ZAWLNUAM	570	88		658	0	34
15	BILKHAWTHLIR	617	281		898	11	12
16	CHAMPHAI	849	606	106	1561	3	2
TOTAL		10254	8102	933	19259	74	88

Source : Compiled from various books concerning Insurgency, Interviews & Census datas.

takin a nghawng a. Mizoram hmun tinah In hal a ni a, a bik takin MNF lamin an lo lambunna bul hnai khua apiang te chu sipai lamin an hal zel a. Tam tak thiah luihtir an niin pemsan luih tir an ni bawk a. An ni mai bakah an lam t̄anglo deuh ni a an hriatte MNF lam pawhin hal an nei nual bawk nen. Tam leh hlauhna karah In t̄ha pawh din ngam ni lovin thingtlang khaw tam berah chuan thlam pawh tluk zolo, chhungkaw leng t̄awk t̄awk tamtakin an din thei hram a, hengte pawh hi halsak an la ni zui fo nen, khaw thenkhat chu vawithum lai hal tuar te pawh an awm a ni. Sawrkar lamin a hmingin rangva, inte takte pawh khuh zo lo khawkhawmna hmunah te chuan a han sem ve a, amaherawhchu hemi hun laia Zoram thingtlang in tam tak chu di-in (thatch type) ti a chhiar phak pawh ni meuhlo, sethlama sak an ni hlawm a ni. A hnuaia table at̄ang hian Rambuai hun laia Mizoram Hmarlam a in hal a nasat dan kan hmu thei awm e.

Tlangkawmna:

A chungka kan hmuh leh sawi angin Mizoram Hmarlam huam chhunga Rambuai hunlai leh a hnulam chhiarpui hun hrang hrang a mihring leh In leh lo pun leh kiam dante, Rambuai avanga mipuiten harsatna hrang hrang an hmachhawnte leh a nghawngte thlirin Chiang taka lo lang tate chu :

- 1) Mizoram Hmar lam huam chhungah Rambuai avang hian khua 74 lai mai luahzawm lohin

an ram phah a, khawthar 88 lai lo pian phahin khaw tam takin an khawhmun luahzui lovin an sawn phah a ni.

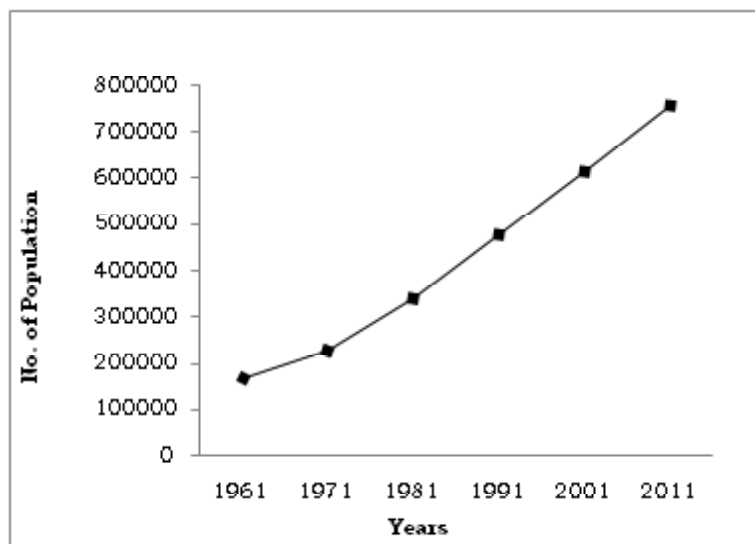
- 2) Khaw tam tak in leh mihringah an tlem phah a, mahse khaw engemaw zah chuan an len phah thung. Mizoram hmarlam huamchin khuate chu khaw 92 ah (Aibawk Block tellovin) hruaikhawm an ni a. Mi tamtak mahni khawlamah kir leh mahse heng khawmna khuaah te hian mi thahnemtak an chambang zuiin khua a lo len phah chho ta a, Vawiin a Sub-Town kan neih tam berte hi he khawkhawm avang liau liauva chak taka t̄hangchho a tih theih awm e. A bik takin heng khua 12 - Aizawl, Bairabi, Champhai, Khawzawl, Kolasib, Lengpui, N.Kawnpui, Ngopa, Saitual, Serchhip, Vairengte leh W.Phaileng-ah te hi chuan rambuai hma (1961) at̄anga khawkhawm leh a hnulam, mi tam takin mahni khua an pan leh hnu pawhin, mihring tam lam kiam tawh chuang lovin nasa taka pung chhovin an t̄hanglian chho ta a ni. Heng bakah hian Grouping Centre engemaw zat chu, mi tam tak mahni khuaa an let leh avangin an han tlahniam deuh a, mahse khua chuan nasa taka a lenphah bakah a t̄hang chho zel a, khaw lian tak (Urban & Sub-Urban) ah a lo din chhuah chhoh phah ta a ni. Entirnan –

Mamit, Kawrthah, Zawlnuam, Sairang, N. Thingdawl, Bilkhawthlir, Thenzawl, Darlawn, N. Vanlaiphai leh Khawruhlian.

3. Mizoram hmar bial mihring pun dan han en hian, Mizoram huamchhunga kan pem kualvelna avanga R.D. Block thenkhat hniam a thenkhat an pun thungna piah lamah, Mizoram pawn lama pem chhuahna leh tam vanga thihna leh tual thihna hluar tak mai te hian Hmarlam bial pumpui thlirin nghawng a nei phak niin a lang. Figure-a Line Graph hi en ila, 1961 atanga 1971 chhiarpua mihring punna hi 1971 atanga a hnulam chhiarpui a pun chhoh dan nen khaikhin chuan a hniam (gentle slope) in, a danglamna a lang Chiang hle.

Chuvangin, Mizoramin kum 20 chhungzet Rambuai a tuar hian ei

leh bar (economy), khawtlang nun (society) leh ramrorelna (politics) mai bakah khaw hrang hrang a mipui pundan leh khaw than lendan te, in leh lo dindan kalhmang leh awmkhawm danah te, In awp khawm dan (administration) leh khawpui leh khaw lian deuchte lo in din chhuah chhohna ah te, thenawm state leh rama kan darh tak dan ah te nghawngchhuah a nei lianin a pawimawh hle a, khaw te deuh leh chengker deuh tamtak in an ral phahin, mi tam takin a hunloah an nunna hlutak an chan a, mi tam tak mahni pian leh murna khua nilovah seilianin an awm hlen phah bawk a ni. Rambuai hi tuar lovin lo awm chho ta zel ila, Mizoram-a khaw hrang hrang awmzat leh awmna te, khaw len zawng leh tam lam te hi tun dinhmun nen chuan nasa takin a danglam ngei ang tih a hmuh thiam theih awm e.



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Women Vegetable Vendors in Small Towns of North East India : A Case Study of Moreh, Manipur and Tlabung, Mizoram

- Benjamin L. Saitluanga

Seyang Baite

Lalnghakmawia Thangluah

Abstract : *Informal economy is an important source of livelihood for the poor. People in rural and urban areas are depending on informal sectors and earn their daily life. Women vegetable vendors in Moreh and Tlabung are working hard to earn their livelihood through their business in spite of their disadvantages. This paper attempt to highlight and compare the working condition, educational qualification, status in the family and in the society, economic empowerment and challenges faced in Moreh and Tlabung towns.*

Keyword : *Street Vendors, Informal Economy, Women empowerment.*

Introduction :

Informal economy plays a vital role in creating employment opportunities to poorer, less educated and unemployed workers in developing countries. The informal economy includes unrecognized, unrecorded and unregulated small-scale activities that occur outside the frameworks of organized public and private sectors (Hart, 2008).

The National Commission for Enterprises in the Unorganized Sector (2007) defined informal sector workers as those “*working in the informal sector or households, excluding regular workers with social security benefits provided by the employers and the workers in the formal sector without any employment and social security benefits provided by the employers*”.

Street vending is one of the most popular types of informal activities.

Street Vendors are considered as the most vulnerable and marginalized workers who play a significant role to meet the demands of the goods and services by providing low price and make it easy to obtained items. Street vendors also help in creating employment opportunities and generating income to provide livelihood to their family (Suraiya and Noor, 2012). Timalsina (2011) mentioned street vending as good sources of earning livelihood for a rural people in urban areas while serving goods with a cheaper price. Street vending plays a vital role in economic development in eliminating poverty and creating employment (Nirathron, 2006; Njaya, 2014).

There is substantial increase in the number of street vendors in the major cities around the world, especially in the developing countries of Asia, Latin America and

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Africa. As per ILO report 2002 street vendors account for 14.6 per cent of total non-agricultural employment in South Africa, 9 per cent in Guatemala, 8 per cent in Kenya, 6 per cent in Tunisia and 1-5 per cent in Brazil, Costa Rica and Mexico. In India Street vendors represent about 3 percent of total non-agricultural employment. (Bhatt and Nengroo, 2013)

In India, a street vendor is defined as a person “*who offers goods or services for sale to the public without having a permanent built up structure but with a temporary static structure or mobile stall (or head load)*” (National Policy on Urban Street Vendors (2004). In this policy document, the term urban vendor is includes hawker, pheriwalla, rehri-patriwalla, footpath dukandars, sidewalk traders, etc. As per the National Policy on Urban Street Vendors, 2006, the total number of street vendors in India is estimated to constitute 2% of the total population in the metropolitan cities (WIEGO). With an estimated 2,50,000 street vendors, Mumbai has the largest numbers of people engaged in street vending among all the major cities in India (National Policy on Urban Street Vendors, 2006).

Objectives:

1. To study the socio-economic characteristics of women vegetable vendors in the border towns of Moreh and Tlabung
2. To assess the role of street

- vending towards gender equality in decision making and
3. To understand the challenges faced by women vendors

Review of Literature :

Husain *et al.* (2015) studied socio-economic aspects of street vendors in Dhaka. They found that most of the vegetable vendors were full time workers who have worked for about 12-16 hours daily. In spite of this, the study reported that the daily incomes of street vendors were relatively low in comparison to those who worked in organized sectors. Most of the street vendors in Kumasi, Ghana were found on the sidewalks and in open spaces like train station and market area (Ayeh *et al.* 2011).

Sharma and Konwar (2014) studied women street vendor and public spaces in Delhi. Their finding is that there is no any specific act implemented for the street vendor in India even after the independence. Street vendors have been struggling for their problems and issues.

Harpreet and Sanpreet (2007) studied quality of work life of street vendors of Khanna in Punjab. They interviewed 30 street vendors and among which only 13.33% of the street vendor have graduate degree and above. Among the vendors, there are 86.66% who earned around Rs 500 in a day and only one person earned above Rs 1000 in a day. Another important finding was that there were 14.66% who

have free access of their vending place while there were 53.33% of the street vendors who do not have a fix place.

Chakravarty and Canet (1996) studied street food consumers and street vendors in Kolkata. The study found that among the consumers 33% purchased street foods daily. Among the vendors 21% of the vendors are illiterate and most of them are a commuter who travels a distance of 2-3 km in a day by train along with their goods. The street vendors normally earned Rs 600-1600 per month and mostly the income of a female were lower than male.

Study Area :

Moreh and Tlabung are located in the N.E Indian states. Both the towns are situated in the border area; Moreh is situated near Myanmar while Tlabung is situated near Bangladesh. Moreh is a small and congested town in Manipur and many types of business are taken up for the livelihood and profit making. Bussiness items are imported from Myanmar through Integrated Check Point (ICP).

Tlabung, situated in the banks of Khawthlang Tuipui gives access to Bangladesh and the Khawthlang Tuipui River flows to join Bay of Bengal in Bangladesh and this river can be called the sustaining life line of Tlabung and its surrounding villages. Items like television, vegetables, heavy machines like engines, kitchenwares, clothes and

others are imported from Bangladesh through Khawthlang Tuipui River. The Integrated Check Point (ICP) in Tlabung is not fully function yet. Because of this, Vegetables and other small items are imported with free trade through ICP while others like Machines and clothes are usually imported illegally.

Methodology :

Primary data is collected through questionnaire designed for this purpose only. Random sampling is employed and 60 women vegetable street vendors each from the small towns of Moreh, Manipur and Tlabung, Mizoram were interviewed through scheduled questionnaire. All the data were entered in the MS Excel and simple graphical methods were employed to analyse the data.

Findings and Discussion:

Socio-economic Condition of Street Vendors :

Education level of the population is important and it is related with vulnerabilities and insecurities in street vending. Although literacy rate is high among vendors in both Moreh and Tlabung, none of the vendors have passed matriculation or Class 10 which is considered as the benchmark for proceeding into higher education. Majority of the vendors are middle school dropouts who have ventured into vending (Fig. 1). With regards to work experience, a few of them have been in the business for more than 15 years while more than half of

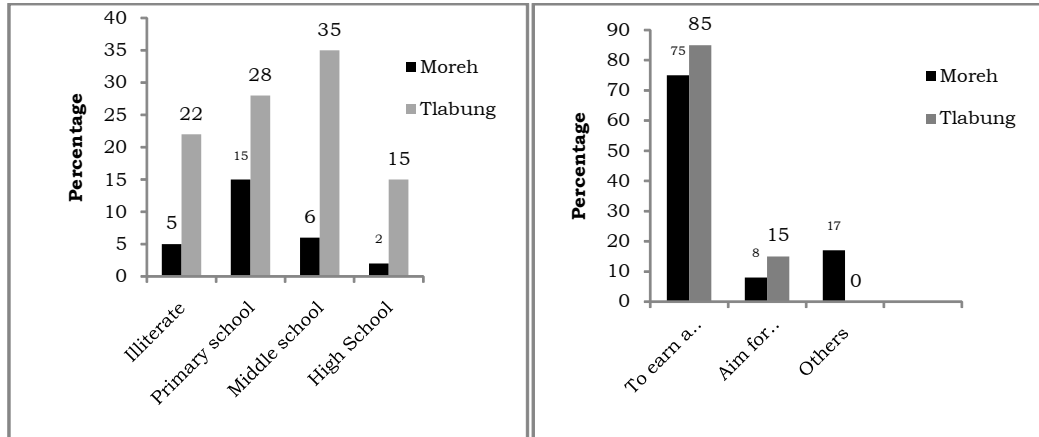


Fig. 1 Level of Education of Street Vendors, Moreh and Tlabung 2018
 Fig. 2 Reasons of taking up Street Vending, Moreh and Tlabung 2018

the total street vendors in both places have less than 5 years of experienced. More than 75% in Moreh and 85% in Tlabung Street Vendors in Tlabung take up the business to earn a living for the family. There are people who aim to have economic independence which constitutes for 8.33% and 15% in Moreh and Tlabung respectively.

women could easily enter into the sector without having much money. The data on the sources of the capital shows that there are 43% of women street vendors in Moreh used their own savings while 72% of the women street vendors in Tlabung used their own saving for starting their business. Apart from the personal saving, 30% and 20% of women street vendors in Moreh and Tlabung respectively women

Street vending is not a capital intensive investment. Poorer

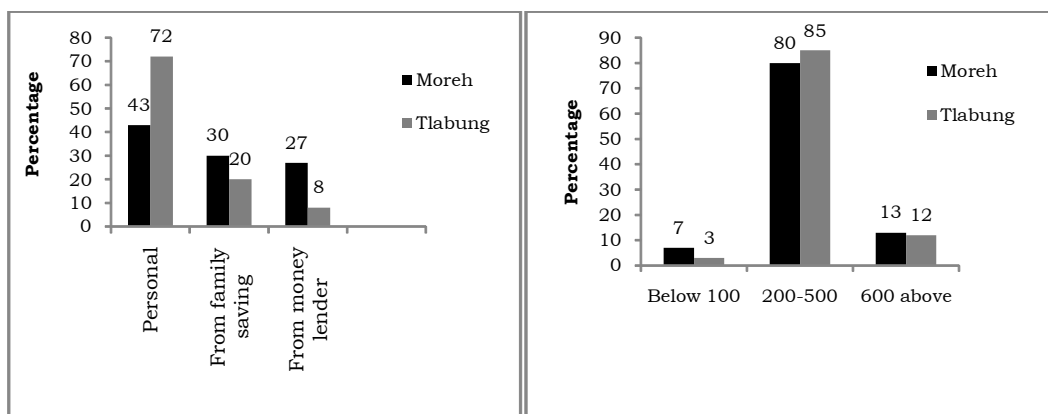


Fig. 3 Level of Education of Street Vendors, Moreh and Tlabung 2018
 Fig. 4 Daily Income of Street Vendors, Moreh and Tlabung 2018

have spent their family savings to initiate their business. Borrowing from money lender is also prevalent among street vendors particularly in Manipur. There is no single person who has loan facility from bank to initiate their business in both the places.

Street vendors contribute significantly to the informal as well as the overall economy in terms of employment and cheap availability of goods and services. Their own earning however is quite low. The majority of the street vendors have daily income between Rs 200-Rs 500.

Empowering Women through Street Vending :

Even though it is difficult for them to avail bank loan, most of the street vendors in Northeast have access to financial institutions. Out of the entire total sample, more than 75% in Tlabung have their owned bank account, 12% of the female vendors shared

their husband account and 13% have joint account with their husband whereas 47% of female vendors of Moreh have their own bank account, 53% shared their husband account or do not have bank account. There are no persons who have joint account with their husband.

In order to know the family situation in decision making, 37% of the sample decision is made by their husband and 63% are made by the street vendors in Moreh, while in Tlabung 30% of the decision is made by their husband while 70% of decision is made by themselves. From the data it is clearly shows that more than 60% of the decision in term of purchase of dresses is made by themselves.

Regarding with the Vendor's organization, 43% of the total vendors joint or affiliated with organization and 57% of the street vendors did not join the vending groups or organization but in

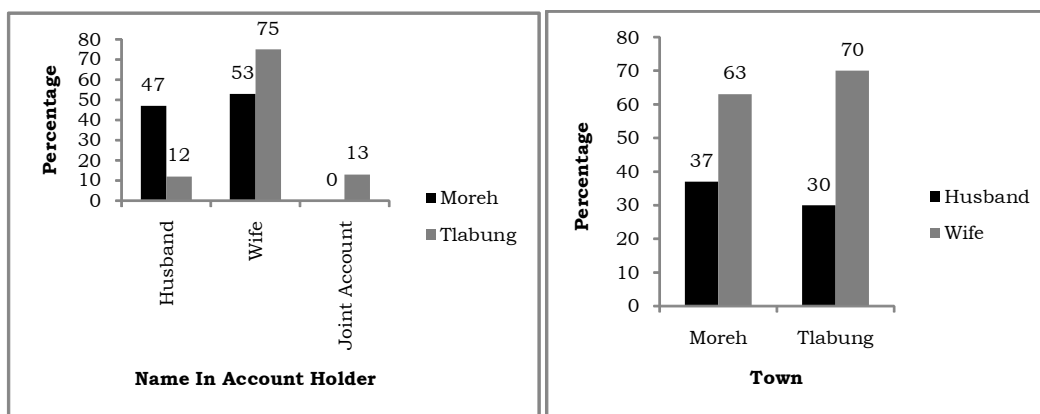


Fig. 5 Bank Account holder name in Family of Street Vendors, Moreh and Tlabung 2018
 Fig. 6 Decision Making in the family of Street Vendors, Moreh and Tlabung 2018

Tabung the street vendors do not form any groups or organization and there is no groups or organization to joint.

Problems and Challenges of Women Street Vendors :

Concerning with the continuation of the business, 53% and 98% of the street vendors in Moreh and Tlabung are responded positively and intended to continue their business while 47% and 2% of Moreh and Tlabung street vendors responded negatively and if alternative business are available in in the future, they will stop and leave for the new business.

The challenges faced by the street vendors are also studied in these two towns. In Moreh, 40% of the vendors have difficulty in capital or facing financial problems for

starting and running the business. Capital or financial problem is the biggest challenges in Moreh town. Although some of the street vendors are working for their family but 17% of the street vendors have problems as they did not have family support. Frequent bandhs and strikes contribute for 15% causing and disturbing their business for the street vendors. Another big challenge is space problems. Due to the increase in numbers of population and development level, there is an increase in the numbers of street vendors causing smaller space and congested. Health related issues and weather conditions did not much effect in the business accounting for 8% and 5% respectively while in Tlabung, the biggest challenge is capital or

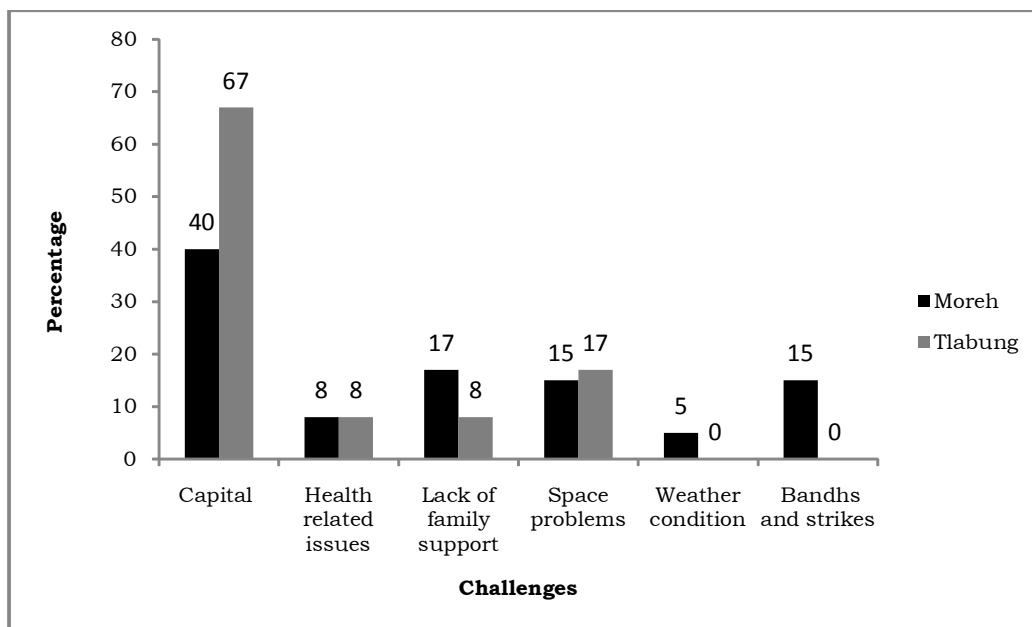


Fig. 7 Challenges faced by the Street Vendors, Moreh and Tlabung 2018

financial problems for starting and running the business smoothly. Another big problem for Tlabung street vendors is space problem. As many people from the neighbouring village used to sell their vegetables, the space of the market is too congested leading 17% of the street vendors have space problem. With regards to lack of family support and health related issues, there are 8% street vendors who have problems.

Significance of Borders :

In terms of procurement of business items, Tlabung has more advantage comparing with Moreh in getting items from local people. Only 13% of items are from local people in Moreh while Tlabung has 38% from local people. Another 25%

of business items are from outside Moreh but inside Manipur and 40% of the business items are from outside Tlabung but inside Mizoram. The business items of 15% in Tlabung market is from outside the state but from within India while Moreh has only 12% of items which are imported from other Indian States. As Moreh and Tlabung are in the borders of Myanmar and Bangladesh, many business items are imported from their neighbouring countries. 50% of the business items in Moreh are imported from Myanmar but 7% items are imported in Tlabung from Bangladesh.

Comparing with the overall business items, Moreh has 50% of imported items from Myanmar and

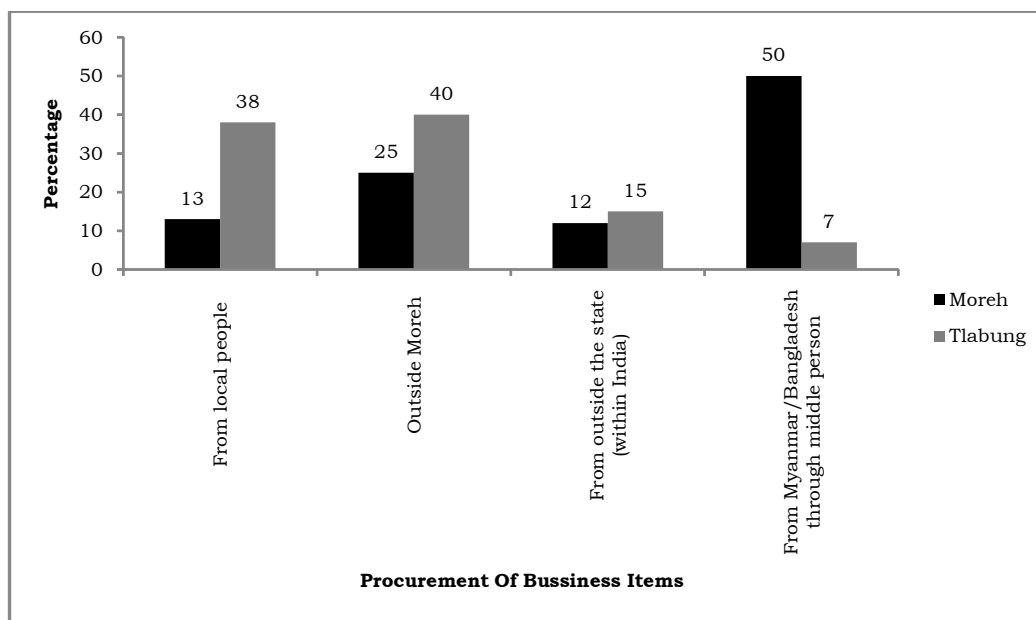


Fig. 8 Procurement of business items of Street Vendors, Moreh and Tlabung 2018

another 50% items are from the Country itself where Tlabung has only 7% are imported from Bangladesh and 93% are imported from the others states of India especially from Assam.

Conclusion :

The women vegetable vendors in Moreh and Tlabung cannot be ignored because of their role played in the family. From the analysis, the women from both the towns are deprived of education; no person is above higher secondary and above in both the towns. More than 75% are trying to earn their living through vendors. But, their daily income is generally quite low for the family and still they are trying to continue their jobs to satisfy the family needs. The main problem or challenges they faced is capital or financial problem and this has affected their trade. So, women are in need of motivated, developed and empowering the women will also help in the growth of the family in terms of income and livelihood of the family.

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Socio-Economic Development in Mizoram : A Study at Blok Level

- C. Nunsiamliani

Abstract : *The present study deals with socio-economic development in Mizoram at the block level by analyzing five indicators. Such as general literacy rate, total workers, medical facility, availability of drinking water and power supply. The paper is based on secondary data of the census of India 2001 and 2011. By using Z score standardized technique through SPSS software and the available block level data, the result is divided into five developmental categories. It is found that there is inequality in the level of socio-economic development at various blocks of Mizoram.*

Keywords : *Socio-economic disparities, developmental indicators, developmental level.*

Introduction :

There exist differences in economic development throughout the world, and this difference is often seen between rural and urban areas within a country. Over the years, there has been increasing transformation of socio-economic conditions of the lifestyle of the people in Mizoram, due to the widespread of modern infrastructure than before. Still, the needs remain enormous in order to achieve a satisfactory standard of life for the people. (Sundaram, 2014).

Socio-economic development affects a number of services such as income, expenditure, saving, consumption, education, employment status, occupational structure etc. In order to understand the concept of socio-economic development, one needs to understand the meaning of development. Generally, development is defined as a state in which things are improving. In the

socio-economic context, development means the improvement of people's lifestyles through improved education, incomes, skills development and employment. Socio-economic development, therefore, is the process of social and economic development in a society (Ohlan, 2013).

However, in order to measure the degree to which a country or state achieve the level of socio-economic development, one found difficulties in choosing the best indicators, as McGranham (1972) has pointed out that the nature of the indicators and quantitative analysis of the relation between them will depend on the conception and the definition of development. For a development indicator, it should represent some factors that are part of the process of development. A good indicator should have the same direction of change as the process of socio-economic development is being

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measured. Drenowski (1972) also opined that the direction of change of these values should conform to the direction of change of the magnitude of the welfare which is supposed to be measured. Baster (1972) also agreed with their views by declaring that the choice of components and indicators of development should reflect changes in the capacity to attain development objectives as well as the extent to which the objectives are attained. Though, Ewusi (1976) argues that other variables that are negatively related to development can be chosen as indicators, so long as the indicator deteriorates progressively with economic development. Another property for a good development indicator is that it must have a definite direction and association with the process under consideration (Nour *et al.*, 1989). Even then, in Mizoram where data are very limited, one should accept any available socio-economic indicator that might give some bearing for testing socio-economic development.

Study Area :

The state of Mizoram lies between 21°56'N - 24°31'N latitudes and 92°16'E - 93°26'E longitudes. The total area of Mizoram is 21,087 square kilometers (Pachau, 2009), and this constitutes only 0.64 per cent of the total area of India. It is located in the northeastern part of India, bounded by Myanmar (Burma) to the east and south, and

Bangladesh to the west and by the states of Tripura to the northwest, Assam to the north and Manipur in the northeast. The tropic of cancer, i.e 23°30'N latitude cuts across the region in Aizawl district and this line divides the region into two almost equal parts. There are 8 districts in the state and Aizawl is the capital city in which most of the important administrative functions are located. It became a centrally administered union territory under the name of Mizoram in the year 1972, and become one of the state in India in the year 1987. There are 22 blocks in 2001 census, which was increased to 26 in 2011 census. The four newly created blocks are Champhai (from Khawzawl block), Bilkhawthlir (from north Thingdawl block), S.Bungtlang (from Lawngtlai block) and Saiha (from Tuipang block). The total number of population in the latest census of 2011 was 10,97,206 with a density of 52 persons per square kilometer. The sex ratio in the 2011 census is 976 and the literacy rate is 91.33 percent.

Objectives :

1. To analyze the spatial pattern of socioeconomic indicator among the blocks in Mizoram.
2. To find out the block disparity in the level of development.

Methodology :

The present paper is based on secondary data which is mainly obtained from General Population

Tables Mizoram 2001 (Tables A-1 to A-4), District Census Handbook & Primary Census Abstract (2001&2011) published by the Directorate of Census Operations Mizoram. The chosen five indicators are analyzed and presented in the form of cartographic characteristics based on statistical techniques like Z-score through SPSS, and Jens (Natural breaks) for classifying the level of development (Prasad, 2015).

Z-Score Standardized Techniques :

A Z-score standardized technique was used for normalization of the raw data and to find out the composite index. Data collected from secondary sources

were transformed into variables to be used as indicators. To transform the data matrix into scale free matrix, indicators was standardized by subtracting the mean from each individual variable and divided by their standard deviation, as the following formula -

$$Z_i = (X_{ij} - X_j) / SD_j$$

Where,

Z_i is the Z-score for the i^{th} unit

X_{ij} is the X variable in the i^{th} unit and j^{th} variable

X_j is the mean of j^{th} variable and,

SD_j is the standard deviation of the j^{th} variable

After obtaining Z-score for every indicator, composite score was

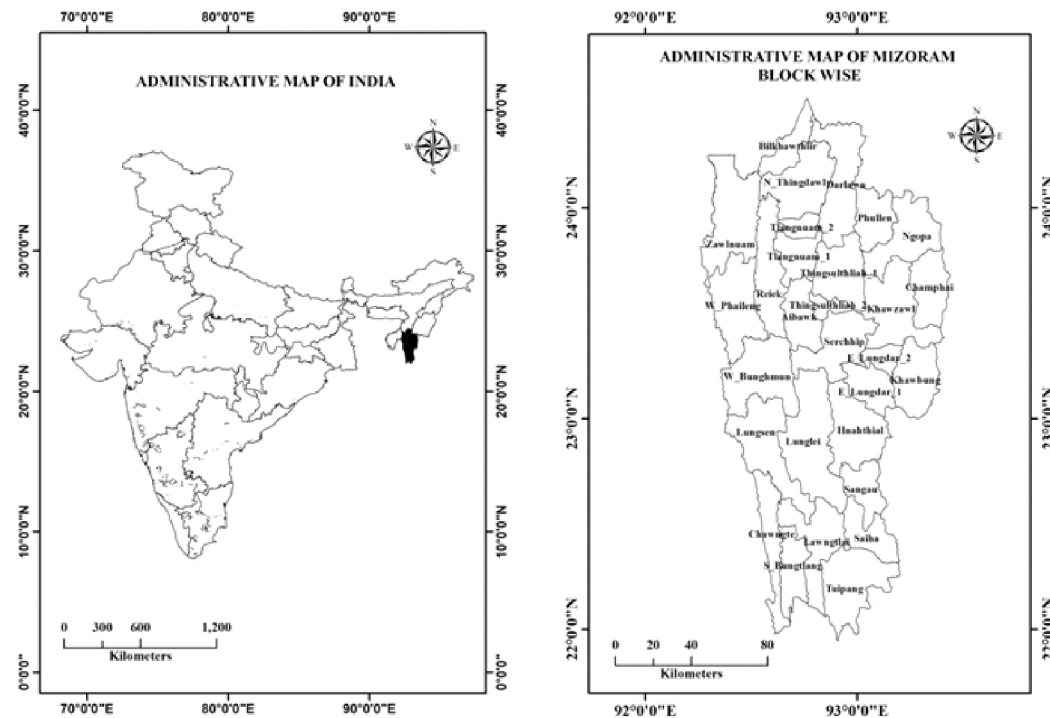


Figure 1 : Location map

obtained by adding up of all individual Z-score or standard data as -

$$C_i = \sum Z$$

Where, C_i is the composite scores and $\sum Z$ is the summation of Z-scores

Analysis :

The study measures and compares the levels of socio-economic disparities among different blocks within Mizoram, and classifies the blocks based on the levels of their development, by selecting data on the basis of the availability constraints.

1. Literacy Rate :

Literacy widens our world, opens opportunity for one's future and played a vital role in the welfare of a society. A nation's progress is intricately linked to the vitality and impact of its education system, from the pre-school to the postdoctoral levels (Sundaram, 2014). It has been noticed that Mizoram has 91.33 per cent literacy rate in 2011 census, highly above the national literacy rate of 74.04 per cent. The highest literacy rate is found in the block of Tlangnuam (97.2%) in 2001, increased to 98.28% after 10 years, followed closely by Serchhip (98.13%) and Aibawk (98.03%) in 2011. This improvement in education shows that the state of Mizoram achieved a great success in case of literacy, which is responsible for an overall development of any society. Yet, great variation among the blocks

still exists which is 46.38% in Chawngte. This variation between the highest and the lowest block in 2011 census amounted to 51.9%.

2. Work Participation Rate :

Even though the state's economy has undergone improvement in the service sector, yet, agriculture continues to be the mainstay of the rural people living in Mizoram. The highest total workers were found in the block of East Lungdar (71.34%), followed closely by Aibawk (69.21%), and Thingsulthliah with 64.23% in 2001 census. However, in 2011 census Hnahthial block with 73.31% has the leading number of workers followed by Aibawk with a great variation of 54.13% only. Sangau with a mere 31.1% has the smallest number of workers in 2011 census.

3. Medical Facilities :

Improving the state of health contributes to economic development. On the other hand, deprivations in well-being in terms of health status are key dimensions of poverty. People living in poverty are less likely to have access to adequate health care and are more likely to suffer from illnesses and to die at younger ages than those living above the poverty line (Sundaram, 2014). The blocks in Mizoram during the study period of ten years showed improvement by attaining 87.5% in 2001 by Serchhip to 88.46% by Khawbung block in 2011. Yet, there exists great variation among the blocks in case

of Chawngte (13.58%) in 2001 and West Phaileng(28.57%) in 2011. There is overwhelming evidence that people of lower socio economic position have poorer health and higher death rates (Marmot 2004).

4. Drinking Water :

The state of Mizoram is fortunate in term of availability of drinking water even though the availability may not be same in different regions. According to the district census handbook of 1991 all the villages have drinking water facilities available within the village in some form or other. Yet, the reality face by the inhabitants is not satisfactory. However, from the record, the availability of drinking water facilities in all the blocks in 2001 census is inadequate except the block of West Phaileng with 96.3%, and N.Thingdawl with 81.82% in 2011 census is found to be the lowest among all the blocks in Mizoram.

5. Power Supply :

There is great variation in case of power supply among the various blocks in Mizoram. Chawngte with 12.35% in 2001 and 30.86% in 2011 census is recorded to be the lowest. While Aibawk, Thingsulthiah and Serchhip in both the censuses have 100% power supplies amenities. There are only three blocks in 2001 census, which has 100% power supply, after that, the number has increased to nine blocks in 2011. Blocks like Darlawn, Phullen,

Tlangnuam, Ngopa, Khawzawl, Khawbung, N.Thingdawl, Chawngte, Lawngtlai, Sangau, Lungsen, Lunglei, Hnahthial, WestPhaileng and Tuipang has shown an increased in their figures. On the other hand, Reiek, Zawlnuam and W. Bunglemun blocks show a decline in their records compare to the previous census. Among this three block, Reiek has shown a maximum decline in amount, from 90.48% in 2001 to 59.09% in 2011.

The percentage values of the above tables are applied to Z-score standardized techniques and the value so obtained are given in the following table.

Accordingly, the level of development among the 22 blocks of Mizoram, has been divided into five categories -

Levels of socio-economic development 2001 :

1. Very High Level of Development (> 0.550):

Four blocks, namely E.Lungdar, Serchhip, Aibawk and Ngopa are included in this category. Serchhip block has a maximum score in three indicators, and the block of Aibawk and E.Lungdar has a maximum score in two indicators. Furthermore, Ngopa has a maximum score in only one indicator; yet, its score in work participation ratio, medical facilities and power supply meet the requirements to be included in this very high level of socio-economic development.

2. High Level of Development (0.207 to 0.550) :

Six blocks are included in this category. The blocks in the order of high score in the level of socio-economic development are as follows : Phullen, Thing-sulthliah, Hnahthial, Khawbung, Reiek, and

Khawzawl. This six blocks have high scores in drinking water, not only that, the block of Thingsulthliah have a maximum score in power supply as well. Although, availability of medical facilities is insufficient in the block of Reiek, however, her score in other indicators is

Table 2 : Z-score of indicators (2001)

Block	A	B	C	D	E	CI
Darlawn	0.531	0.822	0.071	0.213	-0.600	0.207
Aibawk	0.879	1.534	0.680	0.213	1.090	0.879
Phullen	0.650	0.473	0.637	0.213	0.776	0.550
Tiangnuam	0.909	-1.406	-0.459	0.213	0.671	-0.014
Thingsulthliah	0.721	0.915	-0.235	0.213	1.090	0.541
Ngopa	0.246	0.624	1.930	0.213	0.383	0.679
Khawzawl	0.504	0.648	0.168	0.213	-0.077	0.291
Khawbung	0.375	0.824	0.272	0.213	-0.027	0.331
N.Thingdawl	0.462	-0.484	-0.009	0.213	0.148	0.066
Chawngte	-1.867	-1.243	-1.886	0.213	-2.215	-1.400
Lawngtlai	-1.232	-1.367	-1.388	0.213	-1.575	-1.070
Sangau	-0.396	-0.146	-0.278	0.213	-0.894	-0.300
W.Bunghmun	-1.351	0.239	-0.558	0.213	-0.310	-0.353
Lungsen	-2.042	-0.259	-1.668	0.213	-1.483	-1.048
Lunglei	0.848	-1.297	0.019	0.213	0.991	0.155
Hnahthial	0.585	0.512	0.403	0.213	0.776	0.498
Zawlnuam	0.102	-0.233	0.002	0.213	0.536	0.124
W.Phaileng	-1.922	-0.361	-0.355	-4.477	-0.585	-1.540
Reiek	0.650	0.538	-0.504	0.213	0.731	0.326
Tuipang	-0.163	-1.996	-0.350	0.213	-1.372	-0.734
Serchhip	0.784	-0.136	2.283	0.213	1.090	0.847
E.Lungdar	0.726	1.798	1.225	0.213	0.855	0.963

Source : Results from table 1

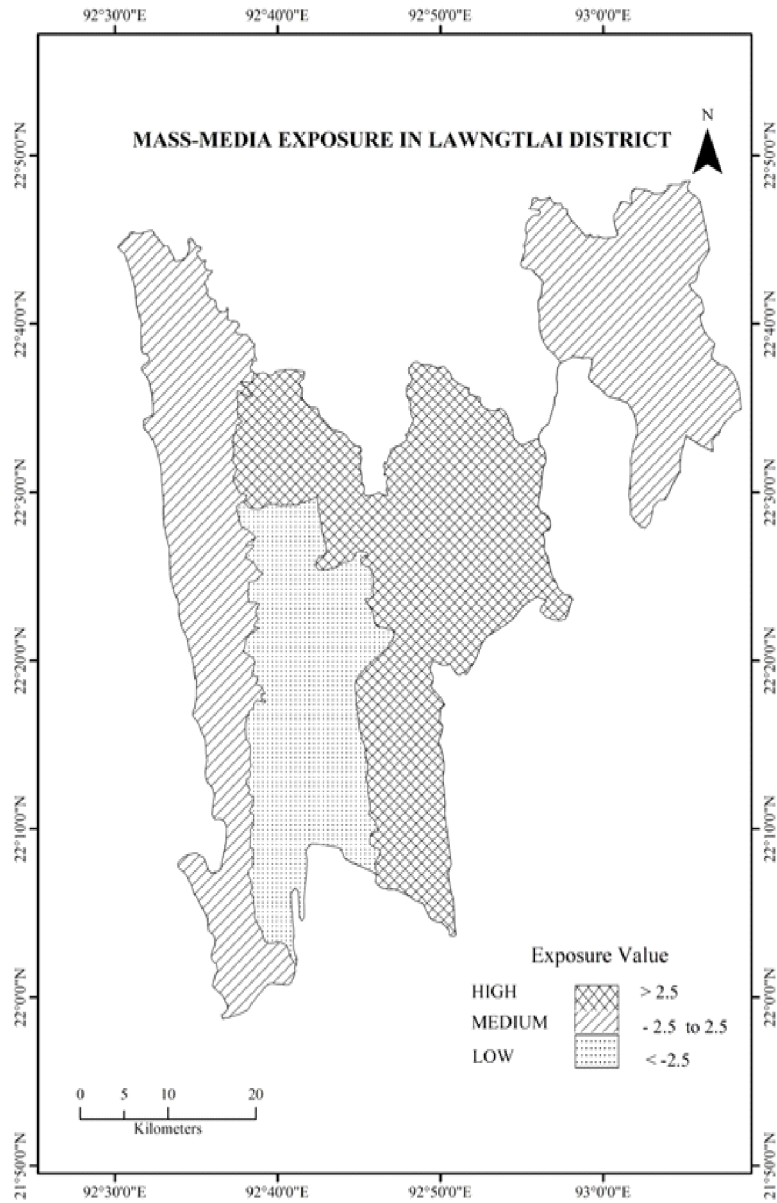


Figure 2 : Level of Socio-Economic Development 2001

adequate to make this block in the high level of development.

3. Medium Level of Development (-0.300 to 0.207) :

This category includes three blocks, namely : Sangau, West Bunglemun and Tuipang. These blocks have a high score in the availability of drinking water facilities. Tuipang block has very low score in the indicator of work participation ratio, and West Bunglemun has the lowest score in literacy rate and availability of medical facilities. Still, their score in other indicators makes them to be included in the medium level of socio-economic development.

4. Low Level of Development (-1.047 to -0.300) :

There are five blocks in this category - Darlawn, Lunglei, N. Thingdawl, Zawlnuam and Tlangnuam blocks. These five blocks have a high score in the availability of drinking water. Tlangnuam has the lowest score in work participation ratio followed by Lunglei, still, their score in literacy rate and power supply is high, which makes them included in this group.

5. Very Low Level of Development (< -1.047) :

Four blocks like Lawngtlai, Chawngte, Lungsen and West Phaileng are included in this category. Even though, they have high scores in drinking water except West Phaileng block. Their score in other indicators is very low,

especially in terms of availability of medical facilities which makes them included in this group.

Based on the above composite index, the 26 blocks are classified into the following five levels of development-

Levels of Socio-Economic Development 2011 :

1. Very High Level of Development (> 0.536) :

This category includes six blocks, namely Hnahthial, Khawbung, Phullen, Ngopa, Aibawk and East Lungdar. Hnahthial and Khawbung block has top score in three indicators, and Phullen block in addition has top score in two indicators. The three blocks of Ngopa, Aibawk and E.Lungdar, has a maximum score in only one indicator i.e availability of drinking water, yet their score in other indicators is sufficient to make these blocks to be included in this category.

2. High Level of Development (0.211 to 0.536) :

Four blocks are included in this category : Serchhip, Champhai, Thingsulthliah and Tlangnuam block. The blocks in this category have high score in two indicators each. Tlangnuam and Thingsulthliah blocks have low scores in work participation ratio and medical facilities respectively.

3. Medium Level of Development (-0.321 to 0.211) :

This category includes seven blocks, namely : Lunglei, Khawzawl,

Table 3 : Z-score of indicators (2011)

Block	A	B	C	D	E	CI
Darlawn	0.478	0.351	0.331	-0.335	-0.236	0.118
Aibawk	0.689	0.933	1.244	-0.538	0.840	0.633
Phullen	0.509	0.508	1.071	0.549	0.840	0.695
Tlangnuam	0.707	-0.573	0.679	0.549	0.596	0.392
Thingsulthlah	0.621	0.542	-0.537	0.549	0.840	0.403
Ngopa	0.423	0.565	1.261	0.549	0.563	0.672
Khawzawl	0.529	0.016	-0.143	-0.276	0.553	0.136
Champhai	0.552	0.035	0.309	0.549	0.840	0.457
Khawbung	0.552	0.362	1.364	0.549	0.840	0.733
N.Thingdawl	0.564	0.149	0.465	-3.796	0.086	-0.506
Bilkhawthlir	0.261	-0.572	-0.119	0.549	0.321	0.088
Chawngte	-3.058	-0.610	-1.220	-0.632	-2.028	-1.509
Lawngtlai	-0.297	-1.321	0.952	0.549	-1.493	-0.322
S.Bungtlang	-2.683	-0.032	-1.785	0.549	-1.925	-1.175
Sangau	0.037	-1.846	-0.081	0.549	0.621	-0.144
W.Bunghmun	-0.816	0.490	-1.404	-0.816	-1.175	-0.744
Lungsen	-1.297	-0.071	-1.814	-0.197	0.192	-0.637
Lunglei	0.638	-0.650	-0.320	0.549	0.840	0.211
Hnahthial	0.589	3.247	0.533	0.549	0.840	1.152
Zawnuam	-0.430	-0.334	-0.501	-1.119	-1.571	-0.791
W.Phaileng	-0.623	-0.336	-2.056	0.549	-0.345	-0.562
Reiek	0.600	0.789	0.984	-1.623	-0.857	-0.021
Tuipang	-0.175	-1.108	-0.573	0.549	-1.423	-0.546
Saiha	0.271	-1.648	0.520	0.549	0.840	0.106
Serchhip	0.696	0.255	0.343	0.549	0.840	0.537
E.Lungdar	0.661	0.856	0.500	0.549	0.563	0.626

Source : Results from table 1

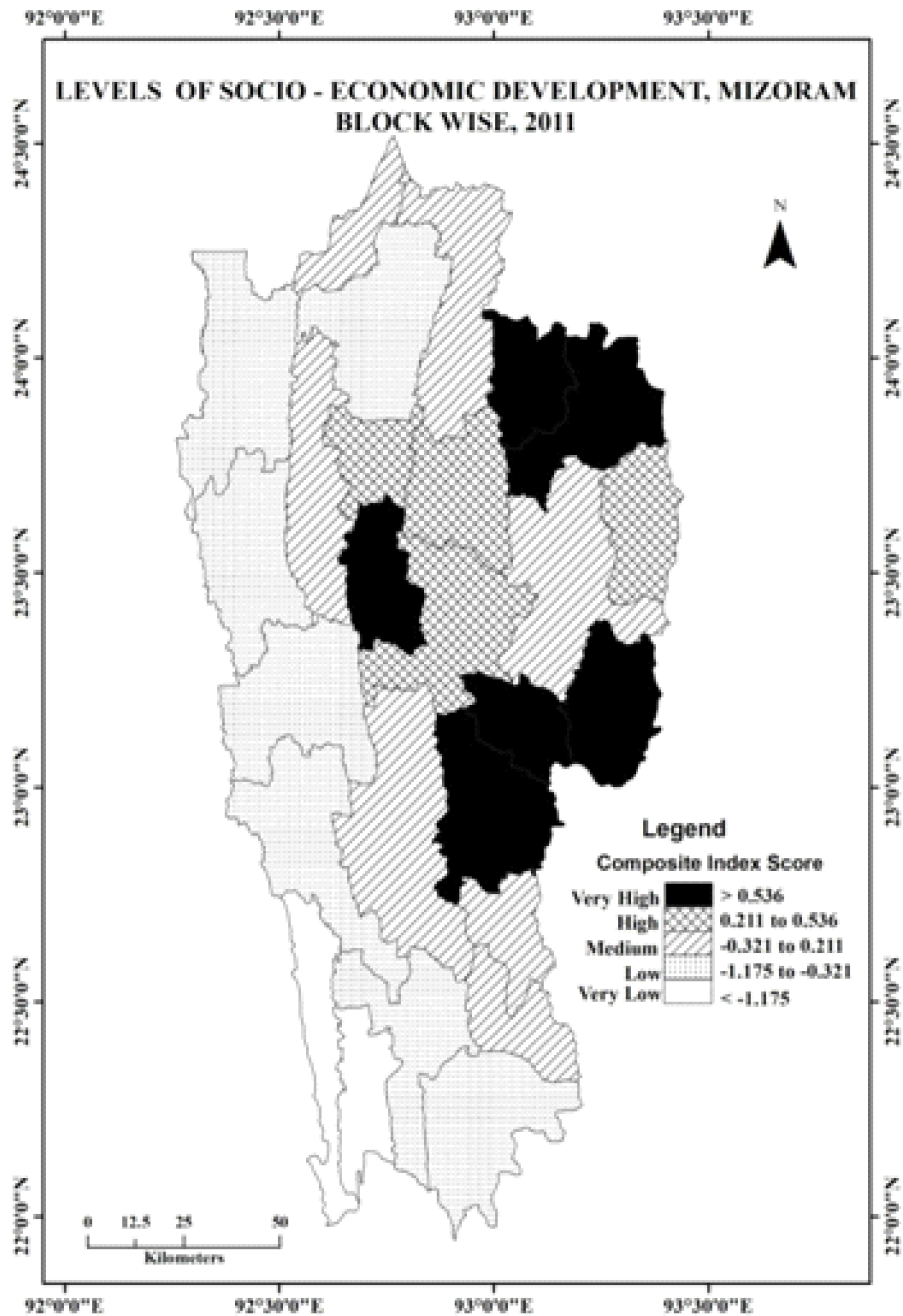


Figure 3: Level of Socio-Economic Development 2011

Darlawn, Saiha, Bilkhawthlir, Reiek, and Sangau. Among these, five blocks have a high score in one indicator each, and two blocks do not have a high score in any of the five indicators. The three blocks of Saiha, Sangau and Lunglei score in work participation ratio is quite low, yet, their score in drinking water and power supply makes it adequate to be included in this group.

4. Low Level of Development (-1.175 to -0.321) :

This category includes seven blocks, namely; Lawngtlai, N.Thingdawl, Tuipang, W.Phaileng, Lungsen, W.Bunghmun, and Zawlnuam. Only three blocks of W. Phaileng, Tuipang and Lawngtlai have the high score in the indicator of drinking water, on the other hand, indicator like literacy rate and medical facilities is low in the blocks of W. Bunghmun, W. Phaileng and Lungsen.

5. Very Low Level of Development (< -1.175) :

This category includes only two blocks i.e. S. Bungtlang and Chawngte. S. Bungtlang has the high score in drinking water facilities, but, its score in literacy rate and medical facilities is very low. Chawngte block has the lowest score in three indicators like literacy rate, work participation ratio and medical facilities.

Conclusion :

The three blocks, namely E. Lungdar, Ngopa and Aibawk

maintain its position of very high level of development even after ten years. There are three blocks-Phullen, Khawbung and Hnahthial which show positive results from high in 2001 to very high level of development in 2011 census. While, Serchhip block showed negative result from very high to high level of development in 2011 census as indicator like medical facilities showed a decrease than the previous census.

Again, there are five blocks which maintain the same status even after ten years; Thingsulthliah block with high level, Sangau block with medium level, North Thingdawl and Zawlnuam blocks with low level and the block of Chawngte with very low level of development. As some of their indicators shows increases in addition to decrease which makes them maintain their position.

There are six blocks which showed increases in their status from the previous census; Tlangnuam from low to high as it showed an increase in three indicators like literacy rate, medical facilities and power supply. Lunglei and Darlawn from low to medium and they showed an increase in same indicators like Tlangnuam block. The three blocks of W. Phaileng, Lawngtlai and Lungsen blocks ascend to low status from very low in 2001 census, as indicators like literacy rate, drinking water and power supply showed an

increase for W. Phaileng, and literacy, medical facilities and power supply for Lawngtlai and Lungsen block.

There are four blocks which descend from their previous status; Khawzawl and Reiek block from high to medium as indicators like work participation ratio and drinking water lessen for Khawzawl, work participation ratio, drinking water and power supply reduce for the block of Reiek. Again, West Bunglemun and Tuipang descend from medium rank to low in 2011 census, as indicators like work participation ratio, drinking water and power supply showed a decrease for west Bunglemun, but for the block of Tuipang in particular only one indicator i.e. work participation ratio showed a decline from the previous census, yet, when ranking is done with other blocks, she showed decrease in three indicators.

There are four newly created blocks in 2011 census; Champhai in the high level, Saiha and Bilkhawthlir with medium level, and South Bunglelang with very low level of development.

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Appendix 1 : Descriptive Statistics 2001

	N	Minimum	Maximum	Mean	Std. Deviation
Litt	22	57.84	97.20	85.0732	13.33956
Worker	22	40.78	71.34	56.8559	8.05584
Medical	22	13.58	87.50	47.0277	17.73040
Water	22	96.30	100.00	99.8318	.78884
Power	22	12.35	100.00	71.0841	26.52020
Valid N (listwise)	22				

Appendix 2 : Descriptive Statistics 2011

	N	Minimum	Maximum	Mean	Std. Deviation
Litt	26	46.38	98.28	88.5338	13.78642
Worker	26	31.10	73.31	46.3969	8.28819
Medical	26	28.57	88.46	64.5815	17.51130
Water	26	81.82	100.00	97.7031	4.18438
Power	26	30.86	100.00	79.7535	24.11484
Valid N (listwise)	26				

Mass-Media Exposure in Lawngtlai District, Mizoram

- C. Hmingsangzuala
P. Rinawma

Abstract : Mass-media plays a significant role in the development of contemporary society. It attracts, encourages and shapes matter of public opinion and belief which influences behavior, confers status, legitimacy and structures perception of reality. The present paper analyzed mass-media exposure in Lawngtlai district at the level of village, intra and inter block with the help of simple statistics like Z-score techniques, Principal Component Analysis and Factor Analysis. Primary data was collected from 1,678 households (25 per cent) of 20 selected villages and town in four rural development blocks using stratified sampling techniques. ArcGIS was also employed for choropleth mapping. The study reveals that the administrative centers and its adjacent areas scores higher value than the periphery areas due to geographical, historical and political factors.

Keywords : Mass-media, Rural Development Block, Exposure

Introduction :

Mass-media has a prominent role to play in modern society. It can bring about radical changes and improve social situation as it influences aesthetic values of society. It is a means to deliver information from a source to recipient information. It also used for more than just passing on information from one person to another, used as a tool to facilitate the participation of people in developmental activities which plays an imperative role in development through diffusion of knowledge, providing forum for discussion of issues, teach ideas, skills for a better life and create a base of consensus for stability of the state (Choudhury, 2011).

In 1947, the American

Commission on Freedom of the Press, the Hutchins Commission, described agencies of mass communications as the most powerful educational instruments, which must assume the responsibility for stating and clarifying the ideals towards which the community should strive (Ogan, 1982). It also plays a notable role in the economic, political and social development of a country. The power of the press arises from its ability of appearing to the minds of the people and being capable of moving their hearts (Sharma and Deepak, 2016). Khalid and Ahmed (2014) noted that 'a mass society is characterized by greater reliance on the mass-media for information and news about the environment in which the people live'. It is a multiplier in

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the communication process, spreading widely and rapidly information which will aid national development (Sommerland, 1981). Thus, the entry of information by mass-media impacts change in society which has the power both to build and destroy.

Objective of the Study :

The main objective of the study is to find out the level of mass-media exposure at villages, inter and intra rural development blocks in Lawngtlai district.

Data Base and Methodology :

To meet the requirement of an in-depth analysis of mass-media exposure in the selected 19 rural and 1 urban area of Lawngtlai district, multi-stage sampling method was applied for determination of sample size. By considering the bases on geographical elements such as accessibility, educational institution, literacy rate, location and direction of the villages (east, west, north and south), a sample of 20 units i.e., 16 villages and 4 rural development blocks (4 villages and 1 block center in each rural development blocks) were considered for collection of primary data. A total 1,678 schedules (sample of 25 per cent households) were supplied to the respondents and face to face interviewed were also conducted during the months of March 2015 – April 2016. A stratified sampling technique was also employed for selection of household.

Level of intra and inter rural development block exposure were calculated by using Z-score techniques and the level of mass-media exposure in theselected villages were analyzed using Principal Component Analysis (PCA) and Factor Analysis (FA) from 7 indicators through Statistical Package for Social Scientists (SPSS).

Level of Mass-media exposure in Lawngtlai District :

The respondents in the villages of Pangkhua (8.47 per cent), Rawlbuk (3.45 per cent), Lawngtlai (2.96 per cent), Kamalanagar (2.31 per cent) and Tuithumhnar (0.5 per cent) subscribed national newspaper through online or other sources. Local newspaper including weekly or monthly bulletin/newspaper published by NGOs or Churches in the village plays a very significant role in rural areas. Among the selected villages, Vaseikai (39.13 per cent), Lawngtlai (29.55 per cent), Mualbu L (26.32 per cent), Rawlbuk (17.24 per cent), Pangkhua (16.95 per cent), Sangau (15.47 per cent), Bungtlang S' (11.61 per cent), Thaltlang (11.11 per cent), Ngengpuikai (5.88 per cent) and Kamalanagar (0.77 per cent) subscribed local newspaper. 2.62 per cent of the respondents in Lawngtlai town subscribed national magazine while Mualbu L, Vaseitlang-II, Charluitlang, W.Saizawh, Dumzautlang, Sekulhkai, Thaltlang and Rawlbuk villages donot subscribe any

magazine.

Within this study area, three villages of Chawngte rural development block like Vaseitlang-II, Jamersury and Sekulhkai could not get access to Television, Internet and Radio mainly due to irregularity of power supply. Five vilages of

Lawngtlai (14.86 per cent), Rawlbuk (6.90 per cent), Pangkhua (3.39 per cent), Sangau (1.2 per cent) and Kamalanagar (1.03 per cent) got access to internet facilities within their premises. Radio is used by the entire villages to acquire news, innovation and knowledge except

Table-1 : Indicators of Mass-Media Exposure in Lawngtlai District (in percentage)

Selected Area	Newspaper Subscriber		No of Magazine Subscriber		No of Television access	No of Internet Subscriber	No of Radio Listener
	National	Local	National	Local			
Lawngtlai	2.97	29.55	2.62	3.67	90.21	14.86	8.74
Mualbu L	0.00	26.32	0.00	0.00	42.11	0.00	15.79
Ngengpuikai	0.00	5.88	0.00	14.71	79.41	0.00	2.94
R. Vanhne	0.00	0.00	0.00	12.50	75.00	0.00	12.50
Tuithumhnar	0.50	0.00	0.00	5.00	10.00	0.00	30.00
Kamalanagar	2.31	0.77	0.00	4.37	20.57	1.03	3.60
Vaseitlang -II	0.00	0.00	0.00	0.00	0.00	0.00	21.43
Jamersury	0.00	0.00	0.00	0.00	0.00	0.00	13.16
Charluitlang	0.00	0.00	0.00	0.00	00.00	0.00	50.00
W Saizawh	0.00	0.00	0.00	0.00	66.67	0.00	44.44
Bungtlang S'	0.00	11.61	0.00	40.18	68.75	0.00	25.00
Hmunnuam	0.00	0.00	0.00	4.55	50.00	0.00	0.00
Dumzautlang	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vaseikai	0.00	39.13	0.00	10.87	13.04	0.00	41.30
Sekulhkai	0.00	0.00	0.00	0.00	0.00	0.00	11.11
Sangau	0.00	15.47	0.00	20.99	17.18	1.20	3.31
Vartek	0.00	0.00	0.00	00.00	30.00	0.00	10.00
Thaltlang	0.00	11.11	0.00	0.00	38.89	0.00	27.78
Pangkhua	8.47	16.95	0.00	25.42	50.85	3.39	10.17
Rawlbuk	3.45	17.24	0.00	0.00	37.93	6.90	17.24

Source : Field survey

Hmunnuam and Dumzautlang. Dumzautlang village do not get any information through mass-media. Charluitlang, Jamersury and Sekulhkai villages have access to Radio while three villages of W. Saizawh, Hmunnuam and Vartek could get access to only two means of communication amongst variable indicators.

The Mass-media exposure in Lawngtlai district at different levels – within the Rural Development Block, among the different rural development blocks and at village level are analyzed in the following paragraphs.

(i) Intra Rural Development Block Mass-Media Exposure:

(a) Lawngtlai Rural Development Block: In the Lawngtlai R.D. Block, the level of Mass-Media

exposure has stretching score value between 5.21 (Lawngtlai) and -2.12 (Mualbu L) which were maximum and minimum level of exposure. The medium level of exposure was found in the villages of Tuithumhnar (-0.53), R.Vanhne (-1.25) and Ngengpuikai (-1.29).

(b) Sangau Rural Development Block: The highest value was scored by Pangkhua village (3.27). The lowest level of exposure was found in the village of Vartek with a score value of -3.58. Three villages of Thaltlang, Sangau and Rawlbuk were under medium level of exposure with a score value of -1.46, 0.39 and 1.38.

(c) Bungtlang S' Rural Development Block: Bungtlang S' and

Table - 2 : Level of Mass-Media Exposure in Lawngtlai RD Block

Sl. No.	Selected Area	Score	Rank	Level	Score	Village
1	Lawngtlai	5.21	1			
2	Mualbu L	-2.12	5	High	Above 2	Lawngtlai
3	Ngengpuikai	-1.29	4	Medium	-2 to 2	Tuithumhnar, R.Vanhne, Ngengpuikai
4	R. Vanhne	-1.25	3	Low	Below - 2	Mualbu L
5	Tuithumhnar	-0.53	2			

Table - 3 : Level of Mass-Media Exposure in Sangau RD Block

Sl. No.	Selected Area	Score	Rank	Level	Score	Village
1	Sangau	0.39	3			
2	Vartek	-3.58	5	High	Above 3	Pangkhua
3	Thaltlang	-1.46	4	Medium	-3 to 3	Thaltlang, Sangau, Rawlbuk
4	Pangkhua	3.27	1	Low	Below -3	Vartek
5	Rawlbuk	1.38	2			

Vaseikai villages were categorized as high level of exposure with a score value of 3.70 and 2.72. Lowest value of -1.10 was scored by Hmunnuam village, and then followed by Dumzautlang (-2.34) and Sekulhkai (-2.97).

- iv) Chawngte Rural Development Block : Newspaper, Magazine, Television and Internet facilities were absent in Vaseitlang-II, Jamersury and Charluitlang. Few families were able to access Radio for receiving information. Kamalanagar village score a value of 3.97 whereas the other four villages score less than 1.

(2) Inter RD Block Mass-Media exposure :

Lawngtlai and Sangau blocks

scored a value of 2.97 and 2.01. These blocks were categorized into high and medium level of exposure whereas a score value of -2.96 in Bungtlang S' blocks falls under low level of exposure. Chawngte block falls under medium level of exposure with a score value of -2.02. Lawngtlai district can be divided into two parts such as high developed (eastern) region including Lawngtlai and Sangau blocks and low developed (western) region of Bungtlang S' and Chawngte blocks in terms of mass-communication.

(3) Village Level Mass-Media Exposure:

To study the level of Mass-media exposure, Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity was significant. KMO showed a value of 0.567 and Bartlett's test of

Table - 4 : Level of Mass-Media Exposure in Bungtlang S' RD Block

Sl. No.	Selected Area	Score	Rank	Level	Score	Village
1	Bungtlang S'	3.70	1			
2	Hmunnuam	-1.10	3	High	Above 2	Bungtlang S', Vaseikai
3	Dumzautlang	-2.97	5	Medium	-2 to 2	Hmunnuam
4	Vaseikai	2.72	2	Low	Below -2	Sekulhkai, Dumzautlang
5	Sekulhkai	-2.34	4			

Table-5 : Level of Mass-Media Exposure in Chawngte RD Block

Sl. No.	Selected Area	Score	Rank	Level	Score	Village
1	Kamanagar	3.97	1			
2	Vaseitlang -II	-3.04	4	High	Above 2	Kamalanagar
3	Jamersury	-1.15	2	Medium	-2 to 2	W.Saizawh Charluitlang, Jamersury
4	Charluitlang	-0.21	3	Low	Below -2	Vaseitlang -II
5	W Saizawh	0.44				

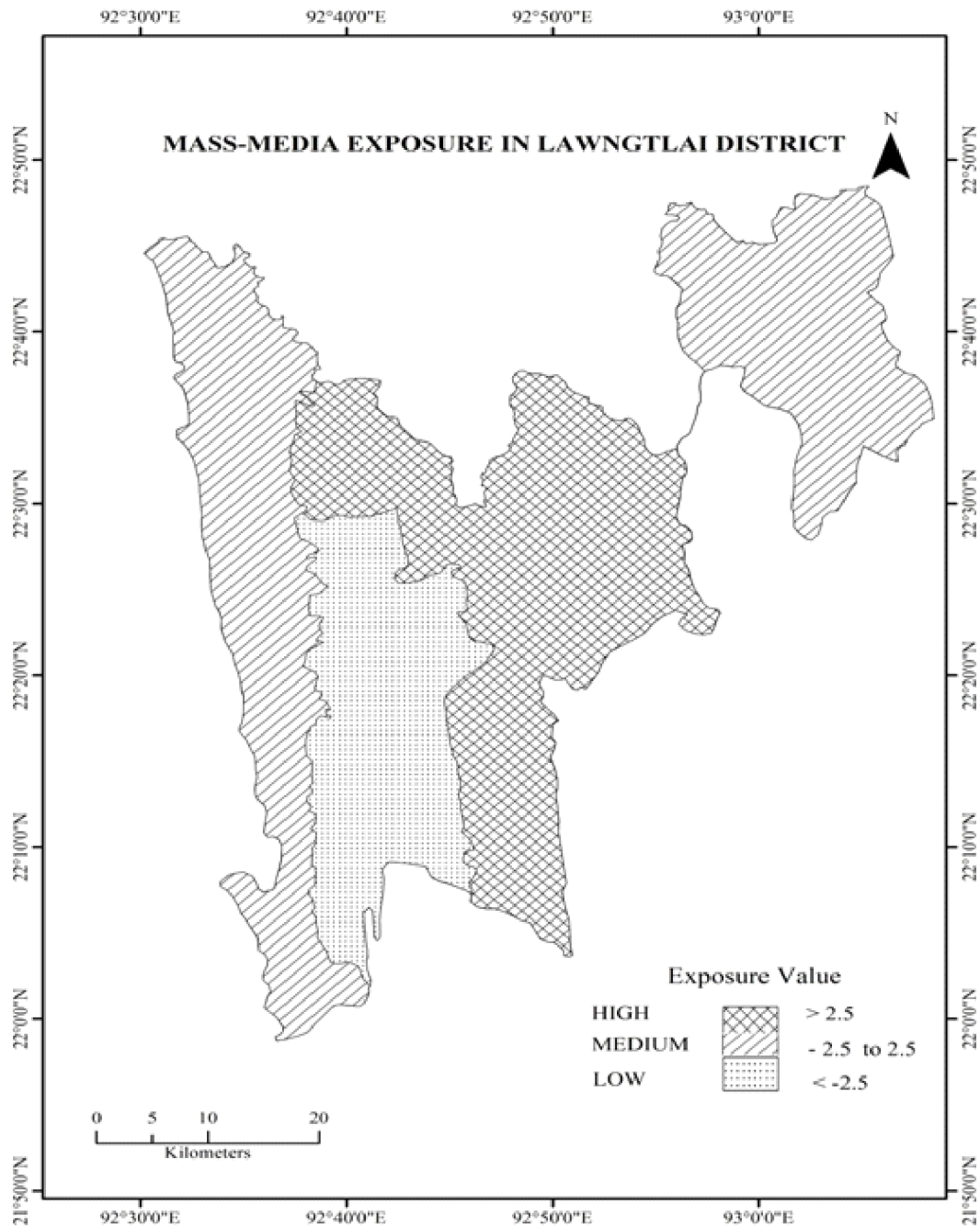


Figure: 1 Level of Mass-Media Exposure in Lawngtlai District

Table-6 : Level of Mass-Media Exposure in Lawngtlai District

Sl. No.	Name of RD Block	Score	Rank	Level	Score	Village
1	Lawngtlai	2.97	1	High	Above 2.5	Lawngtlai
2	Chawngte	-2.02	3	Medium	-2.5 to 2.5	Sangau, Chawngte
3	Bungtlang S'	-2.96	4	Low	Below -2.5	Bungtlang S'
4	Sangau	2.01	2			

Table- 7 : Level of Mass-Media Exposure in Lawngtlai District

Sl. No.	Selected Area	Score	Rank	Level	Score	Village/Town
1	Lawngtlai	7.637	1			
2	Mualbu L	1.317	8			
3	Ngengpuikai	1.899	5			
4	R. Vanhne	1.256	9			
5	Tuithumhnar	-0.407	18			
6	Kamalanagar	1.379	7			
7	Vaseitlang -II	-0.641	19	Very high	Above 3.5	Lawngtlai
8	Jamersury	0.062	14	High	2.5 - 3.5	Sangau, Pangkhua
9	Charluitlang	-0.770	20	Medium	1.5 - 2.5	Rawlbuk, Ngengpuikai, Bungtlang S'
10	W.Saizawh	-0.121	17	Low	-0.5 - 1.5	Kamalanagar, Mualbu L, R.Vanhne, Hmunnuam, Vaseikai, Vartek, Thaltlang, Jamersury, Dumzautlang
11	Bungtlang S'	1.821	6	Very low	Below-0.5	Sekulh kai, W Saizawh, Tuithumhnar, Vaseitlang-II, Charluitlang
12	Hmunnuam	1.004	10			
13	Dumzautlang	0.001	15			
14	Vaseikai	0.762	11			
15	Sekulh kai	-0.332	16			
16	Sangau	2.901	2			
17	Vartek	0.677	12			
18	Thaltlang	0.307	13			
19	Pangkhua	2.742	3			
20	Rawlbuk	2.147	4			

sphericity at 0.008 significant level indicating adequacies for conducting factor analysis and the null hypothesis could be rejected.

From the above table-7, the district headquarters of Lawngtlai scored highest value of 7.637 which falls under very high level of exposure. Sangau and Pangkhua villages were categorized into high level of exposure with a score value of 2.901 and 2.742. A score value of 2.141, 1.889 and 1.821 in the village of Rawlbuk, Ngengpuikai and Bungtlang S' were categorized into medium level of exposure. Nine villages of Kamalanagar (1.379), Mualbu L (1.317), R.Vanhne (1.256), Hmunnuam (1.004), Vaseikai (0.762), Vartek (0.677), Thaltlang (0.307), Jamersury (0.062), and Dumzautlang (0.001) fall under low level of exposure. Very low level of mass-media exposure in Lawngtlai district was found in Sekulhkai (-0.333), W.Saizawh (-0.121), Tuithumhnar (-0.407), Vaseitlang-II (-0.641) and Charluitlang (-0.770) villages.

Conclusion :

Mass-media are powerful guardians of shaping public perception and observation, belief, values and ideas of individual. It plays a significant role in forming and influencing society's attitudes and behavior. The final products or score values show that the district headquarters, rural development centers and its adjacent region scored a high value. It means that

the administrative functions take part a vital role in the exposure of mass-media as it is mostly found in the area which has high concentration of population like Lawngtlai, Sangau, Pangkhua and Kamalanagar. The remote areas which lack communication and transportation facilities scored lower values, they are Charluitlang, Vaseitlang-II, Sekulhkai, Tuithumhnar villages etc. Geographical and historical factors play an important role which directly or indirectly influences the economy and attitudes of people through media communications. Acquiring knowledge through media awareness and relevance needs to be stressed especially in rural areas of the district.

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Impact of Brick Fields on Riverine Environment: A Study Along River Kopai, Eastern India

- Tanmoy Das

Abstract : River-human harmony has been gradually lessen and riparian brick field is one of major causes behind this. This paper is an attempt to study on impact of brick fields on riverine environment along Kopai River. Rapid growth of brick fields is an emerging problem for this area. Brick field is one of the important seasonal industrial activities but it has an antithetic impact on river as well on the river bank dwellers. Majority of brick fields of the study area are of recent origin. Dumping of ashes in the river bed and mud extraction from river bed interrupt the natural flow of river and that change the river characteristics. This study also suggest some ameliorative measures for these foreground.

Keywords : Brick field, Riverine Environment, Antithetic impact, River bank dwellers, Mud extraction

Introduction :

India is the second largest producer of bricks in the world, next only to China, producing about 200 billion bricks/annum and provide employment to nearly 10 million people in different sub occupations (Report- Brick by Brick, 2017). In 2018, there are 28 brick fields which have been identified within the river basin of Konai river. Out of 28, 18 are located along the right bank and remaining 10 brick fields are located along the left bank. Majority of brick fields are concentrated in middle and lower portion of river basin mainly Sarip bazar to Amdahara. Brick production depends upon various factor such as availability of raw materials, market, access to the nearest metal road. November to March is the main season for brick production. According to Birbhum District Environment Impact Assesment Authority, no

brick earth mining shall be allowed in rainy season and the mining operation shall be carried out in restricted working hours between 6:00 a.m to 7:00 p.m in non-rainy season. Now-a-days increasing riparian brick field is a great threat to the riverine environment.

Methodology :

Topographical map of 1972 (1:50,000) published by Survey of India (SoI), Satellite imagery of 1990 (Landsat 4 TM), 2005, 2012 (IRS LISS III & LISS IV) and 2018 (Landsat 7 ETM) have been considered to determine the location of brick field along the river course and verified with the help of GPS during field survey. From the analysis of SoI topographical map, satellite imagery of different time period and secondary data collected from different gram Panchayat office and Block Land Records Office

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it is found that there has been an increasing numbers of brick field during the last three decades. River bed sediment sample have been collected from three sites of Kopai River to analyse micro level impact on sedimentological characteristics. Sieving method was used to determine grain size distribution of river bed sediment. Water sample have also been collected from the different parts of river course to analyse and check the variation of river water quality in response to brick fields. Sample water have been tested in a reputed scientific laboratory. A case study of a sample village has been done to generalize impact of brick fields on riverine environment.

Location of the Study Area :

Kopai is an important river of Eastern India which covers an area of 501.28 sq. km. This river has originates from Khajuri village of Jamtara district of Jharkhand. Total length of this river is about 110 km. It meets with Bakereswar River at Paschim Kadipur village of Labpur block which is 3km south of Labpur urban centre. The latitudinal Extension of the study area is 23°26'18"N to 23°56'30" N and longitudinal Extension is 87°13'E to 87°49'30 "E. After originating from Khajuri village of Jharkhand state, river Kopai crosses 329 villages of six police stations of West Bengal namely Dubrajpur, Khoyrasole, Rajnagar,

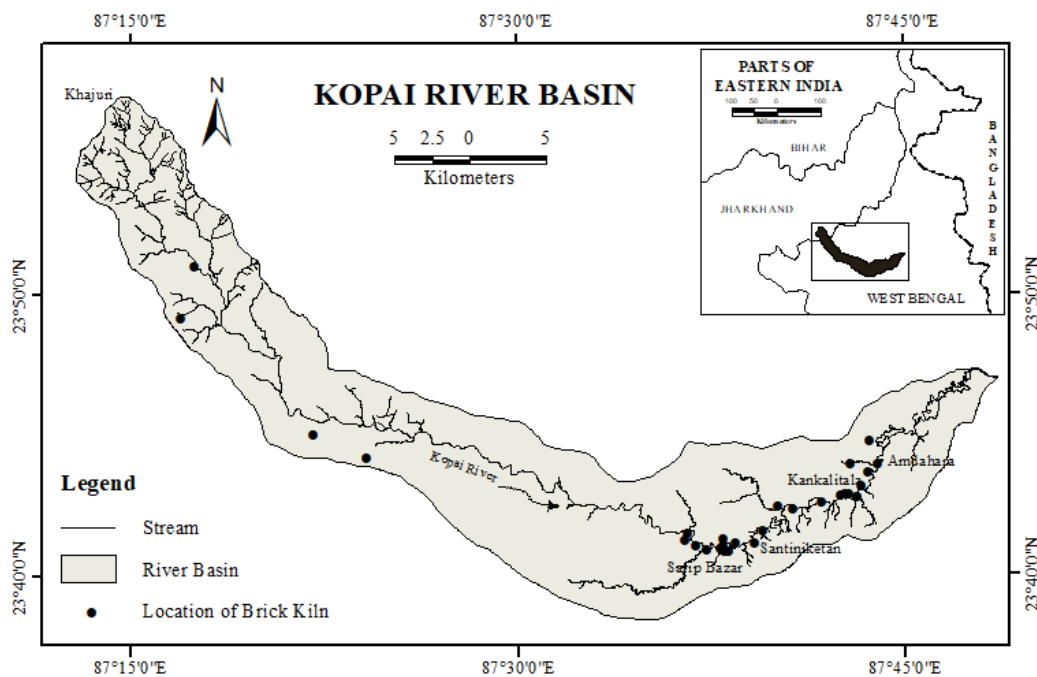


Fig. 1: Location of the Study Area

Illambazar, Bolpur and Labhpur. Some important villages of Kopai river basin are Lokepur, Hetampur, Kukhutia, Kultore, Nachansaha, Ballavpur, Kobi Mahonpur, Binuria, Paschim Islampur, Syambati, Goalpara, Kankalitala, Amdahara, Milanpur and others.

Rapid Growth of Number of Brick Fields:

Neer bricks is the first brick field of the study area. It was established in the year of 1970s along the right bank of the Kopai at Sarip Bazar of Ruppur gram panchayet. On the other hand, Bappa bricks is latest one, located at Paschim Islampur village of Ruppur gram panchayet was established in 2012. Before 1990, there were only two brick fields identified in this area. But during the year 1990 to 2000, 13 new brick fields were established. At present (2018) the total number of brick fields reached to 28. Due

to the imposition of Environmental impact assessment and complicated governmental rules that restricted the establishment of new brick field from the year 2013 to 2018, there were no brick field records. Though the number of brick field is confined to 28 areas but area of each brick fields is expanding at a faster rate. This trend of increasing number of brick field and areal extension leads an emerging problem in the present configuration of riparian environment of Kopai River. Some house building programme such as Indira Abash Yojona (IAY) since 1985, Pradhan Mantri Gramin Awaas Yojana (PMGAY) since 2015 have generated a huge demand of bricks among the riparian dwellers. Even to fulfil heavy demand and huge production of bricks, good quality mud has been imported from outside the locality.

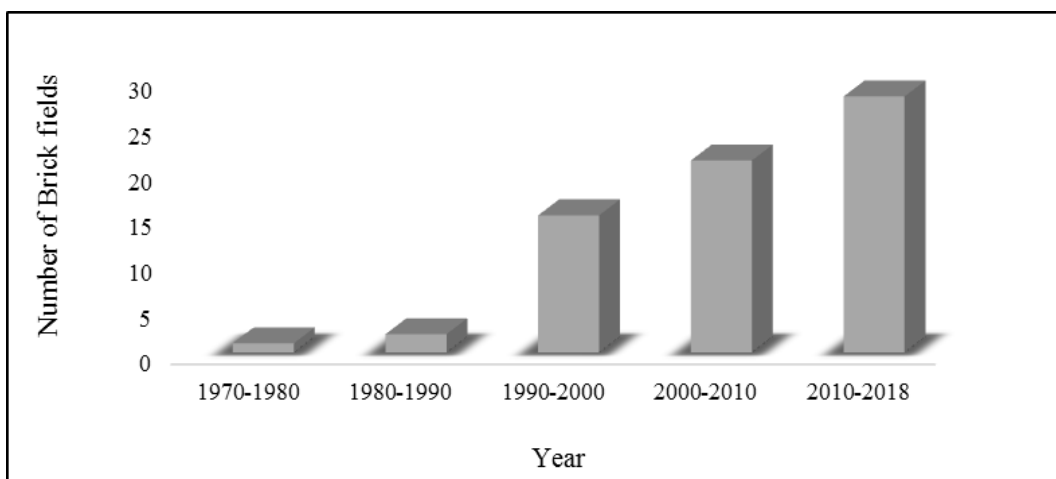


Fig 2 : Decadal growth of Brick fields along Kopai River (1970-2018), Source: Data generated from primary as well as satellite data.

Impact of Brick Fields on Riverine Environment

On Agricultural Land

Now a days there has been increasing demand for bricks made from the riparian areas which promote to large scale construction and developmental activities (Sarika, *et.al.* 2012). Every brick field collects brick earth as a raw material, from nearest agricultural land (Khan, *et.al.* 2007; Rahman and Khan, 2001). During the survey, we could observe that top soil of agricultural lands are extensively used for brick production. Good quality mud that can raise the crop production are also necessary for brick making. But the farmers are giving more preference to brick kiln than agricultural practices because brick kiln owners assures more money than what they can get from agricultural field. Due to this one time economic benefit farmers consign their agricultural lands

adjacent to brick kiln for short term lease. After completion of lease period, those agricultural lands turn to around 1-1.3m deep (Plate 1). So by over exploitation of agricultural land by removing top soil, many of the agricultural land are becoming infertile.

From the Field study it is revealed that agriculture is the primary activity in most of the villages in this area. But a shift in the occupation from agriculture to non-agricultural activities were also observed. Many agricultural labours are now engaged in truck driving, labour contractors, labour supervisors etc.

Brick field and river bed configuration :

Mud and sand are used as a raw material for production of bricks. Sand is collected from the river bed and bank of Kopai River. But in the present trend Kopai River have faced a problem of unscientific sand lifting in a huge dimension in



Plate 1: Evidences of cutting of agricultural land at Kankalitala Village (A) and Dalla Village (B)

between Nachansaha to Sangri village. In some cases haphazard extraction of mud from river bank experiences unusual river bank erosion. Enormous mud extraction changes the bank characteristics of many villages along Kopai River for example Nachansaha, Paschim Islampur, Mahishdhal, and Kankalitala etc.

River bed sediment analysis is very important to know the size and composition of sediments along the longitudinal profile of the river. Riparian brick field have micro level impact on sedimentological characteristics of Kopai River. To

analyze such kind of micro level impact, three bed sediment samples have been collected from 500m upstream side of Royal Bricks (Sample A), near Royal Bricks (Sample B) and 500m downstream side of Royal Bricks (Sample C) which is situated along the right bank of Kopai River near Mahishdhal village.

Sieving method was used to determine grain size distribution of bed sediment. A set of histograms (Fig. 3) of three sample are presented to find out the grain size distribution of bed materials of these sample sites. Textural

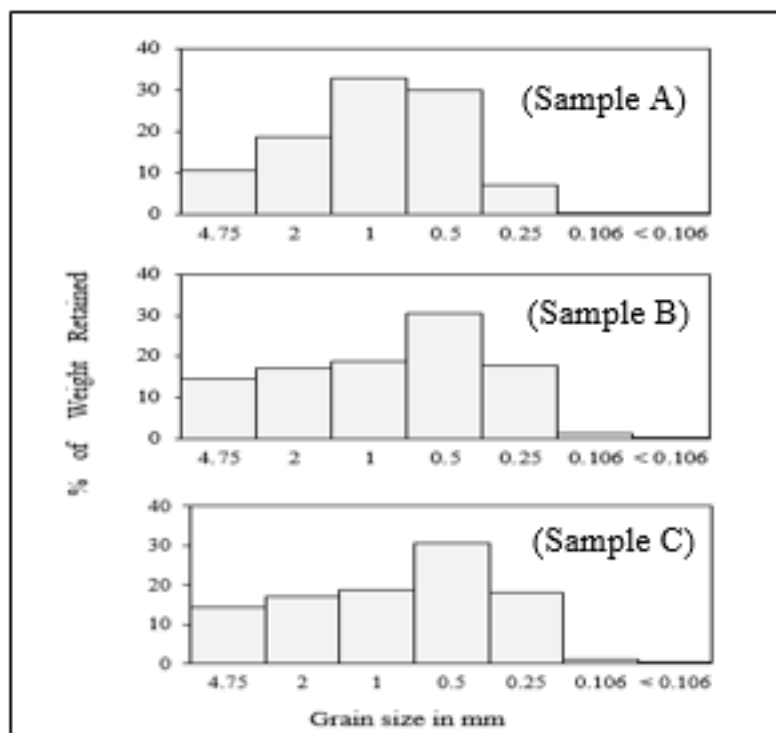


Fig 3: Histogram showing Grain Size Distribution of Bed sediments at different sample sites of Kopai River

characteristics of these three samples are more or less same (Table 1). A huge amount of effluents and ashes have directly mixed with river near brick fields. As a result, tiny particles of bricks have been detected in sample B which is further deposited at sample C. This tiny particles of bricks act as a leading factor to form a bar which a river cannot erode properly (Bandhopadhyay and De, 2017). River course can be affected by such kind of micro level changes due to existence of riparian brick fields.

Detention of River Flow :

For a short term benefit brick makers obstruct the natural flow

of river in an unscientific manner which has a negative impact on river characteristics. In this study some of the brick fields workers have constructed temporary roads across the river beds during brick production season for easy loading and unloading of raw materials from one to another side of the river bank (Plate 2) to minimize the transportation cost. Therefore, this anthropogenic event is one of the important causes for detention of Kopai river flow.

Pollution Status of Kopai River Water :

Brick field also have a negative impact on river water quality of Kopai. To identify the massive changes of river water quality

Table 1: Textural characteristics of Bed materials at different sampling site of Kopai River

Sample Site		Coarse sand >1 mm	Fine sand 1 mm – 0.25 mm	Silt 0.25 mm – 0.106 mm	Clay <0.106 mm
A	Weight in %	29.2	62.9	7.6	0.3
B	Weight in %	28.2	57.5	13.9	0.4
C	Weight in %	31.5	49.3	19.0	0.2

Source: Estimated by researcher

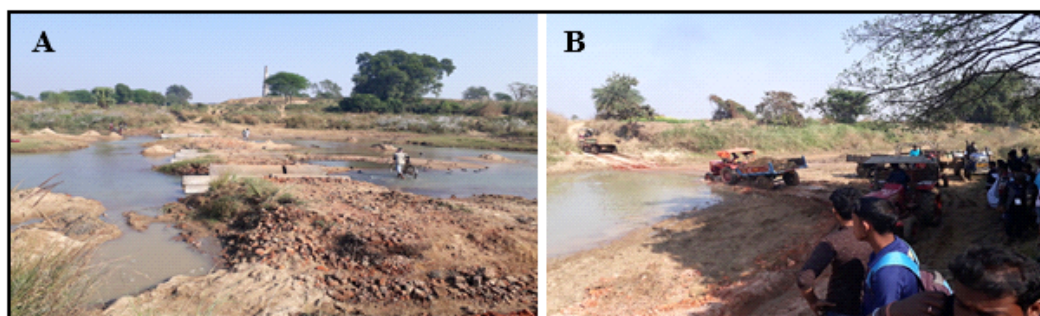


Plate 2: River bed used as a transportation route near Bondhu bricks of Sarip bazar village (A) and Paschim Kadipur village (B)

among the different stretches of Kopai River, five water samples have been collected. From the test report it is clear that from Sarip bazar to Amdahara village, there is a high risk of pollution of river water than other stretches of river as the brick field mainly concentrated in the particular stretch. In this study migrated labourers live in some temporary houses and they face lack of sanitary facilities. So every day large amount of excreta directly mix with the river water. The middle

and lower stretches of Kopai receives high amount of effluent from the brick kiln and they dump waste materials and ashes along the river bank. Therefore a huge proportion of dust has been mixed with river water that has deteriorated quality of Kopai river water.

To study the pollution status of Kopai river water, five water samples have been collected namely K1, K2, K3, K4 and K5 (Fig. 4). K1 & K3 sample were collected from the

Table 2: Present Water Quality of Kopai River (2018)

PARAMETERS	K1	K2	K3	K4	K5
Temperature (°C)	23.0	23.5	24.0	25.5	24.5
Turbidity, NTU	7.3	30.8	16.4	28.4	27.5
Total Suspended Solid, mg/L	8.0	27.0	14.0	22.0	27.0
Total Dissolved Solid, mg/L	176.0	224.0	210.0	178.0	186.0
pH	7.67	8.49	7.75	7.65	7.81
Chloride (as Cl), mg/L	30.9	32.9	19.83	21.2	28.9
Total Hardness (as CaCO ₃), mg/L	149.0	133.3	113.7	141.1	121.5
Biochemical Oxygen Demand, mg/L	3.5	3.0	3.2	<2.0	4.2
Chemical Oxygen Demand, mg/L	16.0	16.0	16.0	9.0	20.0
Streptococci (CFU/100ml)	0	0	54,000	31,000	120,000
Coliform (CFU/100ml)	0	5000	35,000	76,000	160,000

(Courtesy: Scientific Research Laboratory, Kolkata-700075 and Bio-Chem Pathological Laboratory, Bolpur-Santiniketan, Birbhum)

K1 : Khajuri (5 km downstream from source area), Kopai River.

K2 : Lokepur (immediate after Raja Brick field, 14 km downstream from Khajuri), Kopai River.

K3 : Sarip Bazar (60 km downstream from Khajuri), Kopai River.

K4 : Adityapur (near KBW Brick field 75 km downstream from Khajuri), Kopai River.

K5 : Kankalitala (immediate after Hira Brick field, 80 km downstream from Khajuri), Kopai River.

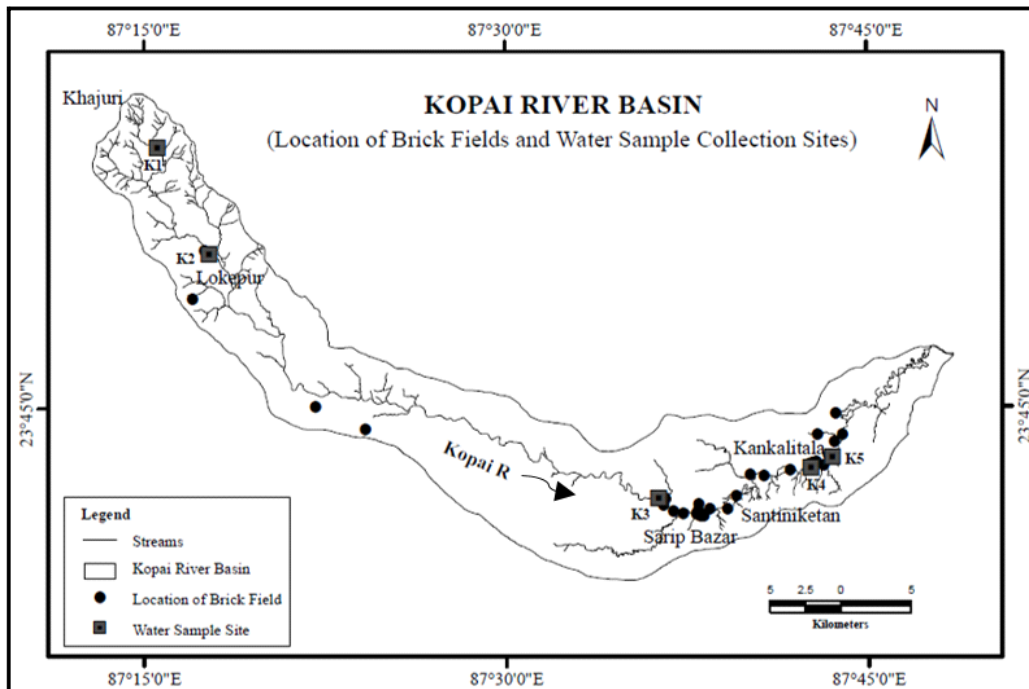


Fig. 4: Water Sample Collection site, Kopai River, Eastern India

area before concentration of brick fields. K2, K4 & K5 were collected from near Lokepur, Adityapur and Kankalitala respectively where concentration of brick field is high. These water samples were collected on late winter, 2019 and tested in Research laboratory, Kolkata and Bolpur. From this tested result (Table No. 2) it is clear that within these five sample site the variation of water quality is noticeable in term of Turbidity, Total suspended solid (TSS), Total Dissolved solid (TDS), Chloride, PH, Hardness, Biochemical-Oxygen Demand (BOD), Chemical-Oxygen Demand (COD), Total Coliform and Streptococci. Turbidity and also Total suspended solid are high in

sample K2, K4 and K5 due to the additional mixture of tiny particles of fragmented bricks and ashes whereas sample K1 and K3 show low turbidity. Alkalinity is more concentrated in K2, K4 and K5 samples because of brick field effluents' and also coming from truck wheel. Total coliform is an indicator of contaminated water. The great number of coliform bacteria indicates presence of pathogenic bacteria as a source of water pollution. Streptococci is an excellent indicator of human waste pollution. All the Samples show high growth of coliform and streptococcus species. But in case of coliform, growth rate is continuously higher in sample K3,

K4 and K5 in comparison to sample K1 & K2. So high growth rate of coliform in last three water samples indicates recent fecal contamination and it can be regarded that pathogenic organism may be present with coliform bacteria. Therefore, from the analysis of tested report water pollution status is determined. Sample K1 and K3 are more or less free from pollution in comparison to K2, K4 and K5 which are highly affected by pollutants because of concentration of brick fields in these areas.

Case Study :

Brick field of Paschim Islampur village:

This is the village under the jurisdiction of Bolpur P.S and Bolpur-Sriniketan C.D Block. Ruppur is the Panchayat of this village. Paschim Islampur is

situated along the right bank of Kopai River covering 48.7 hectares of land. Total population of this village is 407 distributed in 101 households. Out of total population 46% belongs to Schedule Caste category. This village do not have any Schedule tribe population. Literacy rate is 79% (Village Census Abstract, 2011). Agriculture is the primary activity of this village. Owing to the views from riparian farmers that crop production was declined after brick field was set up.

Findings :

- From 1991 to 2011, working population has been increased by 4% to the total population. In 1991, as much as 86% out of total main workers were engaged in Agricultural sector but in 2011, only 37% of the total main



Plate 3: River Water Pollution Caused by Brick Field

(A: Dumping of waste materials along the river bank which meets with river water at Puja bricks, B & C: Effluent points coming from brick field at Bandhu bricks and Rudra bricks respectively)

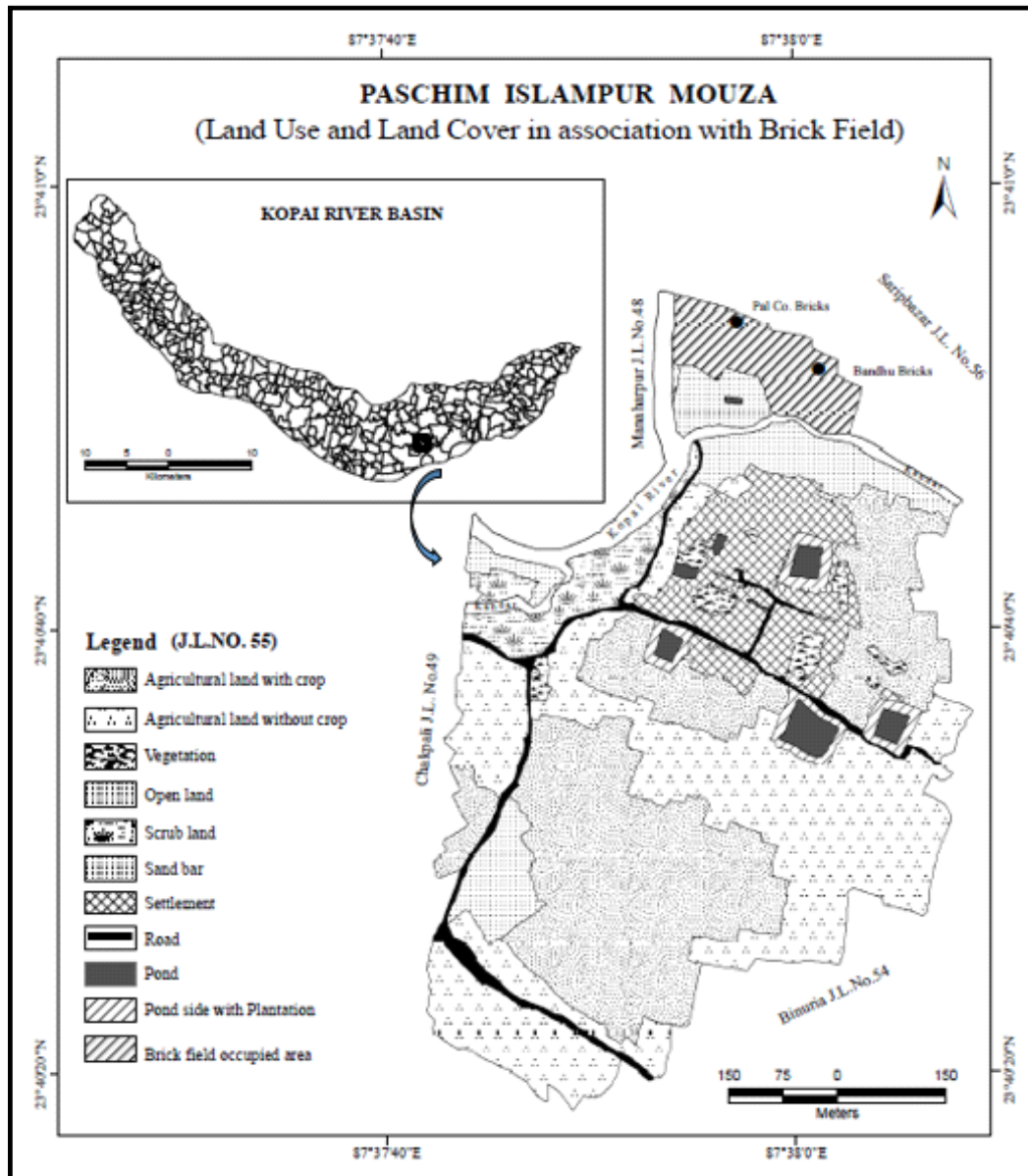


Fig. 5: Map of Paschim Islampur Mouza (Source : Office of the District Land & Land Reforms Officer, Birbhum)

workers were engaged in Agricultural sector.

- All the working population along with Agricultural workers are now shifted to practice other activities like poultry farming, household industry, collection of forest products and others secondary activities to the nearest town Bolpur.
- In 1991, only one brick field was identified at Paschim Islampur but during 1991-2011, a new riparian brick fields was established in this village. Not only have the number, areal extension of each brick field also increased which changes land use and land cover along the river. Total Agricultural land was decreased to (-) 12.54% whereas uncultivated land was increased to (+) 10.51% from 1991 to 2011 (Table 3).
- Respondents reported that the older generation still wanted to continue with agricultural

practices while the newer generation is unable to continue with the agricultural activities. They think that it is hard labour with little return. Women's perception about brick kilns is also the same in this area. They think that the short-term benefits coming in this way will help them in the establishment of other business. So, they lease out their good, fertile and productive land to the brick kiln owners on a 2-3 years contract as brick earth is the main raw material for manufacture of bricks. Giving land on lease brings in instant hard cash and more money than what they get from agriculture. After completion of lease period those agricultural lands turn unfertile, unproductive.

- It was seen that the brick kilns have eroded the rural character of this village. Many of the landless labourers who were

Table 3 : Changing Land use & Land cover of Paschim Islampur Mouza (1991-2011)

LULC Category	1991		2011		Relative Changes (1991-2011) (%)
	Area (Hectare)	Area (%)	Area (Hectare)	Area (%)	
Forest	--	--	1	2.05	2.05
Irrigated land	42.49	87.25	38	78.03	-9.22
Unirrigated land	1.62	3.33	0	0	-3.32
Culturable waste land	2.02	4.15	2	4.10	-0.04
Uncultivated land	2.58	5.29	7.7	15.81	10.51
Total Area	48.7	100	48.7	100	

Source: District Census Handbook, Birbhum District, Census of India, 1991 & 2011

previously working in the agricultural sector, are not interested now because of low wages so they prefer to work in the brick kilns. Farmers are deviated from their farming activities to secondary activities.

Ameliorative Measures and Conclusion :

Beneficial impact of brick industry on economy of villagers is to create income generation and employment opportunity. But it has direct and indirect adverse impact on agricultural lands, quality of river water as well as riverine environment. However several ameliorative measures can be taken for the protection of environment and control of pollution.

- a) Recycling of waste materials (Annon, 1999; Greentech Knowledge Solutions, 2012) can reduce dumping problem of waste along the bank of river. Waste material such as firing dust and ashes, small fragmented bricks can be used for construction of rural roads. Dumping of waste should be done in earmarked places as approved in mining plan.
- b) Problem of over exploitation of agricultural land by removing top soil can be solved by introduction of a selective blend of solid by-product wastes into the feedstock replacing quarried raw materials. The lesser the use of primary raw materials the lesser the environmental footprint of a production process (Moedinger, 2005).

- c) Brick field owners must be accommodated with proper sanitation system for migrated labourers.
- d) Collection of sand and mud should be done scientifically without hampering riverine characteristics. Use of alternative material in place of natural river sand shall be encouraged in order to reduce stress on natural ecosystem.
- e) Government should take immediate necessary steps to control such sort of unscientific and illegal activities related to brick field.

It can be concluded that brick manufacturing is a basic requirement for building materials. It is not possible to stop such kind of activities but above measures can be taken to sustain environment. Waste lands those are located away from the river should be planned as relocation site for brick fields. Mud extraction from river bank can change the river characteristics and create unusual river bank erosion. Therefore, before developing a brickfield, suitable sites should be identified through thorough research and should be area specific in nature. An architecture should be designed in a way which takes minimum number of bricks as followed by western world. Coal ash as a substitute of brick earth can be used for manufacturing of bricks that would reduce the immense pressure of mud extraction from

river bank. Therefore eco-friendly methods of brick production should be accepted to sustain the natural resources for our future generation.

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