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Prevalence of Diseases and Deaths and the Major Obstacles for Healthcare Seekers in Mizoram

K.C. Lalmalsawmzauva¹
Rosie Lalthanpuii²

Abstract: This paper is an attempt to study the prevalence of diseases, the prevalence of death and developmental factors obstructing healthcare seekers in Mizoram. Present research finds out that sickness is extremely common in Mizoram. Among the eight districts, it is most prevalent in Kolasib and Serchhip districts with more than 98% reported of having sickness in their lifetime. On the other hand sickness of any kind is the least prevalent in Aizawl and Saiha districts with a little over 73% and 80% respectively. It is interesting to find out that among the top five common diseases, only Cancer and Malaria are persistently dominant among the top causes of death in Mizoram. Research showed that poverty became the main obstacles (58.1%) of healthcare seekers, followed by problems of location of healthcare facilities as it is too far (30.4%), ignorance (27.2%), delay treatment (17.9%) and no response (3.8%). The present research clearly shows that seeking health care is quite common in Aizawl district (91.7 %) compared to other districts of Mizoram and far better than the state average of 65.9% while Mamit and Serchhip records the least percentage of family members that went for health check-up in time of illness with only 51.5 % and 51.7% respectively.

Keywords: Diseases, prevalence, obstacles, healthcare-seekers, death

Introduction:

The World Health Organization (WHO) constitution clearly highlighted that "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, and political belief, economic or social condition. Unequal development in different countries in the promotion of health and control of disease, especially communicable disease, is a common danger" (WHO, Basic

Document, 2014). Diseases and death are as sure as life, it cannot stop. However, the degree of prevalence of diseases and deaths and the causing factor was an issue which can be mitigated and controlled. Health, life and death used to be considered as the domain of medical practitioners, especially in today's technologically advanced world. However, an inter-disciplinary and complex world of today demands healthcare study from social scientist perspectives as

¹**Dr. K.C. Lalmalsawmzauva** is an Assistant Professor in the Department of Geography & Resource Management, Mizoram University, Aizawl, Mizoram

²**Dr. Rosie Lalthanpuii** is an Assistant Professor in the Department of Radio Imaging Technology, Regional Institute of Paramedical Nursing Sciences, Aizawl, Mizoram

health is not merely confined to biological, rather it relates to social, economic, political and environmental. Largely, healthcare is a developmental issue. Human behaviour and attitudes toward health care are directly or indirectly influenced by the level of development, which includes poverty, education, accessibility and transport communication, mass media exposure, age, sex, quality of healthcare system as well as the availability of healthcare facility and health personnel.

Methodology:

For the present study, the primary study has been carried out by using structured questionnaires. Multi-stage stratified sampling has been adopted to conduct the primary survey.

To collect information on people's health-seeking behaviour all the eight districts of Mizoram are covered. From each district rural village, one Rural Development Block headquarters (village or town) and district headquarter are surveyed based on the number of household size, level of literacy and location. Therefore, the study covered at least one urban/town and two rural/villages from each district i.e. 1 (town)+2 (villages)=3 x 8 (districts)=24. Together, 10 towns and 14 villages were surveyed during 2016-2017. The total sample size is 3833(N) with 1280 (33.3%) rural and 2553 (66.6%) urban households. From

each district study covered large (L), medium (M) and small (S) number of the household as well as a high, medium and low level of literacy. To represent the whole district, villages are selected spatially while keeping in mind literacy and the number of households. From each village or town at least 20% or more household are selected for conducting the survey.

Additional stratification is adopted for eight district headquarters as the towns are too big even after taking the sample size of 20 percent household. It is also assumed that selection criteria such as household number and level of literacy might not be valid within district capitals as the capital has more or less uniform literacy or equal chances to access educational facilities and therefore selection has been made based, mainly on geographical difficulty within the town that might contribute relatively more to the decision making of people's health-seeking behaviour. Thus, selection of study sites is based on economic and altitudes of the town within itself, such as – one locality/ward from the higher altitude, one locality from medium altitude, and one locality from low altitude to get a better representation of spatial geographical variation within the city. While taking altitudes as selection criteria, the location of localities will also be considered. For example - locality located in the main business centre

or centre of the town and others from the outskirts of the town, that might be far from healthcare infrastructure will be looked at.

Structure household questionnaires are prepared in both English and Mizo languages. Information was collected in the usual places where household members go for treatment when they get sick, the prevalence of diseases, prevalence of death and what factors stopped healthcare seekers when needed.

Theoretical Framework:

Examination of the prevalence of diseases and death is extremely important to understand the problems and its related causes to prevent and mitigate disease and death ultimately. Good health is a prerequisite to human productivity and development. Health is essential for economic, socio-cultural, political and technological development and vis-a-vis. Providing healthcare facilities and healthcare personnel is the basic rights of an individual. A healthy person and community is the infrastructure upon which to build an economically viable society. The progress of any nation and society greatly depends on the quality of its people. World Health Organization defines Health as "a state of complete physical, mental, social, and spiritual well-being and not merely the absence of disease or physical infirmity" (WHO, 1999).

The present study focuses on the prevalence of diseases, prevalence of death and factors stopping people to seek health care in the time of needs in Mizoram. Variables of the study contain the dependent and independent variable. Dependent variables include health-seeking behaviour such as -

- (a) whether patients went for the check-up in time of illness,
- (b) whether they visit healthcare facilities during last one year,
- (c) whether they consult health personnel in times of illness and what are common diseases and
- (d) do they visit the hospital for treatment before family member die?

Independent variables are developmental factors like

- (a) cost too much for healthcare,
- (b) healthcare facilities are too far,
- (c) the problem of transportation & improper road connectivity
- (d) family members/patients require for household work
- (e) there is no proper healthcare facility,
- (f) patients are not interested in check-up,
- (g) patients required to work in the agricultural fields and
- (h) the patient required for outside work for payment in cash or kind.

This paper mainly focuses on the prevalence of sickness, common

diseases, the prevalence of death and factors stopping people to seek health care in the time of needs in Mizoram.

Results and Discussions: Prevalence of sickness

Habitat, population, and behaviour form the vertices of the triangle that encloses the state of human health. Habitat is that part of the environment within which people live, that which directly affects them. Houses and workplaces, settlement patterns, naturally occurring biotic and physical phenomena, health care services, transportation systems, schools, and government are parts of the habitat. Infectious insults consist of the pathogens - agents that cause disease. Every person is infected at all times with many billions of viruses, bacteria and protozoa that cause no harm, such as intestinal bacteria. Change in present status can cause a normal

being relationship to alter and become pathogenic.

During the survey, people are asked whether any of their family members got sick in their lifetime to understand the prevalence of sickness across the districts. Table 1 depicts that sickness among families in Mizoram is extremely common with an average of 90.8%. In Kolasib and Serchhip districts more than 98% families experiences sickness while In Mamit and Lunglei districts more than 95% families experience sickness. On the other hand, Aizawl and Saiha districts are the least that experiences sickness within the family.

Thus, it is evident from this research that Kolasib and Serchhip districts are reported of having the highest number of sickness or most prevalence of sickness among the eight districts of Mizoram with 98.5% and 98.2% respectively. On the other hand sickness of any kind is least

Table 1. Is Anybody ever got Sick in your Family?

District	Yes	No	Total
Aizawl	73.9	26.1	100
Champhai	91.9	8.1	100
Kolasib	98.5	1.5	100
Lawngtlai	92.8	7.2	100
Lunglei	95.2	4.8	100
Mamit	95.4	4.6	100
Saiha	80.8	19.2	100
Serchhip	98.2	2.1	100
Mizoram	90.8	9.2	100

Source : Field Survey, 2016-17

Table 2. Common Diseases suffered by the Family

Diseases	Aizawl	Champhai	Kolasib	Lawngtlai	Lunglei	Mamit	Saiha	Serchhip	Mizoram
Cough & Fever	70.92	95.86	55.8	93.6	88.2	87.1	82.8	66.3	80.1
Kidney problem	2.37	42.94	7.5	65.9	70.7	23.4	19.3	16	31.0
Ulcer	1.78	2.64	11.5	38	40.7	14.3	16.6	12	17.2
Cancer	0.59	9.6	6.9	22.3	11.8	11.3	10.4	8.4	10.2
Malaria	2.37	4.14	5.8	19.7	2.9	15.2	4.7	3.8	7.3
Nerve problem	0.3	0.56	0	20.9	25.1	1.8	1.5	5.2	6.9
Polio	0	0	51.8	0	0	0	0	0	6.5
Liver pain	5.04	7.16	5.5	12.4	7.5	7.1	0	3.8	6.1
Asthma	4.15	2.26	1.5	16.1	7.9	3	3.3	6.5	5.6
TB	1.19	0.75	3.8	14.9	0.2	5.7	3.9	3.3	4.2
Diabetes	3.86	5.27	0.2	7	5.4	4.1	1.5	6	4.2
Diarrhoea		1.32	0	12.9	0	9.4	0	2.7	3.8
Goitre	0.59	0	19.7	0	0.2	0	0	0	2.6
Jaundice	2.08	2.26	0	7.6	0	2.1	3	0	2.1
Pneumonia	0	0	0	4	2.1	0.9	1.8	0.3	1.1
Hepatitis	0	0	0	8.4	0.2	0	0	0	1.1
Deafness	0.3	0	4.2	0	0	0	0.3	0	0.6
Blindness	0.3	0	3.8	0	0	0	0	0	0.5
Typhoid	0	0	2.7	0	0	0.5	0.6	0	0.5
Septicemia	0.3	0	0	0	0.4	0.9	0.9	0.3	0.4
Stroke	0.59	0	0	0	1.5	0	0.3	0	0.3
Total	100	100	100	100	100	100	100	100	100

Source : Field Survey, 2016-17

prevalent in Aizawl and Saiha district with 73.9% and 80.8% respectively.

Common Diseases :

The present study questioned the common diseases or health problems faced by family members to identify the prevalence of common diseases in Mizoram. There are 22 common health problems identified during the survey. Table 2 shows that Cough and fever (80.1%)

become the most common disease suffered by family members in Mizoram, followed by Kidney problem (31.0%), Ulcer (17.2%), Cancer (10.2 %), Malaria (7.3 %), Nerve problem (6.9%), Polio (6.5 %), Liver pain (6.1%), Asthma (5.6 %), T.B (4.2 %), Diabetes (4.2%), Diarrhoea (3.8 %), Goitre (2.6%), Jaundice (2.1%), Pneumonia (1.1%), Hepatitis (1.1%), Deafness (0.6%), Blindness (0.5%), Typhoid (0.5%), Septicemia (0.4%) and Stroke (0.3%).

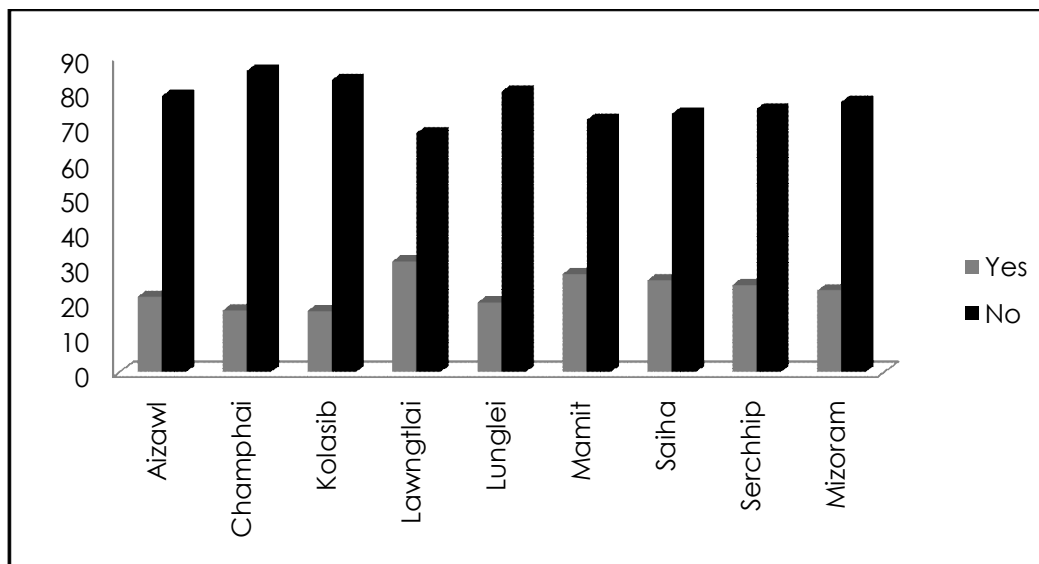


Fig. 1. Is there anyone of your family member ever died?

Considering the top five common diseases, except Cough and fever, such as Kidney problem, Ulcer, Cancer, Malaria and Nerve problem- Lunglei and Lawngtlai districts, located in the southern part of the state ranked at the top, which meant they are the worst sufferer of the above diseases while Aizawl and Kolasib districts are at the bottom of the least sufferers among the eight districts. There is huge inter-district variation in all the identified common diseases. The occurrence of some other health-related problems in Mizoram need further medical investigation, as the present research deals only with the level of prevalent diseases in Mizoram.

Prevalence of Death:

Knowledge about the prevalence of death is important to

identify reasons for death as well as patient's health-seeking behaviour. Fig. 1 reveals that 23.4% of families in Mizoram already experienced the death of their family members while a fairly good number of 77% reported of not yet experienced any death in their family.

Lawngtlai district records the highest number of death (31.7%), followed by Mamit (28%), Saiha (26.3%), Serchhip (24.9%), Aizawl (21.5%), Lunglei (19.9%), Champhai (17.7%) and Kolasib (17.5%) districts. Death is least common in Champhai, Kolasib, Lunglei and Aizawl district (fig-1).

Reason of Death:

The present section is to identify reasons for death and what are their relationships with common diseases. It is expected that most common diseases might be the

Table 3. Cause of Death

Reason	Aizawl	Champhai	Kolasib	Law ngtlai	Lunglei	Mamit	Saiha	Serchhip	Mizoram
Cancer	21.53	40.43	35.4	39.6	57.3	33.1	26.3	22.7	34.5
Liver problem	18.75	3.19	2.5	15.7	3.1	10.5	1.8	6.6	7.8
Malaria	5.56	1.06	13.9	10.1	7.3	18	0.9	1.4	7.3
Pneumonia	2.78	1.06	0	9.4	10.4	6	5.3	1.9	4.6
Jaundice	2.78	9.57	1.3	8.8	1	8.3	4.4	0	4.5
Accident	5.56	3.19	16.5	4.4	1	3.8	0.9	0.5	4.5
Asthma	3.47	9.57	0	4.4	6.3	3.8	2.6	0.9	3.9
Ulcer	3.47	6.38	3.8	0	1	0	13.2	2.4	3.8
Septicemia	2.78	3.19	5.1	5	2.1	3	2.6	0.5	3.0
Kidney problem	2.08	6.38	6.3	1.3	1	3	3.5	0	2.9
Stroke	5.56	2.13	6.3	0.6	6.3	1.5	0.9	0	2.9
Internal bleeding	7.64	1.06	5.1	0	0	0	6.1	0	2.5
Cough&Fever	0	8.51	0	0	0	0	1.8	0	1.3
Old age	5.56	0	0	0	2.1	0	0	0	1.0
Diabetes	1.39	0	0	0.6	1	0	2.6	1.9	0.9
TB	0.69	1.06	3.8	0	0	0	0	0	0.7
Typhoid	0.69		0	0	0	0.8	0.9	0.5	0.4
Seizure	0	1.06	0	0	0	0	0	0	0.1
Total	100	100	100	100	100	100	100	100	100

Source : Field Survey, 2016-17

commonest causes of death. There are 18 types of reasons of death identified in this study.

Table 3 shows that Cancer (34.5%) topped the rank by becoming the most common cause of death in Mizoram, followed by Liver problem (7.8%), Malaria (7.3%), Pneumonia (4.6%), Jaundice (4.5%), Accident (4.5%), Asthma (3.9%), Ulcer (3.8%), Septicemia (3.0%), Kidney problem (2.9%), Stroke (2.9%), Internal bleeding (2.5%), Cough and fever (1.3%), Old age (1.0%),

Diabetes (0.9%), T.B (0.7%), Typhoid (0.4%) and Seizure (0.1%).

It is interesting to find out that among the topmost common diseases discussed in the previous section, only Cancer and Malaria are persistently dominant among the top causes of death in Mizoram. Even though kidney problems, ulcer, and nerve problems are common diseases, they are not causing death in most cases.

Among the districts, Lunglei

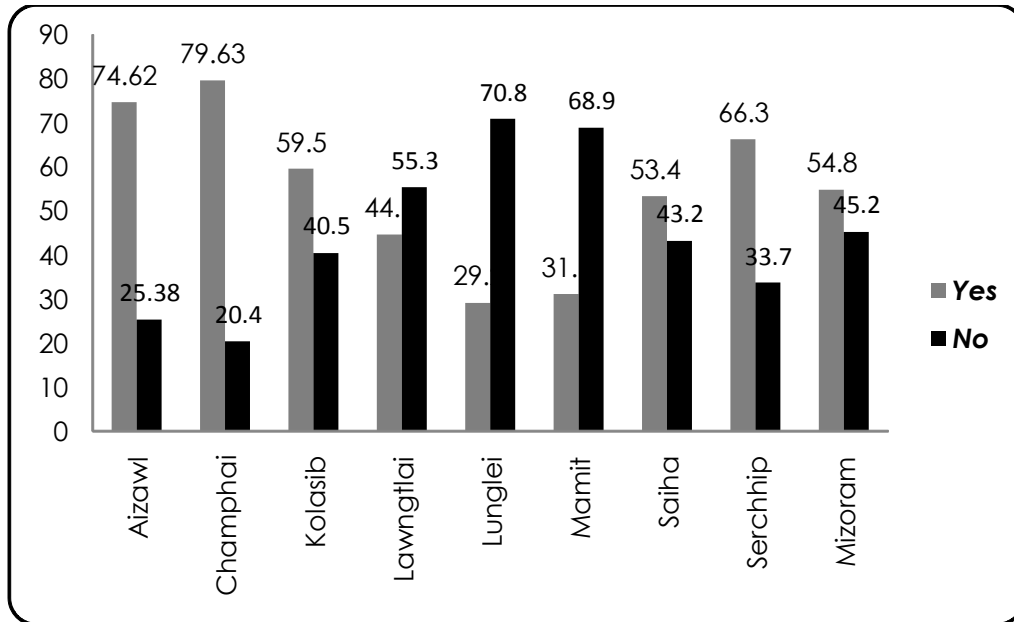


Fig. 2. Patient visit hospital before he/she die

records the highest death due to cancer, followed by Champhai and Lawngtlai districts. It is interesting to reveal that Aizawl district records the highest number of death due to liver problem, which is considered in most cases, as alcohol-related death. It is known that Aizawl district is where maximum concentration of liquor shops is located compared with other districts of Mizoram.

Health treatment before family member dies:

To specifically know the prevalence of health-seeking behaviour, present research makes an inquiry on whether patients of the family members visit healthcare facilities or not before he/ she dies.

Fig. 2 shows that more than half of patients (54.8%) in Mizoram visit

hospital before they die. The number of patients within the family members who visited hospital before dead in different districts of Mizoram are: Champhai (79.63%), Aizawl (74.62%), Serchhip (66.3 %), Kolasib (59.5%), Saiha (53.4%), Lawngtlai (44.7%), Mamit (31.1%) and Lunglei (29.2%).

The patients who do not visit hospital for treatment before they die are as high as 70.8% in Lunglei, Mamit (68.9%) and Lawngtlai (55.3%) districts followed by Saiha (43.2%), Kolasib (40.5%), Aizawl (25.38%) and Champhai (20.37%) districts.

Reasons for not visiting Health Institution:

The present section examines the reasons why patients are not visiting health institutions, whether because

Table 4. Reasons for not visiting Health Institution by Patients (%)

District	No Money	Too far	Ignorance	Delay treatment	No response	Total
Aizawl	33.33	2.22	35.56	28.89	0	100
Champhai	47.06	17.65	17.65	17.65	0	100
Kolasib	52.2	26.1	26.1	4.3	0	100
Lawngtlai	42.1	34.2	19.3	20.2	30.7	100
Lunglei	91.2	61.8	44.1	22.1	0	100
Mamit	71.4	47.6	32.1	22.6	0	100
Saiha	60	28.3	3.3	20	0	100
Serchhip	67.9	25	39.3	7.1	0	100
Mizoram	58.1	30.4	27.2	17.9	3.8	100

Source : Field Survey, 2016-17

of poverty/no money or because healthcare facilities are located too far or because of ignorance or just because of delayed treatment. It is necessary to clarify hereby that the reasons are in many cases, multiple rather than a single reason.

Table 4 depicts district-wise reasons for not visiting health institution by patients. It shows that poverty or no money became the main obstacles (58.1%) of healthcare seekers, followed by healthcare facilities are too far (30.4%), ignorance (27.2%), delay treatment (17.9%) and no response (3.8%). Among the eight districts, Lunglei records maximum percentage of patients who could not visit healthcare facility due to poverty (91%), and distance of healthcare facility (61.6%) followed by Mamit with 71.4% and 46.7% respectively. These two districts are the worst among the eight districts in term of poverty and inaccessibility

of healthcare as problems. As far as poverty is the reason for not visiting healthcare is concerned Serchhip district (67.9%) topped followed by Lunglei and Mamit districts.

As far as inaccessibility or distance of healthcare infrastructure become a reason for not visiting healthcare is concerned Aizawl district has the least problems, followed by Champhai districts while Lunglei, Mamit and Lawngtlai district are having maximum problems on this regards.

It is unexpected to find out that Aizawl district, record the highest percentage of patients who have delayed treatment with 28.89%, followed by Mamit and Lunglei with a little over 22% each.

Health Seeking Behaviour:

Health seeking behaviour refers to the decision or an action taken by an individual to maintain, attain, or regain good health and to

prevent illness. The decisions made encompasses all the available health care options like visiting a public or private, modern or traditional healthcare facilities, self-medication and use of home remedies or not to utilize the available healthcare services. Health seeking behaviour is a result of a complex interaction of provider, patient, illness and household characteristics. It is influenced by a variety of socio-economic variables, physical accessibility, income or expenditure, health services and diseases pattern, education and mass media. Planning for health care services provision depends on health needs and health-seeking behaviour of the population. Determining the healthcare seeking behaviour is essential to provide need-based health care services to the population.

Table 5 shows the inter-district

variations of family members going for health check-up in time of illness such as Aizawl District (91.7%), Champhai (71.8%), Kolasib District (66.8%), Saiha District (66.9%), Lawngtlai District (64.7%), Lunglei District (61.8%), Serchhip District (51.7%) and Mamit District (51.5%).

Aizawl District scored the highest percentage of family members who went for health check-up in time of illness while Mamit and Serchhip record the least percentage of family members attending health check-up in time of illness (Table 5). The present research clearly shows that seeking health care is quite common in Aizawl District (91.7%) compared to other districts of Mizoram and far better than state average of 65.9% while Mamit and Serchhip records the least percentage of family members attending health check-up in time of illness with 51.5% and 51.7% respectively.

Table 5. District-wise : Family member attending check-up in time of illness

District	Yes	No	Total
Aizawl	91.7	8.1	100
Champhai	71.8	28.2	100
Kolasib	66.8	33.2	100
Lawngtlai	64.7	35.3	100
Lunglei	61.8	38.2	100
Mamit	51.5	48.5	100
Saiha	66.9	33.7	100
Serchhip	51.7	48.3	100
Mizoram	65.9	34.2	100

Source : Field Survey, 2016-17

Reason for not checkup in time of illness:

This section tries to identify the reasons why people did not go for health check-up in time of illness. There are certain reasons, such as – cost of healthcare is too much, far location of healthcare facilities, transport problem, improper road connectivity, required for household work, no proper healthcare facilities, not interested in check-up, require for work on agriculture field or family affairs, engaged in business like shop, retail shop, grocery etc. require for outside work for payment in cash or in kind.

Table 6 shows the average percentage of reasons for not check-up in time of illness, such as cost of healthcare is too much (63.6%), healthcare facilities are located too far (50.8%), transport problem (46.9%), improper road

connectivity (42.7%), required for household work (42.1%), no proper healthcare facilities (35.2%), not interested in check-up (27.8%), require for work on agriculture field or family business like shop, retail shop, grocery (17.9%) and required for outside work for payment in cash or kind (10.5%).

There are inter-district variations in the reasons why people do not go for the check-up in time of illness. Cost too much is the biggest hurdles for Aizawl (66.7%), Champhai (76.9%) and Serchhip (45.5%) districts whereas 'too far' become the main problems for Lawngtlai (72.3%), Lunglei (77.8%) and Saiha (94.5%) districts. Another major hurdle that stopped people from seeking healthcare is "inaccessibility", "require for household work" and "lack of healthcare facilities."

Table 6. Reason for not Check-up in Time of Illness

District	Cost too much	Too far	Transport problem	Improper road	Required for Household work	No proper HC facility	Not interested in check-up	RA	RP	Total
Aizawl	66.7	25.6	33.3	35.9	0	0	33.3	0	0	100
Champhai	76.9	21.3	58.6	43.2	42	65.1	5.3	34.3	20.7	100
Kolasib	38.4	12.7	16.6	26.7	15.3	38.8	18.9	17.3	13.4	100
Lawngtlai	61	72.3	37.9	48.6	54.2	11.3	50.8	15.3	6.2	100
Lunglei	62.4	77.8	45	66.1	70.9	17.5	66.7	12.7	5.8	100
Mamit	69.8	61.3	62.1	54	72.2	58.9	13.3	45.6	0	100
Saiha	88.1	94.5	85.3	31.2	52.3	64.2	33.9	0	22	100
Serchhip	45.5	41.1	36.8	35.8	29.9	25.9	0.3	18.1	15.6	100
Mizoram	63.6	50.8	46.9	42.7	42.1	35.2	27.8	17.9	10.5	100
RA= Required for work on agricultural field or family business (shops, retail shops, grocery etc.)										
RP= Required for outside work for payment in cash or kind										

Source : Field Survey, 2016-17

Findings and Conclusion:

The present research finds out that sickness is extremely common in Mizoram. Among the eight districts, it is most prevalent in Kolasib and Serchhip districts with more than 98% reported of having sickness in their lifetime. On the other hand sickness of any kind is the least prevalent in Aizawl and Saiha districts with a little over 73% and 80% respectively.

It revealed that Cough and feveris the most common disease among patients of Mizoram. Kidney problem, Ulcer, Cancer, Malaria and Nerve problem are the following topmost common diseases suffered in Mizoram. Among the eight districts, Lunglei and Lawngtlai, located in the southern part of the state recorded the highest percentage, which meant they are the worst sufferer of the above diseases while Aizawl and Kolasib districts are the least sufferers.

Lawngtlai district records the highest number of death occurrence in the family (31.7%), followed by Mamit (28%), Saiha (26.3%), Serchhip (24.9%), Aizawl (21.5%), Lunglei (19.9%), Champhai (17.7%) and Kolasib (17.5%) districts. The study proved that Cancer (34.5%) topped the rank by becoming the most common cause of death in Mizoram, followed by the Liver problem (7.8%), Malaria (7.3%) and Pneumonia (4.6%).

It is interesting to find out that

among the top five common diseases, only cancer and malaria are persistently dominant among the top causes of death in Mizoram. Even though kidney problems, ulcer and nerve problems are among the top five common diseases, they do not necessarily cause deaths in most cases.

Among the eight districts, Lunglei records the highest death due to cancer, followed by Champhai and Lawngtlai districts. It is interesting to reveal that Aizawl district records the highest percentage of death due to the liver problem, which is considered in most cases, as alcohol-related death. It is known that Aizawlis the district where maximum concentration of liquor shops is located as compared to other districts of Mizoram.

The study exposed that majority of patients (54.8%) in Mizoram visited the hospital before they die. Champhai and Aizawl scored the highest percentage of patients visiting healthcare facilities before they die while Lunglei and Mamit districts are the lowest performers on this regards.

Research showed that poverty became the main obstacles (58.1%) of healthcare seekers, followed by problems of location of healthcare facilities as it is too far (30.4%), ignorance (27.2%), delay treatment (17.9%) and no response (3.8%).

The present research clearly shows that seeking health care is

quite common in Aizawl district (91.7 %) compared to other districts of Mizoram and far better than the state average of 65.9% while Mamit and Serchhip records the least percentage of family members that went for health check-up in time of illness with 51.5% and 51.7% respectively.

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A Study on the Factors Influencing Production of Food Grains in Mizoram

Lalrinkimi Pachuau

Abstract: This paper studies the cropping pattern of Mizoram with respect to its food-grains cultivation; the intensity of cultivation, its popularity, dominance among other food-crops and its productivity or lack of it. A study is also made on the different factors that influence food-grain production in Mizoram. India is still very much dependent on agriculture and allied activities and serves the backbone of the economy. To be self-sufficient in food is an important step towards economic excellence. This paper also gives some suggestions on the enhancement of food-grain productivity and the like.

Keywords: Food-grains, Productivity, Mizoram.

Introduction:

India being one of the most populated countries is facing huge problem associated with food shortage. When supply does not meet demand, disequilibrium arises in the economy and its mechanism, where the available production of food grains does not equate its demand for it. India is heavily dependent on agriculture and allied activities, providing livelihood to a very large portion of the population till date. Majority of the Indian population live on food-grains.

Agriculture occupies a very important place in the economy of Mizoram,. In the Economical Classification of Workers as per 1991 Census, majority of the population i.e. 61.37% are cultivators who are engaged in agricultural activities mostly by practicing 'Jhum' cultivation. Meanwhile, the share of agriculture alone in the net domestic

product (NSDP) is merely 30% at current price during 1998-99. As per the Agriculture Census (1995-96-the latest census), there were 65,919 operational holdings with a total operated area of 85,000 hectares. Out of the total number of holdings 42.04% is marginal 39.0% small, 17.83% semi medium 1.11% medium and 0.01% large holdings.

The economic life of the Mizo has always been centred around Jhum or Shifting cultivation. The crops grown in the Jhum are mixed. The principal crop is paddy and others are maize, cucumber, beans, arum, ginger, mustard, sesamum, cotton etc. After clearing the burnt Jhum, seeds for crops other than paddy are sown. Towards the end of April near the full moon time, paddy is sown. Mainly two types of paddy seeds are sown in the same field –early paddy and principal paddy. Yield of early paddy is rather poor but it ripens early and provides

Dr. Lalrinkimi Pachuau is an Assistant Professor in the Department of Economics, Government Champhai College, Champhai, Mizoram

sustenance till the principal paddy is harvested. There is vast scope for cultivation of tapioca, sugarcane, cotton, pulses and oilseeds in the State. Some pulses like cowpea, rice beans and French beans are cultivated in the Jhum. Oilseeds crops like sesamum, mustard and soybean are growing well in the state.

In spite of the fact that agriculture is the mainstay for about 60% of the population of Mizoram, only 5% of the total area is under cultivation and about 11% of the total cultivated area is under irrigation. Paddy continues to remain the chief food crop and the staple food of the Mizo. It occupies almost 50% of the total cropped area and more than 88% of the total area under food grains. In spite of the fact that the rice being the most important crop occupying the largest share in area and production, Mizoram is still not self-sufficient in rice production. The state's economy is pre-dominantly agricultural with more than 60% of the total work force engaged either directly or indirectly in agriculture. However, agriculture still remains under-developed and the primitive method of Jhum (Shifting cultivation) predominates. Both production and productivity are relatively low.

Of the total area only 21 % is put on the paddy/seasonal crops. As high as 63 % of the total crop area is under Jhum cultivation. According

to the departmental figure of 2007 - 2008, total production of paddy stood at 15688 lakhs MT. During the same year the area under fruits was a little more than 21559. The forest production is mainly timber, bamboo, broom-sticks etc. The forests are continuously under great pressure of shifting cultivation.

Although in the field of education Mizoram has made tremendous progress over the years, which pushed up the literacy level, percentage of literacy being nearly 88.50%, (next only to Kerela). In pure statistical terms it is a big achievement, but qualitatively the picture is not that bright because nearly 60% of the educated population are unskilled and only 10% of the total work force are reportedly skilled. This is one grey area which has to be taken care of urgently.

The State has 8 Administrative Districts and 24 Development Blocks. There is no land tenure system. Of late, a programme for limited cadastral survey as a preliminary step towards formulating a land tenure system, particularly in the urban conglomerations, has been taken up.

Objectives of the Study:

The main objectives of the study are :

- i) To assess food-grain productivity in Mizoram over the past few years (2006-2016).

ii) To determine the factors affecting food-grains production in Mizoram.

Methodology:

Sources of data:

The present study is based on purely secondary data., which contains statistics on production of food-grains, rainfall pattern, area under cultivation of food-grains, fertilizer consumption and population for the period from 2006-07 to 2015-16. The necessary secondary data are compiled from various reliable published sources like agricultural statistics, rainfall statistics, population statistics by Directorate of Economics & Statistics, Mizoram Statistical Handbook, Census of India and Fertilizer Association of India.

Tools of analysis:

The study uses multiple linear regression analysis to find out the factors influencing food-grains production in the specified state; whereby, the independent variables include area under cultivation, rainfall, fertilizer consumption and population.

Results and analysis:

Factors influencing food-grains production In Mizoram.

The independent variables for the study include-

1. Population: According to the final results of Population Census 2001, the population of Mizoram stood at

888,573 as on 1st March 2001. The decadal growth rate during 1991-2001 is 28.8 per cent. The literacy rate in Mizoram has increased from 82.26 per cent in 1991 to 88.8 per cent in 2001 (provisional), which is the second highest in India next only to Kerala. The density of population in Mizoram has also increased from 33 person sq. km in 1991 to 42 persons in 2001. Aizawl District is recorded as the highest density area with 95 persons per sq. km as per 2001 census. High natural population growth rates are likely to prevail for the foreseeable future due to the higher than average number of women in the child bearing age-groups and higher birth rate. The resultant increased pressure of population on the resources base will exacerbate the vulnerability of the communities.

2. Area under cultivation: Mizoram has the most variegated hilly terrain in the eastern part of India. The hills are steep and are separated by rivers which flow either to the north or the south creating deep gorges between the hill ranges. The average height of the hills is about 900 metres. The highest peak in Mizoram is the Phawngpui with a height of 2157 metres. The land use pattern of the State has been affected primarily by land capability as determined by characteristics of micro and mini watersheds. Besides, several social and legal factors such as land tenure system etc. also affect the land use pattern. The total

cropped area in 2003-04 was 1.27 lakh hectares, of which only 5,000 ha are sown more than once. The gross irrigated area was only 12.4 % of the total cultivated area.

3. Rainfall: Mizoram has a pleasant climate. The upper part of the hills are predictably cold, cool during the summer, while the lower reaches are relatively warm and humid. Storms break out during March-April, just before or around the summer. During winter, the temperature varies from 11°C to 21°C and in the summer it varies between 20°C to 29°C. The entire area is under the direct influence of the South West monsoon. It rains heavily from May to September and the average rainfall in Aizawl is 208 cm. The entire Mizoram receives an annual rainfall of 2455.9 mm, more or less evenly distributed excepting the South-Western parts that generally receive slightly higher amount of rainfall. The rainy season normally starts from May and lasted up to October it rains heavily during this period.

4. Fertilizer consumption: Total fertilizer nutrient consumption in the state of Mizoram increased from 1.19 thousand MT during 2011-12 to 1.76 thousand MT in 2012-13. The nutrient consumption ratio for N, P₂O₅ and K₂O was 3.0:3.5:1 in the year 2011-12 as over 31.0:6.0:1 in the year 2012-13. The total consumption of plant nutrients per unit of gross cropped area was 8.9 kg/ha in 2011-12 which increased to 13.2 kg/ha in 2012-13.

5. Production of food-grains: Mizoram is an agricultural state, however its productivity has been minimal as compared to other agriculturally-productive states due to its lacking in various field. Mizoram is heavily dependent on river water and monsoon rains since there is a lesser predominance of advanced irrigation system and facilities. The major food- grains production in Mizoram includes rice, maize and pulses. Rice is extensively grown as compared to other food-grains., followed by maize production and pulses come on the last.

From Table 1, it can be seen that the share of Food-grains in Agricultural production in Mizoram recorded the highest share throughout the year except recently which could be due to the increased production in sugarcane from 2014-2016. However, agricultural productivity is fairly low as compared to other regions of the country due to it being practised only on subsistence level and has not so far made its mark on the commercial platform.

From Table 2, it can be seen that rice is the dominant produce in Mizoram especially among food-grains. Rice has been the main food item consumed in the State and in the country and as such major importance is given as compared to the other food-grains or food crops till date, as can be seen from the Table 2. The share of rice production

Table 1. Share of Food-grains Production to the Agricultural Production in Mizoram (in MT)

Year	Food-grains production	Agricultural production	Share of foodgrains (%)
2006-07	68893	86487	79.65
2007-08	19049	21783	87.44
2008-09	81881	99660	81.16
2009-10	84121	101712	82.7
2010-11	86993	102319	85.02
2011-12	89294	102000	87.54
2012-13	69051	79510	86.84
2013-14	72872	85182	85.54
2014-15	72273	123209	58.65
2015-16	77425	134552	57.54

Source: Statistical Handbook 2008-2016

Table 2. Major food-grains Production in Mizoram

Year	Food Grains Production (in MT)			Total
	Rice	Maize	Pulses	
2006-07	42091	20969	5833	68893
2007-08	15688	729	2632	19049
2008-09	68917	9318	3646	81881
2009-10	66132	11510	6479	84121
2010-11	67429	13499	6065	86993
2011-12	75566	8397	5331	89294
2012-13	57700	8063	3288	69051
2013-14	58994	8221	5657	72872
2014-15	60679	8624	5970	75273
2015-16	62089	10295	5041	77425

Source: Statistical Handbook, 2008-2016

Table 3. Factors influencing food-grains production in Mizoram

Year	Production (in MT)	Area under cultivation (in ha)	Average annual rainfall (in mm)	Fertilizer consumption (in MT tones)	Population (in millions)
2006-07	68893	68676	299.22	12646	0.85
2007-08	19049	66917	330.33	16074	0.87
2008-09	81881	65479	162.71	15443	0.89
2009-10	84121	59675	291.65	14850	0.98
2010-11	86993	53654	229.2	15166.7	1.09
2011-12	89294	49717	200.5	3186.95	1.12
2012-13	69051	48617	196.25	5899.66	1.14
2013-14	72872	48458	195.95	10666.44	1.16
2014-15	72273	46845	181.64	9598	1.19
2015-16	77425	46736	190.07	6442.09	1.25

Source: Statistical Handbook 2008-2016

to the total produce is exceptionally high throughout the years followed by maize and pulses.

The production of food-grains in Mizoram is influenced by various factors like; rainfall and irrigation facilities, area of land under cultivation, temperature, climate change, work-force availability, price of agricultural inputs and commodities, fertility of the land and use of fertilizers, technological advancement, income of the farmers and its profit margins, population growth, agricultural policy of the State and Central Government, income of the consumer. Taste and preference of the consumer, consumption pattern of the consumer etc. Many such factors could contribute to the productivity of food-grains in Mizoram, however, the major influencing factors are being taken into consideration for this study as

presented in Table 3.

It can be derived from Table - 3 that there is a gradual decrease in cultivated land as per hectare over the years; but production is only minutely affected and is able to manage a standard ratio. This could be due to the application of a more productive method of cultivation over time. However, there is a direct relationship between the two where production is likely to decrease with the decrease in area under cultivation. The same goes for fertilizer use and its effect on production.

Multiple Linear Regression Model:

The Multiple Linear regression analysis was adopted to form a mathematical relationship between a dependent variable and a set of independent variables. The formula for Multiple Linear Regression is $Y = a + b_1x_3 + b_1x_4$

Table 4. Results of analysis of factors influencing food-grains production in Mizoram

	B (Coeff.)	St Error	T Stat	P-value
Intercept	-1.829	7.008	-0.261	0.803
Area (X1)	0.187	0.072	2.054	0.083
Rainfall (X2)	-0.003	0.001	-2.325	0.054
Fertilizer Consumption (X3)	0.005	0.002	3.101	0.02
Population (X4)	0.015	1.233	0.011	0.891

B- refers to regression coefficient* 5% level of Significance.

Results of multiple linear regression analysis

R	R2	Adjusted R2	Standard Error
0.95	0.9	0.82	0.67

R= Multiple Regression

Where, x_1 = area under food-grains, x_2 = average rainfall, x_3 = Fertilizer consumption, x_4 = Population.

There were a numerous number of factors that could influence food-grains production in Mizoram, however, variables such as area under cultivation, rainfall, population and fertilizer consumption were finally considered in the model based on their statistical significance and stability of the functional relationship to estimate the demand for the period 2006 - 07 to 2015 - 16. The food-grains production was postulated as the dependent variable and the independent variables include area under cultivation, rainfall, population and fertilizer consumption and use. The results of the multiple regression analysis are presented in Table 4.

From Table 4, it is observed that the multiple correlation co-efficient

(R) is 0.95 of variation. The dependent variable is thus highly influenced by the set of all independent variables, whereby the most influential contributing factor is the area under crops cultivation (Coefficient 0.187) for the production of food-grains in Mizoram.

Conclusion:

The food-grains production is directly influenced by the factors such as area under cultivation, fertilizer consumption, rainfall and population of the state. Food-grains production can be increased by focusing more on commercial farming instead of subsistence farming, which will cater the problem of insufficiency and generate more income and also ensuring that there is timely supply of input factors required for agricultural productivity and marketing base.

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Spatial Pattern of Workforce and Occupational Structure in Manipur: A Geographical Study

Naorem Bobby Singh

Abstract: Workers of any country are considered to be of a great economic resource. Regularity of workers' employment, type of occupation, shift of workforce from primary to other activities or diversification of agriculture, etc, no doubt, affect the economic development of a country which depends largely upon the number of persons, who are economically active and the level of technological development the country has attained. This paper attempts to examine the spatial pattern of workforce and occupational structure in Manipur on the basis of Census data. The unit of analysis is conducted at district level.

Keywords: Worker, occupational structure, male-female, rural-urban and regional pattern.

Introduction:

In every instance, various physical and human determinants play an important role in diversifying the economic activities of any region. These specific determinants provide different opportunities of livelihood for human beings, inhabiting different parts of the earth. It depends upon the caliber and interest of human beings that what type of economic activity they choose for their survival. Thus the relationship between man and land to earn a livelihood is considered as the most significant characteristic of any area. In general, the human beings, who are engaged in any economic activity to earn livelihood, are called workers.

Workers of any country are considered to be of a great economic resource in every country. Work, according to 2001

Census, has been defined as participation in any economically productive activity with or without compensation of wages or profit. Such participation may be physical and / or mental in nature. Work involves not only actual physical work, but also includes effective supervision and direction of work. It even includes part time help or unpaid work on farm, family enterprise or in any other economic activity (Census of India, 2001).

According to Census of India 2001, "A person is categorized as 'worker' when she/he has participated in any economically productive activity at any time during the reference period". For all the questions on Workers and Non-Workers the reference period is one year preceding the date of enumeration (Census of India, 2001). Census of India 2011 classifies

Dr. Naorem Bobby Singh is an Assistant Professor in the Department of Geography & Resource Management, Mizoram University, Aizawl, Mizoram

workers into two broad categories, on the basis of their engagement period in economic activities. These two categories are main workers and marginal workers. Main workers are those, who worked more than six months (183 days) during the last one year. Marginal workers are those, who worked less than six months (less than 183 days) during the last one year. Non-workers are those who, did not work anytime at all in the year preceding the enumeration period. A non-worker is either mainly engaged in household duties or is a student or a dependent or a pensioner or a beggar etc.

Objective and Methodology of the Study:

The objective of this paper is to study the spatial patterns of workforce and occupational structure, based on the information gathered from different sources, including Primary Census Abstract of Manipur, 2011, government documents, journals, published and unpublished thesis. The unit of analysis for the present study is at district level. The collected data are tabulated and processed. Maps have been prepared with ArcGIS 10.5 to show the spatial patterns.

The Study Area:

Manipur is located between 22°68'N and 25°85'N latitudes and 93°03'E and 94°78'E longitudes (Horam and Rizvi, 1998) at the extreme eastern corner of India. It

is bounded on the North by Nagaland, on the East by Sorma tract and the upper Chindwin district of Myanmar, on the South by the Chin Hills of Myanmar and the state of Mizoram and on the West by the Cachar District of Assam. Manipur has a geographical area of 22,327 sq.kms which constitutes 0.7 per cent of the country's total area. Out of the state total area, about 90 per cent of the total geographical area of the state i.e. 20,089 sq.kms. is covered by hills, the remaining area is a small valley covering only 2,238 sq.kms. and accounting for only one-tenth of the total area of the state. Thereby, the state can be broadly classified into two geographical/physiographical regions, the Manipur Hills and Manipur Valley, also known as Imphal Valley. The Manipur Hills comprise of five hill districts namely; Ukhrul, Tamenglong, Churachandpur, Chandel and Senapati, whereas, the Manipur valley, also called Imphal valley is formed by 4 valley districts and they are Thoubal, Bishnupur, Imphal East and Imphal West. According to 2011 census, the major share of the total population in Manipur is confined in the 4 districts of Imphal valley i.e. 63.56 per cent and the 5 districts under Manipur Hill have 36.44 per cent.

Work Force in Manipur:

According to the 2011 census report, Manipur had 34.10 per cent of main workers to total population of the state, which was recorded

higher percentage than the national average of 29.94 and it is surprised to find out that all the 9 districts had recorded higher percentage of main workers than the national average. It is also noted that the percentage of main workers was found higher in the hilly area (37.08 per cent) with compare to the valley area (31.90 per cent). The district-wise proportion of main workers, marginal workers and non-workers are shown in Figure 1.

Among the districts, Tamenglong district with 39.80 per cent of the population engaged in the main work force recorded the highest percentage while Thoubal district with 31.60 per cent recorded the lowest proportion of main workers

(Table 1). In case of marginal worker, the percentage range from 9.2 in Imphal West to 15.6 in Chandel. The proportion of non-workers is highest in the district of Imphal West (58.8 per cent) and lowest in Chandel district (47.1 per cent). Overall, the state accounts for 45.7 per cent of its total population are recorded as economically active. The figure in this category is recorded higher in the 5 hill districts than 4 valley districts. Table 1 gives the district-wise distribution of the working force of the study area.

Rural economy are generally engaged in agriculture in which education and professional skill have less meaning. Children join the helping hands in family enterprises in

Table 1. Percentage of Workers to Total Population, District Level, Manipur 2011

<i>State/District</i>	<i>Total Workers</i>	<i>Main Workers</i>	<i>Marginal Workers</i>	<i>Non Workers</i>
MANIPUR	45.7	34.1	11.6	54.3
Bishnupur	46.3	32.2	14.1	53.7
Thoubal	46.3	31.6	14.7	53.7
Imphal West	41.2	32	9.2	58.8
Imphal East	42.7	31.8	10.9	57.3
Valley Districts Total	44.1	31.9	12.2	55.9
Senapati	48.8	38.8	10	51.2
Tamenglong	50.2	39.8	10.4	49.8
Churachandpur	44.7	32.7	12	55.3
Ukhul	47.8	36.8	11	52.2
Chandel	52.9	37.3	15.6	47.1
Hill Districts Total	48.88	37.08	11.8	51.12

Source: Census of India (2011), Manipur: Primary Census Abstract.

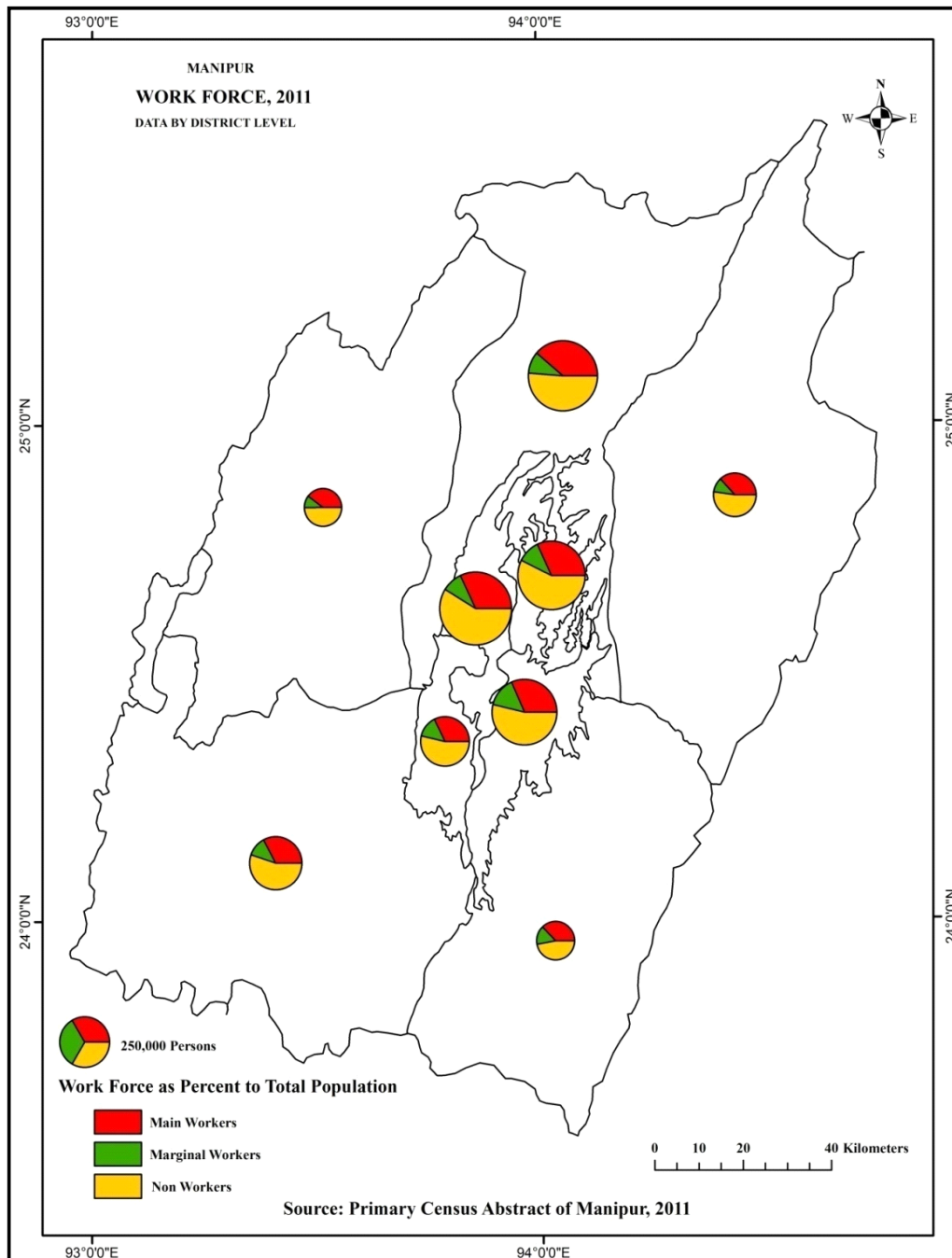


Fig. 1. Workforce, District Level, Manipur, 2011

the early stage and the aged people also contribute the physical assistance for longer duration. On the otherhand, in the urban areas most of the jobs, earning and economy is largely engaged with non-agricultural activities, a large number of the population stay longer duration in education, thus, enter the workforce in the later stage and the older population has left less chance to share in the family enterprise. Therefore, all the valley districts that have a higher proportion of the urban population have recorded the less percentage of workforce and high percentage of non-workers than the hill districts.

Male-Female Differences:

In almost all the countries in the world, the male participation in workforce is much higher than the females (Table 2). In the state, although, the main workers comprised of 34.1 per cent of the state total population, but their proportion varied widely in between male (42.8 %) and female (25.3 %) population. The factors associated with differences in the participation rate of males and females were:

- The earning of bread for family is mainly the responsibility of the males and to look after the family is the responsibility of females to share the burden of their partners (Mehta, 1967).

- The general apathy of the society is towards the education of females and, therefore, encouraged engagement in work.

At district level, there were vast spatial variations in male-female differences in main workers. All the districts of Manipur registered higher proportion of main male workers than main female workers. The maximum difference in the proportion of male and female main workers was recorded in the valley districts. Bishnupur district recorded the highest difference (25.2 % points) of main male workers (44.8 %) and main female workers (19.6 %). The reason behind high differences between male and female main workers in the valley districts was due to low participation of females in the workforce.

On the other hand, the hill districts had a high percentage of rural population and the percentage of females engaged as cultivators in the hill districts (*75.86%) was much higher than the percentage of females in the valley districts (**21.64%). Due to more female participation in workforce in the hilly districts, the overall percentage of persons engaged in main workforce was also much higher in the hill districts (37.08%-average of 5 hill districts) as compared to the districts in the valley areas (31.92% average of 4 valley districts).

(Note : * and ** are average values of females engaged in cultivation in 5 hill districts and 4 valley districts respectively.)

Table 2. Percentage of Main Workers to Total Population, District Level, Manipur 2011

State / Districts	Persons	Male	Female	Rural	Urban
Manipur	34.1	42.8	25.3	35.3	31.3
Senapati	38.8	41.2	36.1	39	25.9
Tamenglong	39.8	42.2	37.3	41.6	28.5
Churachandpur	32.7	41.5	23.8	32.9	30.7
Ukhrul	36.8	39.4	34	38	29.7
Chandel	37.3	45.4	28.6	38	32.2
Hill Districts Total	37.1	41.9	31.96	37.9	29.4
Bishnupur	32.2	44.8	19.6	32.6	31.6
Thoubal	31.6	42.8	20.4	31.9	31.1
Imphal West	32	43.3	21.1	32.9	31.5
Imphal East	31.9	44.2	19.7	32.2	31.4
Valley Districts Total	31.9	43.8	20.2	32.4	31.4

Source: Census of India (2011), Manipur: Primary Census Abstract.

Rural-Urban Differences:

The workforce participation rate also varies by residence. The social life and economy of the countryside was very different from that of the urban areas. Consequently, the incidence of participation in economic activities in the two areas differs (Chandna, 1986, pp.319). In 2011 census, 29.21 per cent of Manipuri's total population was urban whereas 70.79 per cent of its population lived in rural areas. The percentage of main workers to total population in the urban areas of the state was 31.30 per cent; on the other hand, in rural areas the corresponding figure was 35.30 per cent. The factors

associated with the differences in work participation rates between of workforce in rural and urban areas are -

- 1) Most of the activities like agriculture and household industries in the rural areas allow a huge participation by the family members as associate workers whereas in the urban areas the dominating non-agricultural activities do not permit such participation at family level (Chandna, 1986).
- 2) The proportion of persons going to school and higher educational institutions in the rural areas is strikingly low in comparison to that in the urban

centres, implying that young people in urban areas enter late into the working force in comparison to the young people of rural areas.

- 3) Both, child participation and female's participation in the economic activities in rural areas are relatively high in comparison to that in the urban areas (Clarke, 1972)

In the 5 hill districts of the state, the rural workforce dominated over the urban workforce. The percentage of population engaged as main workers in the rural areas of 5 hill districts (*37.90%) has obtained higher percentage than the 4 valley districts (**32.4%). The highest percentage of rural main workers were registered in Tamenglong (41.60%) district followed by Ukhru land Chandel district's with 38.0 per cent each and the lowest was recorded in Senapati district (25.90 %).

In case of urban areas, surprisingly, the highest percentage of main workers were also recorded in one of the hill districts, Chandel (32.2%). Agriculture continues to be the main source of livelihood of the people of Chandel district. This district is also known for its commercial activities because of Moreh town. Moreh is essential to

the Look East plan and considered to be one of the famous commercial towns which will serve as a conjunction between India and the other participating countries. The National Highway 39 now renamed National Highway 2 connects to Moreh. And the government is looking at Moreh as an important part of its relations with Myanmar and Southeast Asia. In 2010-11, India's export to Myanmar saw a growth of more than 60 per cent against the overall export growth of 40.49 per cent. This is why the town has been given the title – 'the Gateway to South East Asia.

Occupational Structure:

Occupation refers to a person's trade or profession or the type of work which one is engaged with. The study of the working population is directly related to the analysis of occupational structure which is concerned with regional resource base, economic behavior, urbanization and the like (Prasad, 1990). In 2011, the Indian census categorized the occupational structure into four categories, i.e. cultivators, agricultural labourers, household industries and other workers. In the following section, the last two categories have been clubbed to study as non-agricultural workers.

(Note : * and ** are average values of persons engaged in the main workforce in 5 hill districts and 4 valleys districts respectively.)

Cultivators :

The census report of 2011 shows that 47.9 per cent of the state total main worker is enumerated as cultivators. The high proportion of cultivators was due to the predominance of agricultural subsistence economy and very low urban industrial growth in Manipur. Although the proportion of cultivators is very high in Manipur but it reflected wide spatial variations within the state. The highest percentage of cultivators were recorded in Senapati district (80.70%) while the lowest was recorded in Imphal West district (18.1%). Out of 9 districts, five districts, namely Senapati, Tamenlong, Churachandpour, Ukhrul and Chandel districts recorded more than 50 percent of main workers engaged as cultivators. These districts had a high percentage of rural population and lack of industrial sector. On the other hand, Imphal East and Imphal West recorded less than 20 percent of main workers as cultivators. These two districts are highly urbanized and like the other urban areas, their economic activities are mostly associated with non-agricultural activities.

Agricultural Labourers:

In Manipur, agricultural labourers population accounted for 4.7 per cent of the total main workers. Thoubal district (9.10 per cent) recorded the highest percentage of agricultural labourers

to total workers while the lowest was recorded in Tamenglong district (1.85%). There were 4 districts which registered more than state average. Out of these 4 districts, 3 districts was recorded from the valley districts. As the soils of four valley districts are fertile and large numbers of people of the valley districts are engaged in agricultural activities, more agricultural labourers are also needed. For example, in Thoubal district, the percentage of cultivators to the main workers is around 45 per cent and the percentage of agricultural labourers is around 9.1 per cent. On the other hand almost all the hill districts have less than 5 per cent of agricultural workers to total workers because of less fertile soil, small land holding, low agricultural productivity and rugged topography.

Regional Pattern of Non-Agricultural Workers:

According to the 2011 census, Manipur recorded 47.4 per cent of non-agricultural workers to total workers against the national average of 49.77 per cent. Out of 9 districts, 3 districts registered higher non-agricultural workers than national average. A study of spatial pattern of non-agricultural workers reveals that the Imphal West district (78.8%) recorded the highest percentage of non-agricultural worker, whereas the lowest (16.6%) percentage of non-agricultural worker was recorded in Senapati

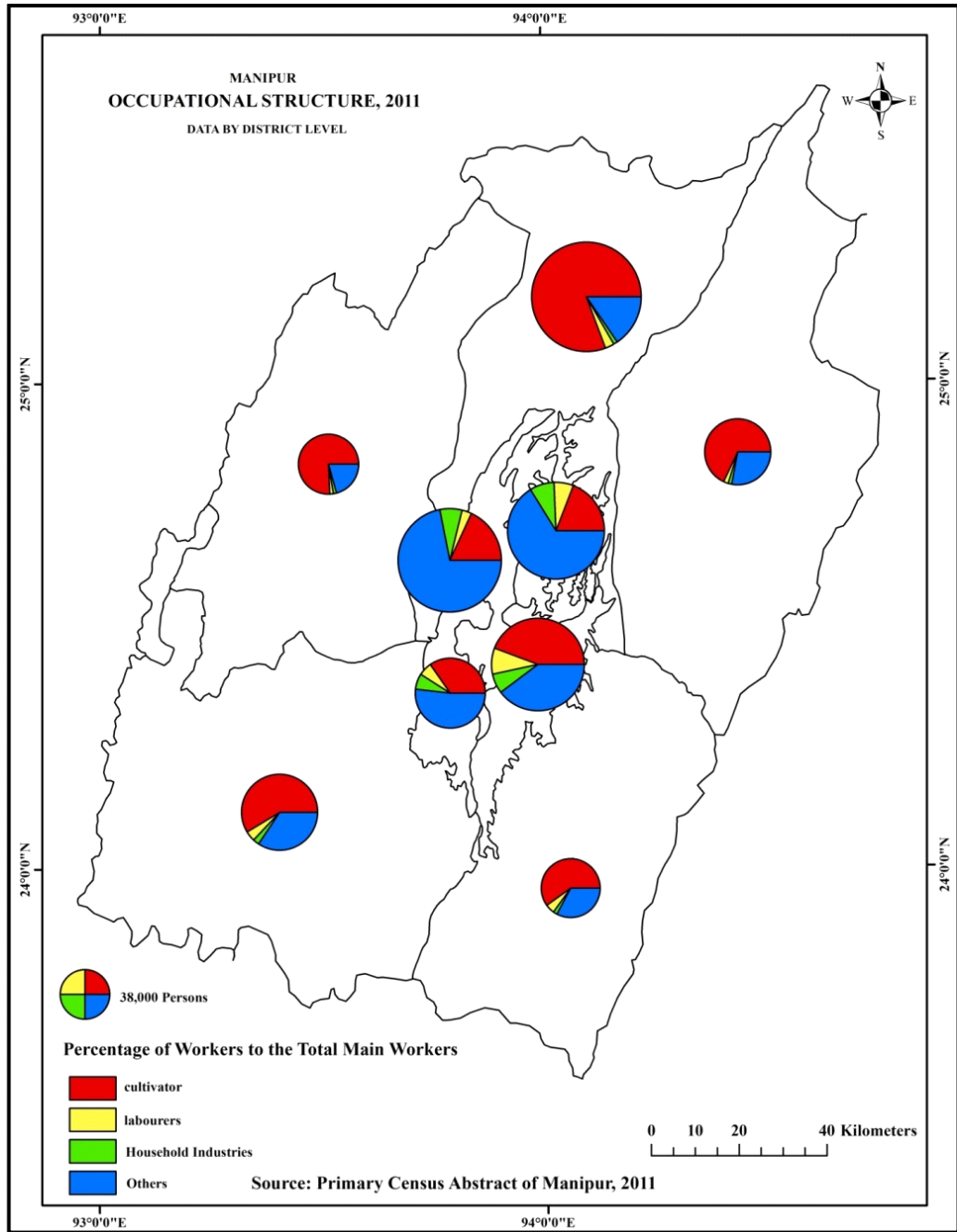


Fig. 2. Occupational Structure, District Level, Manipur, 2011

district (Fig. 2). Keeping in mind the state average of 47.4 per cent of non-agricultural workers to the total workers, the entire state may be grouped into following three categories.

- A. Areas of High Non- Agricultural Workers (66-90 per cent).
- B. Areas of Moderate Non- Agricultural Workers (41-65 per cent)
- C. Areas of Low Non-Agricultural Workers (16-40 per cent).

Areas of High Non-Agricultural workers (66-90 per cent):

Broadly speaking, Manipur can be divided into two physiographic regions, i.e. the valley area and the hill area. Due to

shortage of land in the valley area and availability of non-agricultural activities here, a large percentage of the population has opted for such activities. The two districts under this category which recorded between 66 to 90 per cent of non-agricultural workers to total main workers were located in the valley districts, namely Imphal West district (78.8 per cent) and Imphal East district (74.3 per cent). Some of the factors responsible for the high percentage of non-agricultural workers in these two districts are –

- Imphal West recorded the highest literacy rate among the district with 86.08 percent and Imphal East district (81.95%) also obtained high.

Table 3. Occupational Structure, District Level, Manipur, 2011

State/Districts	% of Main Workers to Total Population	Cultivator*	Agricultural Labourers*	Non Agricultural Workers*
Manipur	34.1	47.9	4.7	47.4
Senapati	38.8	80.7	2.7	16.6
Tamenglong	39.8	75.7	1.8	22.5
Churachandpur	32.7	58.6	4.3	37.1
Ukhrul	36.8	68.1	2.3	29.6
Chandel	37.3	59.9	5.2	34.9
Hill Districts Total	37.1	68.6	3.3	28.1
Bishnupur	32.2	34.7	6.2	59.1
Thoubal	31.6	44.3	9.1	46.6
Imphal West	32	18.1	3.1	78.8
Imphal East	31.8	19.2	6.5	74.3
Valley Districts Total	31.9	29.07	6.2	64.7

Source: Census of India, 2011, Manipur: Primary Census Abstract.
* as Percentage to Main Workers.

- These two districts fall in the city zone of Imphal city which provides many non-agricultural activities.

Areas of Moderate Non-Agricultural Workers (41-65%):

Out of the four valley districts, the remaining two districts which do not come under the high category of non-agricultural workers constituted the moderate category (41-65%) that is, Thoubal (46.6%) and Bishnupur (59.1%) districts. Factors responsible for a moderate level of non-agricultural workers in these districts are -

- Over the recent years, the percentage of urban population had increased rapidly in these districts. Eventually, a large proportion of agricultural land has been transferred for non-farm activities or urban use with adverse consequences to agricultural production. Meanwhile the economy from the non-agricultural sector has emerged with huge potential and number of people begin to rely from these new economic activities. Thus urbanization and land put to non-agricultural may have a strong negative impact on the agricultural sector but addressing the new one in the society.
- Literacy is moderately high which supports the non-agricultural activities.
- Bishnupur district is located on

the sides of the Loktak Lake. People settled near the lake opt fishing culture equally important like the cultivation.

Areas of Low Non-Agricultural Workers (16-40%):

All the five hill districts had fallen under this category and they are, namely Senapati, Tamenglong, Churachandpur, Ukhrul and Chandel. Among them, Senapati district with 16.6 per cent recorded the lowest percentage of non-agricultural workers to the total main workers. The factors responsible for low level of non agricultural workers in these districts are -

- All the districts under this category had achieved low percentage of urban population. Most of the people are engaged in agricultural activities.
- Literacy is found to be low in the districts of Senapati (63.6%), Tamenglong(70.05%) and Chandel(71.11%).

Conclusion:

According to 2011 census, Manipur recorded a low percentage of main workers (34.11%) as compared with the surrounding states like Mizoram (37.83%), Nagaland (37.46%) etc. though it was able to score higher than the national average (29.94%). The reason behind the low percentage of main workforce is related to low female participation rate(25.3%).

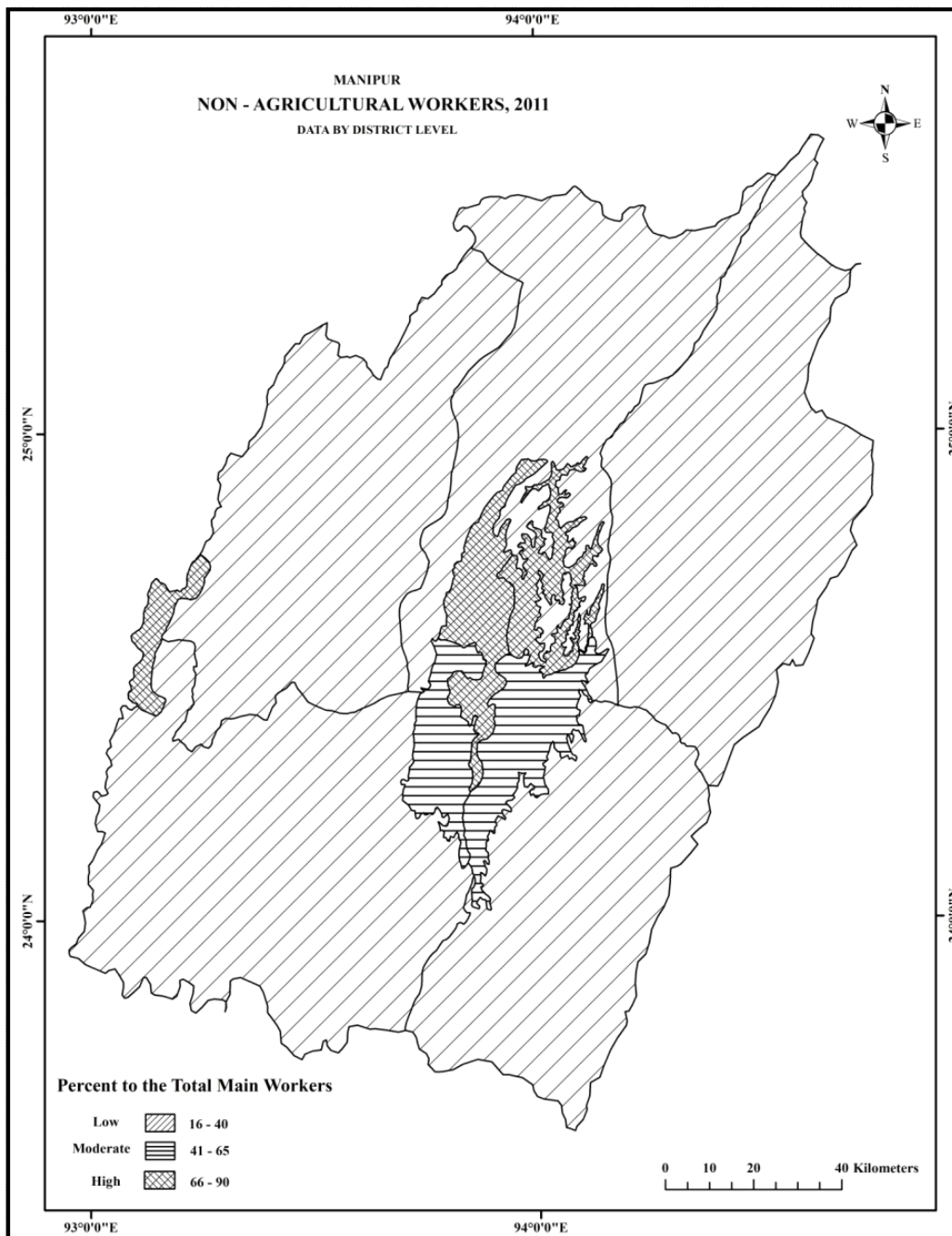


Fig. 3. Non-agricultural Workers, District Level, Manipur, 2011

Around 53 per cent of the state's total workers are engaged in agricultural activities. The areas having a high proportion of agricultural workers are located in the hilly region of the state where urban-industrial development is low, literacy is low, the terrain is hilly and access to market is limited. Manipur recorded 47.4% of total workers as non-agricultural worker. The area having high proportion of non-agricultural workers were largely the valley districts with high level of urban-industrial level, high level of literacy, good transport system and availability of market facility.

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Livelihood of Traditional Handloom Weavers of Darlong Community in Unakoti District of Tripura, India

Stabak Roy¹

Debasish Debbarma²

Siamfela Darlong³

Saptarshi Mitra⁴

Abstract: Tripura is a small state in North East India which has 10486.43 km² geographical areas. Unakoti, one of the eight districts of Tripura is situated in the northern border of the State. Presently about 8,000 Darlongs belonging to Kuki-chin group are residing in 22 villages of Unakoti, North Tripura and Dhalai districts. Their population is even less than one per cent to total population of the State. Maximum concentration of this community is found in Unakoti District. Weaving is the primitive economic activity as well as cultural symbol of this tribal community. The research tries to find out the status of socio-cultural-economic life of the Darlongs in the rural sites of Unakoti District, Tripura through extensive field survey. Modernization plays a crucial role in the developmental process over social traits of the Darlong Community. The research additionally explores the challenges being faced by the community weaving mores. Acculturation of Darlong culture and that of modern western culture is transforming their own culture giving a new shape. It has been observed that large segments of the Darlong society who reside in the interior part of the hilly state have little scope of getting involved in the handloom activities. About 400 samples have been collected through a Stratified Random Sampling technique by Systematic Schedule Survey. Secondary data have been collected from Census of India, different Panchayats and Rural Development Blocks of Unakoti District. The findings reveal that the socio-economic status of the surveyed rural villages of Darlong has been changing rapidly because of educational improvement and cultural assimilation as a result which time-honored cultural element especially traditional dresses particularly of man gradually being replaced by modern western dress.

Keywords : Traditional Weaving, Handloom, Acculturation, Darlong

¹**Stabak Roy** is an ICSSR Project Fellow in the Department of Geography and Disaster Management, Tripura University, Suryamaninagar – 799022, Tripura

Email : stabak.roy@gmail.com

²**Debasish Debbarma** is a Research Scholar in the Department of Geography and Disaster Management, Tripura University, Suryamaninagar – 799022, Tripura

Email : saslang1989@gmail.com

³**Siamfela Darlong** is an Ex-student in the Department of Geography and Disaster Management, Tripura University, Suryamaninagar – 799022, Tripura

Email : sfrante619@gmail.com

⁴**Dr. Saptarshi Mitra** is an Assistant Professor in the Department of Geography and Disaster Management, Tripura University, Suryamaninagar – 799022, Tripura

Email : aptarshigeotu2000@gmail.com

Introduction:

Clothing is the basic need of the mankind and as such that led to the weaving of textiles since time immemorial (Khatoon et al, 2014). Conformity of clothing is a process of adapting the pre-existent socio-cultural norms. The tribal communities with different cultural background maintain standards set of socio-cultural ethos (Sarkar and Bairagi, 2013). The tribal community is both a product as well as the prime mover of the socio-economic milieu (Dang, 1980). North-East India has the unique distinction of having more than 100 tribal communities dominating the demographic characteristics and it is considered as power house of handicrafts wherein each region is replete with different craft traditions (Karolia and Ladia, 2012). The reservoir of handloom skills is concentrated in the North-Eastern States of India (Phukan, 2012). Tripura, a small State in North Eastern region of India with a population of 36,79,917 is home to 19 Scheduled Tribes (ST) that constitute about 31.05 per cent of states' total Population (Census of India, 2011). The Darlong is a substantial tribal community of Tripura. They belong to Kuki tribe and they are residing in 22 villages covering Dhalai, Unakoti and North Tripura Districts. Darlong language is an unclassified Sino-Tibetan language and intra community marriage is always encouraged (Darlong, 1996).

The Darlongs believe that the origin of mankind lies in the "Sinlung" myth. The people recall that their forefathers came out of a cave called "Sinlung". In ancient times the Darlongs lived somewhere in the present South-China (Darlong, 1996). In course of time, they migrated to Kirat kingdom and remained there as faithful citizens of Kirat country. Finally they migrated to Reng Ram, the then Twipra (now known as Tripura). Ancestors of the Darlong society state that they have been living in "Reng Ram" from time immemorial. The Kukis of Tripura may broadly be divided into two major groups like "DarlongKukis" and "RokhumKukis" (Singh, 1985). As per Census of India, 2011, total kuki population in the state is about 10965. Currently, except in the state of Tripura, the existence of Darlongs elsewhere is insignificance. Their population is even less than one per cent to the total population of the state. The beginning of Christian movement among the Darlongs started in 1912 specially among the Mizos of Jampui Hills in North Tripura. In 1924, only 50 Christians had been found among Darlongs then gradually whole Darlong tribe become Christians by 1972 (Debbarma, 1996). Traditional culture of Darlongs has been influenced by Christianity.

Major objects of the study are to find out the present scenario of traditional weaving and condition of the weavers in Darlong

Community and also focus on the traditional socio-cultural- economic life of Darlong Community.

Methodology:

The traditional weaver from Darlong community of Unakoti District has been considered for the study. Total population of the district is about 2,98,574 comprising 26,0118 rural population and 38,456 urban population as per the Census of India, 2011. The District is divided into two Sub-divisions, namely, Kailasahar and Kumarghat. From Kailasahar Sub-division Deoracherra and PurbaRatachhara Gram Panchayats have been taken as the main study area where the total population are 3926 and 6679 respectively (Census of India, 2011). Darchawi and East Raitwisa have been considered Gram Panchayat has been considered from Kumarghat subdivision. Darchawi Gram Panchayat has the total Darlong population of 1823 and the Raitwisa Gram Panchayat of about 3303 respectively (Census of India, 2011). About 400 samples have been collected through stratified random sampling by schedule survey. Participatory and Non participatory Observation (Jorgensen, 2015) have been used to understand the socio-economic and cultural status of traditional weavers of Unokati District, Tripura. Secondary data has been collected from Directorate of Census Operation, Tripura, Agartala, Directorate of Handloom, Handicraft and Sericulture,

Government of Tripura, Kumarghat and Kailasahar Sub-division Offices, Gournagar, Chandipur, Kumarghat and Pecharthal Rural Development Blocks and different Panchayats of the study area.

Study Area:

Tripura is the second smallest state in Northeast India. Tripura is surrounded by Bangladesh on its north, south and west. It shares borders with Bangladesh, Mizoram and Assam. The length of its international border is about 856 km. The state is connected with the rest of India by NH 8 and by railway. It has an area of 10,486 km² with a total population of 36,73,917 (Census of India 2011). Total geographical area of Unakoti District is 686.97 km². It is the smallest district in the state. It is bounded by Bangladesh on the western side, North Tripura District on the eastern side and Dhalai District on the south-western side (Fig. 1).

Result and Discussion:

Diversified processes of weaving like pit, frame pedal, lion loom etc. are prevalent in Tripura. Lion loom weaving is the most common type of weaving process among Darlong community. Only the females weave however males are not prohibited to weave. The Darlongs are fully skilled in their traditional spinning craft. Each tribe has separate name of the loin loom. Generally the loin length is eight to ten hands and the breadth is two and half hands. No separate room

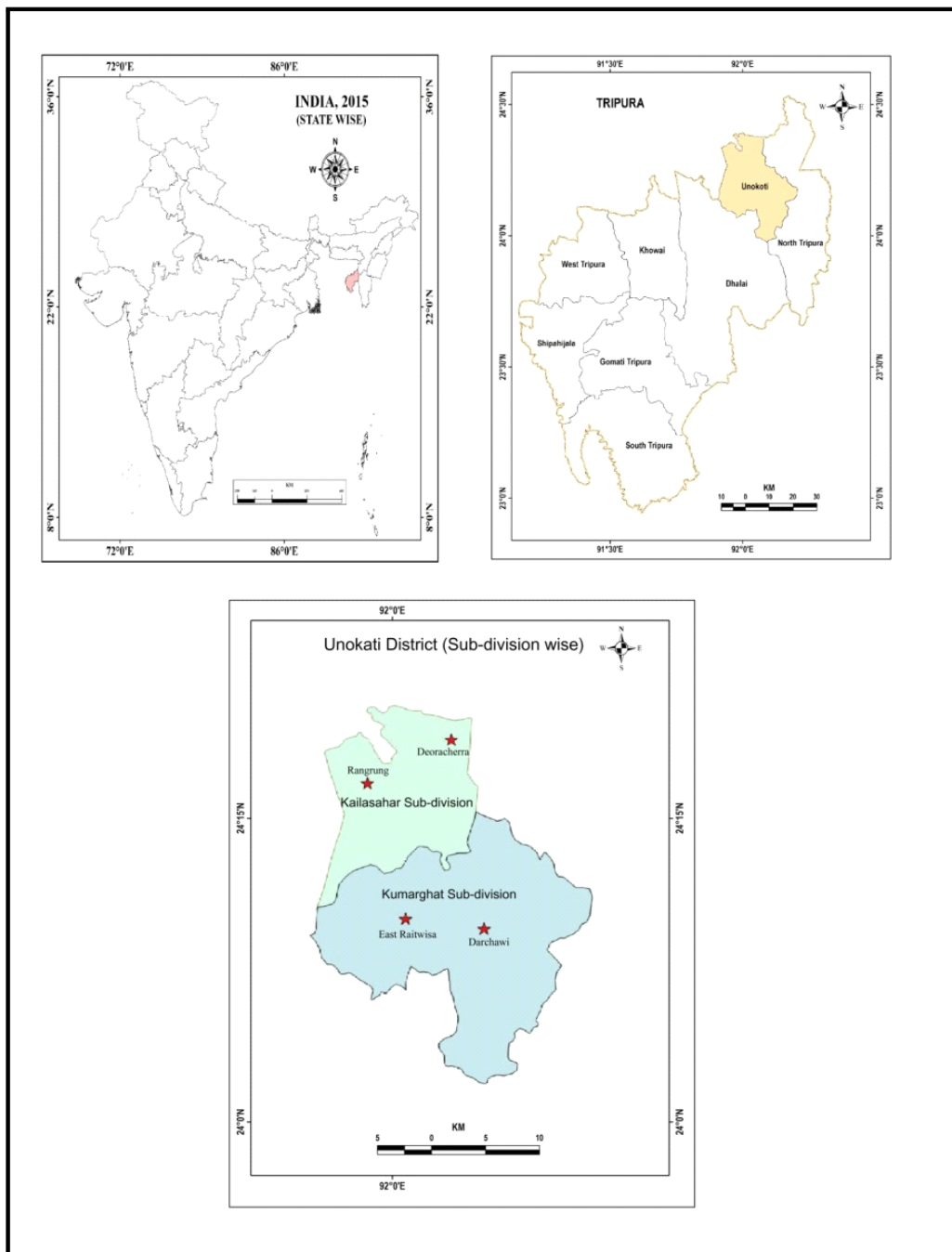


Fig. 1. Location Map of the Study Area

Table 1. Traditional Products of Darlongs Weavers

Name of the Products	Raw Material	Time of Production	Cost of Production(?)
'Hnam Puan'	Yarn	10-14 days	1500-2000
'Recop'	Yarn	7-10 days	2000-2500

Source: Primary Survey, 2016-17

is required to hang this loom. The Darlong weavers mainly produce 'Hnam Puan' and 'Recop' (Table 1). Raw material (Yarn) is available in the local market.

Earlier raw materials were obtained from cotton through Jhum cultivation but now this practice has almost abolished from the State of Tripura. Now raw materials are available in the local market. According to the weavers' raw materials are readily available but the cost of the raw materials are increasing day by day. Some of the raw materials like special type of fabric are also obtained from

Mizoram. Further, local markets are dependent on regional market for the raw materials.

Very Active weavers are very much market oriented who are aware about the customers' demand (Table 2). Efficiency rate is extremely high among the very active weavers. Generally they produce six to eight cloths in a month. About 4.5 per cent of Darlong weavers fall under active group. About 35.25 per cent active weavers have been found who weave both for domestic and commercial purposes. Active weavers have higher production

Table 2. Activity of Darlong Weavers

Category of Weavers	Percentage	Activity
Very Active	4.50	1. Average weaving more than 6 hours/ day 2. Purpose of production mainly commercial 3. High market orientation 4. Major source of income
Active	35.25	1. Average weaving 3 to 6 hours/ day 2. Purpose of production both domestic and commercial 5. Aware about market 4. Subsidiary source of income
Less- Active	60.25	1. Average weaving less than 6 hours/ day 2. Used for domestic purpose 3. Less involved with market 4. Generally not related with income

Source: Primary Survey, 2016-17

efficiency than less active weavers'. Mainly less active weavers weave for domestic use and for gift and passion. Only about 60.25 per cent among less active are trained in weaving. This category of Darlong weavers spends minimum time in the traditional practice.

On the basis of practicing behaviours of the weavers, three kinds of weavers have been found among the Darlong Community in Unokati District of Tripura. About 4.5 per cent weavers are very active. They usually spend more than six hours a day for weaving and their main approach is commercial. About 35.25 per cent weavers regularly work on an average three to six hours who may be termed as active weavers. They work for both domestic and commercial purposes (Table 3). About 60.25 per cent weavers weave irregularly.

Generally they practise less than three hours in a day after completion of household hustle. Domestic need is the prime purpose of weaving of less active weavers. Similar feature has been observed in all Panchayats (Table 3).

The economic conditions of all the weavers are not equal and the average monthly family income is unequally distributed. According to primary survey about six per cent weavers of Darlong community live Below Poverty Line (BPL). Mean income of about 24.5 per cent families of Darlong weavers in between Rs. 5001 and Rs. 10000. Family income of about 42.75 per cent weavers is around Rs. 10,000 to Rs. 15,000 per month (Table 4). Insignificant amount of earning come from weaving as it's not their prime occupation. About (42.75 + 20.5) 63.25 per cent of the respondents have a monthly income

Table 3. Category of Weavers

Name of the Districts / Sub-divisions	Name of the Panchayats	Category of Weavers		
		Very Active	Active	Less Active
Kailasahar Sub-division	Deoracherra	4	43	53
	Rangrung	3	37	60
Kumarghat Sub-division	Darchawi	9	20	71
	East Raitwisa	2	41	57
Unokati District	Total	18	141	241
	Percentage	4.5	35.25	60.25
	Mean	4.5	8.81	60.25
	Median	3.5	39	58.5
	Standard Deviation	3.11	10.47	7.72

Source: Primary Survey, 2016-2017

Table 4. Average Monthly Family Income

Income (Rs.)	No of Respondent	Percentage
< 5000	24	6.0
5001-10000	98	24.5
10001-15000	171	42.75
15001-20000	82	20.5
20001-25000	22	5.5
>25001	3	0.75

Source: Primary Survey, 2016-2017

more than Rs. 10,000 basically which generated from rubber garden, pineapple garden and agricultural land. Only about 0.75 per cent weaver families have income of more than Rs. 25,000 per month. In such cases minimum one family member is involved with service sector.

About 37 per cent of the total respondents stated that earlier their income was primarily dependent on tea garden. However, shifting to rubber plantation from tea plantation is increasing as rubber latex generates more income than tea plantation. On its hilly terrain, betel nuts, betel leaves and lemons are grown.

It was found that very few respondents are engaged in the handloom cooperative society. In through the study it has been found that most of the villagers do not have any information about the government schemes. Moreover, Handlooms in the surveyed villages are mostly done for the domestic use and even if for commercial sale it is run at small scale.

The monthly family income from weaving is unequally distributed in the study area. About 29.25 per cent weavers are having an income of less than Rs. 2000 per month (Table 4).

About 49.5 per cent weavers on an average earn Rs. 2000 to Rs. 4000 per month from weaving (Table 5).

Table 5. Average Family Monthly Income from Weaving

Family Income Range (Rs.)	No of Respondent	Percentage
Nil	117	29.25
1-2000	192	48
2001-4000	71	17.75
4001-6000	9	2.25
>6001	11	2.75

Source: Primary Survey, 2016-2017

Maximum weavers of this category do weaving for personal use but sometimes local distributors purchase the product from them at a marginal cost. Only about 2.25 per cent respondents earn more than Rs. 6000 per month from weaving. This segment of weaver population is considered as commercial weavers.

As per opinion of commercial weavers, they are having problems in collecting quality raw material, expensive raw materials, increased cost of production, mechanised product at low cost, modern dresses and location of the market. The study area being situated in isolation away from urban centres the weavers have to incur additional transport cost etc.

According to Census of India, 2011, the Darlong population of the State is 10,965. About 89.22 per cent of total Darlong population are

Christians. As a result, the Darlong socio-cultural life is mostly influenced by westernization. Literacy rate of the Darlong society is very high. A total number of six per cent respondents have never attended formal schooling (Table 6). About 44 per cent weavers completed primary school. According to them due to financial distress and lack of infrastructural facility they were unable to continue their education in upper level. Table 6, represents that only 23.5 per cent and 25.75 per cent weavers completed their education up to secondary and higher secondary levels respectively. Only about 0.5 per cent weavers have graduate degree (Table 5). Study reveals that educated group of people are not interested in weaving. Young educated Darlong people try to undertake alternative economic activities on the basis of their education and skill.

Table 6. Educational Standard of Traditional Darlong Weavers

Educational Standard	No of Respondent	Percentage
Illiterate	24	6.00
Primary	176	44.00
Secondary	94	23.50
Higher Secondary	103	25.75
Graduate	2	0.50
Post Graduate	0	0.00
Others	1	0.25
Total	400	100

Source: Primary Survey, 2016-17

The educational status of the surveyed village is higher than the state literacy rate in spite of its economic and geographical backwardness. However it is important to mention that Bukpui (youth dormitory) exists here within the Darlong community which is a kind of institution for learning its culture and traditions. Nowadays, with the progress of the community due to modernization impacts this kind of institution is being neglected. Involvement in weaving among young generation decreased with the increase of their educational standard and modernisation of their social life. Only about 8.25 per cent youth are involved in weaving (Table 6). About 59.75 per cent of mature age group of people are practising weaving as subsidiary occupation. Very nominal percentage of this group of weavers

markets their products for financial benefit. Around 32 per cent old persons do weaving regularly (Table 6). Gradually traditional handloom weaving activity has been decreasing among the Darlongs. Survey reveals negative approach of young generation in weaving due to ample of alternatives with better economic prospect.

Earlier Darlongs mostly lived in huts or mud houses made of thatch roof. There was no artificial boundary, natural trees and bushes were used as compound boundaries. Proper sanitation was also lacking. However, the field study carried out reveals that there has occurred huge difference in this regard. Now mostly houses are made of concrete with tin roof, artificial house boundary is erected and even the sanitation has been better.

Table 7. Age wise Educational Standard of Traditional Darlong Weavers

Literacy Level		First Generation		Second Generation		Third Generation			Group Total	
		Illite- rate	Pri- mary	Seco- ndary	Higher Seco- ndary	Gra- duate	Post Gra- duate	Oth- -ers		Total
Young	15-25	0	2	5	0	0	0	1	8	33
	26-35	0	9	12	2	2	0	0	25	
Mature	36-45	0	19	17	65	0	0	0	101	239
	46-55	1	47	54	36	0	0	0	138	
Old	56-65	17	99	6	0	0	0	0	122	128
	66-75	6	0	0	0	0	0	0	6	
Total		24	176	94	103	2	0	1	400	400
Group Total		200		197		3			400	

Source: Primary Survey, 2016-17

Culturally the Darlongs are very rich in Tripura. Tharlakut is the main festival of the Darlongs. The festivals are held jubilantly for days where showcase of cultural items and traditional dance are observed in the second week of the first month of a calendar year. This festival is believed to have originated from the legendary lovers of a folk tale. This festival has a deep inner meaning. It is a community level festival. However, any outsider is also warmly welcomed to participate. Homemade Food item is a rare sight during the festival. Other festivals worth mentioning are Ramzu in Chapcharkut. This can be called spring festival. It is celebrated after the hard work of cutting their Jhum and before they are burnt, that is towards the end of January and the beginning of February. Kangdaikut festival is observed from the evening of the Jhum burning day to the following day. This does not make a big festivity. Hence it is considered less significant than the rest festivals due to abolition of Jhum.

The Darlongs do not have a good variety of musical instruments. But some of their musical instruments are unique and highly priced. Some musical instruments used till dates are Rawsem and Darkhuang. Rawsem is made of cell of gourd with a narrow neck. The instrument is played by blowing and puffing from the end of the neck of the gourd and the notes are controlled

by both the hands. Experts can play almost any type of music with it. Darkhuang is a big gong is a big gong with a projected round centre to beat on it. It is only played in important occasions. Both the Rawsem and Darkhuang are so specially valued that the Darlong Hnam committee accepted the two as emblems of the Darlongs. These types of traditional instruments are most common nowadays as majority of the adult population be it male or female know how to beat it. It is also used in churches and in important occasions at home to beat along the song sung.

The community has taken steps to preserve the traditional music by introducing the recent programme aired on local cable channel called the Darlong idol. There are various singing competition held by different churches. However, a good number of the respondents are not interested in traditional music, rather age group of 18-35 years mostly prefer to hear western modern song. Cheraw Dance is another traditional dance of The Darlong community. They strongly believe that man is destined to transcend beyond the plebeian world towards heaven after one's demise. Incidentally, they think that if a pregnant woman dies due to some reason, she feels very difficult with all her physical strains, to go the long way to heaven. Hence, at the last stage of the pregnancy or immediately prior to her delivery, all

her relatives gather together and perform this 'Cheraw' dance, throughout day and night. People practising this dance, strongly believe and feel that even if the woman dies at this stage, it will be possible for her to go to heaven with courage and confidence. It is performed using the sound of bamboo as the rhythm and if the sound continues till her death, her arrival to heaven is assured.

The Darlongs lived a very simple life in the old days. They did not put on simple dresses and did not use many ornaments which speaks of their simplicity. Preservation of traditional Puan or cloth for future use is commonly seen. During the festivals women put on full sleeve dark-blue shirts which they decorate with winged cover of green beetles. Frock or gowns are also commonly worn. The bride is dressed in western wedding dress. Marriage is done in church with ceremony which is due to impact of western culture. Men's dress is very simple shirt and pant is the most common among men with varying designs depending upon one's choice.

Meat is a favourite food of the Darlongs. However, in the old days of animism, the Darlongs had many restrictions in their food habit. Even tea was totally avoided till they had come in contact with other tribes. Lately, the Darlongs have been able to do away with this religious belief particularly after embracing Christianity, not because Christianity

encourages, but because it has no specific restriction. So the Darlongs take almost every known food and meat excepting a few. The range of food they take is wide, covering the leaves or roots to the modern items of food.

Rice is the main staple food of the Darlongs. From the jungle alone they collect a good number of foods in the form of plants, leaves, fruits and roots which are used as vegetables. Items collected from nature in Darlong dialect are Anchiri, Aihria (wild cardamom), Aihretil, Indung, Hratzang, thialkha, rawtuai (bamboo shoots), kawkcha (fern with edible leaves). One thing may be noted, that in most cases the Darlongs use sodium bi-carbonate which is of two types the home made and the manufactured one. Side by side they use fermented pork oil to add taste to the curry.

Divorce (Inmak) was common and easy in the past of the Darlong. After embracing Christianity, they have got rid of bad practices related with marriage such as throwing of water, mud, rotten eggs and smearing of dirt and colours on the bride's party. Monogamy type of marriage with paternal linkage in the Darlong society is lately observed. Marriage by elopement and engaged marriage are the most common type of marriage observed today. Paying of bride price still continues, but the price is fixed for everyone irrespective of one's social economic status. Marriage

ceremony in case of elopement is performed by the village head or the village council while marriage in church is always done by an authorised pastor.

Findings and Conclusion:

The study of socio-economic and cultural characteristics of handloom weavers' of the Darlong community in Unakoti District of Tripura gives us an insight into the livelihood and transformation of the traditional culture. Scarcity of quality raw materials, expensive raw materials, cost of product, mechanized product at low cost, modern dresses, market demand, time consumed and laborious work as well as less involvement of young generation and lack of Government initiative etc. cumulatively keep handloom weaving of the Darlongs under threat.

Mainly hand weaved traditional dresses are not in much demand in local market because of high cost. This puts a negative impact on their traditional cultural aspect. On the other hand those who know the

traditional weaving methods are gradually being extinct. The knowledge is being limited among the old aged persons. The modern culture discourages to follow the traditional culture. One of the major drawbacks of the Darlongs in study area is primarily lack of awareness about Government Scheme be it about cluster weaving or workshop oriented service. Majority of the respondents are still not aware of the schemes that can benefit the weavers. Availing the scope of participation in fairs is rarely seen by the Darlongs. Only a few of them are involved in exhibiting the dresses and clothes of various designs through SHGs and other governing bodies. All these problems have resulted in gradual decaying of the traditional culture of weaving among the Darlong community in Tripura.

Acknowledgment:

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Level of Agricultural Development in Mizoram: A District Level Analysis

Lianchhungi

Abstract: Regional approach plays a vital role in the analysis of regional disparities in farming practices and for interpretation of the changing pattern of agricultural regions. A widely accepted definition of region is an area that is differentiated from other areas according to the specified criteria. In the process of agricultural development various variables may play major role. Agricultural region is a device for identification of weaker and prosperous zones of agriculture development. The principal objective of this paper is to determine the levels of agricultural development in Mizoram at the district level.

Keywords: Agricultural Development, Terraced Cultivation, District, Mizoram.

Introduction:

In the context of agricultural pattern; regions on earth surface reflect weaker and prosperous zones of agriculture. Region means a large indefinite location on the surface of the earth. A region may be defined as a part of planet's surface having certain characteristics which enable it to be recognised as a unit, distinguishable from other units which surround it, and which may themselves be identified by similar or different characteristic features. A region may be defined in physical terms, e.g. a tropical volcanic plateau, a river valley; in climatic terms, e.g. a tropical monsoon region by economic and social criteria, such as a textile-manufacturing region, or a nomadic herding region (Symons, 1978). A widely accepted definition of region is an area that is differentiated from other areas according to the specified criteria.

The regional approach is fundamental in the study of agricultural economics. Agricultural regions must be defined in terms of agricultural elements that are by crop, livestock or enterprise data or by measurement of farming process or of farming organization of areas of dominance by particular enterprise, association of enterprise or farming types, to the recognition of such areas as distinctive region. Researchers identify regions based on characteristics of landform features; it is an uninterrupted area having some kind of homogeneity with specifically defined outer limit. The development of any region may be assessed by several ways. One of the approaches might be to assess the annual rate of growth of national income in relation to growth rates of other economies. Khan (1997) has considered twelve variables with respect to technological determinate for

*Lianchhungi is an Assistant Professor in the Department of Economics,
Government Aizawl North College, Aizawl, Mizoram, Ph: 7005204140, 9436152582*

assessment of agricultural development. Pawar (1989) has considered ten variables for assessment.

Objectives: The principal objectives of the study are -

1. To determine the levels of agricultural development in Mizoram at the district level.
2. To suggest ways and means to improve agriculture in the districts.

Methodology:

The present paper is based on secondary data which is obtained from the Statistical Abstract of Mizoram, 2015, Government of Mizoram. Altogether, six indicators were considered to determine levels of agricultural development including

- X1: Production of Rice
- X2: Production of Maize
- X3: Production of Pulses
- X4: Production of Oilseed
- X5: Production of Sugarcane
- X6: Production of Potato

In order to compare the position of different districts, therefore, it was required to have unit free measurement (or pure number). Hence, Z-Score method has been adopted which assures simplicity in calculation and interpretation.

Z-Score is defined as the deviation of observation from its mean divided by the corresponding standard deviation. Symbolically, it

may be represented as

$$Z = \frac{X - \mu}{\sigma}$$

Where μ and σ are the mean and the standard deviation respectively. Z-score, by definition, is a pure number, which can be used for the comparison of different variables with different measurement units. After calculating Z-score for two or more variables, one, further, needs composite score to evaluate the overall performance. In this study, thus the sum of z-score from different variables represent the overall performance of different districts in Mizoram. The Composite Standard Score is algebraically expressed as

$$C.S.S = \sum Z_{ij} / N$$

Where Z_{ij} indicates 'Z' Score of an indicator 'j' in district 'i' and 'N' refers to number of indicators.

In addition to the ranking of different districts according to their performances on the indices, relationship between the major variables or indicators has been established. The analysis is expected to provide the information on the interdependence of different components of agricultural resource in Mizoram. To examine these relationships, Spearman's rank correlation method has been adopted and which may be defined symbolically by

$$r = 1 - \frac{6 \sum d_j^2}{n(n^2 - 1)} \quad (i)$$

Where d_j is the difference between the ranking of two indicators. The statistical significance of the rank correlation has been tested by comparing the calculated value and the table value (Kothari, 2008). If the calculated value is higher than table value, there is significant rank correlation between the two indicators, and insignificant otherwise.

To test if there is any discrepancy on the performances of different districts with respect to the six indicators, Kendall's Coefficient of Concordance (Kothari, 2008) method has been adopted. Kendall's coefficient of concordance (W) is defined as

$$W = \frac{s}{\frac{1}{12}k^2(N^2 - N)} \quad (ii)$$

where,

$s = \sum (R_j - \bar{R}_j)^2$, k = number of sets of rankings, N= number of object ranked.

The statistic being used to test the significance of Kendall Coefficients is defined by

$$\chi^2 = k(N - 1)W \quad (iii)$$

which follows chi-square distribution with N-1 degrees of freedom. If the calculated W is not statistically significant it indicates that different RD blocks under study have different performances on the three major indicators, if W is not significant it indicate there is no significant relationship between the

three indicators. On the other hand, if W is significant, we say there is a significant relationship between the performances of different blocks on the selected indicators. After computation of Z- score, blocks have been ranked on each parameter.

Results and Analysis:

The composite scores were calculated and they have been divided into three categories as High Level of Development (HLD) with a composite score of more than 2.80, Medium Level of Development (MLD) with 0.00- 2.79 and Low Level of Development (LLD) with a score of less than 0.00.

High Level of Development:

Kolasib and Serchhip fall under the high level of development category. Kolasib rank first in the overall composite index followed by Serchhip district. Kolasib district by virtue of its location near the Assam plain has favourable physical conditions. Large area of land under cultivable slope, adequate moisture supply through rainfall and availability of irrigational facilities in the district has favoured development of agricultural resources in this district.

Serchhip district is located on the higher elevation of central Mizoram. As a result, it has a moderate percentage of land on cultivable slope. Unfavourable land on the other hand, has forced the people to utilize the land to its maximum

extent. Thus, the district has large area of cultivated land which is among the highest in the state. Sufficient rainfall and the presence of flat plain in North Vanlaiphai village and Thenzawl village have facilitated agricultural operation in this district.

Medium Level of Development:

Aizawl and Champhai districts fall under this category. Aizawl ranked third and Champhai ranked fourth in the composite index. Champhai district has large area under cultivated land. The region has moderate rainfall and irrigational facilities. This has helped the region to have higher intensity of productivity and cropping in the plains located in Champhai known as Zote plain and Tuisenhnar in the vicinity of Khawzawl village where permanent cultivation has been carried out. Its nearness to the international boundary, on the other hand, has facilitated agricultural facilities in this district.

Aizawl district houses the state

capital. It has moderate amount of land on cultivable slope. Abundant rainfall in the district favours the growth of forest resources and development of agricultural resources. Higher concentration of population on the other hand, has encouraged the people to participate in agricultural activities.

Low Level of Development:

Lunglei, Mamit, Lawngtlai and Siaha districts falls under this category. Lunglei block, which is considered to be the second capital in the state falls in the category of underdeveloped region. Unfavourable physical factor with steep have hampered the development of agricultural resources in this region.

Mamit district is located in the western part of the state, the district borders Bangladesh plain and Tripura. The district is mostly dominated by Riang people in the southern part of the district. They settle temporarily in this region due to internal tension between the Mizos and the Riangs. This temporary

Table 1. Composite Scores and Ranking of Variables

<i>Districts</i>	<i>X1</i>	<i>X2</i>	<i>X3</i>	<i>X4</i>	<i>X5</i>	<i>X6</i>	<i>Composite Score</i>	<i>Rank</i>	<i>Category</i>
<i>Mamit</i>	-0.82	-0.08	0.37	-1.03	-0.61	-0.32	-2.49	6	LLD
<i>Kolasib</i>	0.85	0.15	0.21	1.23	-0.15	2.46	4.75	1	HLD
<i>Aizawl</i>	-0.33	-0.63	1.94	0.69	1.41	-0.29	2.79	3	MLD
<i>Champhai</i>	1.59	0.06	0.13	-0.12	-0.5	-0.29	0.87	4	MLD
<i>Sechip</i>	-0.12	1.75	0.23	1.38	1.75	-0.29	4.7	2	HLD
<i>Lunglei</i>	-0.32	0.92	-0.6	-0.18	-0.4	-0.29	-0.87	5	LLD
<i>Lawngtlai</i>	0.7	-0.7	-1.03	-0.81	-0.69	-0.31	-2.84	7	LLD
<i>Saiha</i>	-1.54	-1.48	-1.25	1.16	-0.82	-0.65	-4.58	8	LLD

settlements has resulted in having lower value in respect of agricultural resources. With adequate cultivable slope and moderate rainfall, the district has an opportunity to increase the agricultural land for crop cultivation as well as increasing the capacity of livestock rearing without destroying the forest resources.

Lawngtlai district ranked seventh on the composite index. The district has large area under cultivable slope. The western part of the district is occupied by Chakmas with low level of living. Despite large area under cultivable slope, the district has been endowed by dense forest which is inaccessible in most part of the region. Beside this, very low level of irrigational facilities has hindered agricultural production in this district.

Sihaha district ranked the lowest in the overall composite index. The district is located in the south eastern part of the state. It is a rain shadow areas with rugged topography. Its topographical features with low amount of moisture has hampered agricultural production in this district.

Conclusion:

It is believed that promotion of terraced cultivation along the river

valleys in different parts of the state will reduce disparities in natural resource endowments. In order to reduce the area of shifting cultivation terracing on cultivable slope will help intensification of cultivation by way of increased productivity, cropping intensity as well as irrigation intensity. This will help to reduce soil erosion as well as it will increase area under forest. Thus, despite, physical constraints, efforts can be made to change the physical setting by way of leveling down the small hills near the river banks and reclamation of forest land destroyed by shifting cultivation on the lower slopes of the mountains. They may be used to promote livestock rearing particularly dairy stocks, which are gaining new economic importance in the state.

In this connection, Government is attempting to bring the jhum land under terrace cultivation by financing the farmers who intend to convert their jhum lands into terraced fields. But so far it has met with little success. What is required at the initial stage of such efforts is convincing the local people of the advantages of terraced cultivation and train them in new technique of cultivation.

Appendix 1: Production of Selected Crops in Mizoram (2014-2015)

District	Rice (X1)	Maize (X2)	Pulses X3	Oilseeds X4	Sugarcane X5	Potato X6
Mamit	4397	1036	960	56	1680	152
Kolasib	10865	1152	870	590	4575	915
Aizawl	6310	761	1866	464	14455	160
Champhai	13737	1110	823	272	2362	160
Sechhip	7120	1967	881	627	16625	160
Lunglei	6347	1543	399	256	3030	160
Lawngtlai	10309	725	149	108	1180	154
Saiha	1596	330	23	24	350	61

Production in Metric Tonnes. Source: Statistical Abstract of Mizoram: 2015

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Solid Waste Management in Urban India – An Appraisal of Ward Number 115 Under Kolkata Municipal Corporation

SamikChakraborty
Pritirekha Daspattanayak

Abstract: Solid waste management is now one of the major problems in urban centres around the world. This has become more critical with rapidly increasing growth of urban population, industries and changing life style of urban dwellers. Most of the municipal authorities are facing trouble to maintain equilibrium between the amount of waste generated with its proper management. Kolkata Municipal Corporation (KMC) is also stricken by the problem from various corners regarding solid waste management such as collection, storage, transportation, and disposal and so on. The present paper is about the case study which has been done at ward number 115 of KMC by analyzing the current management practices of solid waste to identify the achievements and challenges of this ward.

Keywords: Solid waste management practices, problems, solutions.

Introduction:

The commodity which has no more necessities to its owner after using it up to the required level is regarded as solid waste. Waste to one person is not necessarily regarded as waste to another. The sources of solid waste can be classified such as domestic, industrial, municipal, organic, bio-medical, radioactive etc. Most of the wastes can affect the environment as well as human being adversely if these are not managed properly. Solid waste management system includes various processes like collection, segregation, storage, transportation, disposal, recycling etc. wastes can be managed through

various processes such as open dumps, sanitary land fill, composting, drainage, scrubber etc.

The concept of waste management is more common in urban areas compared to rural. There are no such organized management practices seen in rural areas because a huge number of vacant lands are found over there and mainly degradable wastes are generated by rural peoples who are naturally decomposed and mixed with soil. But the waste creates severe problems in urban areas. Very high density of population associated with modern lifestyle of urban dwellers is mainly responsible for the huge generation of solid

Samik Chakraborty is a Ph.D. Research Scholar in the Department of Applied Geography, School of Regional Studies and Earth Sciences, Ravenshaw University, Cuttack – 753 003, Odisha, E-mail - samik.chakraborty2012@gmail.com

Prof. Pritirekha Daspattanayak is Professor and Head in the Department of Applied Geography, School of Regional Studies and Earth Sciences, Ravenshaw University, Cuttack - 753003, Odisha, Email : pritirekha@gmail.com

wastes at a regular basis. The disposal grounds have become too short day by day and no other alternative land is found as such. Moreover, compositions of solid wastes have made this condition more difficult by consisting almost fifty per cent or more with non-degradable wastes, mainly plastic in regular waste, generated from various urban sectors including households. So nowadays the solid waste management has become a tough challenge to the municipalities of every urban centres around the world. According to United Nations Development Programme (UNDP) solid waste management is the second biggest urban problem in most of the urban centres just after unemployment.

Taking the above facts in mind along with other objectives, the Government of India has started the "Swachh Bharat Mission" or "Clean India Movement" in October 2, 2014 to make India clean, up to the October, 2019 on an occasion of 150 birth anniversary of Mahatma Gandhi. 4041 cities have been selected for this mission. Kolkata, one of the metropolitan cities of India is struggling with the same. There are many steps taken for the betterment of solid waste management by the responsible authority i.e. Kolkata Municipal Corporation but side by side a lot of drawbacks are creating barriers to achieve the goal to provide adequate services regarding solid

waste management to the inhabitants of Kolkata.

Very recently, along with 10 other cities from around the world, Kolkata has been honored with the best cities of 2016 award in recognition of its inspiring and innovative programme with regards to solid waste management. Kolkata is the only Indian city who has got a prestigious award on the occasion of international summit of Mayors of million plus cities which formally named after "C40 Mayors' Summit" held in Mexico City. In addition the Department of Solid Waste Management of KMC has started working even at nights for providing a better management of waste to their city dwellers. But this has taken place in some selective areas of some selective wards out of 144 total. As per the MIC (Members, Mayor in Council) of SWM (Solid Waste Management) Department of KMC, they will do the same in future in all wards, if it will work successfully. KMC have spent huge fund to setup modern compactor machines for reducing the amount of garbage almost everywhere in Kolkata.

Besides, the aforesaid merits, there is a lot of demerits in solid waste management practices in Kolkata such as little scope of recycling and reuse, conventional management practices, manual collection system by hand carts and tricycles, inadequate funding, increased transport cost, lack of

new disposal sites, creating pollution from dumping ground and waste burning, ground water contamination by leachate water and many more.

The Study Area:

Keeping the above discussions in mind the present study focuses on the challenges and opportunities of solid waste management in ward number 115 under Kolkata Municipal Corporation.

Kolkata is one of the metropolitan cities in India as well as the capital of the state of West

Bengal lies between 22°37' to 22°30' North latitudes and 88°23' to 88°18' East longitudes. Elevation ranges from 1.5 meters to 9 meters above the mean sea level. Hooghly is the main waterway in Kolkata which also creates the western boundary of the city. The KMC area is about 187.33 square kilometers having 44,86,679 populations with a density of 23950.67 persons per square kilometer. The population growth rate of the city during last decade was 7.6 per cent. Kolkata is divided into 16 boroughs and 144 electoral wards. The city generates more than

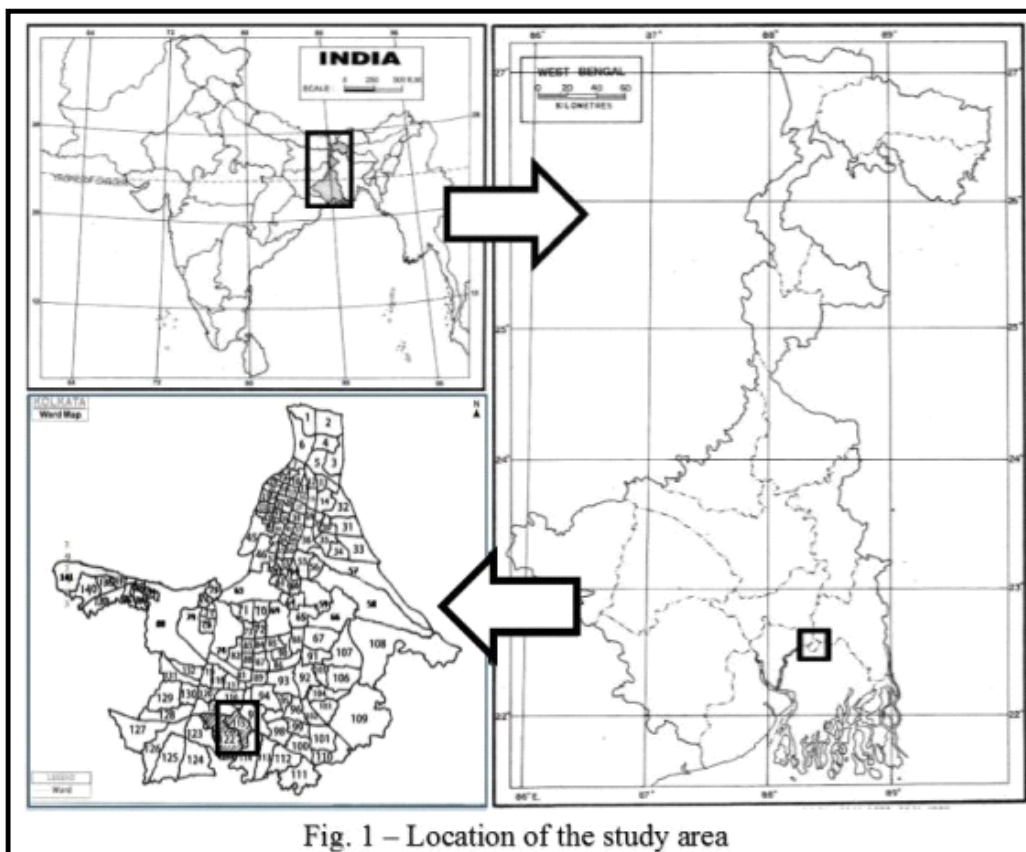


Fig. 1 – Location of the study area

2700 metric tons of municipal solid waste daily at a rate of 450 to 500 grams per capita per kg.

Among 144 electoral wards, the Ward Number 115 of Kolkata Municipal Corporation is located at the southern part of Kolkata. This ward is under the Borough Number 13. There are 8461 households in this ward. 31919 people reside over an area of 1.47 sq. km. with a density of 21713.61 persons/sq. km. Percentage of urban population growth during last decade was 4.26. Residents of this ward generate 25.45 tons of garbage regularly. Mention should be made that the ward 115 is one of the model wards along with five others in Kolkata Municipal Corporation where the facility of waste segregation is done at household level.

Objectives:

The objectives of the study are as follows:

1. To examine the existing management practices of solid waste and its impact on environmental quality in ward number 115.
2. To identify the roots of problem in managing solid waste in this ward.
3. To understand the peoples attitude towards waste management as the inhabitants of a model ward.
4. To find out some remedial measures for aforementioned problems.

Database and Methodology:

This study is based on primary as well as secondary sources of data. Primary data has been collected from 150 households across the ward. Information has also been acquired by interviewing the Councilor and Overseers of ward number 115. Secondary data has been taken from Information Technology Department, KMC, Solid Waste Management Department, KMC, District Statistical Handbook, Kolkata – 2004 and 2011.

This study has been done by following three major stages i.e. pre-field study, field survey and post field analysis. First of all various studies have been reviewed which focuses on solid waste management in Kolkata as well as in India. Some research papers focuses on urban centres of other than India has also been studied. Household survey, taking interviews, direct observations have been done during field survey. Results from field survey have been analyzed critically during the post field study.

Analysis and Major Findings:

Existing Solid Waste Management System:

Waste Generation:

There are approximately 26 tons of solid wastes generated regularly from the ward number 115. Every household generates $\frac{1}{2}$ kg of solid waste per day on an average.

Composition of Wastes:

Vegetable peels, fish scales, waste foods, flowers, tea leaves, tree branches and dry leaves are mainly found as degradable waste from households where first three categories have occupied maximum amount compared to the rests. On the other hand plastic packets and polythene bags are generated maximum as recyclable or non-degradable waste. People sell the old news-papers otherwise it will be treated as one of the biggest sources of non-degradable waste. Besides, a very little amount of packaging-board, aluminum foil, cloth, broken glass, thermocol or polystyrene are also generated from the households. Rubbish is generated during the demolition of old buildings and silt or dust is mainly found on the roads. But the amount of rubbish and silt is not high as compared to wastes generated from households. Roads or streets sweeping are conducted by a separate group of workers who called '100 days workers'. These type of workers are mainly appointed by the municipal authority on contractual basis.

Collection:

Degradable and non-degradable wastes are collected separately from each household at the ward number 115. As it is previously stated that this ward is one of the model wards of KMC among other five out of total 144

wards, where the segregation facility is available. To execute this process a white bucket is given to each household from the municipality to put recyclable wastes into it. Degradable wastes are collected thrice in a week between 6 – 7 a.m whereas non-degradable wastes are collected twice in a week between 8 – 9 o'clocks in the morning. A worker collects wastes from almost 70 households at a regular basis. Tri-cycles are mainly used to collect wastes from households and hand-carts are used to collect rubbish, silt etc.

Storage, Transportation and Disposal:

Wastes collected from households are stored into the roads vats from where from wastes are transported to disposal land by trip cars. Regularly five trips to disposal site are taken place. There are two types of roadside vats i.e. covered and uncovered. Among 4 vats in this ward 2 are covered and other 2 are uncovered. The only disposal site for entire Kolkata namely 'Dhapa Dumping Ground', situated at the eastern part of the city, covering an area of 34.2 hectares. Not only KMC dumps the city-waste into this dumping ground, but also neighbouring cities use this ground to waste disposal.

People's Awareness on Solid Waste Management:

To identify the people's attitude towards solid waste management, field survey has been done using

various indicators such as waste segregation, problems of water logging, significance of recycling, performance of the municipal authority, type of groceries they use, where from they buy etc. By analyzing the above indicators following results are found.

Cent per cent of surveyed respondents know that recycling has various significances mainly to reduce the amount of waste. They also know that why they have provided the white bucket from the municipality. But still now 36 per cent among them put all types of waste together irrespective of various income groups or levels of education. 87.34 per cent of the respondents suffer from water logging problem during monsoon and almost 87 per cent of them have told that during monsoon, wastes from roadside vats are accumulated with water and spread over the road and creates problem. In addition, 24.67 per cent of the respondents are not happy with the existing service provided by the municipality for waste management.

Respondents have given their views on negative impacts of waste on environment. They have told that improper management of waste creates so many problems such as air, water (surface and subsurface both), soil, odor, visual pollution, spreads dengue, malaria, chikungunya, water borne diseases, allergy, breathing problem, drain

chocking, water logging etc.

They have suggested some remedial ways from their daily life experiences for reducing the problems regarding solid waste management such as –

1. Daily waste collection and road cleaning is needed.
2. Using bleaching powders to prevent mosquitoes and flies are required.
3. Water logging problems are needed to be solved.
4. Stop throwing wastes into vacant lands or open roads.
5. More covered vats are needed to set up.
6. Optimum use of recourses.
7. Following 3R policy i.e. Reduce, Reuse and Recycle, as much as possible.
8. Using only waste bins to put waste.
9. Increasing people's awareness etc.

Problems:

There are so many challenges to solid waste management in this ward which have been spotted out during the field survey, these are as follows –

1. Inadequate permanent labours.
2. Some of the neighbouring wards also put their wastes into the vats of ward number 115.
3. There is only 1 compactor station has been built in this ward still now. This is not sufficient enough to carry the load of wastes for

- the entire ward. So more compactor plants should be built.
4. At times people throw wastes on nearby roads, drains and vacant lands which ultimately pollute the area. Sometimes drains are choked and overflowed by this.
 5. Manually operated tri-cycle vans and hand carts take so much of time to complete the procedures of waste collection and storage.
 6. As a model ward of KMC, a white bucket is given to each household from the municipality to preserve non-degradable recyclable waste separately. But many people don't use it for the aforesaid purpose. In most of the cases they store recyclable wastes and other kinds of degradable wastes together and finally all are wasted.
 7. Uncovered vats are responsible for the origin of flies, insects, mosquitoes and their associated diseases. During monsoon wastes are spread over roads mixing with rain water.
 8. There are 5 slum areas in this ward and the slum dwellers live over there very unhygienically.
- They produce huge amount of domestic waste and do not manage properly. As a result, most of the times they are affected by the infectious diseases originated from wastes.
9. KMC authority does not give adequate economic assistance to manage solid waste.
 10. Lastly, unavailability of sufficiently recorded database is one of the major problems in this ward.

Suggestions and Conclusion :

Keeping the above facts in mind it can be said that there are so many challenges and opportunities regarding solid waste management in the ward number 115 which has been upheld from the present study. Most interestingly, the maximum suggestive measures have been recommended by the inhabitants of this ward which have already been stated earlier. And the municipal authority should consider the opinions of their residents seriously in this regard. It must be remembered that a proper management plan only can be executed when local authorities and local people will work together.

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Socio Economic Development in Mizoram : District Level Analysis

C. Nunsiamliani
Rintluanga Pachuau

Abstract: The present study assesses the pattern of disparities in socio-economic development at the district level in Mizoram applying Z score standardized technique through Statistical Package for Social Science (SPSS) which rank the eight districts of Mizoram according to their level of development. Based upon selected socio-economic development indicators, the districts are classified into three levels of developmental categories according to the values of the constructed development index. The results show that wide disparities in the level of socio economic development exist among the different districts of Mizoram. The study suggests that low developed districts require improvement in most of the indicators for improving their level of overall socio-economic development.

Keywords: Disparity, Levels of Development, Development Indicator.

Introduction:

Development is 'of the people, by the people, and for the people'. The socio-economic upliftment of the people is the main objective of any country at any point of time (Majumder et al., 1995). The essence and major objective of socio-economic development is raising the standard of living of all individuals and particularly that of the poor (Thorbecke, 2007). Socio-economic development, therefore, is the process of social and economic development in a society, and the measurement of socio-economic development in its totality presents formidable difficulties even within one country, owing to the difficulty of finding appropriate empirical correlates to one's concept of socio-economic development.

Indeed the very concept has varied from one researcher to another (Ghosh, 1986). Inequality of development occurs at various levels and is considered to be a problem. By 'unequal development' we mean differences in community life-styles and values which may promote or hinder mobility chance (Cote, 1997).

Over the years, there has been an increasing transformation of socio-economic condition of life style of the people in Mizoram. The increased transformation of modern socio-economic conditions of people in Mizoram drastically changed the lifestyle and initiated new possibilities into the society of both urban and rural tribes in Mizoram (Sundaram, 2014). Yet, this transformation is not enough, as

C. Nunsiamliani is an Assistant Professor in the Department of Geography, Government Aizawl North College, Aizawl, Mizoram

Prof. Rintluanga Pachuau is a Professor in the Department of Geography & Resource Management, Mizoram University, Aizawl, Mizoram

there exist large variation in the level of development among the districts in Mizoram. Realizing the importance of the problem of socio-economic disparities that exists in the state, the study measures and compares the levels of socio-economic development at the district level and classifies the districts based on the levels of their development by choosing five indicators, which is mainly governed by the availability of data.

Study Area:

Mizoram, the land of the Mizos is one of the state in India, and the state lies between 21°56'N - 24°31'N latitudes and 92°16'E - 93°26'E

longitudes (Pachua, 2009). It is located in the northeastern part of India, bounded by Myanmar (Burma) to the east and south, and Bangladesh to the west and 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. The total area of Mizoram is 21,087 km² (Pachua, 2009), and this constitutes only 0.64 percent of the total area of India. It became a centrally administered

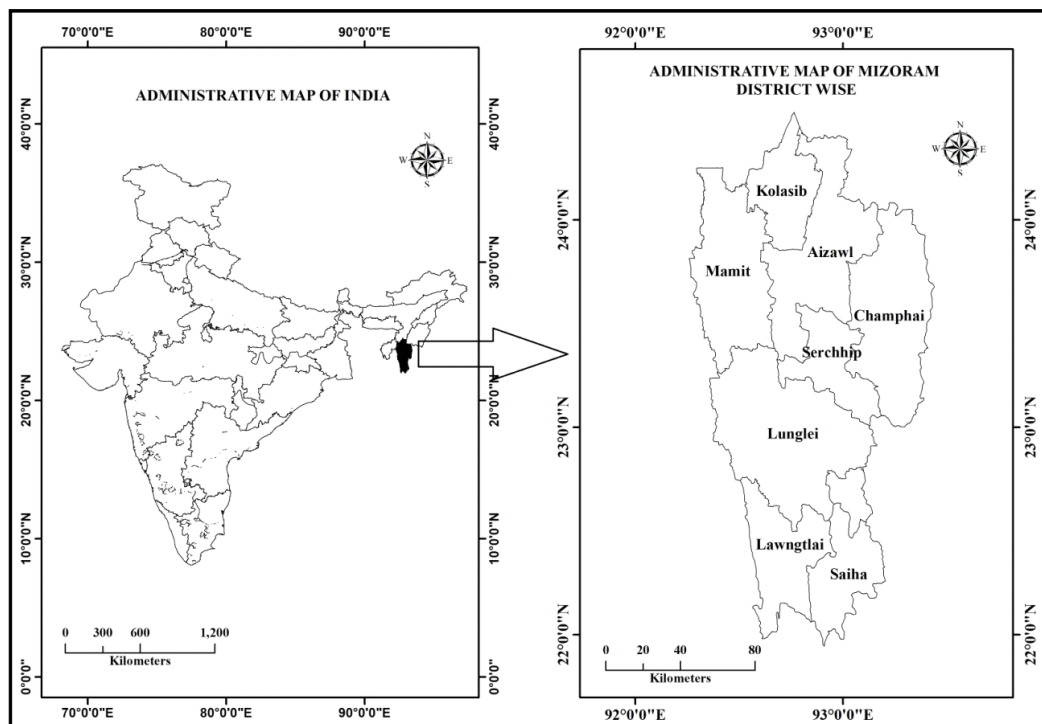


Fig.1. Location Map of the Study Area

union territory on 21st January 1972, and it became the 23rd state of the Indian Union on 20th February 1987. There are only three districts before 2001 census namely Aizawl, Lunglei and Chhimituipui. Later, five districts were created in the year 1998, the districts of Mamit, Kolasib, and Champhai were carved out from Aizawl district, and the district of Chhimituipui is dissolved to form Saiha and Lawngtlai district. Aizawl district is the most populated, and Lunglei has the largest area among the district of Mizoram. The highest mountain in the state, Phawngpui is located in Saiha district, and the district of Mamit houses Dampa Tiger Reserve.

Objectives of the study:

1. To analyze socio-economic indicators
2. To find out the uneven pattern of development
3. To rank the districts according to their level of development

Methodology:

The present paper is based on secondary data which is mainly obtained from District Census Handbook & Primary Census Abstract (2001&2011) published by the Directorate of Census Operations Mizoram, and Statistical Handbook of Mizoram (2004&2012) published by the Directorate of Economics and Statistics, Government of Mizoram. The chosen five indicators are analyzed and presented in the form of car-

tographic characteristics based on Z-score method for classifying the level of development.

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 data matrix into scale free matrix, indicators were standardized by subtracting the mean from each individual variables 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 obtained by adding up of all individual Z-score or standard data as -

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

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

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

$$C_i = \sum Z$$

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

The collected information is also displayed by using cartographic technique like bar graphs.

Selected indicators:

The study is being carried out with five socio-economic indicators as these represent the factor that is part of the process of development. They are- literacy rate, which plays an important role in Mizoram's social change. New ideas and values are initiated by it and become the goals for the young generation to pursue and achieve (Sundaram, 2014). It is a moder-

nization of attitudes in a society, and is one of the main components of Human Development Index (HDI) (Kumar, et al., 2014). Next is work participation rate that indicates the percentage of total workers (main+marginal) to the total population (Census 2001). Third are the medical facilities as health is a very important aspect of development (Gopal, 1992). The fourth in number is drinking water and last but not the least is the power supply.

As per the data analysis, the above indicators are summarized as follows :

1) Literacy Rate: The literacy rate among the districts in both the censuses can be classified like this : High: The district of Aizawl, Serchhip, Champhai and Kolasib are included here. Medium: Three districts of

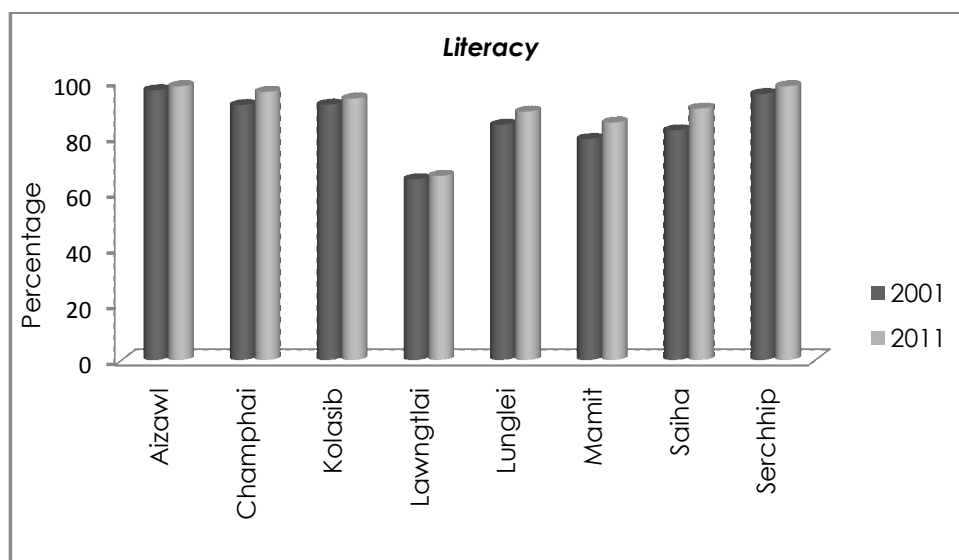


Fig. 2. Literacy Rate, District Level, Mizoram

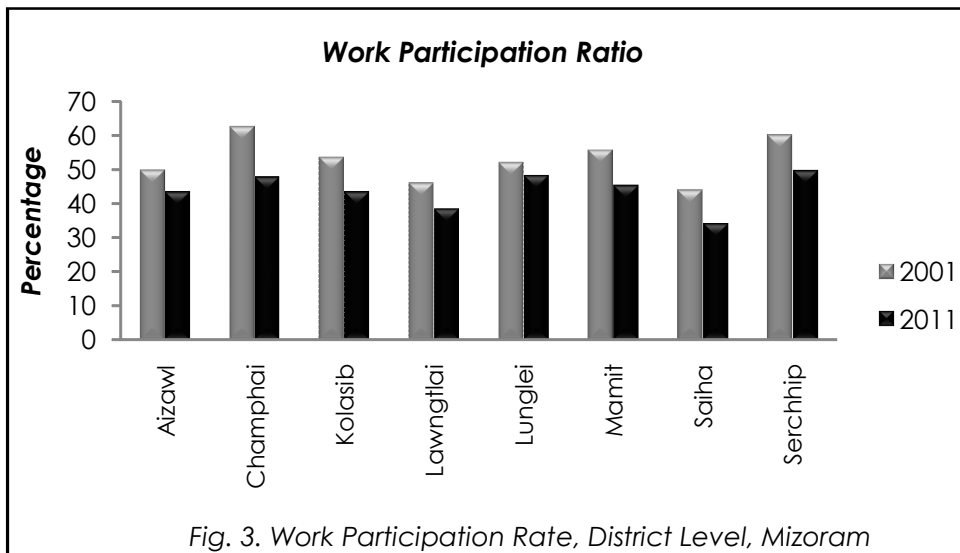


Fig. 3. Work Participation Rate, District Level, Mizoram

Lunglei, Mamit and Saiha are in this category. Low: The district of Lawngtlai alone is found in this class.

includes the district of Lunglei and Aizawl. Low: the districts of Lawngtlai and Saiha are in this class.

2) Work Participation Rate: The work participation rate in both the censuses is: High: Champhai, Kolasib, Mamit and Serchhip districts are in this group. Medium: This level

3) Medical Facilities: The availability of medical facilities among the eight districts in Mizoram can be classified like this: High: The four districts of Aizawl, Champhai, Kolasib and

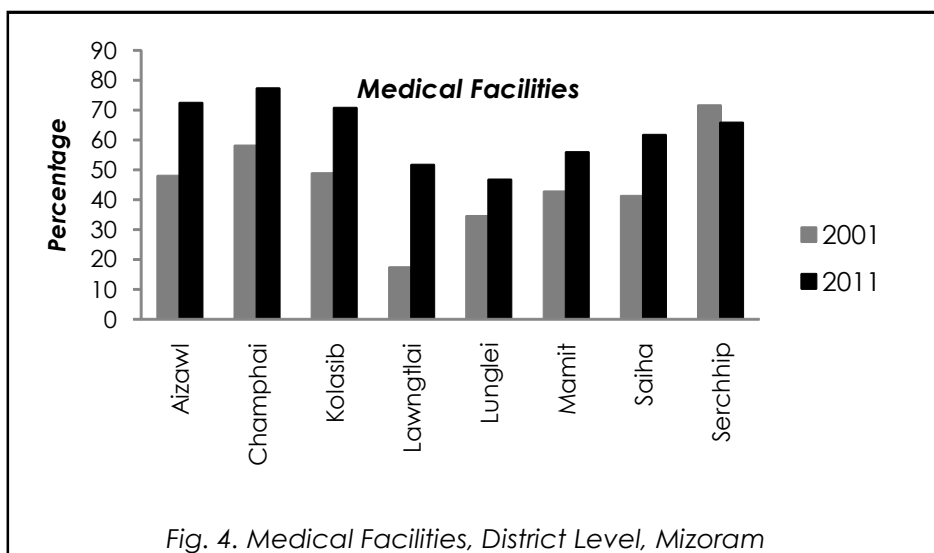
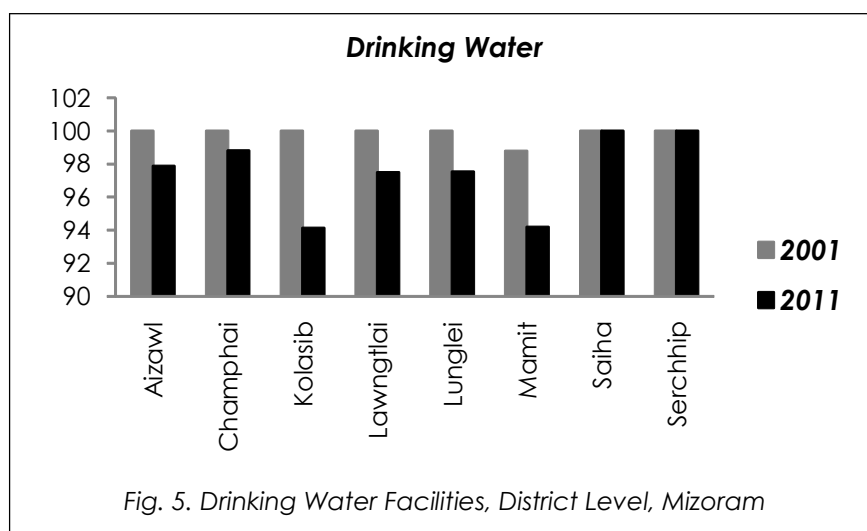


Fig. 4. Medical Facilities, District Level, Mizoram

Serchhip are included. Medium: The two district of Mamit and Saiha are in this level. Low:Lawngtlai and Lunglei district are found in this class.

4) Drinking Water: The state of Mizoram is fortunate to have sufficient quantity of drinking water, though the availability may not be same in various districts. That is the reason why seven out of eight districts are categorized as high level, namely Aizawl, Lunglei, Champhai, Kolasib, Serchhip, Saiha, and Lawngtlai are included in thi and no district are found in the medium class. The district of Mamit is included in the low level in 2001 census. But when we give classification to the latest census of 2011, we have Aizawl, Champhai, Lunglei, Saiha and Serchhip in the high level. Medium level consists of the district of Lawngtlai, and the low level consists of the districts of Mamit and Kolasib.

5) Power Supply: Power supply means domestic electric supply, a village is taken to be electrified if there is at least a single domestic connection within the village (Census 1991). The rank of district in the state are: High: Aizawl, Champhai, Kolasib, Serchhip and Mamit district can be included in 2001 census, however, the district of Lunglei which was found in the medium level in 2001 be capable to be included in the high category in 2011 census. In the same way, the district of Saiha which was found in the low level in 2001 census come up to the medium level in 2011 census. The district of Mamit falls to the low level in 2011 census and Lawngtlai even though increase from 19.42% in 2001 to 41.51% in 2011 census maintain its position to be in the low level.



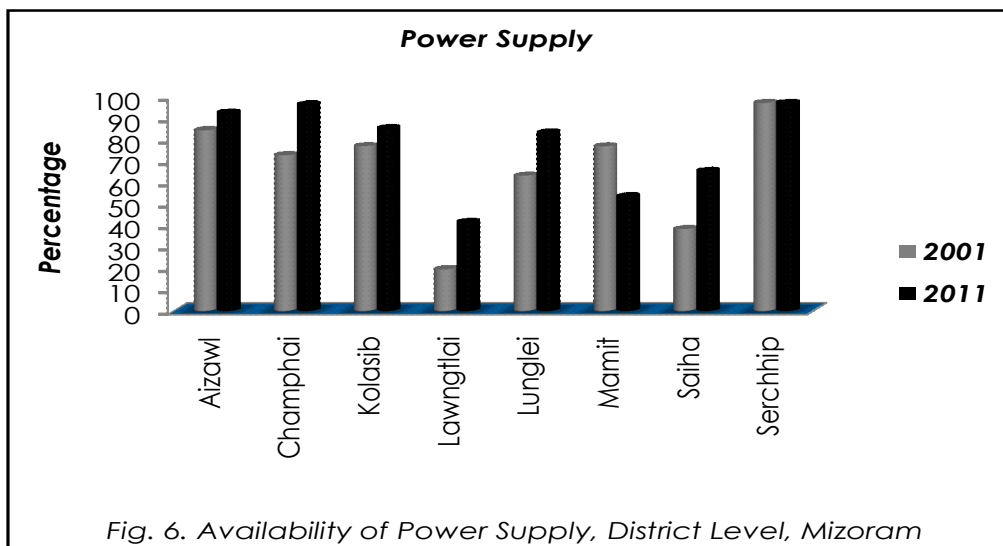


Fig. 6. Availability of Power Supply, District Level, Mizoram

Analysis :

Table 1 presents the figure of selected socio-economic indicators for the districts in per centages for the two decadal censuses of 2001 and 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.

The descriptive statistics for both the censuses are also given in the following table for further references.

Accordingly, the level of development among the eight districts may separately summarized as follows -

Levels of Socio-economic Development, 2001:

1. High Level (>-0.143) : There are four districts in this category, namely

Serchhip, Aizawl, Kolasib and Champhai. Serchhip district scores the highest point in the level of socio-economic development, even higher than the Aizawl district in which the state capital Aizawl is located. This is due to the fact that the district scores higher in case of indicators like power supply and availability of medical facilities than other districts. Next comes Champhai district with the highest score in the number of total workers, high enough in case of medical facilities and drinking water, sufficient to put this district in the category of high level of development. Aizawl district scores highest point in literacy rates. Although the score in the five indicators of Kolasib district is not that high compare to other three districts, yet high enough to be included in this high level of socio-economic development.

Table 1. Values of Selected Socio-economic Indicators, Mizoram

Districts	Literacy		Work participation		Medical		Drinking water		Power supply	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Aizawl	96.51	97.89	50.04	43.63	47.92	72.34	100	97.87	84.37	92.55
Champhai	91.19	95.91	62.86	47.99	57.95	77.11	100	98.8	72.73	96.39
Kolasib	91.34	93.5	53.84	43.68	48.72	70.59	100	94.12	76.92	85.29
Lawngtlai	64.74	65.88	46.31	38.65	17.27	51.57	100	97.48	19.42	41.51
Lunglei	84.17	88.86	52.32	48.5	34.37	46.58	100	97.52	63.12	83.23
Mamit	79.14	84.93	56.01	45.55	42.68	55.81	98.78	94.19	76.83	53.49
Saiha	82.19	90.01	44.19	34.4	41.18	61.54	100	100	38.23	65.38
Serchhip	95.15	97.91	60.38	49.89	71.43	65.71	100	100	97.14	97.14

Source: Census of India 2001&2011(PCA & DCHB).

Table 2. Z-scores of Indicators

District	A		B		C		D		E		CI	CI
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Aizawl	1.048	1.048	-0.496	-0.496	0.171	0.903	0.354	0.163	0.718	0.748	0.36	0.47
Champhai	0.539	0.539	1.487	1.487	0.798	1.348	0.354	0.569	0.261	0.931	0.69	0.97
Kolasib	0.554	0.554	0.092	0.092	0.221	0.740	0.354	-1.475	0.425	0.401	0.33	0.06
Lawngtlai	-1.991	-1.991	-1.073	-1.073	-1.746	-1.034	0.354	-0.008	-1.833	-1.686	-1.26	-1.16
Lunglei	-0.132	-0.132	-0.143	-0.143	-0.677	-1.500	0.354	0.010	-0.117	0.303	-0.14	-0.29
Mamit	-0.614	-0.614	0.428	0.428	-0.157	-0.639	-2.475	-1.444	0.422	-1.115	-0.48	-0.68
Saiha	-0.322	-0.322	-1.400	-1.400	-0.251	-0.104	0.354	1.093	-1.094	-0.548	-0.54	-0.26
Serchhip	0.918	0.918	1.104	1.104	1.641	0.285	0.354	1.093	1.219	0.967	1.05	0.87

Table 3. Descriptive Statistics, 2001

Indicators	N	Minimum	Maximum	Mean	Std. Deviation
Literacy	8	64.74	96.51	85.55	10.45
Workers	8	44.19	62.86	53.24	6.46
Medical	8	17.27	71.43	45.19	15.99
water	8	98.78	100.00	99.84	0.43
Power	8	19.42	97.14	66.09	25.46

Table 4. Descriptive Statistics, 2011

Indicators	N	Minimum	Maximum	Mean	Std. Deviation
Literacy	8	64.74	96.51	85.55	10.45
Worker	8	44.19	62.86	53.24	6.46
Medical	8	46.58	77.11	62.65	10.72
Water	8	94.12	100.00	97.49	2.29
Power	8	41.51	97.14	76.87	20.97

2. Medium Level (-1.257 to -0.143):

This category includes three districts namely Lunglei, Mamit and Saiha. The score of Lunglei district is good in terms of literacy rate and the availability of drinking water, while Mamit score good enough in case of work participation ratio, medical facilities and power supply. The district of Saiha score is also enough in case of availability of drinking water and medical facilities, as such these districts can be categorized as medium level of socio-economic development.

3. Low Level (< -1.257): Only one district falls under this category, i.e the district of Lawngtlai, located in the southwestern most part of Mizoram. It is characterized by low levels of power supply, medical facilities and work participation ratio. Yet, in case of drinking water the district has a satisfactory score like the other district. Still, this indicator alone is not sufficient to make the district to be in the category of other than this level of socio-economic development.

Levels of Socio Economic Development, 2011:

1. High Level (> 0.062): Three districts namely Champhai, Serchhip and Aizawl are included in the high level category. Serchhip district scores highest point in almost all the categories except in the level of medical facilities. On the other hand Champhai has the highest score in case of the availability of medical

facilities. The score of Aizawl district in which the state capital is located score in all the five indicators is good enough, yet, improvement in these indicators can bring the district to higher socio-economic development.

2. Medium Level (-0.676 to 0.062):

There are three districts in this category i.e Lunglei, Saiha and Kolasib. Among this three district Kolasib has the highest literacy rate and medical facilities. Lunglei has the highest number of total workers and the district of Saiha has the highest score in the availability of drinking water. The availability of medical facilities in Lunglei is lowest and Saiha has the lowest work participation ratio.

3. Low level (<-0.676): This category includes the two districts of Mamit and Lawngtlai. The work participation ratio as well as the availability of power supply in Lawngtlai district is very low. Availability of drinking water and medical facilities is low in the district of Mamit which clearly confirm that level of socio-economic development in this two district is low.

Conclusion:

It can be concluded that there is a disparity in the level of socio-economic development among the districts in Mizoram between the two censuses. The three districts of Aizawl, Champhai and Serchhip still maintain the high level of development even after ten years, while Kolasib which was found to be

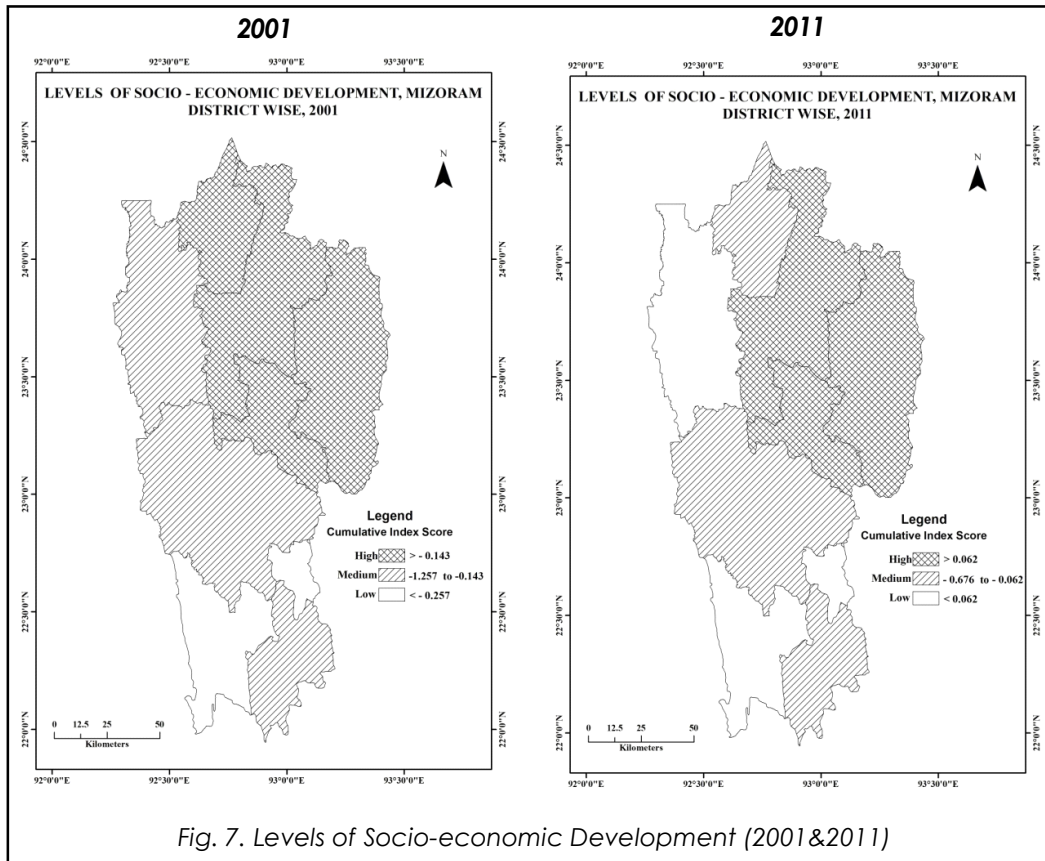


Fig. 7. Levels of Socio-economic Development (2001&2011)

among the high level of socio-economic development in 2001 census fail to maintain its position, and descend to low levels of socio-economic development in 2011 census. It appears from the analysis of indicators that the work participation ratio and drinking water facilities have a declining trend. The other district which failed to maintain its position is the district of Mamit where there is a decrease in almost all the indicators like work participation ratio, drinking water and power supply. The composite development index shows that the

district of Lawngtlai has a low level of socio-economic development in both the two censuses; yet, this district has shown an increase in three indicators out of five indicators chosen. The three indicators are: literacy rate, medical facilities and power supply which are considered to be very important indicators of level of development. Based on these results, it may be suggested that there should be given more attention in the improvement of those districts like Kolasib, Mamit and Lawngtlai, by adopting the policies directed towards rural devel-

opment, as the availability of these indicators is mainly dependent on government actions, so that the situation in the level of socio-economic development in this districts may be better, and hope to reduce the district inequalities exist in the state of Mizoram.

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Towards Self-Sufficiency in Rice: A Comparative Study of Rice Cultivation Practices in Mizoram

Lalrinpuia Vangchhia¹
Immanuel Lawmchullova²

Abstract: Agriculture has been traditionally a subsistence profession in Mizoram. The self-sufficiency in rice production are not yet to achieve due to low productivity resulting from several factors like steep slopes, erratic rainfall, high degree of soil erosion, shallow soil depth, inaccessible terrain and system of rice cultivation. The main aim of the present study is to find out the most suitable rice cultivation system by comparing the three existing rice cultivation system viz. Shifting, Wet Rice Cultivation (WRC) and System of Rice Intensification (SRI) methods in Mizoram to achieved self-sufficient. The study tries to find out the best practices of rice cultivation system in terms of productivity, problems and prospects among the three cultivation methods. Field surveyed was conducted during the ends of 2018 by employing a concrete scheduled. Z-score Standardize techniques, Pearson's co-efficient of correlation, percentile and simple arithmetic have been used to analyzed data. The study finds System of Rice Intensification is the best suited method to attain self-sufficiency in rice among the three cultivation methods.

Keywords: Agriculture, Shifting cultivation, Wet Rice Cultivation, System of Rice Intensification, self-sufficiency

Introduction:

Over the past few decades, a number of policies seeking to replace shifting cultivation with alternative rice cultivation systems have been implemented in Mizoram. However, none of them has succeeded against traditional shifting cultivation in terms of productivity, economic feasibility and popularity; these policies have failed because of a lack of interest by shifting cultivators (Jhumias) for one or another reason. Moreover, many of these policies have been implemented for only a very short

time of less than five years before being replaced by a new one. There were administrative reasons for this, but there is one exception (Tripathi et al., 2018).

Economy of Mizoram is mainly dependent on the traditionally cultivating cereal crops. It served as the main occupation with traditional shifting method regionally known as jhumming. In 1991 census, people who are involved in agricultural activities as their main occupation constituted 27.33 per cent of the total population of the state accounting for as much as 64.62 per

¹**Dr. Lalrinpuia Vangchhia** is a Guest Faculty in the Department of Geography and Resource Management, Mizoram University, Aizawl, Mizoram

²**Immanuel Lawmchullova** is a 4th Semester Student in the Department of Geography and Resource Management, Mizoram University, Aizawl, Mizoram

cent of the total main workers. In 2001 the workers in agricultural sector account for 31.86 per cent of the total population, showing 60.60 per cent of the working population (Pachuau, 2009). In 2011 census agricultural laborers and cultivators accounts 28.08 per cent of the total population of the state (Statistical handbook, 2018).

For present the total consumption of rice in Mizoram is 1, 80,000 MT whereas, it produces only 44,950 MT rice (25%). During the past decades, 58.1 per cent area under shifting cultivation in the state has been decreased (from 68,114 ha in 1997-98 to 28,562 ha in 2010-11). Meanwhile, the area under wet rice cultivation has been increased by 28.4 per cent (from 9,446 ha to 12,130 ha) in 2010-2011. The share of shifting cultivation in net sown area was calculated about 38.64 per cent during the recent past. The fallow cycle under shifting cultivation has been decreased from 20-25 years to 2-3 years. It is now more intensive and frequent. Therefore, it has put excessive burden on the land thus, soil fertility has been reduced. As a result, the production and per ha yields of cereal crops and vegetables have been decreased considerably. In Mizoram, the economic life of the people has always been centered on shifting cultivation. It is their way of life (Sati, 2017).

Changing agriculture and cropping pattern worldwide has become an issue of debate. A

number of studies have been conducted about changes in agriculture and cropping pattern and the driving forces. However, no substantial work has been carried out on rice and cropping pattern in Mizoram so far (Sati, 2017). Rice cultivation is characterized by Jhuming cultivation, which is practiced in the hilly terrain with high slope gradient areas. It is the main occupation and a major source of rural livelihoods and thus it is called the way of life of Mizos. However, it leads to unsustainable. Under this practice, ownership of Jhum land remains with the local self-government. Keeping these hindrances in mind, the state government launched a New Land Use Policy in 1985 which aimed to make agriculture practice more permanent and sustainable. Arable land was allotted to the rural marginal farmers at permanent basis. As a result, about 50.8 per cent cropped area and 24 per cent crop production in Jhuming cultivation was reduced. Further, a substantial increase in area (48%) and production (41%) of crops grow as WRC was registered and finally, agriculture and cropping pattern have been changed during the period. However, the proportion of arable land that has been allotted to marginal farmers in permanent basis was substantially less (Sati, 2017). System of Rice Intensification (SRI) was introduced in 2005 and it increased the productivity of rice.

The present study compares the three methods of rice cultivation practices such as Shifting cultivation, Wet Rice Cultivation (WRC) and SRI. It tries to find the best suitable methods of rice cultivation practices in order to achieved self-sufficiency. It also tries to identify the most suitable cultivation method for farmers itself as well as the state benefit. The study was mainly concentrated on rice cultivation as it is the staple food in the state as well as self-sufficiency is a matter of security for peopling. Production, productivity, problems and prospects etc. have been compared to find out the most suitable agriculture system. Socio-economic conditions among the three cultivators were measured to identify most economic viable cultivation.

Objectives:

Major objectives of the study are

1. To study pattern of rice cultivation in Mizoram
2. To examine methods of rice cultivation practices in Kolasib town
3. To find out the problems and prospects of rice cultivation in the study area
4. To identify the suitable method of rice cultivation

Methodology:

Methodology of the study includes selection of the study area, data collection, sampling and sample size, data processing and

graphical representation. Both quantitative and qualitative studies have been used to accomplish the study. Primary information for rice cultivation system viz., Shifting, Wet Rice Cultivation, and System of Rice Intensive Cultivation have been collected from 30 households by cluster sampling method. Household were equally divided into three clusters such as Shifting, WRC and SRI cultivators and data were collected through door-to-door household survey adopting well designed scheduled during the end of 2018. Kolasib town was selected for case study because it is regarded as the area where SRI is widely practiced in the state. Information from three major methods of rice cultivation practices such as shifting cultivation, WRC and SRI in the study area have been collected. Data like socio-economic, rice cultivation methods as well as major problems and prospect of the different cultivation systems were also collected to find out the most suitable agriculture practice. Secondary data has also been collected from Census of India, Statistical hand book, Agriculture abstract etc. The collected data were analyzed by using statistical techniques like percentile, sum, average and simple arithmetic for calculation of general observation. Z- Score standardized techniques has been applied to measure level of socio-economic condition among different cultivators (Prasad, 2015). Pie diagram, histogram, line graph etc.,

were used for graphical interpretation of the variables through Microsoft excel.

Study Area:

Kolasib District lies in the northernmost part of Mizoram and extent between 23070' degree and 24050' N latitude and 92050' E longitude. It is bounded by Cachar District and Hailakandi District, Assam on the North and North West, respectively, on the south east by Aizawl District, Mizoram and on the south west by Mamit District, Mizoram. The location of the district occupies an important site as it is the main stream of road communication from other state of Mizoram. National Highway No.54 passes through the middle of the district from north to south direction. The only rail head in the state is located at Bairabi, and the only center for Military Counter Insurgency & Jungle Welfare School in the country is located at Vairengte, which is the largest and well known to the whole of Asia as well as other countries of the world. Agriculture is the most important land use in the district, which is done through WRC and jhum or primitive method of cultivation (Shifting) and about 75 per cent of the total population depends upon agriculture. About 984.00 hectare of land is recorded as irrigated land, 4752.01 (approx.) hectare of land is covered by WRC (developed and to be developed). Most of the cultivated area in the district is under cereal cultivation

mainly rice, other crops include pulses, fruits, vegetables, arecanut, etc. Kolasib town is the second largest arable plain in Mizoram and the largest WRC cultivator next to Champhai. According to 2016-2017 Agriculture Statistical Abstract of Mizoram, from the Wet Rice Cultivation area is 4342 hectares and production is 9118 metric tonnes. Jhum cultivated area is 1376, production of rice is about 1843 metric tons. System of Rice Intensification reported area is about 50 hectares, most of them, are although practice WRC as well, both practice hand in hand, but the area is small sizes in compare to other system.

Result and Discussion:

Socio-economic Condition Cultivators (Shifting Cultivation, WRC and SRI):

Socio-economic comparison have been done by selecting some indicators like availability of household assets like Television, Fridge, Washing Machine, Computer, Internet, Mobile Phone, Bank account, Gas connection, Water connection, Long Chair/Sofa and RCC. Father's education, Mother's education, occupation, annual income and annual expenditure were also measured. Applying data obtained for the above indicators are applied to z-score standardize techniques. The results so obtained are as given for the following table (Table 1).

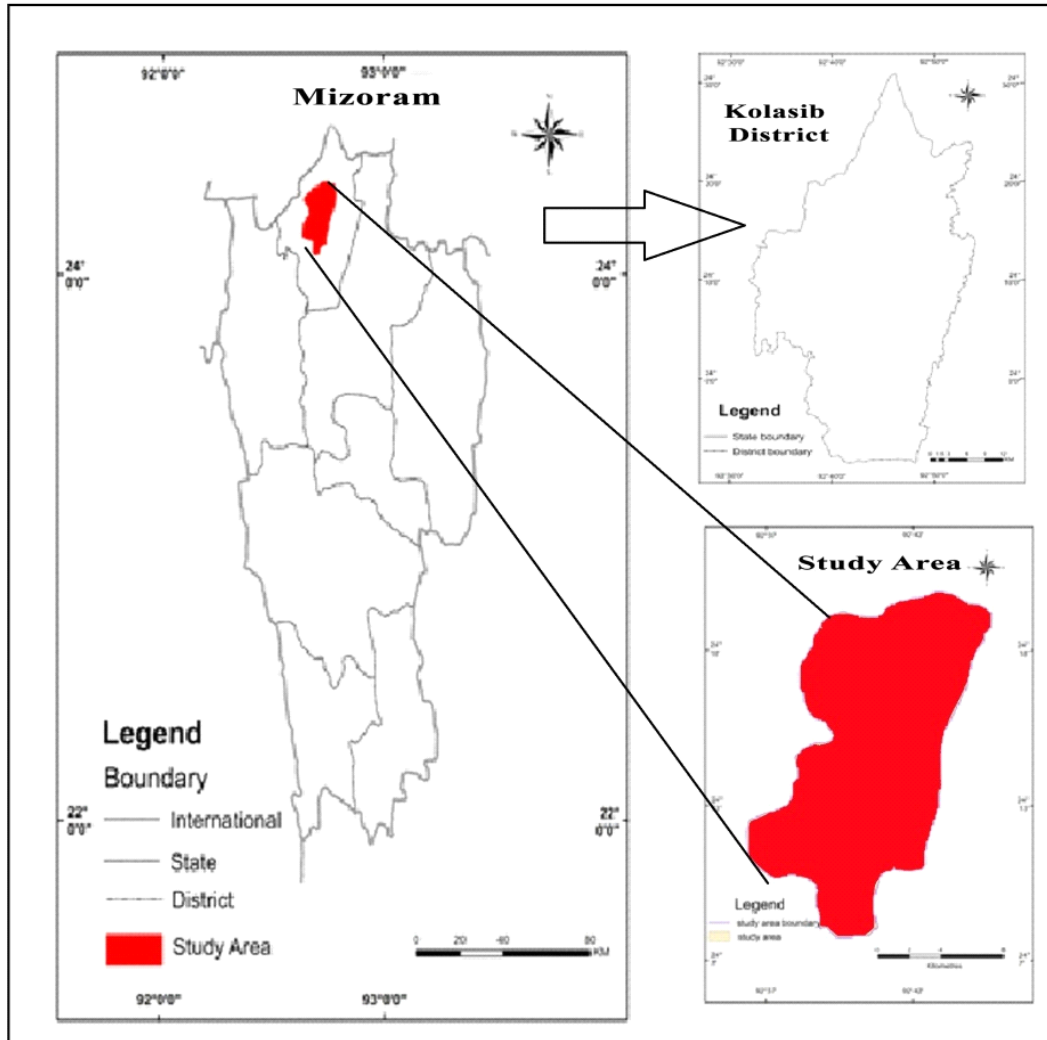


Fig. 1. Location Map of the Study Area

Again, composite score of the three cultivators were calculated by same selected socio-economic indicators. Cultivators are code by alphabetic such as Shifting cultivators were coded by alphabet A to J, WRC by K to T and SRI by A1 to J1 (Table 2).

Accordingly, cultivators are

divided into three economic classes such as high, moderate and low. The high socio economic status comprises three cultivators from WRC such as L (1.90), Q (0.83), R (0.76) and one from SRI i.e., E1 (1.94). It means no shifting cultivators are high socio-economic condition. Moderate composite score about twenty

Table 1. Descriptive Statistics on Socio-economic Indices (All Cultivators)

Indicators	N	Minimum	Maximum	Mean	Std. Deviation
Television	30	1.00	2.00	1.4000	.49827
Fridge	30	1.00	2.00	1.4667	.50742
Washing Machine	30	.00	2.00	1.0667	.52083
Computer	30	.00	3.00	1.0000	.83045
Internet	30	2.00	6.00	3.7333	1.11211
Mobile Phone	30	2.00	6.00	3.8667	1.04166
Bank Account	30	1.00	8.00	3.2667	1.65952
Gas Connection	30	1.00	3.00	1.3667	.55605
Water Connection	30	.00	2.00	1.0333	.41384
Long Chair/Sofa	30	2.00	12.00	6.3667	2.20475
RCC	30	.00	1.00	.5000	.50855
Father's Education	30	.00	1.00	.4333	.50401
Mother's Education	30	.00	1.00	.2333	.43018
Govt. Employment	30	.00	1.00	.3333	.47946
Annual Income	30	.00	1.00	.9333	.25371
Annual Expenditure	30	.00	1.00	.8000	.40684

Source: Field Survey, 2018

Table 2. Composite Score (All Cultivators)

Cultivators Shifting	Composite Score	Cultivators WRC	Composite Score	Cultivators SRI	Composite Score
A	-0.64	K	-0.74	A ₁	-0.28
B	-0.01	L	1.90	B ₁	0.20
C	0.04	M	0.21	C ₁	0.12
D	-0.56	N	0.05	D ₁	0.22
E	-0.65	O	0.43	E ₁	1.94
F	-0.13	P	-0.16	F ₁	0.18
G	-0.31	Q	0.83	G ₁	-0.23
H	-0.83	R	0.76	H ₁	-0.43
I	-0.07	S	-0.18	I ₁	-0.18
J	-0.86	T	-0.30	J ₁	-0.31

Source: Field Survey, 2018

one cultivators which is 70 per cent of the total selected cultivators. Moderate socio economic status is comprise by the combination of six shifting cultivators such as B (-0.01), C (0.04), D (-0.56), F (-0.13), G (-0.31), I (-0.07), six WRC cultivators such as M (0.21), N (0.05), O (0.43), P (-0.16), S (-0.18), T (-0.30) and eight SRI cultivators viz., A1 (-0.28), B1 (0.20), C1 (0.12), D1 (0.22), F1 (0.18), G1 (-0.23), H1 (-0.43), I1 (-0.18) & J1 (-0.31). Low socio-economic condition accounts 16.66 per cent of the total cultivators comprise by four shifting cultivators such as A (-0.64), E (-0.65), H (-0.83), J (-0.86) and one WRC cultivators i.e., K (-0.74) as shown in table 3.

Productivity Comparison (Shifting and WRC):

By comparing the two existing major rice cultivation system in the whole state i.e., WRC and Shifting cultivation, productivity found higher in WRC than Shifting cultivation every year. At the same time rice productivity declining trends found 2000 to 2018 in both of the two by 10.50 per cent and 12.91

per cent respectively. By comparing the year 2000 and 2018, productivity decline has been found for both of the two cultivation practices like 7.69 per cent in shifting cultivation methods and 14.29 per cent in WRC methods (Fig.2).

By comparing productivity, though WRC contribute highest in actual production (21010 kg), the yield per Hectare (1240.602 kg/ha) is lower than SRI methods (1338.65 kg/ha) by 3.8 per cent as shown the figure 3. Productivity of rice found very low in shifting cultivation (796.25 kg/ha) as compared to WRC and SRI methods.

Problems and Prospects:

Shifting Cultivation:

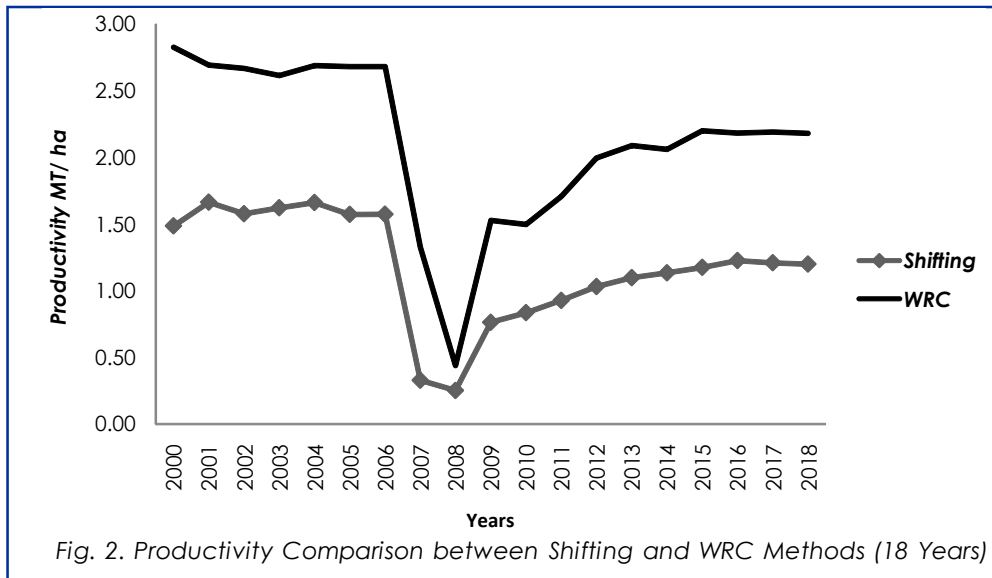
Major problems found among the shifting cultivators are less productivity (10%), financial problems (10%), livelihood unaffordable (70%) and others factors like environmental degradation, lacks in transportation, and not feasible in marketing etc., (10%). 80 per cent of the farmers still wants to continue shifting cultivation but other 20 per cent like to stop cultivation as in the

Table 3. Levels of Socio-economic Condition (Overall)

Index	Levels	Cultivators
0.5 & Above	High	L, Q, R & E ₁ (13.34%)
-0.5 to 0.5	Moderate	B, C, D, F, G, I, M, N, O, P, S, T, A ₁ , B ₁ , C ₁ , D ₁ , F ₁ , G ₁ , H ₁ , I ₁ & J ₁ (70%)
-0.5 and below	Low	A, E, H, J & K (16.66%)

Source : Field Survey, 2018

Cultivators: A-J= Shifting Cultivators, K-T= WRC, A₁-J₁= SRI



same methods (Fig. 4).

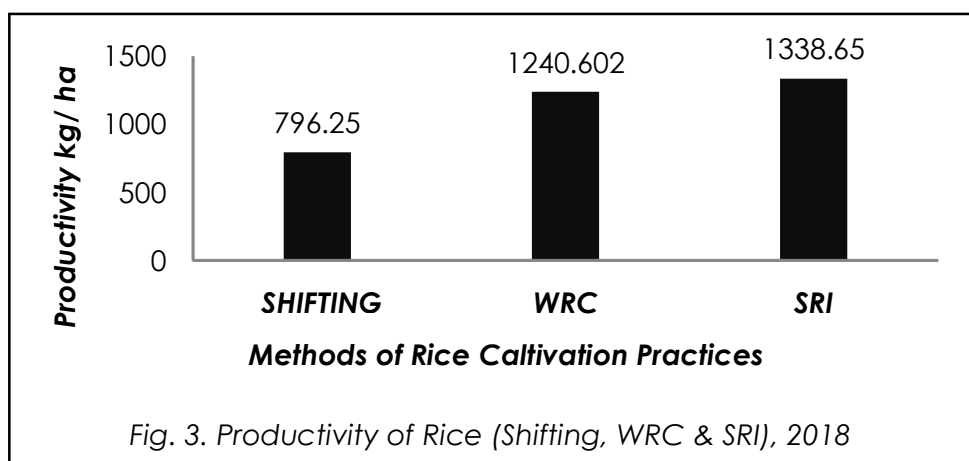
Wet Rice Cultivation (WRC) :

Livelihood related problems (like floods, drought, uncertain rainfall, shortage of land, increasing population pressure, lack of machineries etc.) accounts 90 per cent of the total major problems faced by WRC cultivators. The remaining 10 per cent are others

problems. Almost all farmers (90%) still wants to continue WRC methods while other 10 per cent wants to change to other method of cultivation (Fig. 5).

System of Rice Intensification (SRI) :

Livelihood related problems like difficulty of land maintenance, geographical issues, lack of irrigation facilities and lack of



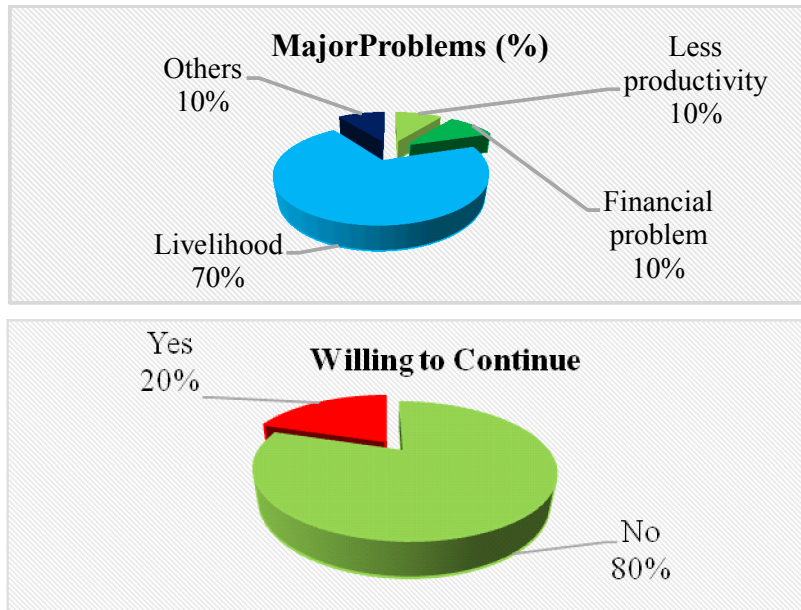


Fig. 4. Problems and Prospects of Shifting Cultivation, 2018

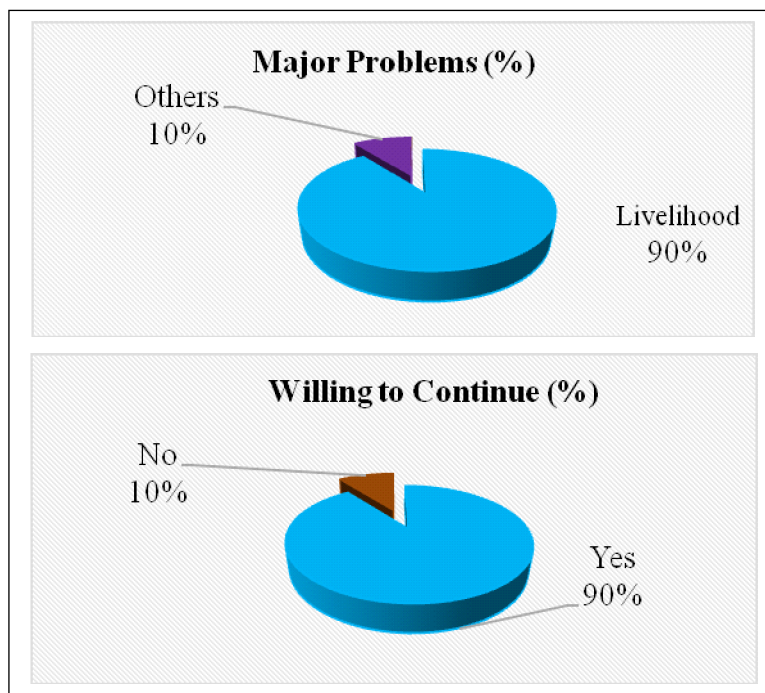


Fig. 5. Problems and Prospects of WRC, 2018

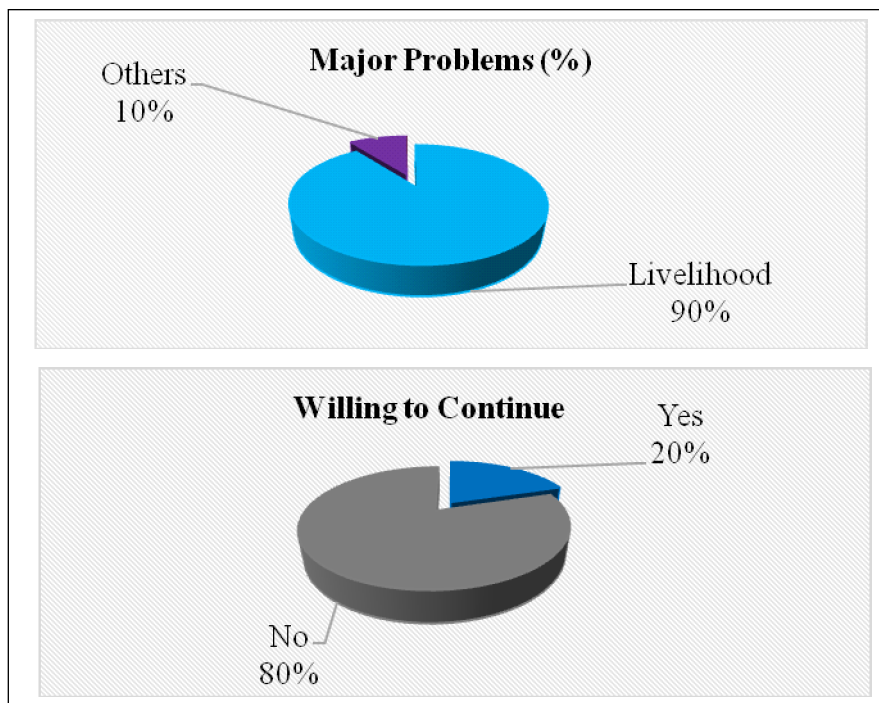


Fig. 6. Problems and Prospects of SRI

equipment comprise 90 per cent of the major problems faced by the cultivators. The other problems like insufficient labor skill and time, difficult to maintain watering of crop etc accounts 10 per cent. 80 per cent of the total selected farmers like to continue the system while 20 per cent wants to change the method (Fig. 6).

Farmers Perception on Best Cultivation Practices:

According to farmer's opinion, WRC is the most suitable practices for rice cultivation to achieved self sufficiency. Comparing the three system of rice cultivating method in terms of areas, production,

productivity, income and expenditure, manure and fertilizer needed, irrigation needed, labor force and easier method, 83.33 percent of the total farmers choose WRC method, and the other 16.67 per cent choose SRI method while no cultivators prefer Shifting Cultivation (Fig. 7).

Adoption of SRI and Farmers Condition:

By Comparing before and after adoption of SRI methods among the cultivators in the study area, beside productivity, persons involved have been decline after SRI (i.e., in normal WRC) for the same amount of production by 9.09 per cent, workforce was also reduced by

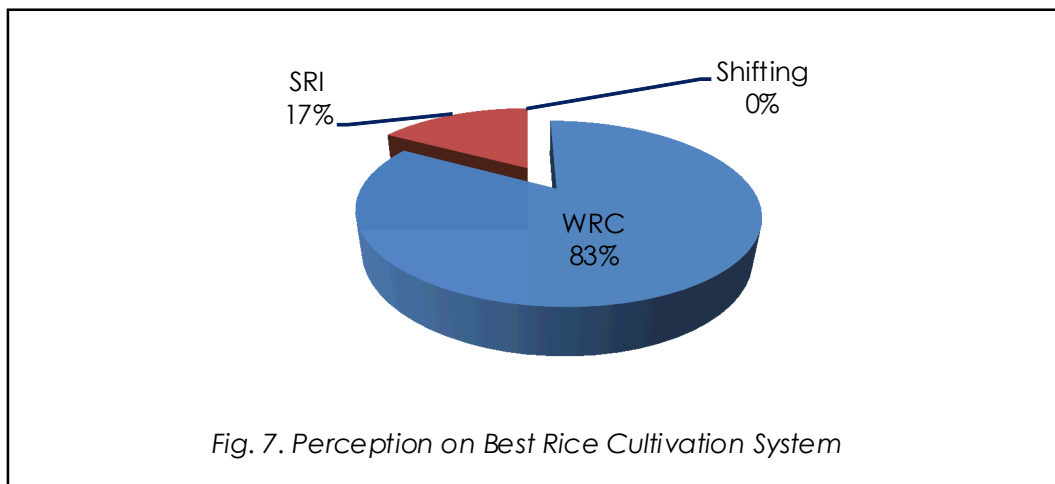


Fig. 7. Perception on Best Rice Cultivation System

Table 4. Farmer Condition Before and After Adoption of SRI Method

Farmer's Condition	No. of Person Involved	No. of Workforce	Annual Expenditure (Rs)	Fund Received (Rs)
Before SRI	12	400	50000	46500
After SRI	10	250	35000	60000
Change in %	-9.09	-30.00	-21.43	12.68

Source : Field Survey, 2018

18.75 per cent. The annual expenditure was also decline by 15 per cent while the fund received after SRI was higher than before by 12.68 per cent (Table 4).

Conclusion:

In the study area, most of the farmers need to continue rice cultivation for their livelihood because they have no other option to sustain their living. Shifting cultivation has been started from their ancestor, WRC system in the middle of 19th century whereas SRI methods only from 2005. The study realized that shifting cultivation failed to achieve self sufficiency mainly due to low productivity (Fig.

2) and other factors like shifting cultivation is economically not viable as shown in table 3, whereas, as much as 20 per cent of the shifting cultivators are not willing to continue (figure 4). Again 100 per cent of the shifting cultivators have a clear perception that is not dependable (Fig. 7).

Towards self-sufficiency, WRC and SRI methods are competing to each other. Most of the farmers opine that WRC method is best practices among the three systems of cultivations other than Shifting and SRI (Fig. 7). It is also highly economically viable as compared to other types of cultivation (table

3). The number of cultivators who wants to continue the method is also very high (i.e., 90%). Meanwhile productivity is highest under SRI method of cultivation other than Shifting (25.41%) and WRC (3.8%). Government financial aid is never received by the shifting cultivator and WRC like SRI cultivator. After adoption of SRI method, even in a small span of time the persons involved declined by 9.09 per cent, workforce by 30 per cent and annual expenditure by 24.43 per cent for the same plot of cultivated land. On the other hand the fund received was increased by 12.68 per cent (Table 4).

However to achieve self-sufficiency in rice, the study recommend SRI method of cultivation by the way of higher productivity and fundable from government. Though WRC was chosen by the farmers because of economically viable and easy methods, the productivity is declining day by day (Fig.2). The fertility of land is also likely to be degraded. So that even requiring skill and financial involvement SRI method would be most suitable to achieve self sufficiency in rice for the study area and Mizoram. To improve production of rice, it requires Government intervention, farmer co-operation, skill development training to cultivators, better policy formulation, adoption of modern technologies, use of high

quality seeds, sufficient irrigation system. With the improvement of these things, the farmers would be able to come up with higher productivity which will greatly change the productivity pattern.

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