# Freshwater Aquaculture 06

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## Settings

Indian aquaculture has grown at a faster pace of almost 5.5 per cent per year consistently since last 50 years. In some of the years the growth rate in the aquaculture was recorded as high as 9 per cent. Indian aquaculture has demonstrated a six and half fold growth over the last two decades, with fresh water aquaculture contributing over 95 per cent of the total aquaculture production and more than half of the national fish production. The three Indian major carps, namely catla (*Catla catla*), rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*) contribute the bulk of production with over 1.8 million tonnes (FAO, 2003) Average national production from fresh water ponds has increased from 0.6 tonnes/ha/year in 1974 to 2.9 tonnes/ha/year by 2009–2010 (DAHDF, 2010), with several farmers even demonstrating production levels as high as 8–12 tonnes/ha/year. For the newly introduced fishes like Pangus the production recorded was as high as 25 tonnes/ha/yr. At the national level as well as in state level, the production and productivity has been on the rise over a period of time. Backed by new policies like Fish Farmers Development Agencies (FFDA), National Fisheries Development Board (NFDB) and state initiatives, there are enough incentives to increase the productivity of fish per unit water areas.

Traditionally aquaculture has been mostly limited to the stocking of the mixed natural seed in the natural impoundments of small water bodies in eastern India. The practice of collecting natural seeds was highly uncertain and risky, yielding very low level of the production. In the past the availability as well as consumption was confined to a large extent with the availability of the fishes from the inland as well as coastal areas. But, with the increased preference for the fish as delicacy and nutritive food the demand for fish has been on rise and the Indian Aquaculture Research System responded to it by generating technology relevant to the resource and time. Over a period of time since seventies, many technologies were being produced by the research system and among them two technologies i.e. induced breeding and composite fish culture, these two basic technologies for seed production and fish husbandry needs special

mention. Both of these technologies and many adaptations there of were able to revolutionize the freshwater aquaculture sector of the country.

Aquaculture in India can be divided into low, moderate and high input based production system with the average productivity of 2 t, 5 t and 8 t per ha per year respectively. At present we are utilizing about half of the available 2.36 million ha water bodies available in the form of the ponds and tanks. These figures are highly underestimated owing to large number of other types of the water bodies being used for the aquaculture as well as large number of the water bodies being carved out on almost daily basis. In addition, the traditional community and multi stakeholder water bodies like small irrigation structure, water harvesting structures, wetlands etc are being put under aquaculture practices.

In India, there is enough scopes for the horizontal as well as vertical expansion of the aquaculture as the average aquaculture production can be increased from 3 to 6 t per ha and total area can be increased from 1.2 million ha to 2.5 million ha. Therefore, the aquaculture provides a considerable opportunity for increasing income and employment to a large number of people. Considering the substantial contribution, aquaculture makes socio-economic development in terms of income and employment through the use of unutilized and under utilized resources in several regions of the country. Environment friendly aquaculture has been accepted as a vehicle for rural development, food and nutritional security for the rural masses. It also has immense potential as a foreign exchange earner. Greater R&D support with strong linkages between research and development agencies, increased investment in fish and prawn hatcheries, establishment of aquaculture estates, feed mills and ancillary industries have all been identified as important areas for maintaining the pace of growth of the sector (FAO, 2011). The implication of aquaculture on the income, employment and livelihoods is context specific, as the level of adoption of the technology, investment and methods greatly determine income and employment. Extensive aquaculture is carried out in comparatively large water bodies with stocking of the fish seed as the only input for utilizing natural productivity produces employment mostly in harvesting, where as in the water bodies many inputs were used. In the intensive system, the employment is generated in input production, input supply, aquaculture management, harvesting and marketing. Therefore, with the increase in the productivity and investment the income and employment generating capacity increases substantially.

Although aquaculture in India has reached the status of an industry, a database with details of human resources in aquaculture and allied sectors is lacking due to the dispersed nature of aquaculture resources and non-availability of a suitable mechanism for data collection. In a study conducted in six major aquaculture producing Indian states (Andhra Pradesh, Haryana, Karnataka, Orissa, Uttar Pradesh and West Bengal), Bhatta (2003) the reported the age of fish farmers ranged from 38 years in Andhra Pradesh to 58 years in Haryana with a national average of 47 years. The educational status of these fish farmers varied from 0–10 years of schooling, a large percentage of these fish farmers practice aquaculture on a part time basis with their involvement in the activity ranging from 17 man-days per annum in Karnataka to the highest of 75 man-days in West Bengal. This study also inferred that fish farming, though a part time activity, contributes to a major share of income of these fish farmers, ranging from 14.98 per cent in Orissa to 95.26 per cent in Andhra Pradesh, with an average of 79.66 per cent (FAO, 2011). This study in no way is a comprehensive assessment of the socioeconomic status

of the fish farmers in India. The structure of the industry and human resource dynamically varies along spatial and temporal dimensions.

The aquaculture operations are more keen to agriculture than other fisheries activities. A large number of the small scale farming of aquaculture operate in a small portion of the agricultural land. Small scale operators operate at about 1-2 ha where as medium scale operations is between 2 to 5 ha of water areas. But in the Kolleru lake areas of the Andhra Pradesh the pond size of 25 to 50 ha is common. At the smaller level the aquaculture is only a household activity for utilization of the farm by products and limited amount of the inputs. But the medium level operators were for the local markets and the large scale intensive operators operates in the high production, high volume and commercial basis.

While carp form the most important species farmed in freshwater in India, it is the shrimp from the brackish water sector which contributes the bulk of the production. The three Indian major carps, namely, catla (*Catla catla*), rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*) contribute as much as 87 per cent of the total Indian aquaculture production. Introduced during the 1970s into the carp polyculture systems in the country, three exotic carps namely, silver carp (*Hypophthalmichthys molitrix*); grass carp (*Ctenopharyngodon idellus*) and common carp (*Cyprinus carpio*) now form a second important group, together constituting as much as 0.169 million tonnes (2002). In spite of the fact that the country also possesses several other cultivable medium and minor carp species which show high regional demand, including, *Labeo calbasu, L. fimbriatus, L. gonius, L. bata, L. ariza, Cirrhinus mrigala, Puntiuss arana, Hypselobarbus pulchellus, H. kolus* and *Amblypharyngodon mola* as well as several others, commercial farming of these species has been almost non-existent (Ayyappan and Jena, 2003).

The present study of the assessment of literacy, income and health status of the fish farmers of India is the first of its kind in which a large sample of the households were studied across six states i.e. Assam, West Bengal, Orissa, Andhra Pradesh, Punjab and Tamil Nadu representing major states, region and types of aquaculture system in India. It presents aquaculturists as diverse group with diverse family welfare performance. Therefore, the comprehensive assessment of the socio-economic status of the aquaculture will give a new insight into the important aspect.

## Sampling and data collection

The fresh water aquaculturists consist of a diverse group of farmers from very small backyard fish culturist to large commercial operators. At one end, the aquaculture is small scale household activity and subsistence in nature while at the other it is a large scale corporate farming providing fish to the urban centres of the country. The variability in size, scale, integration, region, location etc makes fish farmers a highly diverse group. Among them, the regional variability is the most important one as types of resources, nature of farming and socio-cultural milieu is region specific. The developmental policies are under the jurisdiction of the state government. Therefore, state is an important unit in characterizing fish farmers in India. In the study, samples were drawn from Orissa, West Bengal, Assam as eastern and northeastern states; Andhra Pradesh and Tamil Nadu as south Indian states, and Punjab as north west state. In each state, the selected districts were sampled to make a fair representation

of the region. A total of 502 samples were collected across six states. The details of the samples are presented in the Table 6.1.

Table 6.1: Sampling distribution of fish farmers of India

| Sl. No. | State | District | Samples |
|---|---|---|---|
| 1. | Orissa | Cuttack | 16 |
| | | Khurda | 21 |
| | | Boudh | 13 |
| | | Anugul | 10 |
| | | Sonepur | 19 |
| | | Puri | 22 |
| | | Total | 101 |
| 2. | Punjab | Ludhiana | 29 |
| | | Fatehgarhsahib | 7 |
| | | Patiala | 13 |
| | | Total | 49 |
| 3. | West Bengal | 24 paragana (N) | 100 |
| 4. | Assam | Nagaon | 32 |
| | | Barpeta | 45 |
| | | Morigaon | 21 |
| | | Kamrup | 2 |
| | | Total | 100 |
| 5. | Tamil Nadu | Tanjevur | 36 |
| | | Tirunelveli | 30 |
| | | Changelpettu | 36 |
| | | Total | 102 |
| 6. | Andhra Pradesh | Krishna | 50 |
| 7. | Grand Total | | 502 |

Orissa is an important state for the freshwater aquaculture in the country. It is among the few states with all types of the fisheries resources like fresh water/inland capture and culture, marine capture and culture and brackish water marine and culture. Among them, the fresh water aquaculture is important from the domestic consumption point of view. The sectors are dominated by ponds and tanks. There are eight agro climatic zones in Orissa but primarily the state can be divided into coastal and interior regions. The coastal regions are plain lands where as the interior areas were mostly plateau or hilly regions. Therefore, in the present project two sets of the samples were made from the coastal and interior regions. In the coastal regions, the districts of Cuttack, Khurda, Puri were chosen where as for interior region the districts of Boudh, Anugul, and Sonepur were selected for sampling in the project. A total of 101 samples were collected out of which 59 were from the coastal and 42 were from the interior districts.

Andhra Pradesh, an east-coastal state in southern India leads the country in carp culture, shrimp culture and also scampi culture. Andhra Pradesh ranks first in coastal aquaculture and fresh water aquaculture. It ranks second in fresh water fish production and overall value of fish/prawn production. Andhra Pradesh contributes nearly 40 per cent of the total marine exports of the country. Inland resources comprise 102 reservoirs of which 7 are large, 26 are medium and 69 are small reservoirs. Indian major carp culture in earthen dug-out ponds represents the first phase of aquaculture in the state which has sustained for more than quarter of a century. Because of rapid expansion and intensification, by 2010, the carp culture area increased to about one lakh ha. Almost 98 per cent of the carp culture in the state developed in and around the largest fresh water lake in India, the Kolleru, which extends between the Krishna and Godavari districts and is now recognized as the fish bowl of India. This region together can be regarded as Krishna-Godavari delta (KG). The samples were drawn mostly from Krishna district of KG delta.

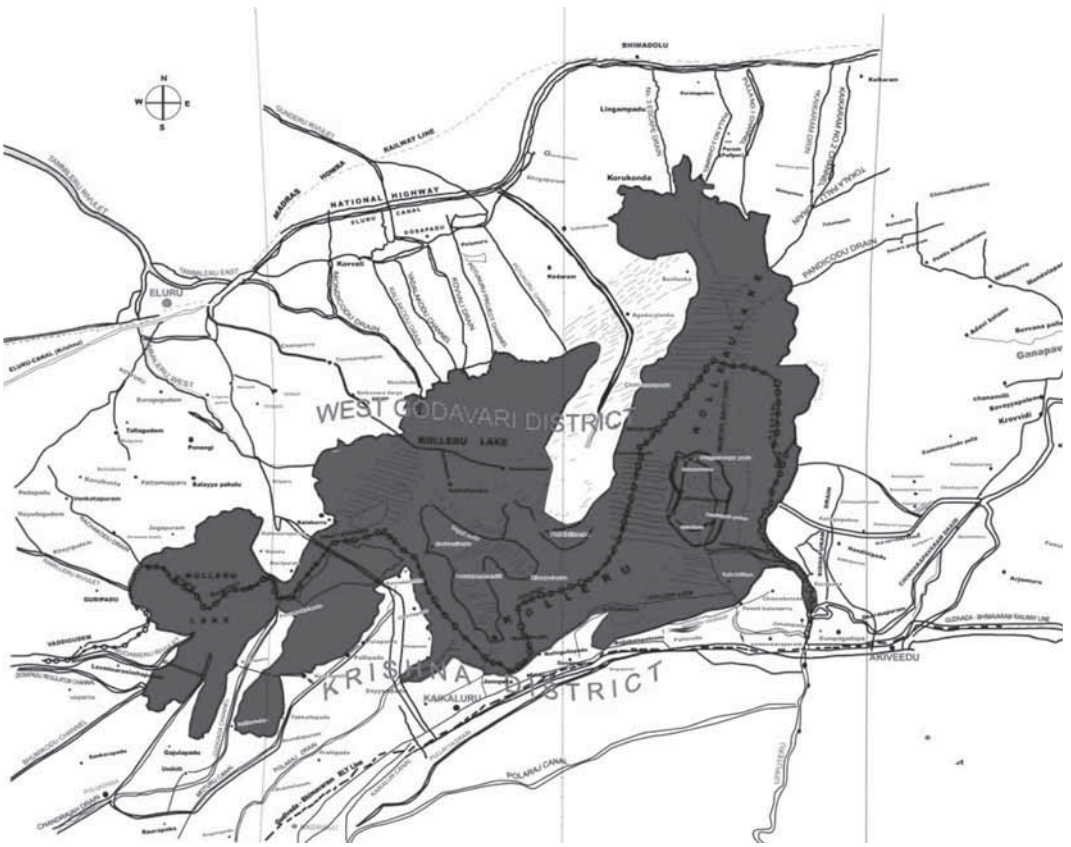


Fig 6.1: Map of Kolleru region, West Godavari/ Krishna districts

This semi-intensive carp culture system, popularly called as Kolleru carp culture, has a production range of 7.5 – 12.5 metric tones/ha/year and an annual state production of 600,000 metric tonnes, achieved by growing basically two species *Labeo rohita* (rohu), and *Catla catla* (catla), at the ratio of 80 - 90 : 10 – 20, with a rare addition of *C. mrigala* (mrigal), in heavily fed and fertilized still water ponds, supporting thousands of farmers and hundreds of people in allied industries and services. The system has become a unique model of carp culture, not

only for the rest of the India, but also for other Asian countries, for example, Bangladesh and Myanmar. More specifically, for the past 15 years, the Kolleru carp culture has become a Mecca, attracting carp farmers, scientists, fishery-policy makers and administrators from other Indian states and also those from several foreign countries who are interested in understanding the unique features of the system.

Mudinepalli, Bantumalli, Mudivepalli, Kalidindi mandals were among the 50 mandals in Krishna district which were purposively selected for selection of 50 freshwater aquaculture farmers as considerable activity in this sector was observed in these places.

West Bengal is the foremost and historically most important state in the aquaculture development in the country. Before development of the modern ways of the fish culture, the traditional methods of 'trapping and holding' system were in practice for centuries. It is no surprise, that the research and development of aquaculture was initiated in West Bengal. The state received greatest attention in the development of aquaculture and it is a popular and household enterprise. To assess the social status of the aquaculture 100 farmers were sampled.

Assam is a very important eastern Indian state from aquaculture point of view. The state has abundant freshwater resources in terms of the river, wetlands and ponds. The demand for the fish is very high as almost every one is a fish eater and in the recent times, the freshwater aquaculture has been developed quite remarkably. About 100 farmers across three districts were being sampled under the project to assess the socio-economic condition.

In addition to these traditional states, Tamil Nadu and Punjab has been selected as two emerging areas in freshwater aquaculture. Large scale commercial farms are being operated in Punjab where as small and medium farmers have taken up freshwater aquaculture in Tamil Nadu. A total of 50 and 100 samples were collected from Punjab and TN, respectively.

## 1. General characteristics

The general characteristics of the fish farmers were measured in terms of age distribution, family size, composition etc. as a measure of demography and household characteristics.

### (i) Age distribution

The age distribution of respondent households is given in Table 6.1. The freshwater aquaculture sector of Orissa was predominantly operated by the middle age group within the range of 36 to 55 years as about 58 per cent of the aquaculturist belongs to these groups. This trend is more prominent in the coastal districts like Cuttack and Puri which were having a tradition of aquaculture. Whereas the respondents of Boudh and Sonepur districts represent younger group of people (i.e. about 70 per cent and 58 per cent respectively). About 18 per cent of the people with age more than 56 years were reported to be in aquaculture.

The age wise composition of AP shows that the farmers were predominantly from the middle aged group. Of the 50 farmers sampled, 70 per cent of the farmers were middle aged between the ages of 36-55. Only 26 per cent were in the senior age category of above 56 years and 4 per cent were in the youth group of less than 35 years of age in AP. But, the trend of West Bengal is different as about 60 per cent of respondents belonged to age group of less

than 35 and 26 per cent of the people within age group of 36 to 55 years. Therefore, it can be concluded that the farmers of WB were relatively younger compared to other states.

Table 6.2 Age wise details of sample respondent (Years)

| Sl. No. | District | <35 | 36-55 | >56 | Total |
|---|---|---|---|---|---|
| 1. | Orissa | 24 | 59 | 18 | 101 |
| | | (23.80) | (58.40) | 17.80) | (100.00) |
| 2. | West Bengal | 60 | 26 | 14 | 100 |
| | | (60.0) | (26.00) | (14.00) | (100.00) |
| 3. | AP | 2 | 35 | 13 | 50 |
| | | (4.00) | (70.00) | (26.00) | (100.00) |

*Figures in parentheses indicate percentage to total*

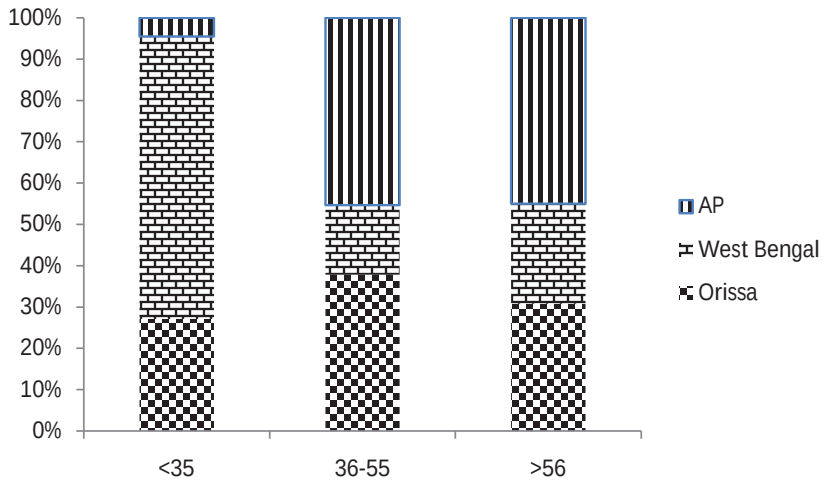


Fig 6.2: Age wise details of sample respondent

## (ii) Male - female ratio and child-adult ratio

Male-Female Ratio (sex ratio) is an important social indicator to measure the extent of equity prevailing between males and females at a given point of time. It is mainly the outcome of the interplay of sex differentials in mortality, sex selective migration, sex ratio at birth and the sex differential in population at times. The sex-ratio is measured in terms of the number of females per thousand male. In natural population the female ratio is marginally higher than 1000 and ratio of 1000 is considered as ideal. But in the sampled population the ratio was found to be 805 which is quite low in any standard. In Assam and Bengal it was even low in the range of 725. Therefore, it can be emphasized that the gender disparity is quite wide spread among the fish farmers in general. Such disparity is reflected in intra-household access to resources, food, education and other provision. Contrary to other states, the state of AP has shown exceptionally higher number of female compared to male. The most educated and higher income group of the people were involved in the fish culture in the state. The higher ratio confirms greater gender equality in AP compared to other states.

The child-adult ratio is an important demographic characteristic in the population. The higher child ratio indicates higher dependency and also the availability workforce in the near future. The child ratio was found to be higher in Assam (48.2 per cent) and low in Punjab (18.9 per cent) with a sample average of 27.0 per cent.

Table 6.3: Sex ratio among the fish farmers of India

| Sl.No | Orissa | Orissa | West Bengal | Assam | Tamil Nadu | Punjab | Total |
|---|---|---|---|---|---|---|---|
| 1. | Female: male ratio (per 1000) | 829.3 | 722.9 | 728.2 | 841.8 | 777.8 | 805.3 |
| 2. | Child: adult ratio (per 100) | 21.8 | 29.4 | 48.2 | 29.4 | 18.9 | 27.0 |

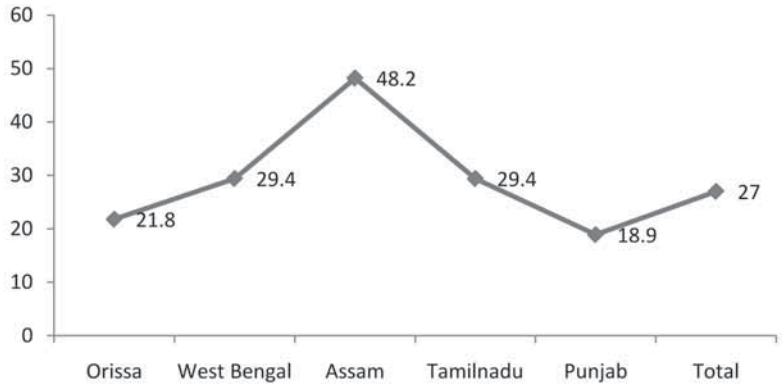


Fig 6.3: Child Adult ratio of fish farmers in India

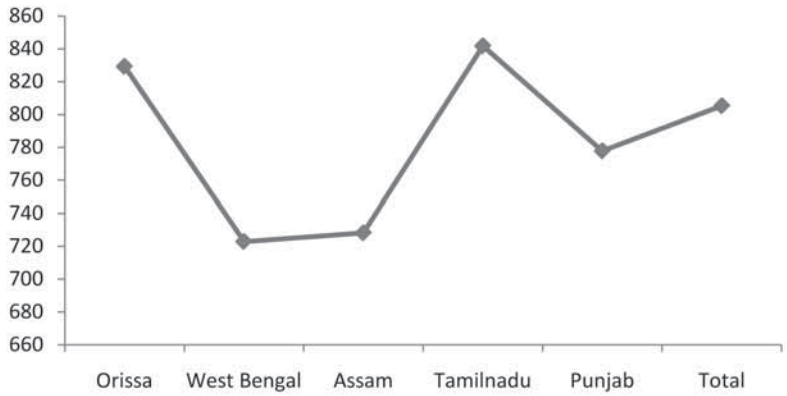


Fig 6.4: Female-male ratio of fish farmers in India

### (iii) Family size

The family size is an important indicator of family welfare. The family of size less than 4 is a nuclear family where as the family with size higher than 7 or more is generally joint family even though there may be exception in each category. In the country, family size group of 2-4 constitutes 60 per cent where as 5-6 is 30 per cent. Other groups together constitute for only 10 per cent. Therefore it can be generalized that the fish farmers are mainly belong to nuclear families. In the southern states viz., AP and TN, 2-4 family size is more than 90 per cent where eastern states shown diverse patterns. Joint family is found more in the eastern states.

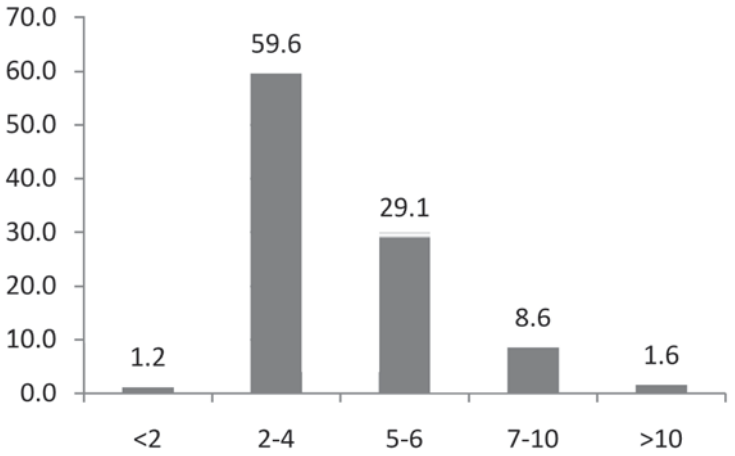


Fig 6.5: Family size of fish farmers in India

Table 6.4: Family size of the respondent household

| Sl.No. | Family size | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | <2 | 0 (0.0) | 1 (1.0) | 1 (1.0) | 0 (0.0) | 4 (8.0) | 0 (0.0) | 6 (1.2) |
| 2. | 2-4 | 57 (56.4) | 37 (37.0) | 41 (41.0) | 92 (90.2) | 46 (92.0) | 26 (53.1) | 299 (59.6) |
| 3. | 5-6 | 38 (37.6) | 38 (38.0) | 41 (41.0) | 9 (8.8) | 0 (0.0) | 20 (40.8) | 146 (29.1) |
| 4. | 7-10 | 6 (5.9) | 17 (17.0) | 16 (16.0) | 1 (1.0) | 0 (0.0) | 3 (6.1) | 43 (8.6) |
| 5. | >10 | 0 (0.0) | 7 (7.0) | 1 (1.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 8 (1.6) |
| 6. | Total | 101 (100.0) | 100 (100.0) | 100 (100.0) | 102 (100.0) | 50 (100.0) | 49 (100.0) | 502 (100.0) |

*Figures in parentheses indicate percentage to total*

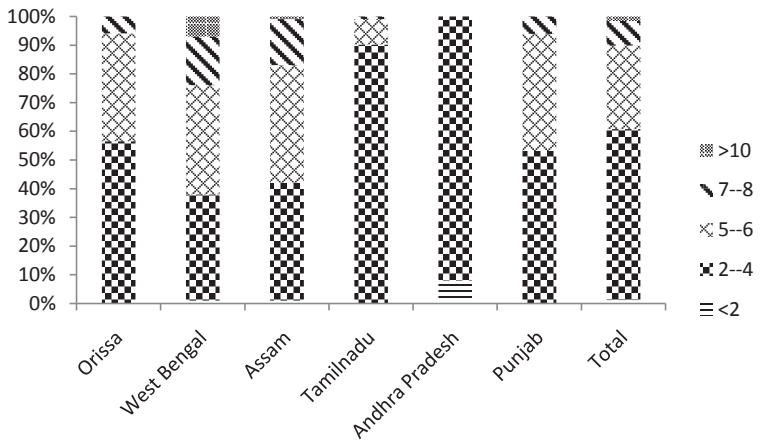


Fig 6.6: Family size of the respondent household

### (iv) Age composition

In the fish farmers' family, the ratio of adult compared to children is quite high at about 74 per cent. The adult ratio was quite high for Orissa and Punjab. Exceptionally higher percentage of children was found in AP (36.4 per cent). The male is about 55 per cent compared to female of 45 per cent. The male ratio was similar across all the states except AP where male were less (39.7 per cent) compared to female.

Table 6.5 Composition of the respondent households (Number)

| Sl.No. | Category | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | Adult | 372 (82.1) | 442 (77.3) | 336 (67.5) | 279 (77.3) | 51 (35.4) | 190 (84.1) | 1670 (74.1) |
| 2. | Children | 81 (17.9) | 130 (22.7) | 162 (32.5) | 82 (22.7) | 93 (64.6) | 36 (15.9) | 584 (25.9) |
| 3. | Male | 246 (54.7) | 332 (58.0) | 287 (57.9) | 196 (54.3) | 56 (39.7) | 126 (56.3) | 1243 (55.4) |
| 4. | Female | 204 (45.3) | 240 (42.0) | 209 (42.1) | 165 (45.7) | 85 (60.3) | 98 (43.8) | 1001 (44.6) |

*Figures in parentheses indicate percentage to total*

## B. Literacy profile

The literacy status of the respondent households was analyzed through the literacy level, educational status – continuing and dropouts, and access to educational facilities. The illiterate indicates fisher folk without any formal education and doesn't even possess functional literacy.

### (i) Literacy status

The literacy status includes the level of education as indicated by primary, secondary and collegiate level. The primary level indicated schooling till fourth grade, secondary level indicated by high school. The collegiate level of education was denoted by college and professional education. The vocational education involved any formal education in vocational schools or college. Professionally educated ones attained some technical and professional education.

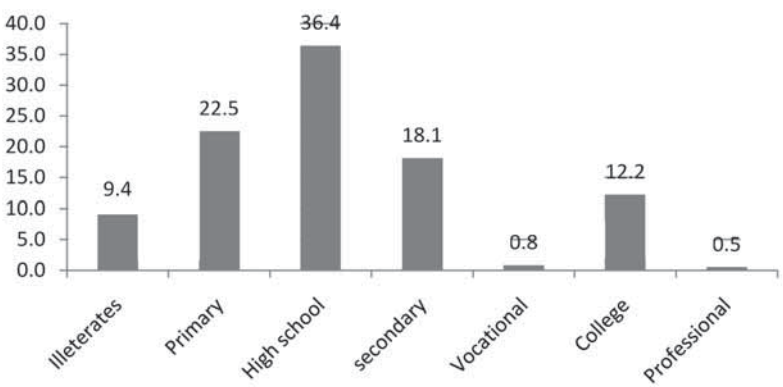


Fig 6.7: Education level of fish farmers of India

About 9 per cent of the farmers are illiterate. Primary, high school and higher secondary school constitute about 23, 36 and 18 per cent respectively. All these group together constitute about 86 per cent. In other words the fish farmers are predominantly within the group of functional education or less. Vocational, professional and college educated farmers are very less. Comparatively, the educational level was found to be higher in case of Punjab and TN. The education level was lower in Orissa and Assam.

Table 6.6. Educational status of fish farmers of India

| Sl.No | Level of Education | Orissa | West Bengal | Assam | Tamil Nadu | A P | Punjab | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | Illiterates | 52 (11.8) | 52 (9.5) | 63 (13.7) | 6 (1.7) | 10 (7.8) | 18 (8.4) | 201 (9.4) |
| 2. | Primary | 185 (42.1) | 109 (20.0) | 45 (9.8) | 57 (16.2) | 29 (22.5) | (56 (26.2) | (481 (22.5) |
| 3. | High school | 104 (23.7) | 158 (29.0) | 287 (62.4) | 117 (33.2) | 72 (55.8) | 41 (19.2) | 779 (36.4) |
| 4. | Secondary | 39 (8.9) | 189 (34.7) | 36 (7.8) | 87 (24.7) | 0 (0.0) | 37 (17.3) | 388 (18.1) |
| 5. | Vocational | 0 (0.0) | 0 (0.0) | 0 (0.0) | 13 (3.7) | 5 (3.9) | 0 (0.0) | 18 (0.8) |
| 6. | College | 57 (13.0) | 37 (6.8) | 29 (6.3) | 69 (19.6) | 13 (10.1) | 56 (26.2) | 261 (12.2) |
| 7. | Professional | 2 (0.5) | 0 (0.0) | 0 (0.0) | 3 (0.9) | 0 (0.0) | 6 (2.8) | 11 (0.5) |
| 8. | Total | 439 (100.0) | 545 (100.0) | 460 (100.0) | 352 (100.0) | 129 (100.0) | 214 (100.0) | 2139 (100.0) |

*Figures in parentheses indicate percentage to total*

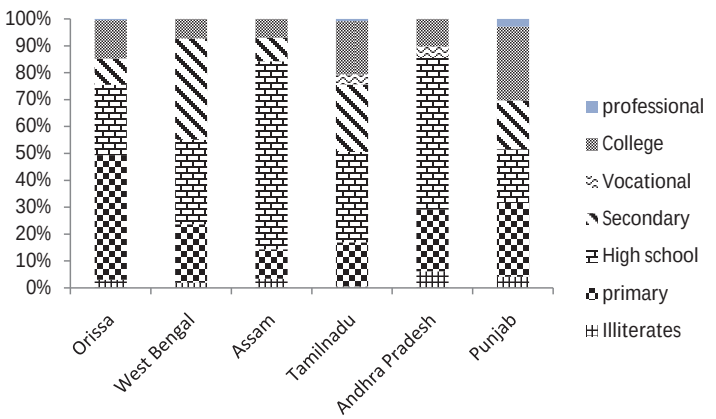


Fig 6.8. Educational status of fish farmers of India

**(ii) Dropouts among the fish farmers household**

The educational status needs to be studied along with the drop-out rates as the drop-outs are the voluntary or involuntary discontinuation of the education. The drops outs were also the indicators of the termination of the education. The dropouts along with the level of education shows the level at which farmers drop out from school. As we have seen in the

earlier section that the level of educational attainment is quite low. In the whole sample about 70 per cent are drop outs. Most of the states have more than 70 per cent of dropouts except Andhra Pradesh where dropout case is low (38.7 per cent)

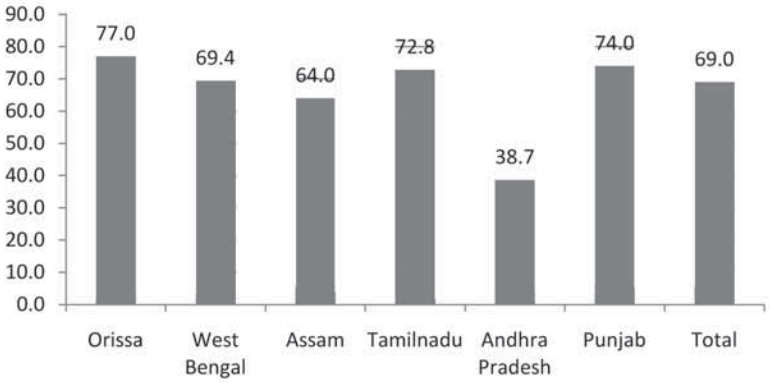


Fig 6.9: School drop-outs among the fish farmers household of India

Table 6.7: Dropouts among the fish farmers household of India

| | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Dropouts (N) | 298 | 342 | 254 | 252 | 46 | 145 | 1337 |
| Literates (N) | 387 | 493 | 397 | 346 | 119 | 196 | 1938 |
| Per cent dropouts | 77.0 | 69.4 | 64.0 | 72.8 | 38.7 | 74.0 | 69.0 |

**(iii) Access to educational institutions**

Access to education is an important yardstick to measure the socio-economic well being of a society. The proximity of the educational institutions like primary school, high school, college and professional college provides a major impetus when it comes to continuing education. The higher distance to the educational institutions reduces the access to it and there is a greater chance of drop outs when the schools or colleges were distantly located. The analysis was presented to evaluate the physical access to education.

The distance to the schools is considered to be an important indicators to the access to education especially for the fisher communities who access the institutions through walk or cycle. The average distance to the primary schools for the aquaculturists, in Orissa was reported to be 0.9 kilometer. The maximum was about 2.0 kilometer in Tamil Nadu. This distance indicates that the primary schools were located either in the same villages or very near to the village. In case of the secondary school the average distance was 1.9 kilometers with highest of 3.6 in AP which can be considered to be accessible but the distance to the colleges and professional institutions were about 11.3 and 21.2 kilometers, respectively. This distance can be considered to be very high as such distance cannot easily be traded by walk or cycle. Therefore, it can be concluded that the primary and secondary schools were accessible but colleges and professional institutions were distantly located. It is interesting to note that even though distances across all categories were less in Orissa the educational attainment was low and it is showing a reverse trend in the case of Punjab.

Table 6.8: Access to education institutions (km)

| Educational Institutions | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Primary school | 0.7 | 0.8 | 0.4 | 2.1 | 2.0 | 0.3 | 0.9 |
| Secondary school | 1.3 | 2.1 | 1.1 | 2.8 | 3.6 | 1.2 | 1.9 |
| College | 5.5 | 32.6 | 5.8 | 5.7 | 8.5 | 7.6 | 11.3 |
| Professional college | 7.7 | 33.0 | - | 17.0 | - | 34.9 | 21.2 |

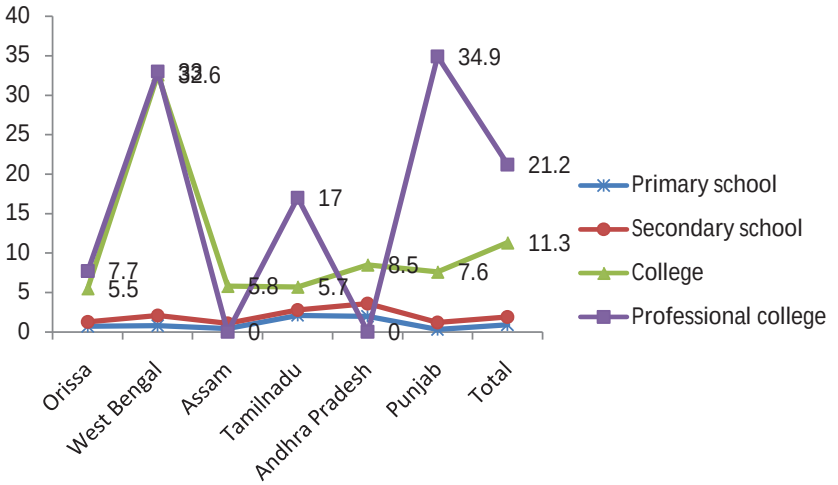


Fig 6.10: Access to educational institutions (km)

## C. Health profile of respondent households

The health status of the respondent households was studied based on the parameters like administration of vaccines, incidence of discontinuation, birth weight of infants, incidence of maternal and child mortality at the time of birth, incidence of common diseases and special ailments among adults and children. Disease management aspects like access to health care, problems in health management and suggestions to improve the health care facilities are also dealt in this session.

### (i) Vaccination regime and incidence of disease

The vaccination for Pox, BCG, MMR and Polio was regularly taken by all the families covered under the study. The average age at which the vaccination for pox was given to the child is worked out to be one year as all the households taking these vaccines were insisted to be taken in the first year of the child birth. Where as the vaccination for the households taking polio were taken upto 5 years as per the practice prevalent and recommendation made by the local hospital and paramedics. The percentage discontinuation was found only in few households, where as all of the other households reported that they vaccinated their child as per schedules recommended by medics. The level of vaccination reported from the three states illustrates that all the four categories of the vaccines were quite satisfactory. Though most of the families reported that their children were vaccinated, there were reported cases of

non vaccination in Tamil Nadu. The primary reasons for the discontinuation of vaccine were found to be lack of awareness and knowledge about the vaccination programmes.

Table 6.9 : Vaccination reported by household having children in percentage

| Vaccines | Orissa | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|
| BCG | 100.0 | 67.3 | 98.6 | 100.0 | 91.3 |
| MMR | 100.0 | 80.8 | 98.6 | 100.0 | 94.7 |
| Polio | 98.2 | 100.0 | 98.6 | 100.0 | 99.0 |
| POX | 98.2 | 76.9 | 98.6 | 100.0 | 93.2 |

Table 6.10: Percentage of households continuing with vaccination

| Vaccines | Orissa | West Bengal | Tamil Nadu | Total |
|---|---|---|---|---|
| BCG | 81.8 | 100.0 | 100.0 | 95.6 |
| MMR | 81.8 | 100.0 | 100.0 | 95.6 |
| Polio | 80.0 | 100.0 | 100.0 | 95.2 |
| POX | 80.0 | 100.0 | 100.0 | 95.2 |

### (ii) Birth weight of infants

Birth weights are considered as an important indicator of the health status of the mother and the families. The birth weight in comparison to the state or national average can be an important indicator to assess mother's health status. The average birth weights for the male and female were 2.9 and 2.8 kg, respectively. It was comparatively less (2.1 & 2.3) in Orissa and high for Punjab, Assam and West Bengal.

Table 6.11: Birth weight of infants

| Gender | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Male | 2.1 | 2.9 | 3.1 | 2.6 | 2.8 | 3.2 | 2.9 |
| Female | 2.3 | 2.8 | 3.0 | 2.5 | 3.0 | 3.0 | 2.8 |

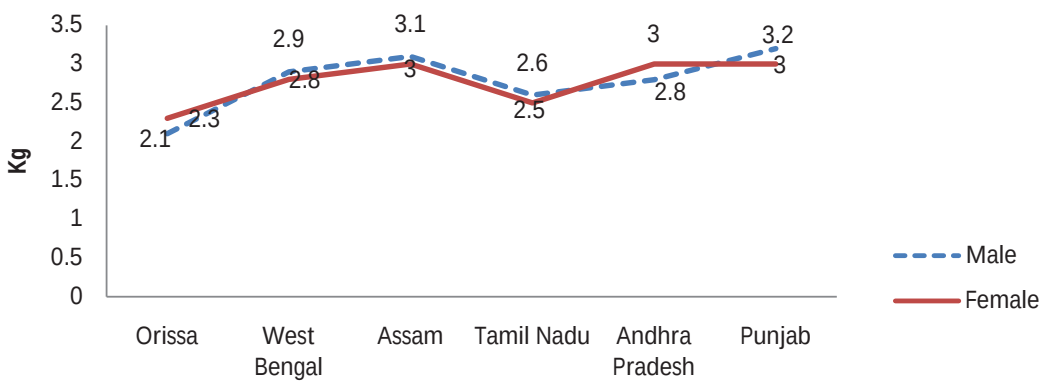


Fig. 6.11: Birth weight (kg)

### (iii) Incidence of mortality among mother/ child during birth

Maternal and child mortality at the time of birth and infant mortality had been pressing concerns over the past. The mortality is an extreme case of failure of the socio-environmental system to protect the mothers. The incidence of mortality was therefore an indicator of the health status of the mother and family. Only two cases of maternal mortality was reported across the households. Whereas Anugul district there were six cases of child mortlaity was reported which is a cause of serious concern.

Table 6.12: Incidence of mortality among mother/ child during birth (Number) in Orissa

| District | No of delivery | Maternal Mortality | percentage | Child Mortality | percentage |
|---|---|---|---|---|---|
| Cuttack | 16 | - | 0.0 | 1 | 6.3 |
| Khurda | 21 | - | 0.0 | 1 | 4.8 |
| Puri | 22 | - | 0.0 | - | 0.0 |
| Boudh | 13 | - | 0.0 | 1 | 7.7 |
| Anugul | 10 | 1 | 10.0 | 6 | 60.0 |
| Sonepur | 19 | - | 0.0 | 1 | 5.3 |
| Orissa | 101 | 1 | 1.0 | 10 | 9.9 |

The reasons reported for the death of mother and child in Anugul district was mainly due to accident during pregnancy. The other less important reasons were lack of vaccination, lack of medical facilities, disease and weakness or poor health of mother.

### (iv) Incidence of diseases among the fish farmers

The incidence, frequency, and previous occurrence of diseases among the adult family members of the respondents across the four coastal districts are discussed in the Table 6.13. Major diseases found among the respondents were categorized under two groups, viz; common diseases and special ailments. Fever/flu, body ache, diarrhoea, gastro enteric disease, skin disorder and reproductive disorders are included in common diseases. Special ailments include diseases like cardiac failure, tuberculosis, anaemia, diabetics, blood pressure, AIDS and others. For most of the common diseases the males were reported to be more prone to them than females. The average annual frequency for all of the them for males was about twice a year and for female it was more than once. The fevers among males is quite common when compared to females, a large number of males were suffering from stomach problems. The body aches were reported to be very high among the males (3 times in a year) compared to females. The occurrence of special ailments was very less. However it is important to note that of the occurrence of anaemia was higher in case of males than females.

In the Table 6.13 the occurrence of various diseases as reported by the households are being presented as percentage of household reported the occurrence of such disease during the last one year period. Fever is most common among the diseases with the adult male, adult female, child male and child female in the descending order of the occurrence as high as 65

per cent of the male in all sample and it is ranged between 12.2 per cent in Punjab and 99 per cent in Orissa from as high as 99 per cent in Orissa. But the female children reported very low occurrence of diseases.

The body ache and gastroenteric diseases were also the commonly occurring diseases and about one third of the male population of the total sample was suffering from these diseases.

Table 6.13.a: Incidence of disease - Fever as percentage of household reported

| Fever | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 99.0 | 72.0 | 77.0 | 37.3 | 52.0 | 12.2 | 63.5 |
| Adult female | 71.3 | 72.0 | 74.0 | 26.5 | 32.0 | 24.5 | 54.4 |
| Children male | 48.5 | 38.0 | 18.0 | 27.5 | 14.0 | 10.2 | 28.9 |
| Children female | 21.8 | 22.0 | 11.0 | 13.7 | 16.0 | 8.2 | 16.1 |

Table 6.13.b: Incidence of disease
Body ache as percentage of household reported

| Body ache | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 6.9 | 10.0 | 45.0 | 42.2 | 92.0 | 0.0 | 30.1 |
| Adult female | 5.0 | 28.0 | 42.0 | 31.4 | 34.0 | 4.1 | 25.1 |
| Children male | 0.0 | 0.0 | 1.0 | 3.9 | 12.0 | 2.0 | 2.4 |
| Children female | 0.0 | 1.0 | 0.0 | 4.9 | 12.0 | 0.0 | 2.4 |

Table 6.13.c: Incidence of disease
Diarrhoea as percentage of household reported

| Diarrhoea | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 9.9 | 5.0 | 21.0 | 8.8 | 62.0 | 0.0 | 15.1 |
| Adult female | 3.0 | 2.0 | 21.0 | 10.8 | 22.0 | 0.0 | 9.6 |
| Children male | 9.9 | 3.0 | 5.0 | 17.6 | 6.0 | 0.0 | 7.8 |
| Children female | 2.0 | 0.0 | 8.0 | 13.7 | 6.0 | 0.0 | 5.4 |

Table 6.13.d: Incidence of disease -
Gastro enteric as percentage of household reported

| Gastro enteric disease | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 49.5 | 24.0 | 66.0 | 20.6 | 0.0 | 0.0 | 32.1 |
| Adult female | 6.9 | 20.0 | 42.0 | 10.8 | 0.0 | 2.0 | 16.1 |
| Children male | 0.0 | 0.0 | 1.0 | 7.8 | 0.0 | 0.0 | 1.8 |
| Children female | 0.0 | 4.0 | 1.0 | 6.9 | 0.0 | 0.0 | 2.4 |

Table 6.13.e: Incidence of disease -TB as percentage of household reported

| T B | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 2.0 | 0.0 | 0.0 | 3.9 | 0.0 | 0.0 | 1.2 |
| Adult female | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.4 |
| Children male | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.2 |
| Children female | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Table 6.13.f: Incidence of disease -
Cardiac failure as percentage of household reported

| Cardiac failure | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 3.0 | 22.0 | 3.0 | 2.9 | 32.0 | 0.0 | 9.4 |
| Adult female | 0.0 | 4.0 | 2.0 | 2.9 | 20.0 | 0.0 | 3.8 |
| Children male | 2.0 | 3.0 | 0.0 | 0.0 | 8.0 | 0.0 | 1.8 |
| Children female | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 0.0 | 0.6 |

Table 6.13.g:Incidence of disease -
Skin disorder as percentage of household reported-

| Skin disorder | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 11.9 | 0.0 | 0.0 | 19.6 | 0.0 | 0.0 | 6.4 |
| Adult female | 3.0 | 0.0 | 2.0 | 10.8 | 0.0 | 0.0 | 3.2 |
| Children male | 8.9 | 0.0 | 0.0 | 15.7 | 0.0 | 0.0 | 5.0 |
| Children female | 2.0 | 0.0 | 0.0 | 13.7 | 0.0 | 0.0 | 3.2 |

Table 6.13.h: Incidence of disease -
Reproductive disorder as percentage of household reported

| Reproductive disorder | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 0.0 | 2.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.6 |
| Adult female | 2.0 | 33.0 | 26.0 | 0.0 | 0.0 | 0.0 | 12.2 |
| Children male | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Children female | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Table 6.13.i: Incidence of disease – Anaemia as percentage of household reported

| Anaemia | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 14.9 | 0.0 | 0.0 | 2.9 | 0.0 | 0.0 | 3.6 |
| Adult female | 0.0 | 0.0 | 0.0 | 6.9 | 0.0 | 0.0 | 1.4 |
| Children male | 0.0 | 0.0 | 0.0 | 17.6 | 0.0 | 0.0 | 3.6 |
| Children female | 0.0 | 0.0 | 0.0 | 15.7 | 0.0 | 0.0 | 3.2 |

Table 6.13.j: Incidence of disease – AIDS as percentage of household reported occurrence

| AIDS | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 0.0 | 6.0 | 2.0 | 0.0 | 0.0 | 0.0 | 1.6 |
| Adult female | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.6 |
| Children male | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.4 |
| Children female | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Table 6.13.k: Incidence of disease – Other diseases percentage of household reported occurrence

| Other Diseases | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 10.9 | 40.0 | 3.0 | 1.0 | 0.0 | 10.2 | 12.0 |
| Adult female | 4.0 | 14.0 | 2.0 | 1.0 | 0.0 | 12.2 | 5.4 |
| Children male | 0.0 | 3.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.8 |
| Children female | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

### (v) Intensity of incidence of disease

The intensity of the occurrence is measured through the number of times a particular disease occurs in a year. The reported cases of diseases among the total population in last one year is presented in the tables below.

Table 6.14.a: Incidence of disease (Annual frequency) (Fever)

| Fever | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 1.8 | 1.2 | 1.4 | 2.4 | 1.0 | 1.3 | 1.5 |
| Adult female | 1.6 | 1.8 | 1.3 | 2.5 | 1.0 | 2.8 | 1.7 |
| Children male | 2.5 | 1.7 | 1.2 | 2.3 | 1.0 | 1.6 | 2.0 |
| Children female | 1.9 | 1.9 | 1.1 | 1.0 | 1.0 | 1.8 | 1.5 |

Table 6.14.b. Incidence of disease (Annual frequency) (Bodyache)

| Bodyache | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 3.0 | 5.9 | 1.2 | 2.3 | 2.2 | . | 2.2 |
| Adult female | 2.2 | 10.9 | 1.6 | 1.8 | 1.2 | 2.5 | 3.7 |
| Children male | . | . | 1.0 | 1.3 | 1.7 | 1.0 | 1.4 |
| Children female | . | 12.0 | . | 1.0 | 1.2 | . | 2.0 |

Table 6.14.c. Incidence of disease (Annual frequency) (Diahorrea)

| Diahorrea | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 2.0 | 2.8 | 1.3 | 1.1 | 1.2 | . | 1.4 |
| Adult female | 1.7 | 2.0 | 1.0 | 1.3 | 1.3 | . | 1.2 |
| Children male | 2.5 | 1.0 | 1.0 | 1.0 | 1.0 | . | 1.4 |
| Children female | 2.5 | . | 1.0 | 1.0 | 1.0 | . | 1.1 |

Table 6.14.d. Incidence of disease (Annual frequency) (Gastroenteric)

| Gastroenteric | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 2.1 | 3.5 | 1.3 | 1.0 | . | . | 1.9 |
| Adult female | 1.7 | 4.1 | 1.4 | 1.0 | . | 2.0 | 2.0 |
| Children male | . | . | 1.0 | 1.0 | . | . | 1.0 |
| Children female | . | 7.0 | 2.0 | 1.0 | . | . | 3.1 |

Table 6.14.e. Incidence of disease (Annual frequency) (TB)

| TB | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 1.0 | . | . | 2.8 | . | . | 2.2 |
| Adult female | 1.0 | . | . | 2.0 | . | . | 1.5 |
| Children male | . | . | . | 2.0 | . | . | 2.0 |
| Children female | . | . | . | . | . | . | . |

Table 6. 14.f: Incidence of disease (Annual frequency) (Skin disorder)

| Skin disorder | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 2.0 | . | . | 1.3 | . | . | 1.6 |
| Adult female | 1.7 | . | 1.0 | 1.0 | . | . | 1.1 |
| Children male | 1.6 | . | . | 1.0 | . | . | 1.2 |
| Children female | 2.0 | . | . | 1.0 | . | . | 1.1 |

Table 6.14.g: Incidence of disease (Annual frequency) (Reproductive disorder)

| Reproductive disorder | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | . | 12.0 | . | 2.0 | . | . | 8.7 |
| Adult female | 1.0 | 12.0 | 1.0 | . | . | . | 7.0 |
| Children male | . | . | . | . | . | . | . |
| Children female | . | . | . | . | . | . | . |

Table 6.14.h: Incidence of disease (Annual frequency) (Anaemia)

| Anaemia | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 1.9 | . | . | 2.0 | . | . | 1.9 |
| Adult female | . | . | . | 1.9 | . | . | 1.9 |
| Children male | . | . | . | 1.3 | . | . | 1.3 |
| Children female | . | . | . | 1.0 | . | . | 1.0 |

Table 6.14.i Incidence of disease (Annual frequency) (Others)

| Others | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 1.9 | 11.2 | 2.0 | 2.0 | . | 1.2 | 8.0 |
| Adult female | 1.5 | 12.0 | 1.0 | 1.0 | . | 1.8 | 7.0 |
| Children male | . | 12.0 | 1.0 | . | . | . | 9.3 |
| Children female | . | . | . | . | . | . | . |

**(vi) Incidence of diseases among adult (male and female) previous occurrence**

The previous occurrence of the disease is measured in months and is being reported in tables below.

Table 6.15.a: Previous occurrence in months (Fever)

| Fever | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 3.6 | 3.0 | . | 2.5 | 1.4 | 3.9 | 3.1 |
| Adult female | 4.2 | 3.8 | . | 2.2 | 1.3 | 3.2 | 3.5 |
| Children male | 2.5 | 2.6 | . | 5.0 | . | 2.2 | 3.0 |
| Children female | 3.9 | 2.7 | . | 1.5 | 1.5 | 1.8 | 2.8 |

Table 6.15.b: Previous occurrence in months (Bodyache)

| Body ache | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 3.1 | 2.5 | 1.0 | 3.0 | 2.0 | . | 2.9 |
| Adult female | 4.0 | 1.2 | . | 1.2 | 2.0 | 2.0 | 1.5 |
| Children male | . | . | . | 2.2 | 1.0 | . | 2.2 |
| Children female | . | 1.0 | . | 1.0 | . | . | 1.0 |

Table 6.15.c: Previous occurrence in months (Diarrhoea)

| Diarrhoea | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 3.8 | 2.8 | . | 1.0 | 3.0 | . | 1.9 |
| Adult female | 4.7 | 3.0 | . | 1.0 | . | . | 1.5 |
| Children male | 2.5 | 4.0 | . | 1.0 | 1.0 | . | 2.0 |
| Children female | 2.5 | . | 1.0 | 1.0 | . | . | 1.4 |

Table 6.15.d. Previous occurrence in months (Gastro enteric)

| Gastroenteric | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 3.2 | 3.1 | . | 1.0 | 1.7 | . | 2.9 |
| Adult female | 5.3 | 3.0 | 2.0 | 1.0 | . | 1.0 | 2.6 |
| Children male | . | . | . | 1.0 | . | . | 1.0 |
| Children female | . | 2.3 | . | 1.0 | . | . | 1.4 |

Table 6.15.e: Previous occurrence in months (TB)

| TB | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 5.7 | . | . | 22.0 | . | . | 13.8 |
| Adult female | . | . | . | 24.0 | . | . | 24.0 |
| Children male | . | . | . | 24.0 | . | . | 24.0 |
| Children female | . | 12.0 | . | . | . | . | 12.0 |

Table 6.15.f: Previous occurrence in months (Skin disorder)

| Skin disorder | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 2.6 | . | . | 7.1 | . | . | 5.5 |
| Adult female | 3.3 | . | . | 1.0 | 1.0 | . | 1.3 |
| Children male | 3.4 | . | . | 1.0 | . | . | 2.5 |
| Children female | 3.5 | . | . | 1.0 | . | . | 2.0 |

Table 6.15.g: Previous occurrence in months (Reproductive disorder)

| Reproductive disorder | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | . | 1.0 | . | 24.0 | . | . | 8.7 |
| Adult female | 1.5 | 1.0 | . | . | . | . | 1.0 |
| Children male | . | . | . | . | . | . | . |
| Children female | . | . | . | . | . | . | . |

Table 6.15 h: Previous occurrence in months (Anemia)

| Anaemia | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 2.8 | . | . | 1.0 | . | . | 1.8 |
| Adult female | . | . | . | 1.0 | . | . | 1.0 |
| Children male | . | . | . | 11.8 | . | . | 11.8 |
| Children female | . | . | . | 6.5 | . | . | 6.5 |

Table 6.15 i: Previous occurrence in months (Others)

| Others | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Adult male | 4.1 | 1.2 | . | 2.0 | . | 1.0 | 1.8 |
| Adult female | 4.3 | 1.0 | . | 1.0 | . | 2.0 | 1.7 |
| Children male | . | 1.0 | . | . | . | . | 1.0 |
| Children female | . | . | . | . | . | . | . |

**(vii) Access to health care**

The access to health care is an important indicator of the human development as the reach of the health care service determines the state of health of the communities. There are many parameters to measure the access to the health services but among them the physical distance is an important parameter. The physical distance is important as the poor fishing communities may have limited access to the modern means of conveyance and hence depend heavily on walk or cycle etc. Therefore, the distance determines the access to the health care in a greater extent. In the present survey, the physical distance in terms of kilometers to the hospital was studied to assess the state of access of the fishers communities to the health care services.

For the fishers involved in the freshwater aquaculture, the average distance to the hospital was 6.8 kilometers and for the PHC it was only 2.3 km. Among the states there were wide variations in the average distance to health care facilities ranging from 14.5 km in West Bengal and 1.1 km in Punjab.

Table 6.16: Access to Health care (km)

| | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| Distance to PHC | 1.9 | 2.8 | 2.0 | 1.9 | 3.4 | 1.0 | 2.3 |
| Distance to hospital | 4.7 | 14.5 | 4.0 | 7.5 | 7.3 | 1.1 | 6.8 |

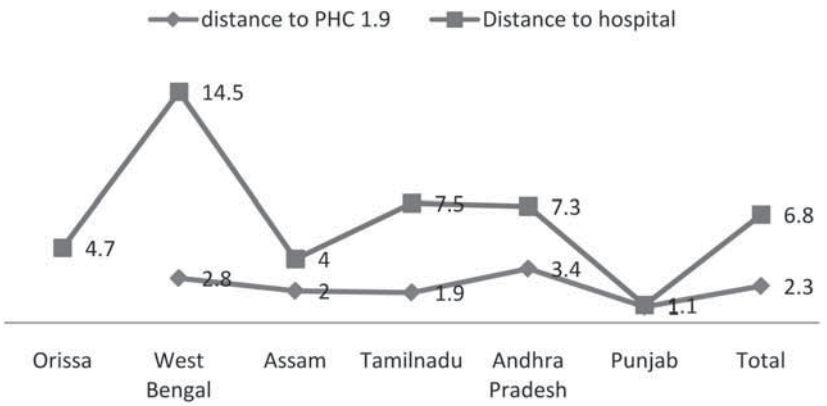


Fig. 6.12: Access to the health care centre as measured in term of distance in km

**(viii) Problems in health management**

Various problems of the health management were investigated in the survey by using open ended questions of important problems affecting the health in the sampled area in order of priority. Then each household were asked to identify the most important problem. The Table 6.17 depicts the results of the survey.

In Orissa lack of medical facilities was identified to be the most important problem in the health management followed by financial problems. This is followed by the problems of the sanitation and water problems. It is interesting to note that very few of them could identify the poor working condition as the problem affecting the health condition of the people. The absence of doctor in the hospital was a major problem identified for Andhra Pradesh.

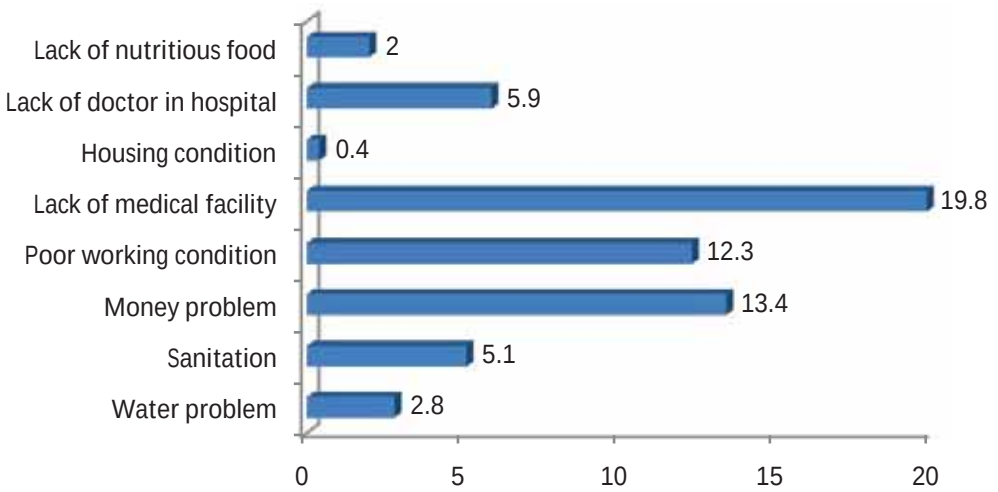


Fig. 6.13: Problems in health management

Table 6. 17: Problems in health management

| Sl.No | Problems in health management | Orissa | TN | AP | Per cent of HH reported |
|---|---|---|---|---|---|
| 1. | Water problem | 3.9 | 3.0 | 0.0 | 2.8 |
| 2. | Sanitation | 11.8 | 1.0 | 0.0 | 5.1 |
| 3. | Money problem | 33.3 | 0.0 | 0.0 | 13.4 |
| 4. | Poor working condition | 30.4 | 0.0 | 0.0 | 12.3 |
| 5. | Lack of medical facility | 47.1 | 0.0 | 4.0 | 19.8 |
| 6. | Housing condition | 0.0 | 1.0 | 0.0 | 0.4 |
| 7. | Lack of doctor in hospital | 0.0 | 0.0 | 30.0 | 5.9 |
| 8. | Lack of nutritious food | 4.9 | 0.0 | 0.0 | 2.0 |

For eliciting responses to the problems of health management in Krishna district an opinion scale of 1 to 5 was offered with 1 indicating total agreement with the statement of reason and 5 in total disagreement. Since the respondents are availing good services from the health institutions like PHC, district hospitals, they are satisfied with the health facilities available in their location.

Table 6.18: Problems in health management (frequency) in Krishna district of Andhra Pradesh

| Sl.No. | Problems | frequency |
|---|---|---|
| 1. | Difficulty in accessing the hospital due to distance | 5 |
| 2. | Non availability of specialist and paramedics in health centers | 5 |
| 3. | Poor infrastructure | 4 |
| 4. | Lack of adequate effective medicines | 4 |
| 5. | Problems on cleanliness/sanitation | 4 |
| 6. | Drinking water problem | 4 |
| 7. | Work related stress | 5 |
| 8. | Others | 5 |

**(ix) Suggestions to improve health care**

The respondents opined on the different suggestions for improving the health care facilities and the details are furnished in table 6.19. The major suggestions cited by the respondents included demand for free medicine, free supply of nutritious food, provision of quality drinking water facility. appointment of knowledgeable staff, and provision of better sanitation facilities.

Table 6.19: Suggestions to improve health services (per cent of household reported)

| Sl.No | Suggestions | Frequency | | | | |
|---|---|---|---|---|---|---|
| | | Orissa | Assam | T N | A P | Total |
| 1. | Sanitation facilities by Govt. | 13.7 | - | 1.0 | - | 4.2 |
| 2. | Provision of free medicine by Govt. | 21.6 | - | - | - | 6.2 |
| 3. | Provision of water facility by Govt. | 18.6 | - | - | - | 5.4 |
| 4. | Provision of nutritious food by Govt. | 19.6 | - | - | - | 5.7 |
| 5. | Appointment of knowledgeable staff | 14.7 | - | - | - | 4.2 |
| 6. | Improvement of hospital facilities | 8.8 | 5.0 | - | - | 4.0 |
| 7. | Govt. support for improvement of health | 2.0 | - | - | - | 0.6 |
| 8. | Continuation of insurance | 0.0 | - | 19.8 | - | 5.7 |
| 9. | Full time doctor | 0.0 | - | 3.0 | - | 0.8 |
| 10 | Specialist doctor | 0.0 | - | | 48.0 | 6.8 |


Fig 6.14: Suggestions for improving health care services

## D. Income and expenditure profile

The income profile of the respondent households are analyzed using income patterns, respondents involvement in non fisheries activities and expenditure pattern. In addition the indebtedness and savings were analyzed using details on savings, indebtedness, sources of lending organization, purpose of availing loan and suggestions for enhancing the income and employment generation

Table 6.20: Occupational structure

| Sl.No | | Capture | Culture | Marketing |
|---|---|---|---|---|
| 1. | Orissa | 6.9 | 77.2 | 15.8 |
| 2. | Bengal | - | 100.0 | - |
| 3. | Assam | - | 100.0 | - |
| 4. | Tamil Nadu | - | 100.0 | - |
| 5. | Andhra Pradesh | - | 100.0 | - |
| 6. | Punjab | - | 100.0 | - |

### (i) Occupation structure

The primary occupation of all respondents across the states was fish farming except in Orissa where about 7 per cent of them were involved in capture fisheries and about 16 per cent in fish marketing enterprises.

### (ii) Income pattern of respondent households

Weekly income of the fish farmers engaged in the freshwater aquaculture was assessed in this study and income profile of the respondents is furnished in Table 6.21. The lowest average weekly income per household was reported in Orissa at Rs. 7.10 with major contributions from agriculture (342.1 per cent), aquaculture (148.7 per cent), and business (141.6 per cent) The highest average weekly income per households was reported in Punjab at Rs. 16914.3 with significant contribution from aquaculture (Rs.1037.5), agriculture (Rs.3436.7)and business (Rs.2408.2). The labour and others constitute a small portion of the income of the people involved in the freshwater aquaculture. But the respondents from the states like West Bengal, Assam and Tamil Nadu were earning at about three to four thousand rupees in a year from labour. Among these states, about 70 per cent of the income was from aquaculture and rest either from agriculture or business. But in case of Andhra Pradesh and Punjab the income was quite high as the sampled households belong to large commercial farming group. The weekly income of respondents from various economic activities are given in Table 6.21. Income were derived from various sources like fishery, agriculture, manual labour and other businesses. The weekly average income of the respondents of Andhra Pradesh amounted to Rs.1731/-. Though income from their primary occupation was Rs.865/- per family, it was supplemented by other sources of income such as agriculture and small business. Female members of the fish farmers household were engaged in activities such as tailoring and house maid work and therefore the income obtained maybe justified. A correct apportioning of income across economic activities may not be available from the survey schedules. In case of Punjab, the aquaculture constituted the major share of income (61 per cent) followed by agriculture and business

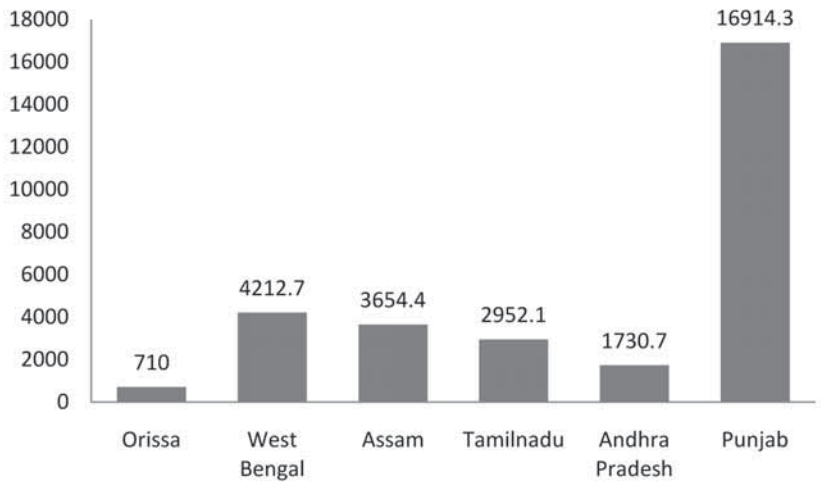


Fig. 6.15: Income profile of respondent per week across states for aquaculture farmers

Table 6.21: Income profile of the respondents (Weekly Rs.)

| Sl.No | Sector | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab |
|---|---|---|---|---|---|---|---|
| 1. | Aquaculture | 148.7 | 2861.2 | 2366.0 | 2151.2 | 865.4 | 10375.5 |
| 2. | Agriculture | 342.1 | 368.2 | 459.0 | 441.9 | 384.6 | 3436.7 |
| 3. | Business | 141.6 | 439.2 | 751.2 | 197.5 | 384.6 | 2408.2 |
| 4. | Labour | 47.9 | 299.1 | 78.2 | 42.2 | 192.3 | 40.8 |
| 5. | Others | 29.7 | 245.0 | 0.0 | 119.2 | | 653.1 |
| 6. | Total | 710.0 | 4212.7 | 3654.4 | 2952.1 | 1730.7 | 16914.3 |

Table 6.22. Income composition of respondent (Percentage)

| Sl.No | Sectors | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | Aquaculture | 20.9 | 67.9 | 64.7 | 72.9 | 89.4 | 61.3 | 79.8 |
| 2. | Agriculture | 48.2 | 8.7 | 12.6 | 15.0 | 4.2 | 20.3 | 8.8 |
| 3. | Business | 19.9 | 10.4 | 20.6 | 6.7 | 0.6 | 14.2 | 5.4 |
| 4. | Labour | 6.7 | 7.1 | 2.1 | 1.4 | 5.9 | 0.2 | 4.6 |
| 5. | Others | 4.2 | 5.8 | 0.0 | 4.0 | 0.0 | 3.9 | 1.3 |

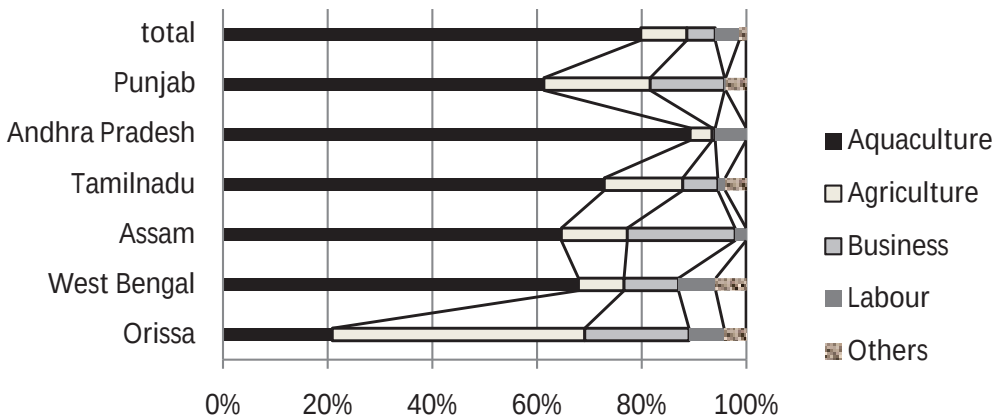


Fig 6.16: Share of source of income

**(iii) Involvement in non-fisheries activities**

The involvement of respondent households in non fisheries activities are illustrated in the Table 6.23. The level of the involvement in non fisheries activities was indicative of the livelihood diversity. It is generally understood that the diversified portfolio of the income helps in reducing the seasonality and increases the adaptability to the risk and uncertainty in the livelihoods. Business and agriculture were the major non fishing activities for 75.2 per cent and 35.6 per cent of the respondents in Orissa.

In Tamil Nadu all the respondent households were having multiple sources of income and all the respondent households engaged in all the non fishing activities enlisted. Among the respondent households of all states, business (69.1 per cent) was predominant source of income followed by labour (44.5 per cent) and agriculture (42.1 per cent).

### (iv) Expenditure patterns

The expenditure is considered to be the most important indicators of the income and poverty as the income data are often unreliable. The expenditure patterns not only show the net expenditure but also the qualitative information of the expenditure across various heads. Table 6.24 is being constructed to analyse the expenditure of the fishers and fish farmers of India. The important expenditure heads including food, clothing, fuel, education, medical expenses, entertainment, durables, personal etc. were studied. The total expenditure per households per week among the fish farmers of the freshwater aquaculture was reported to be in the range from Rs.613.9 in Orissa to Rs. 20896.2 in Punjab. On an average weekly expenditure of fresh water fish farmes across the states was Rs. 4552.2. Responsdent households in Orissa and Assam spent more than 50 per cent of their income on food. Likewise, West Bengal and Tamil Nadu also spent major portion of their income for food with 49.7 per cent and 39.7 per cent respectively. Whereas in the case of household expenditure of respondents of Punjab, they spent their major share on durables (71.2 per cent) and only 13.2 per cent was spent on food. Generally expenditure pattern changes with improvement in economic status and people with high income spend comparatively small share of their income on food like in the case of respondents in Punjab.

Table 6.23: Source of income (Percentage of household reported)

| Sl.No | Sector | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | Business | 75.2 | 73.0 | 58.0 | 100.0 | 14.0 | 62.5 | 69.1 |
| 2. | Agriculture | 35.6 | 12.0 | 55.0 | 100.0 | 2.0 | 10.4 | 42.1 |
| 3. | Labour | 15.8 | 79.0 | 11.0 | 100.0 | 28.0 | 2.1 | 44.5 |
| 4. | Others | 5.0 | 4.0 | 0.0 | 0.0 | 0.0 | 6.3 | 22.8 |

Table 6.24: Weekly expenditure per households(Rs.)

| Sl.No | Item | Orissa | West Bengal | Assam | Tamil Nadu | Punjab | Total |
|---|---|---|---|---|---|---|---|
| 1. | Food | 364.5 | 1582.5 | 1158.0 | 1568.0 | 2753.1 | 1308.7 |
| 2. | Clothing | 37.3 | 332.6 | 155.4 | 526.6 | 157.8 | 216.4 |
| 3. | Fuel for cooking | 25.2 | 226.5 | 31.2 | 182.2 | 122.8 | 108.7 |
| 4. | Medical expenses | 48.9 | 329.1 | 216.5 | 256.4 | 50.2 | 187.0 |
| 5. | Education | 38.4 | 361.8 | 182.6 | 778.3 | 817.6 | 342.5 |
| 6. | Entertainment | 39.5 | 165.2 | 37.3 | 302.7 | 0.0 | 98.4 |
| 7. | Personal | 58.1 | 186.5 | 256.0 | 319.0 | 2117.3 | 423.0 |
| 8. | Durable | 2.0 | 0.0 | 0.0 | 429.8 | 14877.6 | 1867.4 |
| 9. | Total | 613.9 | 3184.1 | 2037.0 | 4362.9 | 20896.2 | 4552.2 |

### (v) Indebtedness and Savings

The indebtedness and loan details are important to understand the level of distress within the household of the fish farmers and fishers involved in the fisheries and aquaculture. The frequency of loans taken and the amounts were studied and is presented in Table 6.26. The number of people out of total households who had taken loan was indicative of the financial independence of the community. Similarly, the actual amount of the loan per household was indicative of the community dependence. The loan amount was indicative of the actual level of dependence to the credit. Overall 43 per cent of the fish farmers household were reported to have taken some kind of loan, with highest in the case of Andhra Pradesh and Orissa. The average loan amount for the fish farmers was Rs. 48797. It is important to note that almost all

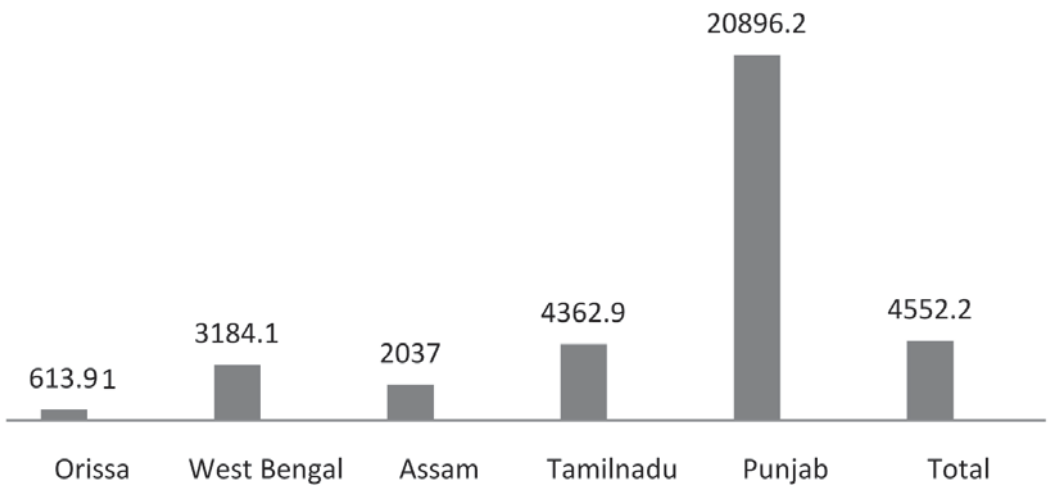


Fig 6.17. Weekly expenditure in Rupees

Table 6.25: Expenditure composition

| Sl.No | Item | Orissa | West Bengal | Assam | Tamil Nadu | Punjab | Total |
|---|---|---|---|---|---|---|---|
| 1. | Food | 59.4 | 49.7 | 56.8 | 35.9 | 13.2 | 28.7 |
| 2. | Clothing | 6.1 | 10.4 | 7.6 | 12.1 | 0.8 | 4.8 |
| 3. | Fuel for cooking | 4.1 | 7.1 | 1.5 | 4.2 | 0.6 | 2.4 |
| 4. | Medical expenses | 8.0 | 10.3 | 10.6 | 5.9 | 0.2 | 4.1 |
| 5. | Education | 6.3 | 11.4 | 9.0 | 17.8 | 3.9 | 7.5 |
| 6. | Entertainment | 6.4 | 5.2 | 1.8 | 6.9 | 0.0 | 2.2 |
| 7. | Personal | 9.5 | 5.9 | 12.6 | 7.3 | 10.1 | 9.3 |
| 8. | Durable | 0.3 | 0.0 | 0.0 | 9.9 | 71.2 | 41.0 |
| 9. | Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

the fish farmers of the Andhra Pradesh have taken loan with the average loan amount of Rs. 42500. In case of Punjab about 31 per cent of the farm households have taken loan with the average loan amount of Rs. 2.7 lakh. Personal expenses are primarily that of males in the fish farmers households. Social evils like drinking and gambling take a heavy toll on the potential savings of the fishers community in Krishna (FWA). Social evils like drinking and gambling take a heavy toll on the potential savings of the fishers community in Krishna (FWA).

The saving details of the respondent house holds across states indicated that around 50 per cent of the respondence had no saving. It was found the only 10 per cent of the respondents possessing saving above Rs. 50,000 and others having less than Rs. 50,000 as their toral savings. In case of West Bengal, indebtedness is a social issue and needs to be controlled. Average indebtedness among the respondents across sectors ranged from Rs. 5000 to Rs. 30,000 or more. The loans were normally taken for tiding over emergency crop/ equipment repair works and sometimes for meeting social obligations.

**(vi) Source of lending**

There were many sources for lending viz., banks, private moneylenders, friends, self-help group, private company, cooperative society and cooperative bank. These sources were diverse with differential institutional arrangement in supply of the credit to the fishers. The private money lenders and friends are the informal sources where as others are the formal sources

Table 6.26: Household reported to have taken loan among fish farmers

| | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|
| N | 85 | 33 | 13 | 22 | 49 | 15 | 217 |
| per cent | 84.2 | 33.0 | 13.0 | 21.6 | 98.0 | 30.6 | 43.2 |
| loan/hh | 6047 | 20730 | 13890 | 49348 | 42500 | 270714 | 48797 |

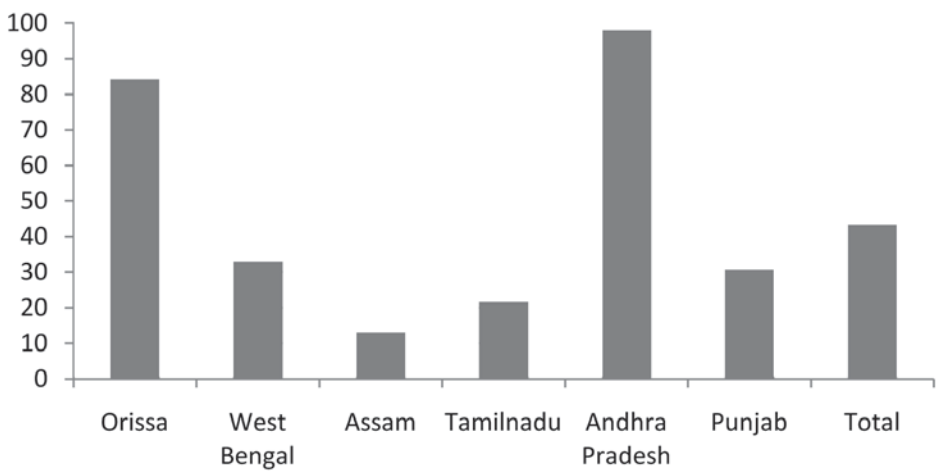


Fig 6.18: Percentage of household taken loan

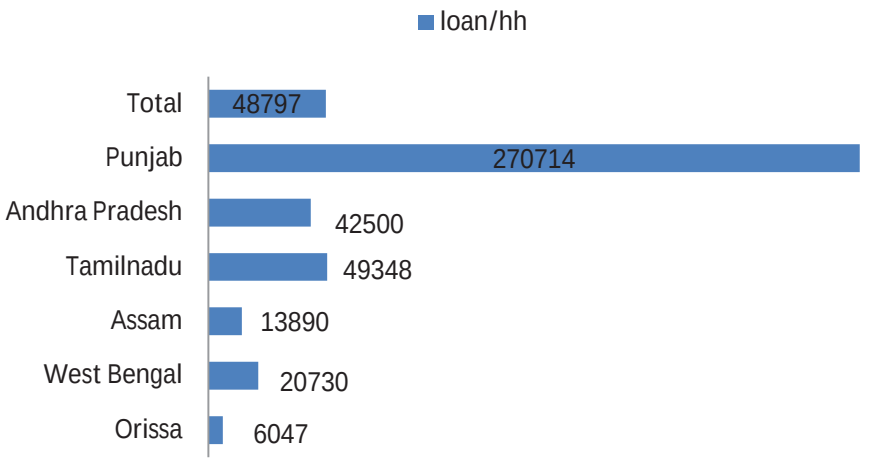


Fig 6.19: Loan in rupees per households

in the credit supply. The Table 6.27 presents the percentage distribution of the loans across the sources. Majority of the respondent fish farmers (70.7 per cent) across the states depend mainly on bank for availing loans. Respondents of Assam and Punjab solely depend on bank for loans. Interestingly, 61.2 per cent respondents of Andhra Pradhesh depend on private money lenders for availing loans. SHGs also was a good source of loan for 16.7 per cent of respondents in Orisaa and 3.1 per cent in West Bengal.

**(vii) Purpose of loan**

The purpose of loan in terms of percentage of households availed the same is illustrated in Table 6.28. The major purpose of taking loans among the respondents was for aquacultre. On an average 38.3 per cent of the respondents availed loan for aquaculture across the states and it was the only reason for taking loan among all the respondents of AP. About 46.2 per cent of respondent in Assam and 22.2 per cent in Tamil Nadu was availed loan for aquacultre. Another important reason for availing loan was agricultre puporse. An average of 35.1 per cent of households availed loan for the same which is constitued by respondents of Orissa (77.8 per cent), West Bengal (73.9 per cent), Assam (46.2 per cent) and Tamil Nadu (16.7 per cent). Other reasons for availing loan include construcion of house (13.6 per cent), pond construcions (1.3 per cent) health expenditure (0.6 per cent), business (3.2 per cent), marriage (0.6 per cent), consumption (3.2 per cent) and education

Table 6.27: Sources of lending (Number)

| Sl.No | Lending organization | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | Bank | 75.0 | 81.3 | 100.0 | 81.0 | 38.8 | 100.0 | 70.7 |
| 2. | Private money lender | - | 9.4 | - | 9.5 | 61.2 | - | 21.0 |
| 3. | Friends | 5.6 | - | - | - | - | - | 1.2 |
| 4. | SHG | 16.7 | 3.1 | - | - | - | - | 4.2 |
| 5. | Cooperative society | 2.8 | 6.3 | - | 9.5 | - | - | 3.0 |

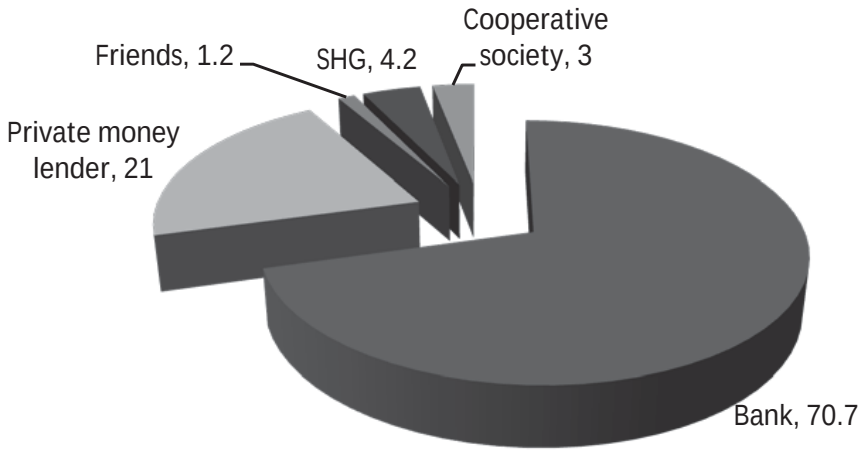


Fig 6.20: Percentage of household having access to lending organisation

**(viii) Suggestions to improve indebtedness**

The survey sought open ended suggestions from the respondent about the options to reduce the loan burden. The suggestions are presented in Table 6.29 as percentage response to the various options. The primary options as perceived by the fish farmers were loan weaver by the government or freeing of interest on the outstanding loans. Some of the other suggestions were providing govt loan, more loans by the bank and government support etc. In West Bengal regulation of fish market was the prime need of almost all the sampled population through institutional interventions. Also, 80 per cent agreed for provision of rural infrastructure for general societal human development especially for fisheries development.

In Andhra Pradesh, multiple scoring was used for assessment of suggestions for enhancement of income and employment. Institutional financial support (6 5per cent); better regulation of marketing arrangements (15 per cent); developing other livelihood enterprises (10 per cent) and streamlining PDS and supply of fuel would go a long way to enhance income and employment among the fish farmers in the district of Krishna of Andhra Pradesh (Table 6.30).

Table 6.28: Purpose of loan

| Sl. No. | Purpose of lending | Orissa | West Bengal | Assam | Tamil Nadu | Andhra Pradesh | Punjab | Total |
|---|---|---|---|---|---|---|---|---|
| 1. | Construction of house | 13.9 | - | - | 5.6 | - | 100.0 | 13.6 |
| 2. | Agriculture | 77.8 | 73.9 | 46.2 | 16.7 | - | - | 35.1 |
| 3. | Pond construction | 5.6 | - | - | - | - | - | 1.3 |
| 4. | Health expenditure | 2.8 | - | - | - | - | - | 0.6 |
| 5. | Aquaculture | - | - | 46.2 | 22.2 | 100.0 | - | 38.3 |
| 6. | Business | - | 8.7 | - | 16.7 | - | - | 3.2 |
| 7. | Marriage | - | - | - | 5.6 | - | - | 0.6 |
| 8. | Consumption expenditure | - | 17.4 | 7.7 | - | - | - | 3.2 |
| 9. | Education | - | - | 33.3 | - | - | 3.9 | - |

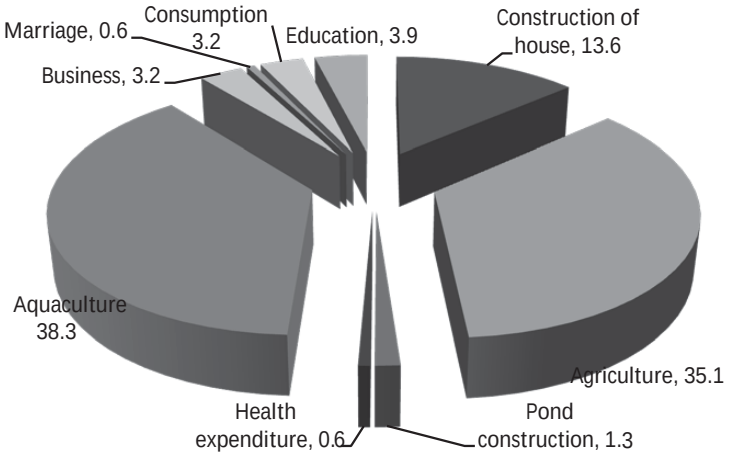


Fig 6.21: Purpose of loan

Table 6.29: Suggestions to reduce the loan burdens of fishers and fish farmers (percentage response)

| Sl.No | Suggestions | Orissa | Total |
|---|---|---|---|
| 1. | Waiver of loan | 41.7 | 20.8 |
| 2. | Freeing of interest | 36.1 | 18.1 |
| 3. | Provide govt loan | 11.1 | 5.6 |
| 4. | More loan by bank | 8.3 | 4.2 |
| 5. | Financial support | 2.8 | 1.4 |

Table 6.30: Suggestions for enhancing the income and employment generation by fishermen (percentage response) in Andhra Pradesh

| Sl.No | Suggestions | Percentage Response |
|---|---|---|
| 1. | Arranging the institutional financial support like micro credit for fisheries, SHG etc | 65 |
| 2. | Regulation of fish marketing through institutional interventions | 15 |
| 3. | Vocational training for fisher women to undertake house hold income activities during dry/off season | 10 |
| 4. | Regulation of PDS and supply of the basic food items and fuel (like kerosene, LPG etc) by the Govt. agencies | 10 |