

## Chapter V Poverty and Vulnerability

### 5.1 Conceptual distinction and policy relevance

Vulnerability implies a predisposition of individuals or households to the risk of sliding down the well-being scale and becoming poor. However, the concept should be distinguished from *poverty*, no matter whether the latter is defined narrowly in terms of the lack of basic income or in terms of several dimensions including educational opportunity, health, nutrition, and so on. Vulnerability can be linked to any of the outcomes of human well-being and often such links are not simple. For example, links between health and vulnerability are complex because not only is ill health often the result of poverty and deprived living conditions, but poor health can also lead to impoverishment.

To understand the livelihood processes we need to distinguish three levels: assets, incomes and what Amartya Sen calls ‘capabilities’. Households and individuals have assets, such as labour, human capital, physical capital, social capital, commons and public goods at their disposal to make a living. Households activate assets to generate income in various forms, including earnings and returns to assets, sale of assets, transfers and remittances. Incomes provide access to dimensions of well-being or human development: consumption, nutrition, health, etc., mediated by information, markets, public services and non-market institutions. Generating incomes from assets is also constrained by information, the functioning of markets and access to them, the functioning of non-market institutions, public service provision and public policy. Each transformation from one level to the next involves active decisions in conditions of risk.

Poor households face risks at various levels in this framework. Assets, their transformation into incomes and in turn their transformation into dimensions of well-being are all subject to risk. Examples include destruction due to environmental factors or conflict, the erosion of human capital due to health or unemployment, the collapse of asset markets and values, problems with property rights and their enforcement, risks in social capital and access risk to public goods and commons.

While well-being and poverty are the ex-post outcome of a complicated decision process of individuals and households over assets and incomes, faced with risk, vulnerability is the ex-ante situation, i.e. before one has knowledge of the actual shocks that will occur. Vulnerability is determined by the options available to households and individuals to make a living, the risks they face and their ability to handle this risk.

Any policy to try to reduce vulnerability must start from understanding the nature of the vulnerability faced by individuals, households and communities. This will require an understanding of how observed outcomes are linked to incomes and assets. Furthermore, one must develop an understanding of the different sources of risks faced by household and their relative importance. Finally, one needs to study how risk affects assets, incomes and entitlements, ex-ante and ex-post, requiring a study of ways individuals, households and communities cope with risk. Policies to reduce vulnerability will include standard poverty reduction policies, aimed at improving levels and trends in well-being, but will need to be supplemented with policies focusing on risk and on fluctuations in well-being, such as related to seasonality.

Optimal policy design should aim to strengthen, complement and replace existing strategies to obtain maximal reduction in vulnerability. Replacement of traditional mechanisms is not necessarily problematic, although more needs to be known about the extent to which, how these changes are occurring and their net impact. Traditional coping mechanisms, such as via mutual insurance, is likely to come further under pressure with economic mobility, wealth differentiation, changing age profiles in the developing world. The security of access to land and commons is also coming under further pressure.

It is found in different studies that vulnerable groups targeted by public interventions are heterogeneous. The majority of the government schemes, whether they are managed at the local, district or state level, target households that are below the poverty line (BPL) or households belonging to scheduled castes (SC) or scheduled tribes (ST) without emphasising the distinction between different

subgroups (for example, self employed SC versus agricultural labourers SC households or male headed BPL households versus female headed BPL households). The implications of recognising inter-group variations in risk-proneness are the following: (1) certain targeted households are vulnerable while others are not, which means that certain vulnerable groups are not adequately covered by public interventions because they are either excluded from BPL category or treated at par with other BPL families who are not vulnerable; (2) there are possible inefficiencies in targeting policies.

Understanding vulnerability requires that we need to think beyond the standard practice of stratification that categories people into poor and non-poor, SC/ST and others, and so on. In addition, observed disparities need to be linked with key individual, compositional and contextual factors. For example, we need to understand the possible interactions between the ‘access to community amenities/resources’ and individual capacities (which mostly come from income and education). Unfortunately, limitations and inadequacy of available data handicap our understanding of this type of interaction.

Public interventions encompass various social risk management strategies. These strategies can be classified into three main categories. (1) risk prevention (i.e. preventing a risk as such); (2) risk mitigation (i.e. preventing *ex ante* the consequence of risks such as exclusion or impoverishment, examples being health insurance in case of illness, crop insurance in case of crop failure etc.); (iii) risk coping (i.e. managing *ex post* the consequences of risks (e.g. support price in case of fall in market price of some agricultural products, waiving farmer’s loan in case of bad harvest etc).

Although highly inadequate to meet the requirement, micro-credit and micro-insurance (not very common) are two general forms of community interventions observed in many contexts as risk mitigation strategies. There are other forms of public interventions to protect the well-being of vulnerable population sub-groups (such as helping through various centrally sponsored schemes, compensation for a loss caused by natural calamities or similar reason, select products at subsidised price etc).

Table 5.1 gives examples of various kinds of risk and the corresponding indicators that could roughly capture those risks in a given population. Even though the concept of vulnerability is to be distinguished from poverty, while empirically capturing the extent of vulnerability in a given population many indicators can be thought of which are indistinguishable from the indicators of poverty in a multidimensional framework.

**Table 5.1: Various kinds of risk and vulnerability and corresponding indicators**

| <i>Nature of risk and vulnerability</i>   | <i>Examples of possible indicator</i>   |
|---|---|
| Imperfect information and knowledge about opportunities to cope with risk                         | Literacy and indicators of access to education and information (eg. exposure to media)                |
| Land tenure insecurity, uncertain titles to other assets  | Percentage landless, unregistered share-cropper, living in own house, ownership of homestead land     |
| Asset damage due to climate or disaster   | Percentage affected by flood etc  |
| Lack of access to commons and public goods due to unclear entitlement                             | Percentage of poor dependent on common property resources, forest resources etc                       |
| Output risk due to climatic shocks, disease, conflict   | Value of crop damage due to flood etc, loss of livestock (eg avian flu)                               |
| Output price risk   | Indicators of movement in pre and post-harvest prices   |
| Risk in asset returns from savings and investment (including inflation)                           | Changes in real rates of return (i.e. inflation-weighted) on investment in different activities       |
| Uncertain access to inputs or cash flow support during production                                 | Indicators of flow of credit (eg. credit-deposit ratio), percentage having access to subsidised input |
| Imperfect enforcement of contracts, such as payment for goods or services rendered                | Percentage of organized workers etc   |
| Uncertainty regarding rationing in public support, for example, risk of exclusion from safety net | Percentage having access to various transfers (eg. old age pension etc)                               |
| Food availability, price risk in food markets, and rationing risk                                 | Percentage having access to PDS   |
| Uncertain quality of public provision in health and education                                     | Various indicators of health and education infrastructure   |

## 5.2 *Towards a block level vulnerability index*

In Chapter 4 we discussed the nature of relationships between the percentage of population below the poverty line (BPL) and various other indicators at the block level. The percentage of BPL in a block is a highly aggregated indicator computed by adding scores on twelve indicators – first for each household and then identifying households with scores below a certain cut-off. Here we make use of the indicator-level disaggregated information to highlight the vulnerability aspect of the population across blocks. A number of indicators among the twelve used by BPL survey can be seen as capturing certain aspects of vulnerability.

Ownership or operational right to land is one of the most important aspects of livelihood security in rural areas, particularly in a predominantly agrarian rural economy like that of Birbhum. The absence of this right generally indicates vulnerability, even though there may be a few landless households whose members have managed to have a better life than a typical small or marginal farmer because of their higher levels of human capital. Therefore this indicator should be considered along with other indicators. We have taken the information on the nature of dwelling, food security, earning capability, working status, education, and special vulnerabilities due to old age, physical handicap, women-headed households etc. We have taken seven out of twelve indicators as they better correspond to our objective of identifying the vulnerable. Instead of taking the whole range of scores that each household is assigned in the process of BPL identification we have focused only on the lower end of each of the seven indicators and computed the percentage of households that may be considered vulnerable according to each of these indicators. In Table 5.2 the second column gives the percentage of households which neither own nor have any operational right on land. The third column gives the percentage of households having no dwelling house or living in a hut with one room. The fourth column presents the percentage of households that cannot even manage one square meal a day during the major part of the year. The fifth column presents the percentage of households that have no male member in the working age. The sixth column gives the percentage of households whose main income earner is a daily unskilled wage worker. The seventh column gives the percentage of households that have at least one child in the school going age who has never gone to school. The last column gives the percentage of

households with disabled or chronically ill persons and also the households headed by a single woman. Given the possibility of misrevelation of information and the way BPL survey was designed, conducted and processed, one has good reason to be suspicious about the quality of the data. Nevertheless, one can still make use of the data with adequate care and judgement at various stages of one's analysis.

**Table 5.2 Indicators of vulnerability across blocks, 2005**

| Block Name        | Landless    | Houseless or hut with one room | Less than one square meal a day | No adult male earner | Daily physical labour | Children never gone to school | Disabled chronically ill women head |
|-------------------|-------------|--------------------------------|---------------------------------|----------------------|-----------------------|-------------------------------|-------------------------------------|
| MURARAI-II        | 68.7        | 67.7                           | 4.4                             | 8.8                  | 69.5                  | 51.9                          | 34.3                                |
| SURI-II           | 58.5        | 67.4                           | 8.9                             | 8.5                  | 56.6                  | 21.9                          | 21.4                                |
| MURARAI-I         | 71.7        | 61.8                           | 6.5                             | 6.4                  | 64.1                  | 26.8                          | 19.2                                |
| NALHATI-I         | 60.1        | 65.1                           | 10.0                            | 8.3                  | 56.3                  | 18.9                          | 22.3                                |
| RAMPURHAT-I       | 58.2        | 63.7                           | 8.3                             | 6.4                  | 59.7                  | 23.3                          | 20.3                                |
| RAMPURHAT-II      | 65.5        | 70.8                           | 6.4                             | 4.5                  | 62.2                  | 13.3                          | 23.3                                |
| MAYURESWAR-I      | 57.6        | 70.7                           | 4.7                             | 6.0                  | 52.6                  | 15.4                          | 16.7                                |
| MOHAMED-BAZAR     | 56.9        | 66.8                           | 3.9                             | 6.4                  | 54.6                  | 18.2                          | 12.1                                |
| NALHATI-II        | 67.9        | 55.9                           | 2.4                             | 5.0                  | 64.3                  | 21.0                          | 20.3                                |
| KHAYRASHOL        | 56.8        | 60.5                           | 4.6                             | 5.7                  | 52.9                  | 17.5                          | 15.4                                |
| BOLPUR-SRINIKETAN | 55.1        | 59.5                           | 3.5                             | 6.2                  | 52.8                  | 20.7                          | 14.9                                |
| SAINTHIA          | 57.1        | 65.9                           | 3.2                             | 5.7                  | 51.1                  | 14.4                          | 11.6                                |
| DUBRAJPUR         | 53.0        | 61.3                           | 3.7                             | 6.0                  | 49.8                  | 22.4                          | 14.7                                |
| MAYURESWAR-II     | 56.8        | 58.6                           | 3.4                             | 5.8                  | 55.7                  | 13.8                          | 18.7                                |
| ILAMBAZAR         | 51.5        | 60.7                           | 3.1                             | 6.1                  | 49.5                  | 14.5                          | 14.6                                |
| LABHPUR           | 50.3        | 65.4                           | 2.4                             | 4.5                  | 45.4                  | 15.7                          | 13.2                                |
| SURI-I            | 67.7        | 46.7                           | 3.7                             | 3.3                  | 48.3                  | 13.2                          | 11.8                                |
| NANUR             | 48.8        | 54.7                           | 3.0                             | 5.1                  | 46.1                  | 15.6                          | 14.7                                |
| RAJNAGAR          | 41.9        | 63.0                           | 0.9                             | 3.7                  | 43.5                  | 14.8                          | 7.6                                 |
| <b>Total</b>      | <b>58.0</b> | <b>63.8</b>                    | <b>4.7</b>                      | <b>6.0</b>           | <b>54.6</b>           | <b>20.1</b>                   | <b>17.6</b>                         |

Source: BPL Survey, Government of West Bengal, 2005

Even though there may be a tendency to overstate one's deprivation if one anticipates the benefits that may come with BPL identification, the extent of misrevelation may not be high as most of the indicators that we have taken here are observable by the enumerators. However, 'agency problems' on the part of the enumerator also cannot be ruled out.

In Table 5.3 we present the composite index of vulnerability following roughly the same procedure of normalization as UNDP's Human Development Index. As expected, the five blocks, which have so far come up as relatively backward in terms of most human development indicators in our analysis, again turn out to be relatively more vulnerable in terms of our composite index of vulnerability. In addition, Suri II turns out to be in the league with these five. The case of Rajnagar is somewhat puzzling. Its least vulnerable status does not go well with some other indicators like child malnutrition, which is high according to the data collected by the District Project Office of ICDS. The truth perhaps lies somewhere in between.

**Table 5.3 Ranking of blocks according to the index of vulnerability**

| Block Name        | Index of landlessness | Index of shelter | Index of food insecurity | Index of earning capability | Index of working status | Index of education deprivation | Index of special handicap | Vulnerability index |
|-------------------|-----------------------|------------------|--------------------------|-----------------------------|-------------------------|--------------------------------|---------------------------|---------------------|
| MURARAI-II        | 0.90                  | 0.87             | 0.38                     | 1.00                        | 1.00                    | 1.00                           | 1.00                      | 0.88                |
| SURI-II           | 0.56                  | 0.86             | 0.87                     | 0.95                        | 0.50                    | 0.22                           | 0.52                      | 0.64                |
| NALHATI-I         | 0.61                  | 0.76             | 1.00                     | 0.91                        | 0.49                    | 0.15                           | 0.55                      | 0.64                |
| MURARAI-I         | 1.00                  | 0.63             | 0.62                     | 0.56                        | 0.79                    | 0.35                           | 0.43                      | 0.63                |
| RAMPURHAT-I       | 0.55                  | 0.71             | 0.81                     | 0.56                        | 0.62                    | 0.26                           | 0.48                      | 0.57                |
| RAMPURHAT-II      | 0.79                  | 1.00             | 0.60                     | 0.21                        | 0.72                    | 0.00                           | 0.59                      | 0.56                |
| NALHATI-II        | 0.87                  | 0.38             | 0.16                     | 0.44                        | 0.8                     | 0.20                           | 0.48                      | 0.48                |
| MAYURESWAR-I      | 0.53                  | 1.00             | 0.42                     | 0.49                        | 0.35                    | 0.06                           | 0.34                      | 0.46                |
| MOHAMED-BAZAR     | 0.50                  | 0.83             | 0.33                     | 0.56                        | 0.43                    | 0.13                           | 0.17                      | 0.42                |
| <b>Birbhum</b>    | <b>0.54</b>           | <b>0.71</b>      | <b>0.42</b>              | <b>0.30</b>                 | <b>0.43</b>             | <b>0.18</b>                    | <b>0.37</b>               | <b>0.42</b>         |
| KHAYRASHOL        | 0.50                  | 0.57             | 0.41                     | 0.52                        | 0.36                    | 0.11                           | 0.29                      | 0.39                |
| MAYURESWAR-II     | 0.50                  | 0.49             | 0.27                     | 0.51                        | 0.47                    | 0.02                           | 0.42                      | 0.38                |
| BOLPUR-SRINIKETAN | 0.44                  | 0.53             | 0.29                     | 0.44                        | 0.36                    | 0.19                           | 0.27                      | 0.36                |
| SAINTHIA          | 0.51                  | 0.80             | 0.25                     | 0.49                        | 0.29                    | 0.03                           | 0.15                      | 0.36                |
| DUBRAJPUR         | 0.37                  | 0.61             | 0.31                     | 0.45                        | 0.24                    | 0.24                           | 0.27                      | 0.35                |
| ILAMBAZAR         | 0.32                  | 0.58             | 0.25                     | 0.22                        | 0.23                    | 0.03                           | 0.26                      | 0.27                |
| SURI-I            | 0.86                  | 0.00             | 0.31                     | 0.33                        | 0.18                    | 0.00                           | 0.16                      | 0.26                |
| LABHPUR           | 0.28                  | 0.78             | 0.17                     | 0.00                        | 0.07                    | 0.06                           | 0.21                      | 0.22                |
| NANOOR            | 0.23                  | 0.33             | 0.23                     | 0.07                        | 0.10                    | 0.06                           | 0.27                      | 0.18                |
| RAJNAGAR          | 0.00                  | 0.68             | 0.00                     | 0.49                        | 0.00                    | 0.04                           | 0.00                      | 0.17                |

### 5.3 *Vulnerability due to flood*

Almost all the rivers flowing through Birbhum are seasonal in nature. They have their maximum flow in the monsoon, but dry up in summer. The district experiences occasional floods due to heavy rainfall during the monsoon months coupled with breaches of river embankments. Excess rainfall in the upper catchment areas of the major river valley projects such as Mayurakshi, Hinglow, Dwarka etc raises the level of water in the reservoirs and when the excess water is released large areas of the district get flooded, which in turn seriously affects the lives of people. Proneness to disasters such as this has important implications for the district's human development strategy.

The main dam in this region is on Mayurakshi river at Massanjore in the state of Jharkhand. Its optimum capacity is 5 lakh acre feet. Apart from this there are six main barrages/dams in the district – Tilpara barrage on Mayurakshi with a capacity of 7350 acre feet, Hinglow dam on Hinglow river with a capacity of 13865 acre feet, Deucha barrage on Dwarka river with a capacity of 1400 acre feet, Baidhara barrage on Brahmani with 440 acre feet, Kultora and Kadisala on Kopai and Bakreswar respectively with negligible capacity. However, the actual capacity of all the dams and barrages come down to an alarmingly low level because of siltration for a long time.

The district experienced a devastating flood in September, 2000. 18 out of 19 blocks and 115 out of 169 GPs so that almost one third of the population of the district were affected. 228 human lives and 7341 animals were lost. It demolished a huge number of houses and caused damage to the standing crops of value Rs 11, 530 lakh. Another devastating flood occurred in 2006. Rampurhat-II, Murarai-I & II, Mayureswar-II, Sainthia, Suri-I, Mahammad Bazar, Bolpur-Sriniketan, Illambazar, Labhpur and Nanoor were the worst affected blocks during this flood. About 10 lakh people were affected and 18 human lives were lost. Total damage was estimated at Rs 6300 lakh.

A detailed *Disaster Management Plan* for the district has been formulated. The plan contains both structural and non-structural measures. The structural measures include construction and strengthening of embankments, anti-erosion works, improvement of road communication, drinking water schemes, and so on. The non-structural measures include collection of rainfall data from Central Water Commission, water level readings from the Irrigation and Water Department, keeping warning system

in order, storage of food, medicines, relief material, drinking water facility, making arrangement for rescue operations and shelter points, preparing inventories of various equipments like excavator, bulldozer, tractors, dumpers, tree-cutting equipments etc.

An interesting organizational innovation can be seen in that desiltation of the reservoir is now being done as part of the NREGS work, even though its share in total expenditure on NREGS is small. The last column in the following table shows that for Birbhum as a whole, 6.8 percent of total expenditure has gone to finance flood control work. However, in a few blocks like Nalhathi-II, Mayureswar-I and Murarai-I, the percentage is much higher.

**Table 5.4 Flood control work with NREGS fund (up to March 2007)**

(Drainage in water logged areas, construction or repair of embankment etc)

|                   | Completed expenditure on flood | Ongoing expenditure on flood | Total expenditure on flood | Total expenditure on all works | % expenditure on flood |
|-------------------|--------------------------------|------------------------------|----------------------------|--------------------------------|------------------------|
| Suri-I            | 1286902                        | 467296                       | 1754198                    | 35751536                       | 4.9                    |
| Suri-II           | 1055044                        | 45000                        | 1100044                    | 41836881                       | 2.6                    |
| Md. Bazar         | 964432                         | 984966                       | 1949398                    | 48573869                       | 4.0                    |
| Sainthia          | 1107355                        | 896420                       | 2003775                    | 54331061                       | 3.7                    |
| Rajnagar          | 0                              | 0                            | 0                          | 35885059                       | 0.0                    |
| Dubrajpur         | 509511                         | 0                            | 509511                     | 57973505                       | 0.9                    |
| Khoyrasole        | 2006451                        | 1063743                      | 3070194                    | 56781277                       | 5.4                    |
| Bolpur-Sriniketan | 3503605                        | 6156251                      | 9659856                    | 92838810                       | 10.4                   |
| Illambazar        | 512878                         | 92158                        | 605036                     | 48782110                       | 1.2                    |
| Labpur            | 3603509                        | 4424493                      | 8028002                    | 86689052                       | 9.3                    |
| Nanoor            | 1110505                        | 1751217                      | 2861722                    | 60440575                       | 4.7                    |
| Mayureswar-I      | 1497716                        | 5147020                      | 6644736                    | 36966378                       | 18.0                   |
| Mayureswar-II     | 1253384                        | 465230                       | 1718614                    | 38202789                       | 4.5                    |
| Rampurhat-I       | 475765                         | 437640                       | 913405                     | 31433971                       | 2.9                    |
| Rampurhat-II      | 3432587                        | 170287                       | 3602874                    | 36187194                       | 10.0                   |
| Nalhathi-I        | 3560231                        | 1599236                      | 5159467                    | 47970964                       | 10.8                   |
| Nalhathi-II       | 3456787                        | 658432                       | 4115219                    | 23748755                       | 17.3                   |
| Murarai-I         | 3028562                        | 782680                       | 3811242                    | 28770643                       | 13.2                   |
| Murarai-II        | 1151408                        | 1259636                      | 2411044                    | 27997162                       | 8.6                    |
| <b>District</b>   | <b>33516632</b>                | <b>26401705</b>              | <b>59918337</b>            | <b>879364131</b>               | <b>6.8</b>             |

#### 5.4 *Vulnerability due to excessive fluoride in water*

The groundwater resources in 95 villages of Birbhum district are reported to have excess fluoride content. The effect of fluoride on human life is apparently paradoxical. In small doses it has remarkable influence on the dental system, while in higher doses, it causes dental and skeletal fluorosis. In India 62 million people including 6 million children are affected with fluoride related health diseases. Excess fluoride in ground water is reported from 17 States in India, including West Bengal. It may be worth mentioning that the extent of fluoride occurring naturally in groundwater is governed principally by composition of the host rock and hydrology. Areas with semi-arid climate, crystalline rocks and alkaline soil are mainly affected. In general, the presence of fluoride may be due to low-level basaltic volcanic activity or even presence of hot spring water.

In West Bengal detection of fluoride contamination is a recent phenomenon. Fluoride contamination of ground water in West Bengal was first detected in 1997 in Nalhati-I block in Birbhum district. According to Rapid Assessment of Fluoride Contamination in Ground Water conducted by the Fluoride Committee with the help of UNICEF, excess fluoride was detected in 665 habitations in West Bengal spread across 43 blocks in 7 districts.

In Birbhum district initially 4 blocks, namely, Nalhai-1, Dubrajpur, Rampurhat-1 and Suri-2 were detected as fluoride affected blocks by SWID. After completion of fluoride analysis of the scheme under SWID, it has been observed that not only the fluoride content in ground water in the aforesaid blocks are increasing but also in five more blocks, namely, Khayrasole, Md. Bazar, Rajnagar, Suri-I and Murarai-1, i.e., whole of the North Western zone of the district, fluoride concentration was subsequently detected above the permissible limit. Altogether 9 blocks comprising 49 mouzas are affected by fluoride contamination.

It may be mentioned here that the presence of fluoride in the North Western part of Birbhum district may be from the sources of steady influx of fluoride into the surface and ground water by the leaching of highly soluble Villiaumite (NaF) present in the volcanic ash, exhalations and sublimates related to the Rajmahal volcanic zone. Detailed list of blocks and the mouzas in the blocks which are affected by fluoride contamination are given in Table 5.5.

**Table 5.5 Mouzas affected by excess fluoride in water**

| <b>Blocks</b>           | <b>Mouzas</b>   |
|-------------------------|---|
| Nalhati-1               | Lakshminarayanpur and Kartickdanga  |
| Murarai-1               | Bhatra  |
| Rampurhat-1             | Narayanpur, Kaura and Ayash   |
| Md. Bazar               | Abdarpur  |
| Suri-1                  | Lakhindarpur, Chandipur, Ranpur and Adda  |
| Suri-2                  | Chatra, Khanna, Rostanpur, Januri and Bansankha   |
| Rajnagar                | Ghoshpara Saluka and Baraghata, Kushmasul, Musaboni, Uparpara, Sahabad, Kushma, Shankarpur, Malpara, Kumarbad and Tantipara       |
| Dubrajpur               | Bakreahwar, Kendragaria, Jamrand, Panchra, Gopalpur, Rampur, Jhapartala, Dechandrapur, Tapaspur, Mamudpur, Teliadangal and Ellema |
| Khayrasole              | Tentulipukur, Ghoshpara and Laubere, Naopara, Kaithi, Barra, Kalyanpur, Sahapur, Anandanagar, Jahidpur, Haripur and Bhaddy        |
| <b>Total (9 Blocks)</b> | <b>49 Mouzas</b>  |

It has been found that very alarming condition regarding fluoride content is experienced in both the mouzas of Nalhati-1 block mentioned in Table 5.5. In these mouzas there are visible signs of tooth decay among children. But surprisingly fluorosis patients have not been seen in that area; possibly people do not drink much water from those particular tubewells. But some families of the villages belong to Laubere mouza of Khayrasole have structurally weak enamel of the teeth, dental molting and skeleton deformation, which are the basic symptoms of fluorosis. More importantly, in some cases highly fluoride contaminated water samples are collected from tube wells, which are situated very close to primary or high schools in various mouzas of these blocks. Students of these schools used to drink water from these tube wells. It is known that children are affected more by fluorosis than adults possibly because their teeth and bones are still forming. The detailed list of the schools affected is given below.

**Table 5.6 Schools with fluoride contaminated drinking water facility**

| Name of the schools     | Block       | Mouza       |
|-------------------------|-------------|-------------|
| Ellema Primary School   | Dubrajpur   | Ellema      |
| Kendragaria PS          | Dubrajpur   | Kendragaria |
| Gopalpur PS             | Dubrajpur   | Gopalpur    |
| Anandanagar PS          | Khayrasole  | Anandanagar |
| Bhaddy PS               | Khayrasole  | Bhaddy      |
| Sahapur PS              | Khayrasole  | Sahapur     |
| Abdarpur PS             | Md. Bazar   | Abdarpur    |
| Jahanabad PS            | Rajnagar    | Uparpara    |
| Kushma PS               | Rajnagar    | Kushma      |
| Shankarpur PS           | Rajnagar    | Shankarpur  |
| Mrityunjoypur No. 2 PS  | Rampurhat-1 | Narayanpur  |
| Adda S.P.P. High School | Suri-1      | Adda        |
| Ranpur PS               | Suri-1      | Ranpur      |
| Khanna PS               | Suri-2      | Khanna      |
| Rostanpur Haripur PS    | Suri-2      | Rostanpur   |

Following the Rapid Assessment of 43 blocks of 7 districts including Birbhum, a Joint Plan of Action in consultation with the Fluoride Committee has been prepared by UNICEF which would take up complete testing of all the public tube wells in the affected blocks and take the following measures:

1. Provision of alternate safe sources in place of unsafe sources.
2. Surface water based water supply schemes.
3. Hand Pump attached Fluoride Removal Plants.
4. Supply of water from traditional sources.
5. Rain Water Harvesting.
6. Household treatment.
7. Artificial recharging including dilution of fluoride by injecting water.
8. Identification of Fluorosis cases at early stage and remedial measures.
9. Communication and awareness generation.

### 5.5 Occupational health hazards

Stone crushing is one of the major non-agricultural activities in Md Bazar-Nalhati-Rampurhat area. There are around 450 stone crushing units in this area. While it provides a relatively more attractive

livelihood option to a good number of people who lack education and skill, a costly trade-off is being made by them between higher earning and serious health hazard. During the different processes of operation in stone crushing, dust is evolved and the evolved dust if contains free silica in higher percentage may lead to silicosis, most dreaded of occupational diseases. The Central Pollution Control Board observed that around the crushing units, respirable particulate matter (RPM) and suspended particulate matter (SPM) were several times higher than the prescribed limit value applicable to this industry. The free silica estimation of the settled dust by FTIR method revealed that it is in non-detectable range. Dr. Rupak Ghosh, a Chest Specialist of Suri Sadar Hospital, conducted a research study to assess the working environmental conditions and health status among 402 stone crushing workers (control male 74, female 49, exposed male 143 and female 135) in the Panchami area of Md. Bazar block with the help of other Government departments.

The control and exposed subjects according to sex were taken in such a way that they were comparable. A substantial number of male subjects of both the groups were smokers and used to take country liquor. They were working for about 8-9 hours per day. Unskilled workers in the crushing units are predominantly tribal women employed on a contract basis.

Apart from vertigo and weight loss and pain in abdomen among the exposed group possibly due to irregular food habits, non-hygienic food intake, bad personal hygiene and worm infestations, distribution of respiratory symptoms suggested that cough, cold and sputum had significantly higher prevalence rates in exposed group compared to control group. Breathlessness and chest pain were comparable. Exposure to different climatic conditions might have its effect on respiratory system. However, exposure to dust was one of the most important aspects needing due consideration for causation of these complaints. The complaints related to musculo-skeletal system such as headache, backache, weakness, joint pain and muscular pain were more in exposed group. The repetitive movements, stress and strain and carrying heavy loads might lead to osteoarthritis of the joints. Bad postures might also be responsible for the aches and pains.

The restrictive type of pulmonary function impairments were more in exposed group but the obstructive and combined type of impairments were more in control groups. The restrictive type of impairments is a feature of dust related morbidity involving the lungs. The radiological picture of the chest x-rays suggested about 3 percent of suspected pneumoconiosis and about 2 percent of definite

pneumoconiosis. Considering the free silica level in non-detectable range, the prevalence rates were on lower side compared to the environmental exposure, presumably because their duration of exposure is low. Nevertheless, protective measures should be undertaken to prevent pulmonary impairment in both groups of workers.

### 5.6 Vulnerability due to such epidemic as avian flu

At the beginning of 2008 there was an outbreak of avian influenza (popularly known as ‘Bird Flu’) in several blocks of Birbhum. In the recent years there had been sharp increases in the stock of animal resources in general and poultry birds, in particular, in the district. With overcrowding in land based occupations and stagnating income from land people find animal husbandry a feasible alternative economic activity. The popularity of the sector is supported by the fact that the credit disbursement to the poultry sector in the district jumped by more than 600 per cent between 2004-05 and 2006-07, according to NABARD (Table 5.7).

**Table 5.7 Credit disbursement in the poultry sector**

| Year              | 2004-05 | 2005-06 | 2006-07 |
|-------------------|---------|---------|---------|
| Credit in Rs lakh | 32.31   | 63.17   | 230.29  |

*Source: Potential Link Credit Plan, NABARD, 2007*

On January 16, 2008, the operation for eradication started in five rural blocks, viz. Rampurhat I & II, parts of Nalhati I & II, Myureswar I; and the entire areas of Rampurhat and Nalhati Municipalities. Soon after, operations had to be extended to other blocks as the incidence of outbreak spread to other districts as well. Among the 19 blocks, 17 (excepting Murarai I & II) were affected, and among the six municipalities three were affected (Rampurhat, Nalhati and Suri). It was an enormous task to identify the affected areas and birds to be culled as the poultry units are mostly of backyard type and therefore highly dispersed – a large number of households rearing only a few birds each.

About 13.5 lakh people live in the 1405 affected villages of the district. Roughly one-third of the poultry population has been eradicated through the culling operation. Around 2.14 lakh families have been affected by the loss of their poultry stock. Besides, there are more than 200 Self-Help Groups who had taken bank loans for poultry have been affected. The numbers of affected people multiply as we add all those whose livelihood depends on selling, transporting and other direct and indirect activities related to the poultry sector. Table 5.8 presents blockwise number of affected families.

**Table 5.8 Effect of bird flu across affected blocks**

| Block             | No. of birds culled | No. of affected families |
|-------------------|---------------------|--------------------------|
| Suri - I          | 226922              | 12457                    |
| Suri - II         | 23637               | 3777                     |
| Md. Bazar         | 87489               | 7223                     |
| Sainthia          | 2835                | 371                      |
| Rajnagar          | 8174                | 1264                     |
| Dubrajpur         | 4365                | 352                      |
| Khayrasole        | 20777               | 3482                     |
| Bolpur–Sriniketan | 39777               | 1727                     |
| Illambazar        | 13675               | 2591                     |
| Labpur            | 29758               | 26570                    |
| Nanoor            | 96601               | 2491                     |
| Mayureswar - I    | 192775              | 33140                    |
| Mayureswar - II   | 123070              | 11588                    |
| Rampurhat - I     | 145618              | 41663                    |
| Rampurhat - II    | 222784              | 39864                    |
| Nalhati - I       | 84258               | 20239                    |
| Nalhati - II      | 19871               | 4889                     |
| <b>Total</b>      | <b>1342386</b>      | <b>213688</b>            |

5

Although Rs 4.8 crore as culling compensation and Rs 5.2 crore as one-time grant – altogether Rs 10 crore was disbursed to families affected by the epidemic, it is not easy for the affected families to recover from the livelihood shock they experienced. Not all the families belong to the poorest of the poor, but in terms of proneness to vulnerability they too are in the need of special policy support.

