AVAILABILITY OF INFRASTRUCTURE AND MANPOWER FOR PRIMARY HEALTH CENTERS IN A DISTRICT IN TAMIL NADU, INDIA

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ABSTRACT

India has a vast public health infrastructure with 23,391 primary health centers (PHCs) and 145,894 subcenters providing health services to 72.2% of the country's population living in rural areas. Although the numbers look impressive, their functional status needs to be studied in terms of physical infrastructure, manpower, equipment, drugs, and other logistical supplies that are greatly needed for ensuring quality services. This work aims to study the infrastructure facilities and manpower in a sample of PHCs in the district of Thanjavur in the state of Tamil Nadu in India. Environment, location and demographic structure have great impact on an individual’s health and provision of healthcare service of any region. Development of human resource is possible by proper provision of healthcare services. Healthcare status of Thanjavur district has been assessed for such analysis. Spatial analysis of the medical parameters of eight taluks of the district have been analysed with secondary data collected from the district health office, government hospitals, medical colleges and census report. Disease profile is identified on the basis of the diseases diagnosed among the patients who came to health centers only. Disease profile, patient concentration, healthcare facilities available in primary, secondary and tertiary healthcare centres are analysed. On the basis of these various factors five healthcare regions have been delineated. Thanjavur taluk being the headquarter of the district and having urban and accessibility advantages has better healthcare facilities. On the other hand Thiruvaiyaru taluk having low urban population, low healthcare facilities are provided.

keywords: primary health Centers, man power, infrastructure, Thanjavur district, healthcare region
Introduction

Primary health centre is the primary level of contact to the individuals and the community, primary health centre have been playing an important role in health care in India. The PHC’s services are free from the patients. In rural people have been utilized many ways in the PHCs. PHCs provides such as services as immunization, anti natal, post natal, family planning etc. Many of them PHCs are located in rural areas. Hence very little access to private health care facilities in rural areas.

In India’s total population 68 per cent covered in rural areas. Many of the people live poverty line, so they are struggling for better and access to healthcare services. The primary health centres are better services to give the rural areas. In India, the PHCs are functioning three tier system. The PHCs covered the population 20000 in hilly areas and 30000 in plain areas.

Manpower

The PHCs in Thanjavur district have been assessed for their infrastructure and manpower. This is compared with the results from studies assessing the PHCs in different parts of India. As per the IPHS, each PHC should consist of one MO and one AYUSH medical officer (AMO). In our study, 100% of the PHCs had one MO. A study showed that 80% of the PHCs in the state of Assam had an MO, while in Karnataka it was 90%. The findings of our study are much better than that of the situation in the north-eastern state of Assam and the neighboring state of Karnataka. Another study showed that the percentage of PHCs that had at least one MO was 65% in Uttar Pradesh, 100% in Madhya Pradesh, Assam, Jammu and Kashmir, and Rajasthan, 75% in Chattisgarh, and 50% in Himachal Pradesh. Our findings in Nellore district are in the same line as that of Madhya Pradesh, Assam, Jammu and Kashmir, and Rajasthan.

The availability of staff nurses was 100%, as per the existing norm of one for each PHC, yet when considering the recommended norm of three staff nurses per PHC, the deficiency was 86.6%. In Assam, it was found that 80% of the PHCs met the manpower requirements for Nurse-Midwife according to the IPHS, while in Karnataka it was found to be 50%. Sekhar et al. reported that the nurse:midwife ratio was 1:1.5 in the PHCs in Andhra Pradesh. The findings of our study are better than the findings of the other reported studies.
Objectives of the study

1. To analyse various diseases and to identify the disease prone areas in the district.

2. To assess the provision of basic healthcare facilities in different taluks of the district.

3. To find out the accessibility, adequacy, and service area of the basic healthcare centres in Thanjavur district

STUDY AREA

Thanjavur district is located on the east coast of Tamil Nadu in the Cauvery delta. Thanjavur district is one of the largest districts of Tamilnadu with an area of 3,396.57 km². The district lies between 9°50’N to 11°25’N latitude and longitudinal extension is from 78°45’E to 79°25’E. It is bounded by Thiruchirapalli district on the North West, Puddukottai district on the south west, Nagapattinam District on the north east, Tiruvarur district on the east and Palk Strait of the Bay of Bengal on the south. Physiographically this district consist of lowland with the natural division namely the delta area and uplands. There are no hills anywhere in the district. Maximum elevation is 60 meter above sea level in the western extremity. The climate of the region in general is monsoon with four seasons. These are 1) the hot weather season, 2) the south west monsoon season, 3) the retreating monsoon season and 4) the cold weather season. The main rivers of the district are Cauvery, Vennar, Kudamurutti and Arasalar. The other rivers are Peminiar, Korayar and Verasolamar. This district is enriched with fertile soil due to the deposition of river Cauvery and its tributaries. The district has 8 taluks namely Kumbakonam, Orathanadu, Papanasam, Pattukkottai, Peravurani, Thanjavur, Thiruvaiyaru, Thiruvidaimarudur. Thanjavur district is predominantly agricultural district. Since the district enjoys tropical monsoon climate, the temperature and rainfall condition favour farming activities. Almost all types of crops have been cultivated through the region. The district is called as the Rice Bowl of Tamil Nadu. In Thanjavur district, one medical college, one district headquarter”s general hospital, 9 taluk hospitals, 15 main primary health centres and 44 additional primary health centres are located. 526 pharmacies, 106 test labs are also found in this district.
DATABASE AND METHODOLOGY

The study is based on the secondary data. The population details have been collected from the census office. The details of the health service centres are collected from the district health office of Thanjavur. Details of govt hospitals are collected from district head quarter’s general hospital of Kumbakonam. Information about medical college and Rajamirasudhar hospitals are collected at that respective hospital. Secondary data are source available in different journal, books, government documents, internet,
DEMOGRAPHIC STRUCTURE

Occurrence of diseases and provision of healthcare facilities depend on demographic structure. The total population of Thanjavur district is 2,402,781 of which male and female population are 1,183,112 and 1,219,669 respectively (Census, 2011). In 2001, Thanjavur had population of 2,216,138 of which males were 1,096,638 and remaining 1,119,500 were females (Census, 2001). The district has a population density of 691 people per km². Its population growth rate over the decade 2001-2011 was 8.42%. Thanjavur has a sex ratio of 1031 females for every 1000 males, and a literacy rate of 82.72% (Census, 2011). Out of total population 64.61% population of Thanjavur districts lives in rural areas of villages. The total population of Thanjavur district living in rural areas is 1,552,325 of which males and females are 765,784 and 786,541 respectively (Census, 2011). Density of population is high in Papanasam, Kumbakonam and Thanjavur taluk and least in Thiruvidaimarudur, Orathanadu, and Peravurani. Kumbakonam and Thanjavur Kumbakonam, Thiruvidaimarudur taluks have low sex ratio. Proportion of urban population is high in Thanjavur taluk. Highest literates are found in Thanjavur and lowest in Peravurani. Birth rate shows gradual declining trend in five taluks namely Thiruvidaimarudur, Papanasam, Peravurani, Thiruvaipayar and Orathanadu during 1991-2001. Still birth rate also, shows declining trend. Thiruvidaimarudur, Thanjavur and Papanasam taluks show declining trend of maternal mortality rate while in other taluks it varies.

REVIEW OF LITERATURE

Daniel H Kress et al (2016) Assessment of the primary health care system performance in Nigeria. This article used the primary healthcare performance indicator conceptual framework health system. The PHCPI conceptual framework to identify key factor that contribute to low coverage of the PHCs in Nigeria. The framework is particularly useful because it highlights a critical area service delivery that has been largely neglected in PHCs performance measurement. The result shows that Nigeria has a relatively abundance of PHC compared with peer Africans countries. Nigeria ranks low on nearly all PHCs performance indicators. The Government has taken imported steps to take address the root cause of underperformance, but policy gaps remain in achieving sustainable and equitable provision of PHC for the people Nigeria.
Hanan al Ahmadi et al (2005) comprehensive review of the quality of primary health care in Saudi Arabia. The data were collected from published literature on quality care in Saudi Arabia primary health services. This study identified access and effectiveness of both clinical and interpersonal care. Poor access and effectiveness were reported including language barriers. Doctors found it difficult to relate some patients because of low level education in the community. The conclusion of the study is that faces significant challenges and significant implication for the primary health care agenda in Saudi Arabia. Quality improvements should be integrating part of all aspects of primary care also needed to improve the knowledge and skills staff.

Kashyap (2016) evaluated the factor influencing the performance of primary health centres in selected district of North Karnataka. The paper examined the health care provided by 24*7 primary health centres in the state. The study was conducted in 24*7 PHCs in the seven district of North Karnataka. PHCs were grouped into high performance, medium performance and low performance. The study found systematic difference in quality and quantity of human resources, services provided and the overall effectiveness between the three groups of PHCs. The average monthly deliveries in the three groups were 48.5 Per cent (High performance district), 18.2 per cent (Median performance district) and 6.4 percent (Low performance district). As reported by the mothers, 80 Per cent of the deliveries were conducted by staff nurses. The author concluded H-PHCs are able to provide greater levels of services in comparison to other groups. They have greater proportion of women doctors, presence of two or more doctors staying in headquarters village and greater number of staff nurses. Another important conclusion of this study is together with larger policy reforms, these evidence based implementation level adaptations of existing policies could be crucial for rapid improvement of health status in India.
Ritu Narang, (2011^4) made an attempt to measure the perception of patients towards quality of services in public health care centres in rural India. Mixed sampling technique was employed to select the sample. A total of 500 respondents from Eastern, Western and Central regions of Uttar Pradesh were surveyed. The study found that the opinions of the respondents towards healthcare quality were not very favorable. Negative scores were obtained on items, “availability of adequate medical equipment” and “availability of doctors for women”. Education, gender and income were found to be significantly associated with user perception. Further, the study also highlighted that knowledge about the patients' perception towards health care quality is one of the most important steps towards introducing reforms in the health care sector. Identification of areas that require immediate improvement in public healthcare centres provides valuable guidance to the policy makers who can devise suitable strategies to make these centres more sensitive and responsible to the needs of the rural population. This can lead to restoration of faith in public healthcare centres and subsequently their increased consumption.

Srinivasan (2006^5) in his study healthcare services in rural India, current status and future challenges. The author defined that the healthcare is essential and universally accessible to all citizens and acceptable to them through their full participation. The study found that IMR has fallen i.e IMR in1995 was estimated 76 per 1000 live births and the death rate at 9 per 1000. The rate of maternal and child mortality owing to diseases and malnutrition has been declined due to better medical care and improvements in social factors. The author high lights the achievements of the country wises the declining trend in preventable disorders due to improvements in immunization coverage , efforts are being made for eradication of poliomyelitis through country wide public polio immunization programs Guninea worm diseases is on the verge of eradication. Thearticle suggested greater importance is laid to the introduction of multipurpose workers scheme (MPWS).
The integrated Child Developed Services (ICDS) and Reproductive and Child Health (RCH) Programs. Which have brought a new ray of hope to the rural community and the expectation of the rural people have increased leading to more demands for institutionalized healthcare services.

**Virendra Kumar et al (2016)** explored the challenges and benefits arising from the involvement of Panchayati Raj Institutions (PRIs) in the provisioning of primary healthcare in a decentralized health system of India. A qualitative study design was used in this study. Data were collected through semi-structured interviews from 89 respondents selected from nine primary health centres across the Harodi district. The results indicate that there are several challenges resulting from PRIs involvement, including prioritization of service providers and users, coercive unethical work and lack of communication. However, there are some benefits associated with the involvement of the PRIs in service provisioning, including improved availability and regularity of healthcare providers at the health centres. The study also highlighted that health issues are among the most important human concerns, and recognizing and addressing the grass root challenges help to locate, and overcome the challenges that hinder the smooth healthcare provisioning process.

**Mavalankar (2009)** analyzed tribe perception on primary healthcare under Panchayati Raj in Gujarat. The author found tribal patients usually do not visit PHCs in the early stages their diseases because for the poor health behavior among tribes. The lack of accountability leads to absentee doctors, as it is hard to get qualified doctors to tribal areas. In efficient ANMs, inconvenient opening times and little or no community participation are some of the other problems faced by the PHCs in tribal area **Methodology**

**Ashok Bhargava (1987)** The family planning programme in India has expanded tremendously since 1961 with a steep rise in proportional allocations in both central and state budgets. This has led to an expansion of infrastructure as well as staff in many states, with a number of categories of non-health staff being drawn into the programme to help fulfill targets. This paper presents a brief review of the health and family welfare programme in Gujarat and points out that the programme is not only expensive but also generally ineffective.
Moreover the single-minded approach to family planning has meant a neglect of primary health care, with programmes such as those combating malaria and tuberculosis, crucial to achieving improvements in health status, have been grossly neglected.

**Ramana Murthy (2010)** Mobile technologies are increasingly growing in developing countries like India. There have been several new researches and developments in this space. Nowadays mobile is becoming an important ICT tool not only in urban regions but also in remote and rural areas. The rapid advancement in the technologies, ease of use and the falling costs of devices, make the mobile an appropriate and adaptable tool to bridge the digital divide. Mobile phone ownership in India is growing rapidly, six million new mobile subscriptions are added each month and one in five Indian's will own a phone by the end of 2007. By the end of 2008, three quarters of India's population will be covered by a mobile network. Many of these new "mobile citizens" live in poorer and more rural areas with scarce infrastructure and facilities, high illiteracy levels, low PC and internet penetration. The availability of low-cost mobile phones and the already broad coverage of GSM networks in India is a huge opportunity to provide services that would trigger development and improve people’s lives. This paper explores the present status of Mobile based Health Care systems in different countries, shortfalls in Primary Health Care Management in rural India, and the potential solution to fill it with the enabling of Mobile Web technologies for Primary Health Care management.

**Alpa Dherai (2004)** We aimed at establishing reference intervals for the various biochemical and hematological analytes in healthy population. We also tried to find the percentage of people with coronary artery disease (CAD) and the associated risk factors in 39,940 subjects who had attended the health check up program at our hospital from the years 1996 to 2001. Methods : The medical record folders of all the subjects were screened manually. Reference values were established using SPSS-8.0 package and the percentiles calculated and with it the corresponding 90% confidence interval (CI). Results : The prevalence of hypertension, diabetes mellitus, and coronary artery disease was found to be 22.5%, 14.2%, and 3.9% respectively. In addition only 41.1% of the population was found to be normolipemic. Most of the analytes showed reference intervals which were in agreement with our reporting values.
There was no influence of diet on the reference intervals. Also, there were some analytes like lipids where it was felt that changing the reference values would assign the subjects at greater risk for CAD. Conclusion: Implementation of reference intervals in case of lipids poses a dilemma. Lifestyle and diet modifications

Krishna Soman (2002) Health care institutions in West Bengal are in a state of flux, with new privatisation initiatives proposed by the World Bank posing a direct contrast to still-existing not-for-profit, traditional health systems. This essay based on a field study in West Bengal's Birbhum district looks at the dichotomy that prevails in rural health care initiatives, the juxtaposition of private vs public health care systems, and probes the villagers' resistance to innovations and the enduring popularity of traditional institutions.uld have to be implemented to reduce the burden of CAD in this population.

HEALTH CARE FACILITY

Health of human being is an important component in the socio-economic development of any region. Health care facilities help in maintaining the health of a community. Health care centres are one of the indices to identify the health care facilities of a region. According to the degree of facilities available health care centres are classified in into six hierarchical orders.

Table 1.1: Distribution of Healthcare Centres

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the Taluk</th>
<th>Main Primary Healthcare Centre</th>
<th>Additional Primary Healthcare Centre</th>
<th>Secondary and Tertiary Healthcare Centre</th>
<th>Total Health Care Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thiruvidaimarudhu</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Kumbakonam</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Papanasam</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Thiruvaiparadu</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Thanjavur</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>Orathanadu</td>
<td>2</td>
<td>9</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>Pattikkottai</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>Peravurani</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>
The health status can be measured by the health service indicators. The most important indicators are doctors, nurses, beds and other diagnostic specialities.

### Table 1.2: Distribution of Healthcare Services

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the Taluk</th>
<th>Primary Level</th>
<th>Secondary and Tertiary Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Doctor</td>
<td>Nurse</td>
</tr>
<tr>
<td>1</td>
<td>Thiruvidaimarudur</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Kumbakonam</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>Papanasam</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>Thiruvaiyaru</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Thanjavur</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>Orathanadu</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Pattukkottai</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>Peravurani</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

The highest number of doctors, nurses and beds in primary level are found in Papanasam taluk. Healthcare facilities at primary level are high in Papanasam and Pattukkottai taluks. Highest number of doctors, nurses and beds in secondary and tertiary level of healthcare are found in Thanjavur, Kumbakonam and Pattukkottai taluks. Highest number of pharmacies and test labs are found in Kumbakonam and Thanjavur taluk. Overall healthcare facilities are high in Thanjavur taluk due to more facilities in secondary and tertiary level with super speciality services. This is followed by Kumbakonam taluk where district headquarter general hospital facilities are available.

### HEALTH CARE REGION

Disease profile, patient concentration, healthcare facilities available in primary, secondary and tertiary healthcare centres are the various factors taken as the criteria to delineate healthcare region. On the basis of these factors five healthcare regions are delineated. The REGION-1 comprises Thanjavur taluk.
This region is the high development region with better demographic structure, high urban population and high literacy rate. This region has highly developed healthcare facilities, that is, medical college hospital with super speciality services is located in this taluk. Other health indicators are highest in this taluk. Accessibility of road is high. It provides healthcare services to the entire population of the district. The REGION-2 comprises only Kumbakonam taluk. Availability of healthcare facilities in secondary and tertiary levels is moderate in this region. This region has district's headquarter general hospital and higher level of healthcare facilities. REGION- 3 comprises Pattukottai and Papanasam taluks, REGION-4 comprises Thiruvidaimarudur, Orathanadu and Peravurani taluks. REGION-5 comprises Thiruvaiyaru taluk with low urban population, low healthcare facilities. Special facilities like X-ray unit, blood bank, ambulance, ECG machine are not available here. Number of doctors, nurses, beds, test labs and pharmacies are less in these taluks. Availability of healthcare facilities is low in primary and secondary level ALTHCARE REGION

**DISEASE PROFILE**

Thanjavur district is a rural district with 65% rural population. It is rather difficult to assess the disease profile in the rural areas because this estimate is based on the diseases diagnosed among the patients who came to the health centres only. In the absence of other reliable information sources, disease profile is identified from the most prevalent diseases, reported at the primary health centres. The most prevalent diseases reported are acute diarrhoea, worm infection, ear discharge, scabies, dental problem, eye vision defect, night blindness, anaemia, leprosy and filaria diseases. The patients with various diseases reported from every taluk are analysed with reference to total population and disease incidence rate has been obtained. Disease incidence rate is a ratio between patients and population. Incidence of diseases has been calculated only for the diseased persons recorded in primary health centres. Acute diarrhoea is caused by bacterial infection of gastrointestinal track of digestive system. The occurrence of this disease may be attributed to poor sewage and drainage facilities resulting in stagnation of sewage water and unhygienic living condition. Incidence rate of it is more than 50 in Kumbakonam and Peravurani taluks and below 50 in Thiruvaiyaru. In other taluks it is moderate.
DISEASE ENDEMIC AREA

The incidence of various diseases are ranked taluk wise and summed up. The average of this aggregate value is represented as Disease Index. The taluks which have less than the value may be considered as High endemic area and the taluks which have greater than this value may be considered Low endemic area. On the basis of the disease index Endemic Areas are delimited.

### Disease Endemic Area

<table>
<thead>
<tr>
<th>Level</th>
<th>Taluks</th>
</tr>
</thead>
<tbody>
<tr>
<td>High endemic</td>
<td>Orathanadu, Peravurani, Kumbakonam, Pattukkottai</td>
</tr>
<tr>
<td>Low endemic</td>
<td>Thiruvaidaimarudur, Papanasam, Thiruvaiyaru, Thanjavur</td>
</tr>
</tbody>
</table>

Concentration of patients at primary, secondary and tertiary health centres are found out. Occurrence of disease is mainly based on environmental factors. Even though Thanjavur taluk is a less disease prone area it has high concentration of patients. This may be due to patients coming from different parts of the district to avail higher level of health care facilities. Orathanadu taluk has high disease incidence but concentration of patients is low, this is due to lack of awareness of disease and education.

### MAJOR FINDINGS OF THE STUDY

1. explains the degree of utilization of PHCs services by the rural people. It is indicates that 5.90 per cent of the respondent states that they were utilized disease outbreak namely infection, blood diseases, skin problems, endocrine, eye ear and injurious of which 56.50 per cent respondents from Thanjavur district and 43.50 per cent from Kancheepuram district.

2. Further, 7.90 per cent of the respondent said that they have utilized the PHCs services for six diseases outbreak such as infection, blood diseases, skin, eye, ear and injurious of which slightly over of two-third of the respondents from Thanjavur district and slightly lower of one-third of the respondents from Kancheepuram district.
3. Moreover, slightly lower one-fourths of the respondents have utilized the PHC services for five diseases outbreak the name of the diseases are infection, gastrointestinal, blood diseases, skin, injurious, eye, obstetric, musculoskeletal, genitourinary, cardiovascular and ear.

4. In addition the slightly over one-fourth of the respondents were approaches four diseases outbreak namely infection, blood diseases, skin, gastrointestinal, eye, ear, injurious, obstetric, and cardiovascular.

5. However, slightly higher one-fifth of sample respondents utilized PHCs services for three diseases outbreaks as such infection, injurious, blood diseases, skin, obstetric, and musculoskeletal. Nevertheless, 6.20 per cent of the respondent approach PHCs for two diseases outbreak namely eye and obstetric of which 54.20 per cent from Thanjavur district and 45.80 per cent from Kancheepuram district.

6. It is clearly observed that he rural PHCs played a vital role for various diseases outbreak and care in health of the rural people.

**CONCLUSION**

In order to convert human being to human resources the strategy has to be changed from disease cure to disease prevention. However, from the study it is understood that even though there are primary healthcare facilities in this district, they are not geared up to meet the objectives of the disease prevention. Lack of awareness of disease, lack of health education and unhygienic environment which are prevalent in this district, can be reduced through health education programme. Government may therefore come forward with many health education programmes. Primary health centers may be equipped with special healthcare facilities. Government should allot more funds in the state’s plan schemes to develop the less developed taluks like Thiruvidaimarudur, Orathandu, Peravorani, and Thiruvaiviyaru. Such an indispensable health facilities protecting the society should be located in such a way, that they are provided equality and easily to all. The involvement of NGOs along with government efforts would help in achieving the development of human resource.
REFERENCE

1. Census report of Thanjavur, 2001

2. Census report of Thanjavur, 2011


