

## Rice field work and the occupational hazards

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Rice is the staple food for Nepalese people; it is prepared by cooking or ground as flour for bread making. Various kinds of rice are produced to suit the taste of the consumers. Rice cultivation is done either in marshy, lowland areas with plenty of water or in plateau or hilly regions where natural rainfall provides adequate amounts of water. Rice cultivation is associated with exposure to numerous agents that may cause musculo- skeletal disorders, skin diseases, respiratory diseases, zoonoses and parasitic diseases and cancers. Many diseases among rice field workers are preventable. Simple measures such as vector control, proper animal house hygiene, food hygiene, personal hygiene, use of latrines, use of personal protective equipments, and immunization can reduce these diseases. Most of these measures require health education of the rice field workers and vigilance of the public health personnel.

**Keywords:** Rice, occupational hazards, safety and health measures

Rice is one of the world's most important food crops. More than half of the people in the world eat this grain as the main part of their meals. Nearly all the people who depend upon rice for food live in Asia. Rice is a cereal grain and belongs to the grass family. But unlike other grains rice grow in shallow water. Farmers usually flood rice fields to supply the growing plants with moisture and kill weeds and other pests. China and India is the world's leading rice producing countries.

Rice is the most important food crop of Nepal. Rice farming dominates the agricultural sector of Nepal, which itself dominates the economy. It is the single most important industry in the country, contributing approximately one-fourth of the GDP and occupying approximately 1.4 million ha. From 1981 to 1994, production has increased at about 2.4% per year.

### Cultivation process

Methods of growing rice vary, depending on the supply of labour and the level of mechanisation. In Southeast Asia and other developing regions, labour is plentiful and most of the work is done by hand. Some farmers have oxen and water buffaloes for pulling ploughs. In the United States and other developed countries, farmers use machinery for most stages of production. Most rice grows in areas of the world with yearly rainfall of at least 40 inches (100 centimetres).

But farmers can cultivate rice in drier regions by irrigating the land. Rice needs the average temperature of at least 70°F (21°C) through out the growing season.

Growing rice involves four main steps: They are (1) preparing the ground, (2) planting, (3) controlling diseases and pests, and (4) harvesting.

**Preparing the ground:** Rice grows best in a field covered with shallow water. Farmers build low dirt walls called dikes or levees to hold water in the paddies. Many Asian farmers flood their fields before leveling them. They work the soil into soft mud to make it easier to plow and to bury weeds. The practice of working flooded land is called puddling. In the developed countries, most rice growers level the ground with large earthmovers. They make sure the land slopes slightly so it can drain quickly before the harvest. They use specialized machines to till (plow) the land and build dikes. Before planting, farmers may add mineral fertilizers to the soil to enrich it. The most commonly applied fertilizers are nitrogen, phosphorus, and potassium.

**Planting:** In developing countries, farmers sometimes plant rice seeds directly in the ground. More commonly, however, they sow seeds thickly in small seedbeds and transplant the seedlings to a flooded field after several weeks. This method reduces the length of time

rice occupies the main field by about 15 to 20 days. This is important in areas where several crops are grown on the same land each year. Transplanting seedlings also permits better weed control. Fewer weeds are able to grow in the thickly sown seedbeds. In addition, farmers can remove weeds more easily in the main rice fields when the plants are larger. Farmers transplant clumps of 3 to 6 seedlings into the muddy soil. The clumps are spaced 4 to 8 inches (10 to 20 centimeters) apart and may be lined up in rows. In industrialized nations, many rice growers use a machine called a drill to place the seeds directly in the soil. The field may be flooded and drained a few more times before the plants reach a height of 3 to 6 inches (8 to 15 centimeters). A layer of water 2 to 8 inches (5 to 20 centimeters) deep is then left in the field until a few weeks before harvest.

**Controlling diseases and pests** is an important part of growing a good rice crop. Fungi, bacteria, and viruses infect rice plants with diseases. Weeds compete with rice plants for nutrients in the soil. Such destructive insect pests as leaf hoppers and stem borers also attack rice. Farmers use chemicals to control many of these enemies. However, since many of these chemicals may be harmful to people and the environment, farmers must use care in applying them. Rice growers can best protect their crop from damage by planting varieties that can resist diseases and pests.

**Harvesting.** Farmers drain the rice fields two to three weeks before the harvest. The grain is ready for harvesting when moisture makes up 18 to 25 per cent of its weight. The wet rice must be dried after harvesting, before storage and milling. In developing countries, farmers harvest the rice by hand. They usually cut the stalks with sickles or knives, tie the stalks in bundles, and dry them in the sun. The crop is then ready for threshing, the process of separating the grain from the rest of the plant. The farmers may thresh the grain by beating the panicles against a slatted bamboo screen and letting the grain fall between the slats. Some farmers put the bundles of rice through a thresher. In some areas, farm animals walk over the bundles to thresh the grain. If the grain needs further drying after threshing, it is spread out on mats in the sun. In industrialized countries, large self-powered machines called combines harvest and thresh rice in one operation. The wet grain is then dried by heated air.

### Occupational hazards

The water-rice field is a suitable place for the growth of several types of bacteria, virus, fungi and different parasites. In the developing countries, diseases like malaria, tetanus, hookworm, leptospirosis, schistosomiasis, hay fever, farmer's lung, dermatitis, blepharitis, conjunctivitis and common cold are very common.

The very common occupational diseases are skin diseases. These include:

- 1) redness and blisters from prickly rice leaves;
- 2) abrasions and skin injuries by prickly plants;
- 3) skin fungal infections (tinea) due to epidermophytes and *monilia* (candida) which may be complicated by secondary sensitization, redness and blisters, frequently due to staphylococcus bacteria;
- 4) vesicular dermatitis (small blisters) on the feet sometime attributed to *Rhizopus parasiticus*;
- 5) itch commonly caused by penetration of the skin by *Ancylostoma* (hookworms);
- 6) schistosome dermatitis caused by the penetration of the skin by *cercariae*;
- 7) redness, blister and edema resulting from insect stings etc.
- 8) calluses of the palms, hands, knees and elbows caused by bad posture and the use of hand tools.

Water-rice field is an appropriate field for the breeding of mosquitoes and development of certain parasites as schistosomes, hookworms, liver flukes etc. People working in such environment without well-protected dresses and shoes are very prone to the mosquito bites and the penetrations into the skin of the certain parasites, which will subsequently lead to certain diseases

The facts enabling the transmission of the different biological agents are poor housing, low sanitary standards, and inadequate nourishment and need to drink large quantity of water, which is not always pure. It may lead to general weakness and fatigue, possible sunstroke, intestinal troubles and diarrhea. In the developing countries, most of the workers in the rice fieldwork on bare feet and as it is a family business all children are also involved in the work.

Respiratory diseases due to organic dust from field preparation and harvesting, dust mites, molds and other organic antigens, as well as smoke from burning rice stubble are also

common in the developing countries. Gram-negative bacterial endotoxin levels in air are high in some countries.

Chemical agents, such as fertilizers, herbicides, pesticides and other extensively used substances increase the hazards for the workers. Human occupational exposure to pesticides is a significant cause of deaths, worldwide, and is suspected to contribute to serious long-term and chronic health hazards. The World Health Organization estimates that there is a minimum of three million acute, severe cases of pesticide poisonings and 20,000 unintentional deaths each year related to pesticide use in agriculture, worldwide. Epidemiological research has revealed that farmers are at a higher risk for certain types of cancer than the general population. The greater incidence of cancers such as soft tissue sarcoma, non-Hodgkin's lymphoma, and stomach cancer has been linked with exposure to pesticides and nitrates. Psychological stress factors such as economic problems, sense of insecurity, lack of social standing, lack of educational opportunities, lack of prospects and risk of unexpected calamities like heavy rain, storms, lightning etc. are common in the developing countries.

Work in rice field requires an intensive use of muscles, bones and joints, causing physical fatigue and resulting in the reduction of work capacity and an increase in injuries and accidents. Chances of injuries increase with the introduction of new machinery, when the workers are not familiar with the machines.

### **Safety and health measures**

Working conditions should be improved and the health hazard reduced through increased mechanization where possible. Ergonomic interventions to organize the work and working equipment, and systematic training of the body and its movements to ensure good working methods, are essential. Necessary medical preventive methods should be strictly applied, including the introduction of first aid instruction, the provision of treatment facilities, health promotion campaigns and medical surveillance of workers.

Improvement of housing, sanitary standards, accessible potable water, nutritional environment hygiene and economic stability are essential for the quality of life of rice field workers. (Separate eating area, hand washing facilities)

As most of the chemicals applied for the eradication of pests and different diseases can cause serious health hazards, it will be wiser to

plant different variety of crops that can resist diseases and pests.

Use of protective equipment as long rubber boots, mask, gloves and glasses have big values in protecting against different parasites and chemical agents. Small children should not be allowed to play around the rice field on bare feet. Immunization against different infectious diseases is of great value in reducing the infectious diseases.

As Nepal is a member of International Labor Organization, following applicable ILO Conventions and Recommendations on agriculture should be followed.

- The Minimum Age (Agriculture) Convention, 1921 (No.10), provides that children under the age of 14 years may not be employed or work in any public or private agricultural undertakings, or in any branch thereof, when school is in session.
- The Night Work of Children and Young Persons (Agriculture) Recommendation, 1921 (No.14), requires that each Member State regulate the employment of children under the age of 14 years in agricultural tasks at night, leaving not less than 10 consecutive hours for them to rest. For young persons between the age of 14 and 18 years, the period of rest must consist of not less than 9 consecutive hours.
- The Plantations Convention, 1958 (No.110), provides that every recruited worker shall be medically examined. This Convention is obviously of great importance for workers of all ages.
- The Maximum Weight Convention, 1967 (No.127), identified optimum loads that can be handled by 90% of workers for all routine and repetitive manual-handling tasks.

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### Lifeline #

#### Sunil Kumar Joshi

*Sunil Kumar Joshi qualified as a doctor from Tajik State Medical University, Tajikistan in 1996 and went on to study at the university of Bergen, and is currently lecturer in community medicine at Kathmandu Medical College, Nepal.*

#### **Which research event has had most effect on your work and why ?**

My research work on occupational cancers which was the first study in that specialty in Nepal, gave me strong exposure to research ideas.

#### **What would be your advice to a newly qualified doctor?**

Be sincere, creative compassionate, respect your colleagues and find time for your family.

#### **What is the best piece of advice you have received and, from whom?**

A professor at Tajik State Medical University used to say that if we could not help a patient, at least do not harm him or her with our mismanagement.

#### **Do you believe there is and after life?**

I cannot recall my previous life, perhaps for some people there is an afterlife.

#### **What are you currently reading?**

The Quest for Health by Hemang Dixit, it is the very enjoyable book.

#### **What do you think is the greatest political danger to the medical profession?**

Involvement of medical professionals in carrying out torture and punishment, instructions of reporting patients' information to the authority, etc.

#### **Describe your ethical outlook.**

Honest, unprejudiced, impartial.

#### **Where were you in your sibling order as a result?**

Being the eldest son is a big responsibility in the joint family system that prevails in the South Asian continent.

#### **Do you believe in monogamy?**

Yes, strongly.

#### **What is your favorite non-medical website of this week?**

Website of the Worldwide Nepalese Students Organization <http://www.wnso.org>.

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