

Prof. Sukhatme's Philosophy of Social Change, Rural Development and Education

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SUMMARY

The Social aspect of Sukhatme's theory of Man and Environment interaction has been dealt with. The findings of the project conducted by ICMR in Narangwal in Punjab state during 1969 for assessing the impact of various interventions related to health, environment and nutrition are discussed. The paper describes how Sukhatme, through an experiment in village Kirkatwadi, showed that the education along Gandhian lines organised around a given social action can bring about a change in the life style of man. A detailed description is given about change in school environment, sanitary improvements, health education, establishment of balwadies, provision to supply safe drinking water etc. It explains Sukhatme's philosophy that communities should be properly educated for bringing social change.

Key words: Serial correlation, Interaction of genotype with environment, Social action, Sanitation, Health education, Community development.

1. Introduction

The challenge posed to our education system is not only the challenge of illiteracy, unemployment or poverty but it is even more a challenge to the quality of mass education as it appears from the crisis of basic values. Various social problems like sexual harassment, aids, drug addiction, crime, violence, gender injustice etc. are some of the crucial problems of public life in Indian society. The planners and policy makers of this nation are so eager for action that we like to start with something that we believe from our studies will help to solve the problem before us. However, it is also true that as we gather experience we realise that we really have not understood the problem at all. On this basis his philosophy of Social Change and Rural Development is deeply rooted in the well-known project conducted in Narangwal in Punjab state of India in 1969.

The project was carried out by ICMR with U.S. assistance for assessing the impact of various interventions related to health, environment and nutrition.

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The project showed that the prevalence of morbidity because of gastro-intestinal diseases was highest among the group which received medical care and the lowest among the controls. The results of this project was appreciated by national and international agencies, academicians and the scientists, working in this field. However, Prof. P.V. Sukhatme was surprised by the findings of this project. In the result there was a clear indication that when a family gets into dialogue with medical care and nutrition supplementation, the families were more interested in getting the nutrition services to deal with the problems of health and illness. The group of villages who did not get any of the services of either sanitation or nutrition supplementation or medical care, showed lowest prevalence of morbidity. However, this low rate of morbidity was stated as under reporting by group leaders. The group was aware that all villages have the provision of relatively safe (hand-pumps) and also the provision of latrines which substantially helps in preventing the spread of pathogenic contamination responsible for morbid conditions among children. But it took a view that when hunger and malnutrition was acute and over 80% of children suffered from malnutrition the immediate goal was to strengthen the medical services to deal with illness and institute the programmes for food interventions rather than education of children in the use of portable water and latrines to prevent malnutrition. In spite of clear evidences from various studies that the food interventions failed almost everywhere in India and in other developing countries. Thus it was not therefore enough to argue that more and better food increases the rate of growth and adult size, that man cannot be an exception to this rule that is observed in animals and that the U.S. media of weights and heights serve as indicators of the growth that can be achieved in practice with more and better food.

The international agencies also asserted that unless our intake is brought on par with the U.S. level, we will not realise our genetic potential for growth. Because the intake is low, our children adopt themselves to low body weight, and because body weights are low, their work output is low and because the output is low, we get poorer still. This is a vicious cycle. Clearly, the Narangwal Group assumed that food requirement is fixed and is equal to the U.S. norms. If the intake falls short of the norm, the individual is undernourished but the group conveniently ignored the fact that if it exceeded the norms, he can be equally entitled to be called as overnourished or malnourished. The truth is that the differences between individuals of the reference type are neither wholly genetic nor wholly environmental, influenced by common external factors, nor are the differences as small as they are reported to be. This is the reason why Indian children cannot reach the norm for weight and height of their counterparts in USA merely by providing more and better food through intervention

programmes. More and better food indeed helps in gain body weight but the results show that the growth stops when the ethnic potential is reached.

In a sense this is indeed what Sukhatme-Margin Hypothesis is all about. It states that the energy requirement of an individual is not fixed, but is dynamic over a homeostatic range, with efficiency of work output decreasing with the increase in intake. Outside the homeostatic range, an individual may adopt low body weight, but even here, there is nothing that prevents him from working for longer hours. Clearly the hypothesis raises the fundamental problem in biology and needs experimental investigation. An intensive field study was therefore undertaken in one village Kirkatwadi to study the effect of nutritional intervention on body weight and adult size and in particular, to know whether education in the use of latrines and piped water takes that long as the Narangwal Group believed, to bring home to the individual the responsibility for one's own well being and that of the community to which one belongs. The basic question is can intervention through diet alone, supported by medical care, be the right answer for solving the problem of malnutrition. Can the considerations of continuous interactions of biological environment of man with cultural, economic and physical environment be left out? Can man be equated with animals as Narangwal does? Can one as individual, not aspire to a day when he/she can live as human should. To answer these questions he undertook a pilot project to test his theory.

This experiment was initiated by him in his capacity as president of the Marathi Vidhyan Parishad with encouragement of Wrangler G.S. Mahajani, the noted mathematician. He provided the funds, but more than funds it was novel experience to study the effects on children of education around appropriate social action. His experience in Kirkatwadi confirmed that the answer to these questions lay in taking note of the continuous and intense interaction of cultural, economic and physical environments with biological environments in man under a sustained change of common external environment. In many ways it was a pioneering experiment. He showed that the education along Gandhian lines organised around a given social action not only serves as a basis for bringing about a change in the life style of man.

At the beginning of project, he observed that the school in Kirkatwadi was surrounded by heaps of garbage. He found it convenient to begin by asking the students and the teachers whether they felt it desirable that children should play in these surroundings wrought as it was with the risk of catching viral infection which can spread from person to person contact? The answer was an emphatic no but the children and the teachers alike expressed their inability to prevent garbage being thrown around the school since they were not present

in the school all the 24 hours. To solve this problem he agreed to erect a fence sufficiently strong to prevent goats and animals from entering the campus, which would help to prevent accumulation of garbage in the vicinity of school and play ground.

This was the simple experiment but it was not an easy task to organize as demarking the campus area, securing approval of Zilla Parishad to build a fence securing community participation in erecting fence it was a novel experience altogether. However, as the experiment progressed, he finds that the existence of nonindependent sources of variation which can serve to develop a negative feedback to put order into the surrounding when entropy is ordinarily the rule. He succeeded in clearing the garbage. Children readily accepted the responsibility of keeping the campus clean but that did not necessarily imply the incidence of infection from person to person contact and unclean handling of food would necessarily diminish. It was futile to hold out the hope of achieving health for all by 2000 if we could not bring home to children the need for observing hygiene and sanitation. What was needed was education in hygiene and public health. He therefore kept observing day to day the change that occurs in the behavior. He found that successive observations developed serial correlation which turned out to be a forerunner of the stochastic process.

But even after this finding, it was by no means clear as to how one could use the observations over time to establish the non independent nature of variation resulting from the interaction between one's genotype and nurture. The stationary variance was found to decrease more slowly than random variation. This was expected. What surprised his expectation was that as the individual move in time, the error variance in the ANOVA increased from the interaction between genetic and local environment component to stabilise it. This jump took him nearly 4 years on intensive thinking which resulted in the model suggested by Sukhatne and Prem Narain [8]. It meant that while we all have different genotypes, our genetic entities interact with the local environment to add a covariance term to stabilize the stationary variance under a sustained change in common external environment.

This was finding of extraordinary importance. It meant that an individual is not able to change the flow of daily energy at will, he can control transcription and translation of DNA message into RNA as if it is a pre-determined process. Apparently some agent external to the system controlled the transcription and translation of DNA. The results showed that interaction of genotype with environment varied from day to day permit us to put on its genetic interpretation.

In this process clearly appears to act like an exogenous variable, a dependent rather than an independent variable controlled by the capacity of

the indigenous variables to ingest food and covert it into nutrients needed to provide the enzymes for the maintenance of one's health. It is hardly surprising that under these conditions, the same intake should result in unequal gain in weight. The fact is that under a sustained common external environment, the internal component of variance is a part of an hierarchical structure and has a stationary and stable value arising from interaction between g and e . This component of variance is under-emphasised in the current nutrition theory because the requirement of an individual is assumed to be fixed. And as a result, there is a tendency to represent it as a fixed genetic potential. In actual fact, however, the part of the individual's requirement arises from common exogenous causes such as intra uterine as well as external environment.

The pathway between energy intake and body weight and indeed between energy intake and productive work output is complex. For there are two influencing factors, one, an external environmental reality and the other, physiological reality. The economic and the physical environment influences physiological process but the relationship is not deterministic. What we see therefore is a holistic pattern made up of a network of intense and continuous interaction between biological environment of an individual and network of intense and continuous interaction between biological environment of an individual and cultural, economic and physical environment under a sustained perturbation of the external surroundings in which an individual lives. These results first published in 1982, have provided him the base to illustrate how education and not nutrition intervention accompanied by and appropriate social action can lead to a change in life style.

On the basis of this philosophy Prof. Sukhatme undertook an action research project entitled "Improving living conditions in villages" with the assistance of Department of Science and Technology. This project was conducted in eight villages of four blocks of Pune District in 1982. The main thrust of the project was on education around appropriate social action. Various social actions under hygiene and sanitation intervention had been undertaken to observe how the school students and the villagers respond to social action. Change in behaviour of children and the change in attitudes of villagers were recorded meticulously over a period of five years of the project. Micro level observations were recorded about creating sense of social responsibility amongst children for self as well as community's development, change in behaviour of the children especially in terms of hygienic habits and reduction of morbidity especially gastro-intestinal diseases such as diarrhoea, dysentery were considered as a key indicators for outcome. Extensive emphasis was given on education to various groups and segments of the community for avoiding the creation of sense of dependency culture. Considering respected status and the

role of school teachers in villages he made schools as a center of actions of project activities.

The school age has a special importance in the process of socialization and acculturation. This age is more sensitive to adopt and internalize the good habits which makes considerable impact on behaviour.

Once the habit formation takes place these children are likely to carry forward in later life. Thus the children of all villages under study were considered as catalytic agents of social change to bring about social transformation of the whole village. At community level village youths who were ready for shouldering the responsibilities of social change were also involved alongwith the members and officials of Grampanchayat. Under the hygiene and sanitation intervention following social actions were undertaken.

- (a) *Improvement in school environment* - At the beginning of the project schools of all villages were unclean and almost unfit for creating conducive atmosphere for learning. The main thrust of the project activities were centered around schools. For assessing the impact of sustained change in the environment on behaviour of school students. Thus a fence around school was erected. Education related to personal hygienic and community health was imparted alongwith necessary social actions. It was expected that active involvement and participation of students and teachers would help in inculcating the habits of cleanliness. It was expected that their habits formed during early childhood would certainly help in modifying their behaviour in later life. The trees were planted along the fence for creating a better environment in schools with active involvement of students so that this sense could be repeated at home with resultant total change of entire community. It was also expected that the attention of students will also be attracted towards environment protection.
- (b) *Latrines and toilets in schools*: Latrines, toilets and the facilities of drinking water were absent in all villages when the project was started. Students were using back side open space of school for toilet purpose and for drinking water they have to walk for a distance of about 1 km from school. To form the habits of use of toilets and latrines among students these facilities were provided to school. It took a long time to form a habit of use of latrines and toilets however in due course we observed all latrines were properly used and maintained well by all students and teachers.
- (c) *Health Education*: It is a fact that childhood is the age for formation of habits consistent with culture and situation and this age is also the

age to think, reason out, adjust and cooperate with other members of society. In the latter years during a adulthood the appropriate way to develop one's sense of responsibility to oneself and to the society is to participate in social action. The knowledge of the interaction between man and environment is grossly neglected in the field of health and also education in most of the education curricula. Relatively large morbidity and mortality in villages is the result of this situation. Massive dose of education to various segments of society is the only way to correct this situation. In this view, new syllabus was prepared covering all constituent aspects of community health, individual health and environment and imparted to village women, youths, adult and school children by using various medias of communication.

- (d) *Balwadis*: The main objectives of establishment of balwadies were to provide all basic amenities to a child necessary for his physical growth and social and mental development at the home and at school. Balwadies did not exist in study villages when the project was started. Considering the significance of education during early childhood balwadies were established and were provided educational and recreational kits. Over the period of years it helped in encouraging the creative aptitude, inculcating hygienic habits and developing the liking of education at early age.
- (e) *Construction of latrines in villages* : Safe and proper disposal of human excreta is one of the important aspects of public health, which is closely associated with health and nutritional status of each individual. At the beginning of project the latrines did not exist in all villages. For want of proper facilities villagers are compelled to defecate outside. This has been always resulted in pollution of drinking water resources. The high incidence of diarrhoea and dysentery and other waterborne diseases its origin in this situation. In villages the spread of fecal matter has always remained the main source of contamination of drinking water. The villagers do not realise the potential danger involved in this situation. Considering this situation substantial provisions were made to provide latrine facilities in the villages under hygiene and sanitation intervention.

In the project Prof. Sukhatme used the new concept of community latrines. Usually group of latrines are constructed at the corner of the villages and the villagers are supposed to use these latrines and for maintenance Grampanchayat is held responsible. In this condition, the latrines constructed for villagers under various Govt. schemes neither remained in use, nor they maintained properly for longer period by

Grampanchayat. It resulting to existence of only physical structure. This situation leads to failure of sanitation intervention in almost all parts of the country. In this process community neither participate in planning nor in maintenance. Proper orientation about the use of latrines always remained far away from community. Naturally, the concept of community belongingness and 'we feeling' never appeared in any of the programme when the community kept aside. Thus it always results in failure. Prof. Sukhatme developed a new concept of community, i.e. a group of three to four adjacent families were considered as a community unit. For formation of community units the villagers came together to decide how they can make most effective unit. One of the family of each unit provided the place and wherever it was not possible Grampanchayat allowed to use public places for construction of a latrine. Each one of the participant family contributed their unskilled labour as their share in construction. For proper cleanliness and maintenance the participant families were held responsible. In this way almost 170 latrines were constructed in three villages covering the entire population. The monitoring and supervision about proper use by all villagers including women and children was entrusted to school going children under the supervision of teachers. Every morning while coming to school students were observing the latrines allotted to them about use and cleanliness and it was recorded by teachers daily. In this way he was able to get day to day information about the use of latrines. At the initial stage there was very cool response from all villages. Student's sincere and hard efforts substantially helped in persuading their parents and villagers about the importance of use of latrines. This also helped in getting good response for utilisation of latrines. The Grampanchayat also took keen interest and put restrictions on the use of public places for open defecation. Prof. Sukhatme observed remarkable change in the behaviour of the villagers. When the student acted as a tool and school operated as a media in a systematic way for their own development.

- (f) *Safe drinking water supply*: Provision of safe water is essential for prevention of water borne diseases. Open wells without proper drainage system is the main source of drinking water in most of the villages. The accumulation of waste water around the well remained main source of water contamination. The villagers are hardly aware about the root cause of illnesses is contaminated water. Considering this situation water chlorination was carried out regularly with the help of local persons during project period. Initially villagers were hesitant to accept

the disinfection but in due course their attitude changed drastically and willingly accepted. In one of the village a fence was erected around well and water was pumped in storage tank for distribution. To our surprise this simple measure has been helped substantially in reducing waterborne diseases.

In this project Prof. Sukhatme had visualized the number of parameters such as reduction of morbidity, improvement in nutritional status, formation of hygienic habits at individual, family and community level, change in attitude of the villagers towards community development, change in the perception about environment among school going children and change in the attitude about the preventive measures of day to day illness among village women etc. In this view he assessed the outcome of various social actions undertaken hygiene and sanitation intervention which have direct implications to various development programmes.

2. Results and Implications

Human behaviour is a dynamic process. Naturally it becomes very difficult to assess the impact of these intervention on behaviour. Education itself is a prolonged and continuous process. Change in habits and attitudes which are deeply rooted in culture and tradition naturally takes considerably large span of time. However, the subjective assessment of school teachers and headmasters of the respective schools felt that these interventions has made a significant change in the behaviour of students as well as villagers by many ways. Among students regular use of latrines, washing hands after defecation and before taking meals, taking bath, attending schools, cleaning school campus, proper maintenance of latrines constructed in school campus, spending more time in school after school hours for play and study etc. are the visual change among the behaviour of students. Taking care of planted trees and more attachment with school, these are some of the subjective indicators of change in behaviour of school students.

A fence around the school provided a simple example of sustained change in physical environment. Given appropriate programme of education it provides an opportunity to students to interact with one another during play and to consciously interact with one's mind to ensure if their action confirms with culture and moral values. This power to develop interaction with one's mind under the impact of micro environment is Adhyatma. It expresses itself in the form of stable non-random component of intraindividual variation in case of behavioral traits over the time. Its properties are stationary variance and co-variance, indicative of homeostatic pattern. In this context homeostasis is

simply a message much like the pattern of sound and light from Radio and T. V. which transmit a message. The aim of altering the educational methods and contains is to develop this 'Adhyatmic' power in a student so that he may distinguish greed from need and mould his character consistent with culture on one hand and advanced technology appropriate to one's culture on the other. This should be the way to make student self reliant in a way that is consistent with normal occupation of the area, particularly agriculture and related industries. Prof. Sukhatme interpreted the change occurred in villagers due to various social actions. Thus his conclusion is that man and environment synergistically interact to regulate man's behaviour with limits defined by their co-variance and further he mentioned that if we do not interpret variation over time in this way it would be tantamount to assuming that the variance of observed trait say P is the simple sum of variance of genotypic and environmental component as

$$V(P) = V(g) + V(e)$$

When in actual fact g and e interact for the observed variability. To assume that V(e) is negligible relative to V(g) is to overstate the influence of genetic determinism, at the other extreme it means overstating the influence of environment and culture in shaping the behaviour of man.

The covariance between g and e in the same individual can be written as $r\sigma_w^2$ where σ_w^2 stands for intraindividual variability arising from interaction of local environmental effects on man's genotypic under a sustained change in environment and \bar{r} stands for the strength of interaction. Covariance in this form simply represents the pattern of information that a message carries when past experience or an intended change in environment is the input. It is this information that gives man the feed back capacity of controlling his system by creating order or in other words, it is the process of moulding the behaviour. The best demonstration enjoys this capacity for plasticity in behaviour under sustained pressure of environment that is implied in above expression and versatility in action based thereon, is to compare what we have achieved in our villages over the years under the programme of education.

In this action project reduction in the prevalence of morbidity was significantly observed in all the age groups especially the incidence of Gastro-intestinal diseases were reduced in all age group of study population. The days lost in various illness and number of episodes were also considerably reduced. At community level regular chlorination of Grampanchayat, restrictions on the use of open places for defecation, compulsion for construction of latrines, compulsions on payment of sanitation tax to Grampanchayat, clean pathways

and absence of bad smell these are the significant considerations for the achievement of the theory that Prof. Sukhatme put forwarded for testing. This situation clearly indicates that clean atmosphere could be achieved through only education around appropriate social education. Reduction in cases of illness clearly indicates that the project has made the impact on behaviour of villagers and children. Another reason for reduction of morbidity was that children have indirectly influenced mothers attitude in respect of hygienic habits to be observed at home. It was also observed that children often argued with their mothers to get them to accept what they learnt at school. The subjective assessment of the teachers of success achieved in reducing morbidity through massive programmes of education on health education confirms the objective assessment.

Attendance in balwadi clearly shows development of positive attitude of parents towards education. The changes occurred due to the inputs of project has now become permanent. Even after ten years of the project one finds that the living conditions (mainly community health) are as it is as it was during project period. The appearance of villages are much better than the adjacent villages where these interventions were not provided. Now this change is rapidly spreading in adjacent villages. Perhaps Govt. is now very keen to provide hygiene and sanitation measures as a preventive step for avoiding malnutrition. In current year Govt. of Maharashtra has set to construct thousands of latrines in villages with the assistance of UNICEF and WORLD BANK. In Narangwal project educational aspect was grossly neglected and their main emphasis was on providing various facilities. This philosophy of Prof. Sukhatme shows that unless communities are properly oriented for a development it will be very difficult to take roots in society. Thus avoiding failures and getting maximum benefits from various programmes education around appropriate social action is the only way of social change.

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