

## CHAPTER 23

### HOME SCIENCE

#### Doctoral Theses

01. Bakshi (Neha)  
**Adult Patients Pre and Post-liver Transplant Nutritional Profile**  
Supervisors : Dr. Kalyani Singh  
Th 23039

*Abstract*  
*(Not Verified)*

Liver Transplantation (LT) is the only treatment for End Stage Liver disease (ESLD). Malnutrition in ESLD patients is associated with poor surgery outcome. The present study aimed at formulating a nutrition profile of LT patients. From 3 hospitals undertaking LT in Delhi and NCR, 54 LT recipients were recruited as study sample. The data regarding patient background, medical & dietary history, nutrition status, Quality of Life (QoL), Performance Status (PS) were gathered. Majority of the patients were Indian males aged 46-53 years. 27.8% and 22.2% of the patients were having Hepatitis C Virus related Chronic Liver Disease (CLD) and ethanol related CLD respectively. LT recipients showed significantly lower QoL scores and PS levels. Nutrition status assessment by different tools showed varied prevalence of malnutrition. 88.9% of the patients were malnourished according to Subjective Global Assessment (SGA) and albumin, and 75% of the patients were malnourished by body's phase angle. The present study showed that SGA has moderate agreement with body's phase angle. Pre-LT malnutrition was significantly related to higher disease severity, tense ascites, weight loss, high body fat, blood loss during surgery, higher blood product usage during surgery, survival after LT and lower muscle mass, % calorie intake, QoL and PS before LT. In acute post-LT phase a significant and gradual improvement was seen in diet progression. Factors which were conducive for calorie and protein intake were higher appetite, number of meals, sound sleep, patient's ability to eat food and no dietary restrictions. Deterrent factors were no dietary advice by dietician, enteral feeding and soft diet. Patients' intake for calorie, protein, fat, calcium and sodium were significantly lower in all phases of LT. Hence, Medical Nutrition Therapy (MNT) is necessary and advantageous during all phases of LT for improved surgical outcome, QoL and PS.

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02. CHAUDHARY (Harshita)  
**Sericin Based Multifunctional Finishing of Polyester.**  
Supervisors : Dr. Charu Gupta and Dr. Deepti Gupta  
Th 22799

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03. CHAUHAN (Shraddha)  
**Effect of Canola Oil Consumption on the Serum Lipid Profile of Dyslipidemic Adults.**  
 Supervisors : Dr. Bani Tamber Aeri  
Th 22800

*Abstract  
 (Verified)*

Many new edible oils have been promoted for their lipid lowering effect. However, similar benefits may be achieved with commonly available oils if overall dietary and lifestyle modifications are incorporated. Dyslipidemic participants (N=218) were enrolled from preventive health check-up program of private hospitals for Phase I- Baseline Phase. Data were collected on dietary and lifestyle practices, physical activity, anthropometric and biophysical parameters, dietary intake and psychological stressors (depression, anxiety and stress). For Phase II- Intervention Phase, 80 participants (40 each in experimental and control group) were enrolled from Phase I for five months (one month run-in and four months intervention). Both the groups were provided dietary and lifestyle advice. Experimental group was provided canola oil for consumption while control group was advised to consume the usual oil(s). Dietary intake, anthropometric and biophysical parameters were assessed at Pre-intervention, Post run-in and Post Intervention stage. Self-report checklist measured compliance. Phase I results revealed that participants were leading a sedentary lifestyle with faulty dietary and lifestyle practices and had unhealthy anthropometric and biophysical parameters. Correlation and multivariate analysis revealed significant associations between these factors. In Phase II, no significant difference was observed in the extent of dietary and lifestyle compliance between both the study groups ( $p=0.525, 0.795$ ). Canola oil consumption along with dietary and lifestyle modifications resulted in a significant reduction in LDL (10.83%, $p<0.001$ ), TC (9.01%, $p<0.001$ ), TG (12.01%, $p<0.001$ ) while consumption of mixed oils along with dietary and lifestyle changes resulted in significant reduction in LDL (13.56%, $p<0.001$ ), TC (10.3%, $p<0.001$ ), TG (7.55%, $p=0.029$ ). HDL levels did not change significantly. Statistically significant reductions were also observed in dietary intake, anthropometric and blood pressure measurements. The difference of these changes between the groups were not statistically significant ( $p>0.05$ ). Thus, dietary and lifestyle modifications play a larger role in managing cholesterol levels as compared to using any particular oil.

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04. GAGAN PREET KAUR  
**Capacity Building of Youth on Energy Management.**  
 Supervisors : Dr. Puja Gupta and Prof. M. G. Matt Syal  
Th 23040

*Abstract  
 (Verified)*

India is set to face massive surge in energy consumption. The present research envisioned to build capacities of youth by adopting evidence based approach to show that the strategic and planned capacity building module on energy management can lead to improvement in knowledge, skill and perception of youth towards energy management thereby increasing the likelihood of pro environmental behavior manifestation. The research is carried out in Delhi covering all nine districts with 450 youth from schools and college. The study was divided into following three phases: Phase 1: Curriculum Analysis and Pre test assessment. Phase 2: Development and validation of capacity building module; Phase 3: Implementation of module followed by post assessment of KSP and training evaluation. Pre intervention findings along with content analysis and teacher's perception were instrumental in designing of the module. Capacity building module was developed using blended educational technologies. Developed 'Capacity building Manuals' incorporate experiential activities and games along with procedures for implementing the same. 'Energy Audit Smart'- mobile application is designed as an innovation for imparting energy auditing skills. Pre intervention and post intervention change was found

to be significant at  $z(450)=43.511$ ,  $p < 0.001$ ;  $z(450)=39.928$ ,  $p < 0.001$ ;  $z(450)=20.439$ ,  $p < 0.001$  for knowledge, skill and perception respectively. Appraisal of the module revealed that nearly cent percent of the participants were satisfied with its content and delivery. A model was developed signifying that capacity building towards knowledge, skill and perception coupled with favourable situational variables can initiate intention of action and subsequent adoption of responsible environment behavior. An environmentally responsible individual is likely to influence people, thus diffusing information that reaches out to large portions of the population. Hence, indicating that the validated capacity building module developed in the research can be a tool for manifesting energy conscious behaviours amongst masses.

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05. GUPTA (Neha)  
**Association of Environmental Exposures, Lifestyle Behavior and Bmi Among 6-12 Year Old Children in Three Rural Clusters of Haryana**  
 Supervisors : Dr. Seema Puri and Dr. Nikhil Tandon  
Th 23041

#### *Abstract (Verified)*

The co-existence of significant underweight and variable burden of overweight/obesity among children in areas with the changing lifestyle and the rapidly developing society has necessitated the need for a unifying approach to understand the determinants, which are likely to be operating at multiple levels. These clusters were significantly different from each other in terms of their socio-demographic and economic profile and retail density. However, the living conditions and environmental hygiene were consistently poor across three clusters. Almost one-fourth (22.5%) of the recruited children were thin/severe thin, 3 per cent were overweight/obese and the remaining were normal as per their BMI-for-age categories according to IAP growth standards. Total energy and consumption of absolute amount of carbohydrate and protein in thin/severe thin and normal/overweight children was similar. The changing eating pattern was evidenced by consumption of similar proportion of calories derived from unhealthy food items among thin/severe thin and normal/overweight/obese children (22.2% vs. 21.3%). Analysis was done using multi-variate logistic regression at three-tier hierarchy including individual, household and community level to identify factors associated with BMI. These are age (>10years), the interaction between minority category and poor SES of the household, availability of sweets and cereals in the household, good street condition (proxy indicator of the hygiene and cleanliness in the neighborhood). The homogeneity of other factors at neighborhood and school level environment probably diluted the heterogeneity in the lifestyles and environment of the recruited children and their households. Therefore, it was evident that the BMI of a child in the age group 6-12 years could not be explained on the simple matrix of lifestyle factors i.e., food intake and physical activity; and several environmental factors interact in a complex manner to influence the outcome.

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06. GUPTA (Rachita)  
**Influence of Extrauterine Exposures on Growth and Development of Low Birth Weight Infants in the First Year of Life.**  
 Supervisors : Dr. Seema Puri  
Th 22801

*Abstract  
(Verified)*

This prospective cohort study was conducted among mother infant dyads enrolled at birth from Safdarjung Hospital in Delhi and followed up till one year of age to evaluate postnatal growth, psychomotor development and morbidity patterns of low birth weight (LBW) infants in comparison to normal birth weight (NBW) infants. The research also aimed to determine the influence of infant feeding practices, morbidities, maternal nutritional status etc on growth and development of these infants. 210 LBW and 208 NBW babies were enrolled for the study but only 156 LBW and 148 NBW infants completed the one year long follow-up study. LBW had a higher growth velocity than NBW infants. However, LBW infants remained significantly lighter, shorter and thinner than NBW infants from birth till one year of age ( $p=0.000$ ). In multivariate analysis, the significant predictors at 12 months of age for underweight were birth weight, reported diarrhea at 6 months of age and protein intake at 12 months of age. Birth weight and diarrhea at 6 months were significant predictors of stunting at one year of age. Birth weight and adequate protein intake were significant predictors of wasting at one year of age. Motor and mental development of NBW infants was significantly better among NBW infants compared to LBW infants and improved with nutritional status among both groups of infants. Birth weight was a significant predictor of mental development while being underweight or having suffered from diarrhea at 12 months were significant predictors of motor development. The present study has shown that promotion of exclusive breastfeeding in the first six months of life and prevention of infections such as diarrhea would be beneficial in promoting optimal growth and development of low birth weight infants.

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07. JAIN (Archana)

**Etraction and Application of Cornhusk Fibres in Textiles.**

Supervisors : Dr. Deepali Rastogi and Dr. Bhawana Chanana  
Th 22802

*Abstract  
(Verified)*

Cornhusk is an agro waste which poses a problem of its disposal. Using them to develop textile products would mean value addition; leading to income generation. Keeping this in view, the aim of the study was to extract fibres from cornhusk, determination of composition, assessment of various physico-chemical properties and morphology of extracted fibres. The dyeing behaviour of cornhusk fibres was also studied. Finally the fibres were put to different end uses as per their suitability. The extraction process parameters of cornhusk fibres were optimised. The extracted cornhusk fibres were analysed for composition and physico-chemical properties using standard test methods. Fibre morphology was studied using scanning electron microscopy and X-ray diffraction. The cornhusk fibres were dyed with reactive and vat dyes in different colours and compared with other similar cellulosic fibres for K/S values and colour fastness properties. Finally, the fibres were used to develop samples of different types of products like blended yarn with cotton and polyester and its fabric; coarse yarn with coir to make rope and hand-made mats of different types; and sanitary napkins with cornhusk fibres in absorbent layer. The cornhusk fibres obtained were yellowish, coarse and had lower strength but higher elongation at break. The moisture regain and water retention of the fibres was found to be high. The cornhusk fibre was further blended with coir fibres to make coarse yarn and was used to develop rope and different types of hand-made mats. As the cornhusk fibres exhibited very high water retention, they were used in absorbent layer of sanitary napkins along with wood pulp in different proportions. Looking at the multifarious applications, a milestone could be established if cornhusk fibre could be used as a source for textile fibres at commercial scale, catering to the needs of future generations to come.

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08. JAIN (Arushi)  
**Risk Assessment of Sulphite Exposure Through Food Among 12-16 Year Old Children in Delhi.**  
 Supervisors : Dr. Pulkit Mathur  
Th 23042

*Abstract  
 (Verified)*

Sulphites added as preservatives in food have been associated with adverse health effects. The present study was designed with an objective of assessing risk of sulphite exposure through food among 12-16 year old children in Delhi. The sulphite concentration in a total of 369 food products collected from different markets of Delhi, was estimated using Optimized Monier-Williams method. The sulphite levels, expressed as sulphur dioxide, ranged from <10.0 mg/kg to 406 mg/kg. Though most food samples had sulphite levels below 50% of maximum permissible level (MPL), a few un-branded products like jam (n=1), sugar (n=1), fruit bars / digestives (n=4) and non-carbonated ready to serve fruit beverages (n=1) had sulphite concentration 106% - 136% of the MPL. A total of 1030 adolescents selected from four private and four government schools of Delhi, were asked to record their food intake using a 24 hour food record repeated on three days and a food frequency questionnaire. The actual average intake of sulphite for consumers in the present study was significantly higher (p<0.05) in males as compared to females, 12-14 year olds as compared to 15-16 year olds and private school children as compared to government school children. The actual intake for sulphites for average consumers was 0.15 ± 0.13 mg / kg b.w. / day which was 21.4% of acceptable daily intake (ADI) and for high consumers (P<sub>95</sub>) it was 65% of the ADI. However, for 2 respondents the actual intake exceeded the ADI. The major food contributors to sulphite intake were beverage concentrates (46%), ready to serve beverages (22%) followed by miscellaneous food items (16%) mainly by ice creams and snowballs. People with sulphite sensitivity need to be aware about hidden food sources of sulphites. Manufacturers of food especially in the unorganised sector need to be sensitized about good manufacturing practices.

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09. JAIN (Meenal)  
**Assessment of Government Initiatives in off-Grid Solar Applications for Commercial Establishments in Selected States of India: A Stakeholders' Perspective.**  
 Supervisors : Dr. Meenakshi Mittal and Dr. M. G. Matt Syal  
Th 22803

*Abstract  
 (Verified)*

The present study aimed at understanding the policy framework for two of the off-grid solar energy technologies namely SPV and SWH at the Central and State/UT levels for the selected states/UTs. It also aimed at understanding the awareness level, accelerators, barriers and satisfaction level of selected stakeholders associated with the same. The study was conducted in six states/Union Territories of India. Stakeholders for the study included government officials from MNRE and state nodal agencies, building owners/managers and channel partners. Questionnaires and secondary sources were used as tools. Mean, Standard deviation, Analysis of Variance or ANOVA and Post hoc Tukey HSD tests were applied at appropriate places. The study has comprehensively assessed the government initiatives for off-grid SPV/SWH systems and brought forth the loopholes in the entire process. It is recommended that national level policies should be framed in consultation with the stakeholders. Time lines have to be specified for each of the stages. Off-grid solar loans should be brought under priority sector lending and high capacity SPV/SWH systems should be given higher incentives. Based on the outcomes of the study, a framework has been developed to improve the implementation and acceptability of government initiatives for off-grid SPV/SWH systems in the commercial sector at two levels. The first one focuses on improving the existing structure of incentives for off-grid SPV/SWH in the commercial sector in terms of

time frame and actions required at each step and the second framework illustrates another scenario wherein manufacturers are incentivized rather than the beneficiaries, to bring down the production cost of SPV/SWH systems. The recommendations of the study will go long way in better planning and implementation of government initiatives for off-grid SPV/SWH systems in the commercial sector and in bringing all the stakeholders on the same page for better functioning of the policy regime.

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10. MALIK (Renuka)  
**Consumer Awareness and Quality Assessment of Milk and Milk Products in Delhi.**  
 Supervisors : Dr. Renu Arora and Dr. Sunita Aggarwal  
Th 23133

*Abstract*  
*(Not Verified)*

Consumers play a vital role in the development of an economic system of a nation. It is the consumer who demands goods and services. Milk and milk products constitute an important component of daily diet intake of consumers all over the world. Hence, the present research was planned to find out the preference of consumers regarding the purchase and consumption of milk products, to study the awareness and consumption pattern of consumers, to determine the variations in nutritional composition and microbial quality and adulteration of milk and paneer available to the consumers in Delhi. The laboratory testing was done on the most commonly purchased and consumed milk product which was found to be 'paneer' in the study piloted on 50 consumers. The present study was conducted in the selected three zones of Delhi. Samples selected for the study were of two types, one was the respondents interviewed for studying their consumption pattern and awareness regarding milk and milk products and another was milk and paneer samples collected for assessing their compositional and microbial quality and for the presence of adulterants. As per the sample analysis, the females were found to be the main decision makers for buying milk in Delhi. Packaged full cream was the most commonly preferred type of milk. The study thus, indicated that at the source fresh milk was pure and of high quality, but, deteriorated and became nonconforming to the standards when it reached the consumers through packaged or vendor loose milk. This may be due to not maintaining the cold chain during storage/transportation or due to adulteration. The results of the study have highlighted the fact that the consumers expect the government to intervene through government regulatory body to prevent adulteration, take needful action and provide facilities for supply of pure milk to them.

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11. NAGPAL (Varuna)  
**Siblings as Caregivers: A Study of Families Living in Slums and Jhuggies of Delhi.**  
 Supervisor: Dr. Shraddha Kapoor  
Th 23082

*Abstract*  
*(Not Verified)*

The study was done to understand the phenomenon of sibling care. Caring for whole family was found to be taken up by children at an early age. Chores included mopping and sweeping, washing clothes and utensils, cooking for all, filling water from community taps, buying grocery, vegetables for family members & looking after younger brothers and sisters. Socialization of children was similar to seven

categories given by Sigel and Kim (1996) regarding parental belief on children's learning. Children learnt through observing, instructions, activity, exposure, experimentation and self regulation. Mothers shared that they were happy as well as sad in seeing their children take up household chores and caregiving roles. The influences of caregiving on sibling caregivers seemed to be both good and not so good. It seemed good because caring activities enhanced skills, potential, created stronger links with family members & community and more. It was not so good because children were teased, molested or robbed, behavior of younger sibling was of a bully, tasks were long and tiring; accidents and sickness were common, lacked in recognizing medicine, school drop out, latched key, compromise on wishes and desires. Children were family caregivers as exclusive sibling caregiving was not found in the study. Sibling care can be seen as an adaptable and feasible phenomenon- best use of resources and manpower to make them economical and efficient. This study is not advocating that this is the best method of care but families found this to be economical, reliable, flexible and part of community culture.

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12. SUPRIYA

**Renewable Energy Options Among Rural Households.**

Supervisors : Dr. Sushma Goel and Dr. Pradeep Chandra Pant  
Th 23043

*Abstract  
 (Not Verified)*

The study entitled Renewable Energy Options among Rural Households was carried out to understand the energy use practices among rural HHs focusing on the adoption of RETs and gaps in the technology transfer. The study covered aspects such as socio-economic profile and energy use practices of rural residents from Faridabad and Panchkula districts (Haryana); and Hamirpur and Bilaspur districts (Himachal Pradesh); effectiveness of RETs and change in quality of life of residents with the use of RETs. Assessment of existing energy resources used by the residents indicated the use of combination of energy resources, viz. a. viz., NRETs and RETs, to fulfil their daily energy requirements for household activities (cooking, domestic lighting, water heating, and indoor space heating and cooling). Amongst the NRETs (traditional biomass, fossil fuels and electricity from conventional electricity grid) the most popular were traditional biomass and fossil fuels for cooking and water heating; conventional electricity and fossil fuels for domestic lighting, and indoor space heating and cooling. RETs found in selected rural areas were Solar Photovoltaic Technologies (torch, lantern, home light and street light); solar thermal technologies (water heater and cooker), solar grids (up to 10 kW) and family-size biogas plants. The present research pointed out a positive and significant change in the lives of residents on account of introduction of RETs in their daily life. Shift to clean and modern technologies, specifically RETs was noticeable though its impact was evident even though less. The penetration of RETs was picking up and a noticeable improvement in the quality of life of RET users would take its due course of time as residents were gaining confidence in RETs when they used them for some time.

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13. SONEE (Noopur)

**Development of Suitable Work-wear Fabrics for Workers of Oil and Gas Industry.**

Supervisors : Dr. Chitra Arora and Dr. M. S. Parmar  
Th 22804

*Abstract*  
(Not Verified)

During the production of oil and gas, risk of ignition of combustion gases or oil is very high due to electrical spark, flash fire etc. The ignition of these gases and oils some time cause fire accidents. As per Government of India, the majority of severe and fatal burn injuries are a result of the individual's clothing igniting and continuing to burn, not by the exposure itself. Flame-Retardant clothing neither ignites nor continues to burn when it comes in contact with the flame. It provides escape time to wearer and increases chances of survival. Hence, keeping the safety of workers in mind, a survey was conducted in refineries and petrol stations to understand the effectiveness of worker's uniform to tackle fire hazard. The work-wear fabrics being used in refineries at present were evaluated for their suitability. The results indicated that these collected samples were not qualified the passing criteria of flammability. The study aimed to develop different woven blended fabrics, using inherent flame-retardant and non-flame-retardant fibers. These fibers were blended with each other to enhance their characteristics of flame-retardancy, breathability and softness, as well as to reduce the cost of fabrics. Produced fabrics were tested and statistically analysed for their suitability, according to ISO 11612. Fabrics which passed the standard criteria for heat and flame, on the basis of their performance, related to the intensity of heat and flame-related hazards, present in work place in refinery, were classified for different end uses. The effect of fiber ratios in blends, on flame-retardancy of fabrics, was found significant at 5 % level. A work-wear was also designed keeping in mind the function, breathability and comfort of the fabric. This study will be a guide to select suitable fiber blends, without compromising on the minimum requirements, in accordance to ISO 11612.

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14. SUDHA

**Dyeing Wet Blue Goat Nappa Skin with the Colorant from *Penicillium Minioluteum***

Supervisors : Dr. Charu Gupta and Dr. Sunita Aggarwal

Th 22805

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