Supplementary Table V. Research priorities in maternal, newborn, child health and nutrition related to technology and its application		
Research options	Weighted score	National rank
Basic research		
Determining optimal growth trajectory of LBW (preterm, SGA) babies: Nutrient and calorie requirements; strategies to minimize, mitigate development of chronic diseases	0.8850	6
Redefining high risk neonates based on demographic, biological, physical, clinical and laboratory based criteria (*e.g.*, ethnicity, maternal nutrition, intrauterine growth trajectory, body composition, gestational age, birth weight, *etc*.)	0.8204	35
Techniques to improve the microbiological (bacterial, viral, fungal, *etc*.) yield for laboratory confirmation in suspected neonatal sepsis (various body fluids, umbilical cord cultures, skin, gut, vaginal cultures, molecular techniques)	0.8143	38
Developing novel therapeutic measures for childhood NDDs (*e.g.*, stem cell, genetic engineering, pharmaceutical, brain cell transplant)	0.8059	43
Developing novel anthropometric screening and measurement tools for use in community settings by health providers and family members	0.8013	44

Research on foetal and early childhood origin of adult diseases: Development and programming pathways of metabolic systems	0.7897	50
Pathophysiological and mechanistic studies to determine novel risk factors, aetiology, severity and outcome of puerperal sepsis	0.7857	51
Aberrations in lipid and glucose metabolic pathways in women with PIH & their impact on pregnancy outcomes (*e.g.*, growth of foetus, stillbirth rate)	0.7054	70
Breast milk as a novel source of pluripotent stem cells	0.7044	71
Characterize immune response elicited by natural infection versus that induced by vaccine versus acquired transplacentally from mother for various vaccine preventable diseases (*e.g.*, measles, *etc*.)	0.6401	73
Mechanistic studies (genetic, physiologic, biochemical, proteomic, metabolic) for congenital disorders (malformations, chromosomal and genetic disorders, inborn errors of metabolism)	0.5381	75
Research on biomarkers		
Novel biomarkers for identification, prognostication and triage of pregnant women with near miss events and other high-risk conditions	0.8068	41
Identifying novel biomarkers (*e.g.*, genetic, inflammatory markers, adiponectin) for prediction and early detection of obesity and chronic diseases (*e.g.*, diabetes mellitus, hypertension, *etc*.) in children	0.7962	47

Identifying novel biomarkers*e.g.*, desmo-sulfate, matrix metalloproteinases, PIGF, PAPP-A, SFLT, tyrosine, LDL, MAP, ECHO, Doppler, CTG, spot urine protein to creatinine ratio, *etc*.for early identification, prognostication of medical disorders and infections during pregnancy (*e.g*., PIH, GDM, chorioamnionitis in premature rupture of membranes, TORCH, *etc*.)	0.7792	55
Identifying novel maternal and foetal biomarkers (*e.g*., acute phase reactants, fibronectin; high vaginal swab, cervical length, *etc*.) for early identification, prognostication of preterm births and associated complications	0.7689	57
Identifying novel biomarkers (biochemical, molecular, genetic, imaging) for early identification and prognostication of neurodevelopmental delays, deviations and disorders	0.7451	60
Identification of/evidence synthesis on valid markers (immune system markers, biomarkers, genetic markers, anthropometric measurements, lean body mass) of non-communicable diseases during pregnancy and early childhood	0.7299	63
Studies to identify novel biomarkers (*e.g*., enzymes, hormones, receptors, genetic and epigenetic markers, *etc*.) of risk factors, aetiology, severity and outcome of vitamin D deficiency in women of	0.7285	64

reproductive age group (pregnant and lactating) and their progeny		
Biomarkers of post-partum depression and psychosis	0.7130	67
Identifying novel biomarkers (biochemical, metabolic, hormonal, genetic, neuronal, infective) for early detection and prognostication of birth asphyxia and trauma	0.7077	68
ICT/maternal health		
Establishing an innovative framework of monitoring and supervision with in-built mechanism of accountability to improve performance of frontline workers and health personnel involved in neonatal care (*e.g.*, physical supervision; engaging PRIs and clients; use of ICT, telemedicine, maternal health)	0.8781	9
Use of ICT (*e.g.*, telemedicine and maternal health) to improve maternal health services	0.8670	15
Use of modern teaching learning methods including ICT and distance learning for skill building and retention in health personnel involved in maternal and reproductive health at various levels of care	0.8660	16
Use of ICT and maternal health to improve access to neonatal health services and associated entitlements (increase service quality, outreach and awareness; improve monitoring and screening for early identification of morbidities; strengthen client referral, tracking and	0.8645	17

treatment compliance)		
Use of modern teaching learning methods including ICT and distance learning for skill building and retention in health personnel involved in newborn care services at various levels of the health system	0.8595	19
Use of ICT and maternal health to improve access to child health services and associated entitlements (increase service quality, outreach and awareness; improve monitoring and screening for early identification of childhood morbidities; strengthen client referral, tracking and treatment compliance)	0.8590	20
Novel strategies to improve ARSH (*e.g.*, ICT, social media, maternal health, innovations in delivery of ARSH packages through platforms such as schools, gyms, youth clubs)	0.8312	30
Use of ICT and maternal health to improve outreach, awareness about reproductive health and public health programmes amongst clients, job-aids for health providers at various levels, tracking of health conditions in pregnant and lactating women, mobilizing them for timely care seeking and effective uptake of entitlements (*e.g.*, incentives, insurance, *etc*.) for reproductive health services by pregnant and lactating women	0.8308	31
Point-of-care diagnostics/technology		

Development and validation of low-cost technologies for screening, referral and management of childhood pneumonia and ARI in the community and at various levels of health care (*e.g.*, maternal health, point-of-care diagnostics & therapeutics, management protocols, *etc*.)	0.9175	2
Development of cost-effective, feasible, validated point-of-care diagnostics for malaria in children for use at community and different levels of healthcare	0.9148	3
Low cost, feasible, portable technological innovations in equipment to improve capacity (diagnosis, identification, management) and outreach for foetal & neonatal care (especially, LBW, preterm: CPAP, surfactant therapy, *etc*.) at various levels of the health system and their impact evaluation	0.8911	5
Developing novel, cost-effective therapeutic regimens for treatment of resistant childhood malaria	0.8848	7
Foetal distress and hypoxia: Development of appropriate technologies (*viz*., low-cost pulse oxymetry, Doppler, foetal monitors) for early detection and management in the public and clinical health services	0.8846	8
Detection and management of GDM within the public healthcare system (point-of-care diagnostics, therapy and monitoring, lifestyle, cost of treatment, efficiency, outcome)	0.8720	12

Developing and validating point-of-care diagnostics, biomarkers (neonatal, maternal, amniotic fluid; core-to-periphery temperature gradient) and a scoring system based on these for identification and prognostication of neonatal sepsis in the community and at primary care level	0.8697	13
Development of validated point-of-care diagnostics (laboratory, histological and radiological) and screening criteria for acute bacterial sepsis in children for use by community-based workers and personnel at various levels of the health system	0.8694	14
Validity & feasibility of screening tools and clinical prediction models for early identification and monitoring of PIH	0.8546	21
Develop and validate low-cost point-of-care diagnostics and technologies for early identification (including antenatal) of congenital disorders (malformations, chromosomal and genetic disorders, inborn errors of metabolism) in the community and at different levels of the healthcare system	0.8519	22
Developing novel validated point-of-care diagnostics for detection of haemoglobinopathies and enzyme deficiencies (*e.g.*, sickle cell, thalassaemia, G6PD deficiency, others) in children in the community and at various levels of healthcare	0.8498	24

Development and evaluation of novel and innovative point-of-care diagnostics for use by frontline workers and primary care physicians for identifying nutritional disorders	0.8492	25
Developing validated context-adapted instruments and criteria for screening and diagnosis of children with neurodevelopmental delays, deviations and disorders	0.8489	26
Paediatric HIV/AIDS: Developing point-of-care diagnostics, novel therapeutic agents and molecules	0.8235	33
Development of validated diagnostic criteria (laboratory, histological and radiological) and point-of-care diagnostics for AES in children	0.8223	34
Developing and validating feasible and economical laboratory/field-based methods for estimating haemoglobin in different age groups	0.8200	36
Developing point-of-care diagnostics for childhood obesity and chronic diseases (*e.g.*, diabetes mellitus, hypertension, *etc*.) for use by frontline workers and primary care physicians	0.8178	37
Developing validated point-of-care diagnostics for detection of helminthic & protozoal infestations in children in the community by frontline workers	0.8105	39
Developing and validating novel point-of-care diagnostics for assessing body Iodine nutriture	0.7170	66

Developing and validating novel point-of-care diagnostics (serology, biomarker, genetic) for early detection of celiac disease/protein intolerances	0.6445	72
Research for identifying definitions		
Definition of metabolic syndrome in Indian children in the context of widespread micro- and macronutrient undernutrition	0.8066	42
Defining anthropometric cut-offs and biochemical markers to monitor the nutritional status of pregnant & lactating women	0.7998	45
Development of India specific (national and regional, if required) foetal growth charts for monitoring intrauterine foetal growth and early detection of growth restriction	0.7831	52
Refinement and validation of current WHO case definition of childhood pneumonia in the Indian context	0.7520	59
Diagnostic criteria for obesity/overweight during pregnancy	0.7068	69
Technology for data-driven programme management		
Improving administrative data quality and strengthening data-driven child health programme monitoring, action and accountability at PHC and district levels (*e.g.*, line listing of households with children with NDD, use of ICT, develop novel indicators)	0.9212	1
Improving administrative data quality and strengthening data-driven	0.8514	23

neonatal care services, action and accountability at community, subcentre, PHC and district levels (*e.g.*, strengthening MCTS, building Maternal Newborn Health Registry, use of ICT, develop novel and innovative indicators)		
Improving administrative data quality and strengthening data-driven monitoring, action and accountability at PHC and district levels for programmes related to nutrition of women of reproductive age (*e.g.*, building community-based registry of maternal health and nutritional disorders, use of ICT, develop novel indicators)	0.8424	28
Improving administrative data quality and strengthening data-driven programme monitoring, action and accountability (health and non-health sectors) for prevention of obesity and chronic diseases in children in India (*e.g.*, setting up childhood obesity and chronic diseases sentinel surveillance sites in representative urban and rural sites across the country)	0.7989	46
Technology for disease prevention		
Identifying novel low-cost environment-friendly strategies for control of vectors	0.9000	4
Development of portable water purifiers and recyclers for generating potable water at household levels	0.8720	11
Development of novel methods of safe abortion (early – upto 12 wk;	0.8337	29

late – upto 20 wk)		
Pharmacologic research for identifying/developing novel, safe, efficacious and affordable iron salt(s) for supplementation/therapy (individual and mass) of iron deficiency state in women and children (*e.g.*, preparation, dosing schedule, route, combining with other micronutrient, minimization of side-effects)	0.7934	48
Development and evaluation of novel technological interventions to reduce and prevent injuries amongst children in different settings (home, school, play grounds, market place, public places, other environments)	0.7821	53
Improving the content and organoleptic properties of oral rehydration salt	0.7596	58
Developing novel methods (*e.g.*, slow release antiseptic drug delivery systems, nanoparticles, *etc.*) to prevent and treat puerperal sepsis	0.7321	61
Pharmaceutical therapy for prevention and treatment of various medical disorders of pregnancy (*e.g.*, Primary Pulmonary hypertension, PIH, *etc.*)	0.7316	62
Technology in agriculture and nutrition		
Development of novel and innovative recipes of nutritious complementary and therapeutic feeds (RUTF) using locally available ingredients	0.8732	10

Food policy interventions and regulations to minimize risk of malnutrition (under and over) and chronic diseases in children [*e.g.*, fortification of salt (iodine, boron; double fortification); biofortification of zinc in staple cereal crops, *etc*.; guidelines for vitamin D fortification of oils; regulations for advertisements, sale, labelling; supply chain management strategies for distribution of micronutrient rich foods and supplements through ICDS/PDS]	0.8629	18
Cost effective methods of agricultural pest control with minimal hazard for health and environment	0.8481	27
Maximum allowable limit for various pesticides used in agriculture in India	0.8278	32
Promoting nutrition sensitive and eco-friendly agricultural practices and influence the value chains that bring value for all stakeholders including the marginal farmers and the consumers from poor communities: Identifying strategies to leverage existing institutional frameworks in agriculture and other related sectors to achieve above objectives (*e.g.*, farm based technologies, engagement of *Krishi Vikas Kendras* and Central Agriculture Institutes, water conservation techniques, improved farming methods)	0.8073	40
Development of novel and innovative food items and supplements based on modern technologies (*e.g.*, nutraceuticals; nanocomposite mixes; microencapsulation; probiotics; food-to-food fortification *i.e.*,	0.7812	54

combining food items in such a way that bioavailability increases) for improving macro and micronutrient content and their bioavailability		
Development of low gluten/gluten-free wheat varieties and hypoallergenic food items	0.6372	74
Vaccine development		
Development of novel and improved measles vaccines (with special focus on programme and ground conditions in low and middle-income countries): Delivery routes, immune responses, duration of protection; storage & transport conditions (CTC)	0.7906	49
Developing a candidate pneumococcal vaccine that is serotype-independent	0.7735	56
Developing candidate vaccines for viral pneumonias (*e.g.*, RSV)	0.7269	65

AES, Acute encephalitis syndrome; ARI, Acute respiratory infection; ARSH, Adolescent reproductive and sexual health; CPAP, Continuous positive airway pressure therapy; CTC, Controlled temperature conditions; CTG, Cardiotocography; G6PD, Glucose 6-phosphate dehydrogenase; GDM, Gestational diabetes mellitus; ICDS, Integrated Child Development Services; ICT, Information and Communication technology; LBW, Low birth weight; LDL, Low-density lipoprotein; MAP, Mean arterial pressure; MCTS, Maternal and Child Tracking System; NDDs, Neurodevelopmental disorders; PAPP-A, Pregnancy-associated plasma protein A; PDS, Public distribution system; PIGF, Placental growth factor; PIH, Pregnancy induced hypertension; PRIs, *Panchayati Raj* institutions; RSV, Respiratory syncytial virus; RUTF, Ready-to-use therapeutic food; SFLT, Soluble fms-like tyrosine kinase-1; SFLT, Soluble fms-like tyrosine kinase-1; SGA, Small for gestational age; TORCH, Toxoplasmosis, Other (syphilis, varicella-zoster, parvovirus B19), Rubella, Cytomegalovirus, Herpes infections