Research Gaps and Policy Priorities: Evidence from Bihar

What is available and what is required?

International Growth Centre

About IGC

The International Growth Centre (IGC) aims to promote sustainable growth in developing countries by providing demand-led policy advice based on frontier research. The IGC directs a global network of world-leading researchers and in-country teams in Africa and South Asia and works closely with partner governments to generate high-quality research and policy advice on key growth challenges. Based at London School of Economics (LSE) and in partnership with the University of Oxford, the IGC is funded by the UK Department for International Development (DFID) and the Bill and Melinda Gates Foundation (BMGF). The IGC believes that rigorous and policy-relevant research will always make development more effective and improve people's lives.

The IGC Bihar programmes were launched in 2009 in close partnership with the Asian Development Research Institute (ADRI), to provide a platform for the state's policymakers to engage with world-class researchers, and through this collaboration, generate practical, rigorous research that would aid better policy formulation. Drawing on ADRI's local expertise, the IGC has developed close links with policymakers, local researchers and the larger civil society in Bihar.

IGC Scoping Paper

The IGC in partnership with the BMGF is currently preparing to engage with government, research institutes, and practitioners in Bihar to build a strong, sustainable ecosystem of research, and monitoring and evaluation (M&E) in the state and create the necessary local institutional capacity. The IGC believes that local solutions are at the heart of the most effective policies; therefore, improving the quality and quantity of evidence available to inform policymaking and programme design is crucial for ensuring that policymakers and practitioners look towards evidence and evaluation when designing and implementing both policies and programmes.

The programme started with a consultative process that included a scoping study, identifying the current state of research and evidence in Bihar for the priority sectors. The consultation gave local stakeholders a voice, sought to lay out the landscape of what is known, and helped identify key policy questions. The main findings have been summarised in this paper.

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Acknowledgement

We are extremely grateful to BMGF for supporting this Scoping Paper. We are also thankful to the numerous interviewees and stakeholders with whom we spoke and from whom we sought advice. IGC Programme Economist Manish Prasad provided excellent research assistance and support. We could not have done this work without the guidance and leadership of IGC India Country Director Dr Pronab Sen and further technical support and review comments from IGC India Lead Academic Prof. Sandip Sukhtankar.

We are grateful for review comments from Diva Dhar and Ashwin Iyer of BMGF, which helped improve the paper.

1. Introduction:

The gap between research and policy priorities has always presented an enormous challenge both for academics and policymakers. With a scarcity of rigorous evidence in certain areas, this gap is particularly large in Bihar. To address this, IGC India, in collaboration with the BMGF, is in the process of identifying the current state of research and evidence in Bihar for a core set of priority sectors – Health, Agriculture, Financial Inclusion, and Gender. IGC India believes that evidence based on economic and social policy research, both at the basic and applied level, is crucial in the search for solutions to Bihar's development challenges. It is generally recognised that strengthening policy research yields dividends in the formulation of well-informed development policies, which will make development more effective and improve people's lives.

This scoping paper provides an independent analysis of the evidence in the priority sectors and identifies key policy and research priorities that are in need of more rigorous evidence. This exercise will enable policy stakeholders to demand more research in crucial areas and understand where new programming and investments can have the greatest impact.

1.1 Objectives: The specific objectives of this paper are:

- To provide independent analysis of the evidence in the priority sectors;
- To recommend areas of research where more rigorous research studies can add value and help decision-makers;

1.2 Methods: For understanding the current state of evidence in Bihar, the IGC India team assessed[1] the information on interventions currently being implemented in Bihar which are relevant to the priority areas, following a search strategy using keywords, for example – "Bihar" or "Health". The timeframe was from 2000 up to and including the period of the search (February – March 2018). Eligible articles were (i) related to research conducted in Bihar and published in peer-reviewed journals; and (ii) related to the priority areas in Bihar. Apart from that, we also followed the below mentioned criteria in the selection process.

Graph 1 – Inclusion and Exclusion Criteria

Date	Exposure of Interest	Geographic Location of Study	Language	Participants
•As stated, for this Scoping Paper, we only reviewed **Peer Reviewed journal articles** and impact evaluation studies from **January 2000 to March 2018**. However, we also understand that a narrow time frame severely limit the number of eligible studies.	•For this paper, we only consider those studies where participants **experienced a particular conditions** i.e. had disease; had no knowledge over technology.	•This Scoping Paper only considers studies conducted in **Bihar**. We limit the review to only studies targeting Bihar because of the current funding (similar socio-economic and demographic factors).	•For this Scoping Paper, we only consider studies in **English**. We excluded studies that are reported in languages other than English simply because of the difficulty of translation but the exclusions may create publication bias.	•Reviews only considered studies related to **adult; children and adolescents**.

[1] Database – Web of Science, PubMed, Eldis, 3ie (International Initiative for Impact Evaluation), and Google Scholar for peer-reviewed journals.

Reported Outcome	Setting and Nature of Interventions	Study Design	Type of Publications
•To determine the inclusion process, in this Scoping Paper, we only considered studies which claerly presented the **outomes**. We excluded studies which has self-reported outcomes.	•The Scoping Paper only included studies which address the treatement efficacy; intervention design; length, timing, and intensity of interventions.	•We only include **experimental, quasi-experimental and descriptive studies**. Apart from that for avoiding the selection biases, we used the quality-weighting approach.**	•This Scoping Paper only considers **original studies** which are **Peer Reviewed.** Commonly excluded publications are grey literatures, technical reviews and NGOs and Government reports.

All relevant articles were downloaded and reviewed. Studies are eliminated from the bibliography if the titles and abstracts clearly disqualify them or studies that do not include sufficient statistics. At this stage of the selection process, studies are further evaluated to ensure that individual studies meet all inclusion criteria. In the initial search, we got 1657 journal articles and based on the inclusion criteria, we reviewed 200 peer reviewed articles. Out of the 200 papers, 124 (62%) were related to health and nutrition, 42 focused on agriculture (21%) and 34 on financial inclusion (17%).

The information on articles' topics, type of research, type of data collected or used, and level of evidence and content, were extracted from the articles using a standardised template. At the same time, journal articles were classified based on the key sub-topics of interest within the priority area of Health, that is, health systems, public service delivery, governance, health finance, information and communication technology (ICT), and insurance. The type of research was classified as follows: descriptive research (studies related to prevalence, risk, knowledge-attitude and practice), programme implementation research (studies related to efficiency & efficacy), and fundamental research (studies assessing the impact of interventions on the priority sectors). Apart from that, the team also classified the data, distinguishing between original data, secondary analysis data, and non-original. They also surveyed (semi-structured interviews) practitioners, local researchers, grant-giving institutions, and policymakers working in the priority sectors in Bihar ('stakeholders') to assess perceptions of the state of the evidence, priorities for research to inform policy, and the demand for new evidence. The team analysed a total of 60 responses for this report[2].

In this process, we realized that there may, of course, be several other research papers and sources of evidence on the priority sectors but for this paper, only peer-reviewed articles and impact evaluation studies have been captured. The team would like to emphasise that for this scoping paper, they didn't review any currently on-going research studies, research studies which will publish soon or any grey literature or working paper on the priority sectors. In this process, it is possible that some issues were erroneously excluded at the title or abstract level and thus not screened at the full text level.

The report is organised as follows. Section 2 discusses the results of the stakeholder survey. Section 3, describes the evidence base using the evidence gap map (availability of evidence and gaps in existing evidence). Section 4 summarises the discussions of key action domains in the need for further evidence and outlines the priorities and suggested areas of research. Section 5 covers the limitations of this paper, and section 6 outlines our conclusions.

[2] Appendix 1 contains the methods and content of the semi-structured interview.

**The quality-weighting approach provides the benefit of a large pool of studies, fuller representation of the available research on a topic, and an opportunity to empirically examine the relationship between methodology and study outcomes.

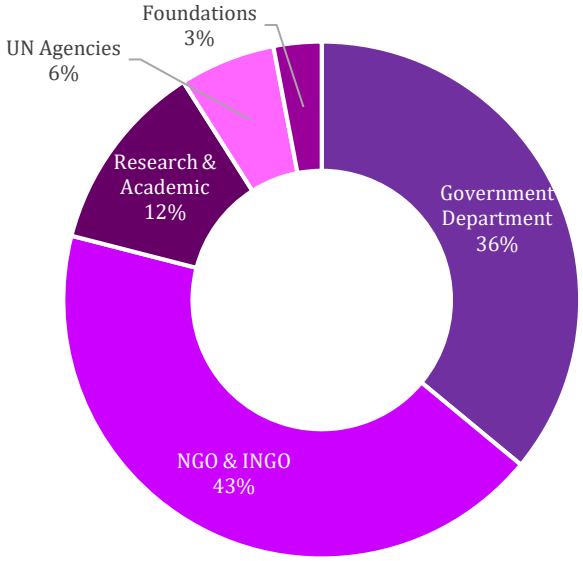
2. Key Findings from Scoping Interviews:

For understanding the availability of different types of evidence and identifying the need for research to inform policy as well as the demand for new evidence, we conducted 60 semi-structured interviews[3] between December 10, 2017 and March 15, 2018. This section provides the main results drawn from the interviews.

2.1 Profile of the Respondents: All the respondents (except secretaries and principal secretaries of government departments) were requested to provide information about their work history and experience, including the type of organisation for which they work at present, their role, sector experience, and geographic familiarity. They were also asked about how they use evidence, their level of knowledge about priority sectors (organisation-specific), and thoughts on future trends and needs. We did not ask for personal information such as educational background.

While analysing the respondents' institutional affiliation, it is seen that the largest share of respondents works in national and international non-governmental organisations (NGOs) (43%), followed by government departments (36%), and research and academic institutions (12%). Significantly fewer (less than 5%) work for both United Nations (UN Agencies) or individual foundations.

Chart 1 - Institutional affiliation



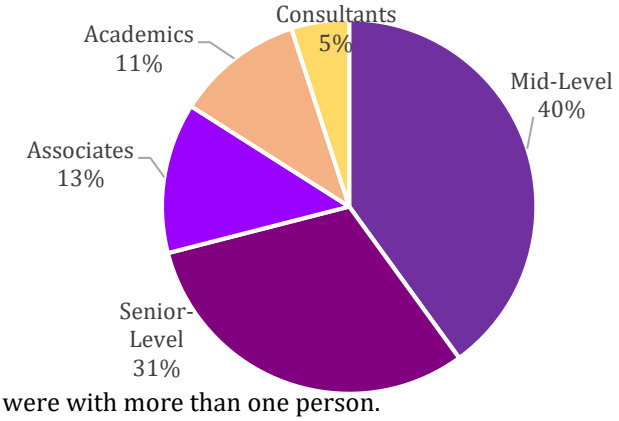
Respondents were also asked about their priority sector-specific experience and their role within their organisation. Almost half (46%) of the respondents have more than 10 years of experience in the sector (Table 1) and 26% respondents have 5-9 years of experience.

Table 1 -Length of time working in priority sectors

Length of Experience	% of Respondents
<2 Years	8.9
2–4 Years	14.4
5–9 Years	26
10–19 Years	29
>20 Years	16.8
Not Applicable	5

The largest proportion of respondents hold mid-level positions (40%), followed by those at the senior leadership level (31%), associates (13%), academics (11%), and consultants (5%). Apart from that the below mentioned Table (2) will provide gender segregated information.

Chart 2 - Respondents position



When asked about their area of expertise, 8% of the respondents did not provide this information. Of those who did, a large proportion (74%) reported more than one area of expertise. Over half (52%) work in research, usually coupled with one or more other

[3] Appendix 2 provides a list of interviewees some interviews were with more than one person.

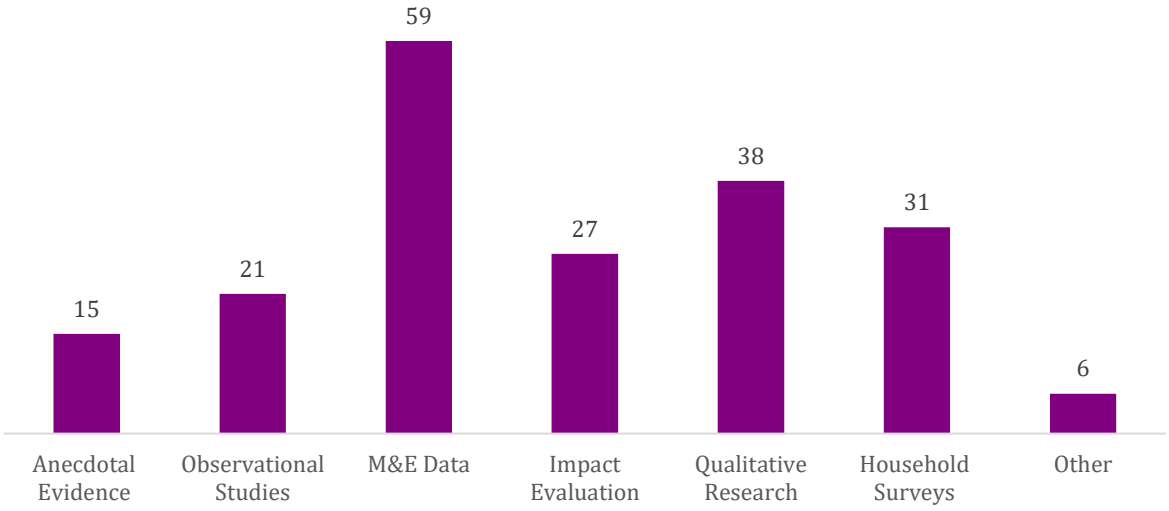
areas. Analysis of the "other areas" revealed that M&E and communication are particularly strongly represented. The majority of respondents work or (did do in the past) on M&E (68%), programme design (68%), and/or programme implementation (64%), while a significant portion have research roles (51% work on evaluation).

Table 2 - Gender Segregated Information (%)

Gender	Respondents	Positions vs Gender (%)					Theme Suggestion		
	%	Senior	Mid-Level	Associates	Academics	Consultants	Health	Agriculture	Fin. Inc
Male	63	47	43	8	12	6	56	44	34
Female	37	15	37	18	10	4	58	56	20

Besides, a majority of respondents stated that they rely on M&E data (59%) in their current work, followed by qualitative research (38%), and household surveys (31%). Some respondents also stated that M&E data is the most frequently generated type of evidence that they use at work. When asked if they were aware of relevant sector-specific evaluations or research studies, majority of the respondents said that they never use these; while most of the answers in the regard provided little detail, but a few interviewees stated that they do not use any such studies because of the poor quality of the studies, lack of time, and lack of understanding of the application of the findings.

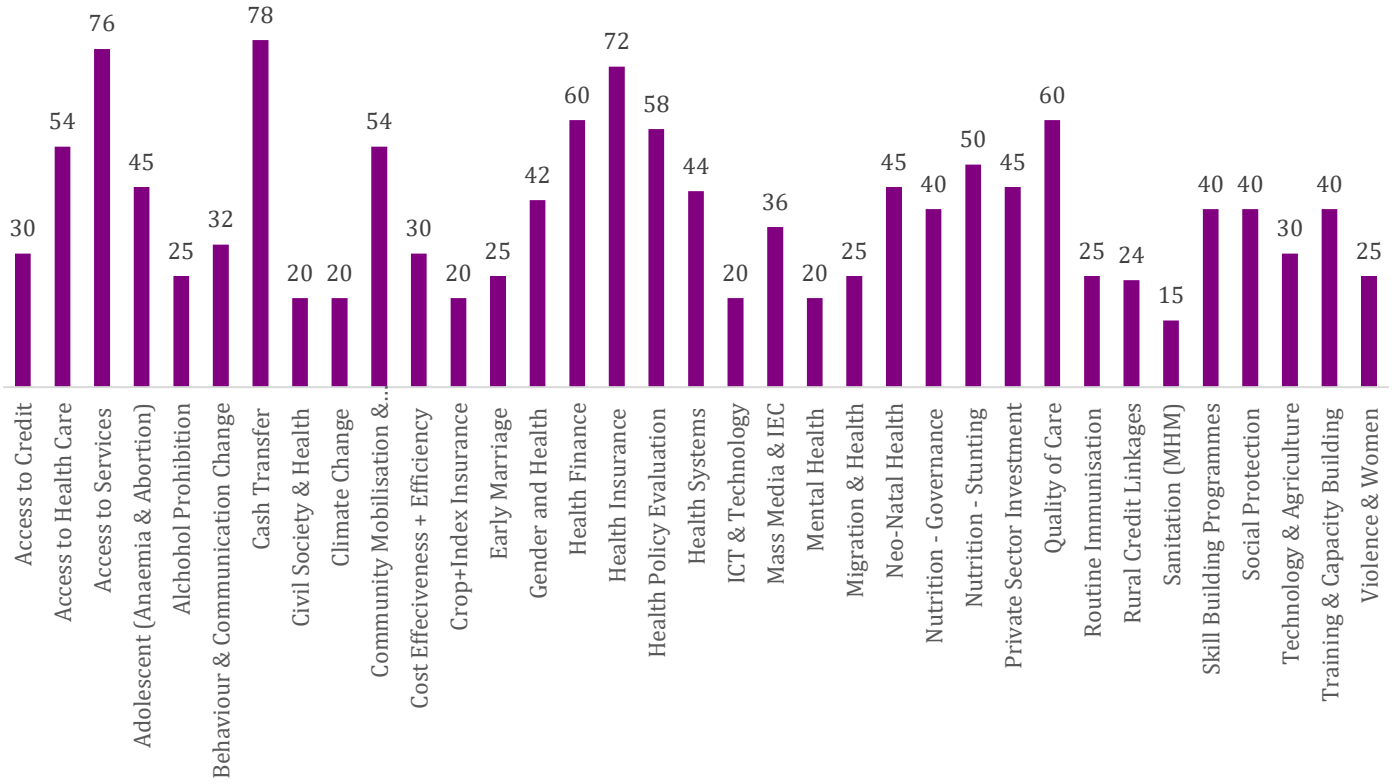
Chart 3 - Types of evidence used by respondents



2.2 Areas Requiring Evidence[4]: When asked about areas where more evidence is needed for policymaking, the majority of interviewees (more than 60%) stated that they require more evidence on health insurance, health finance, cash transfers and their impact on health outcomes, and quality of care. Over 40% of the interviewees stated that they require more evidence on private sector investments in health systems (both delivery and access). One-fifth of respondents said that they need more evidence related to crop insurance, mental health, and use of technology in healthcare services. Conversely, many respondents stated that there is a strong evidence base on the effectiveness of family planning and contraception. While analysing the responses on areas that require greater evidence, we saw that only in the health sector, there is a strong correlation between the areas which require more evidence and the person' area of expertise - but for other sectors, the interviewees who do not have personal expertise in a particular area also prioritised different areas.

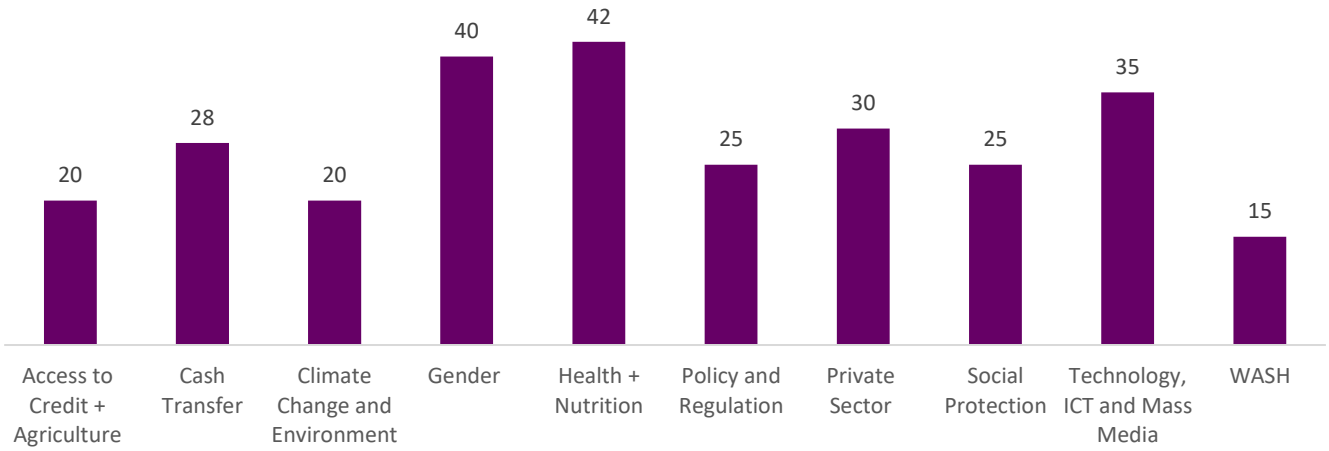
[4] More Information – Appendix 3
* MHM – Menstrual Hygiene Management

Chart 4 - Areas that need more evidence (%)



2.3 Areas Recommended for Further Research: Forty-two per cent of the interviewees stated that it would be helpful if IGC commissioned more studies on health and nutrition, followed by studies related to gender (40%). Chart 5 below lists the priorities for research and intervention areas to be evaluated.

Chart 5 - Areas required further research (%)



*WASH – Water and Sanitation Hygiene

2.4 Recommendations for Research Outcomes[5]: The stakeholder conversations also provided insights into the important outcomes that need to be measured in the priority sectors for better uptake of research. Health outcomes and access to quality care turned out to be the dominant ones (more than half of the respondents). Many respondents also emphasised on equity, social protection policy, and

[5] We are unable to quantify this section.

better policy and regulation when considering outcomes (for example, Agricultural Produce Market Committee (APMC) Act).

While discussing the targeted population[6] for research, more than half of the interviewees suggested that the focus should be on specific subgroups. Some respondents also contended that it would be helpful for Bihar if the future research includes all members of the population. Further, a few suggested that IGC should emphasis on children. Some of the respondents also said that it would be helpful for Bihar and for stakeholders who are working on Bihar, if the research outcomes can give some insights into the effectiveness of programmes or interventions.

2.5 Key Findings of the Scoping Interview: The interviewees attempted to provide detailed information on the areas where more evidence is needed for policymaking. There is significant level of interest in more evidence on health insurance, health finance, cash transfers and their impact on health outcomes, and quality of care (respondents believe the current evidence on these is insufficient or not that useful). Below is a summary of the key points:

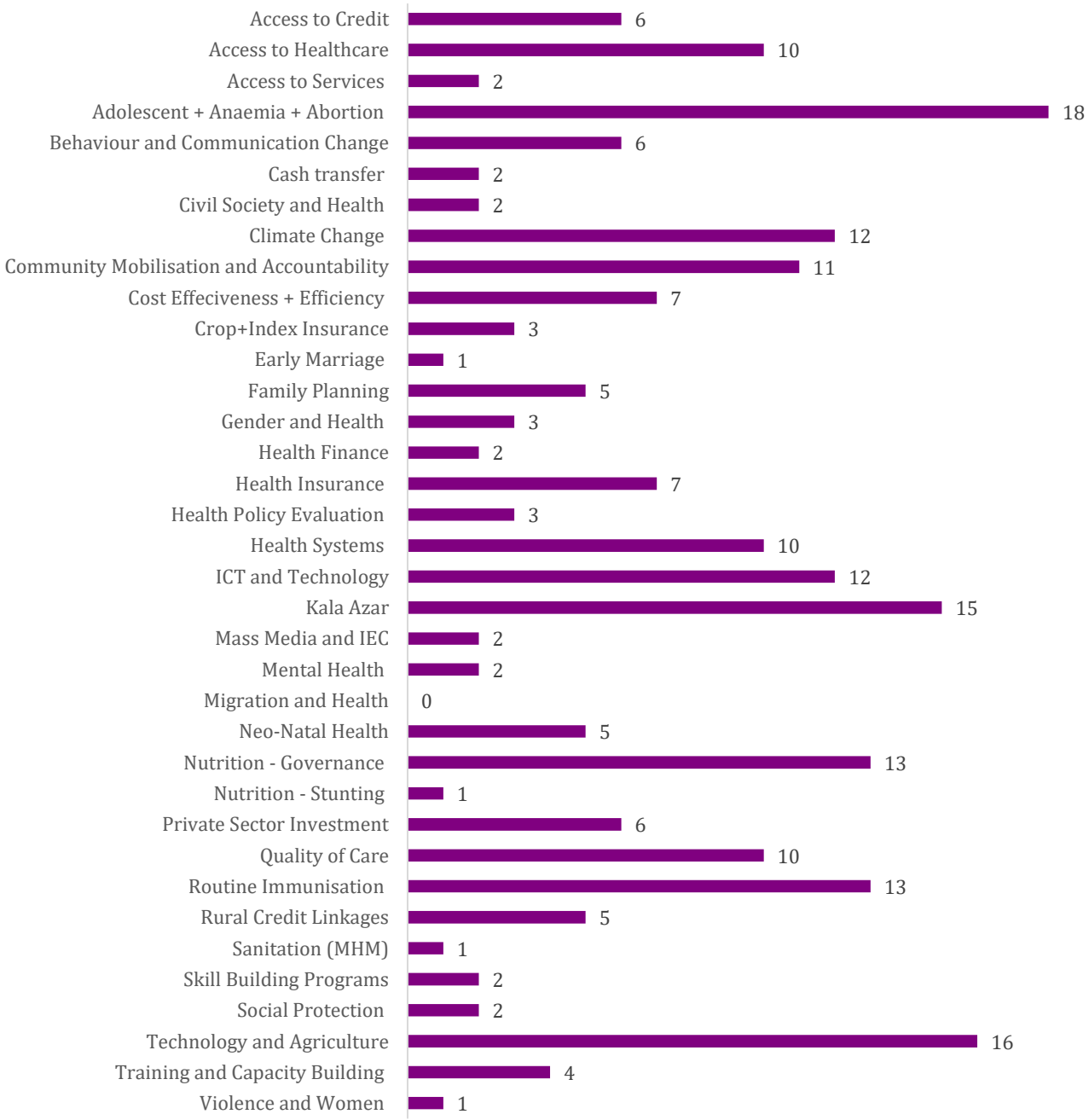
- Policymakers and development practitioners are willing to consider evidence when making decisions relating to programme and policy implementation.
- Interviewees stated that future research in the priority sectors should lay emphasis on local communities and the local context. Some also contended that study of research outcomes should include unintended consequences of a policy or intervention.
- The scoping paper's recommendations for areas of research should be broad.
- Several interviewees highlighted the urgent need of evidence on the priority sectors for taking informed decisions with regard to policy implementation. They also suggested that IGC should take a look at the user side of the research and for this, from the inception phase, the researchers should work closely with policy stakeholders to understand the effect of the research on policy and development interventions.

[6] For Example - Musahar or Maha-Dalit

3. Mapping Evidence – Availability and Gap

3.1 Literature Review Brief: Based on the inclusion criteria, from January 2000 to February 2018, 200 peer-reviewed articles were published in journals on the priority sectors (Health, Agriculture, and Financial Inclusion) focused on Bihar. For the purpose of this scoping paper, these were accessed through PubMed, Web of Science, and ELDIS, and reviewed, along with 12 Impact Evaluation Studies (3ie Repository). Out of the 200 papers, 124 (62%) were related to health and nutrition, 42 focused on agriculture (21%) and 34 on financial inclusion (17%). We also reviewed 102 systematic reviews related to the priority sectors, which were accessed through Cochrane Library and Evidence for Policy and Practice Information (EPPI) of the University College London database. Research on reproductive health mostly focused on family planning. The majority of health system articles cover health service delivery and governance. Most publications report descriptive studies. The proportion of articles reporting implementation studies was higher in articles addressing health system research.

Chart 6 - Number of topics covered



3.2 Evidence Availability - Health Nutrition and WASH: For understanding where we have evidence – what is known and what is unknown – and what the priorities are, this mapping exercise will provide insights to IGC and BMGF to prioritise research commissioning, by quickly identifying existing evidence gaps. For assessing the evidence, we only included studies that evaluate the effectiveness of priority sector programmes in Bihar

Chart 7 – Evidence Availability – Health, Nutrition and WASH

Topic/ Area	Knowledge & Attitudes		Care Practices				Behaviour		Quality of Care & Satisfaction		Community Participation and Accountability			Health Systems		Health Outcomes						Cross-Cutting		Others	
	Knowledge & Attitudes of Individuals, HH and Service Providers	Social Norms in the Community for RMNCH	Maternal Care	Antenatal Care	Family Planning Method Use	Abortions for Unmarried Pregnant	Routine Care-Seeking Behaviour	Care-Seeking for Complications - Illness	Perception of Quality of Care & Services	Provider Communication and Engagement Skills	Community Capacity	Participation in Program Planning	Social Accountability	Governance	Access to Health Care	Maternal Health	Child Mortality	Child Growth and Development	Adolescents Psychosocial Assets and Wellbeing	Increase in Immunization	Child and Adolescent Health	Role of Women	Cost	Visceral Leishmaniasis	Arsenic
Home Visits	Malaviya et al (102)		Vilms et al (59)	Pallikadavath (5)										Malaviya et al (102)	Vilms et al (59)		Espie´et al (3)	Choudhary (6)		Vilms et al (59)				Malaviya et (102)	
Facility Visits	Mohanan (123), Gargano (124)		Wendt et al (114)	Pallikadavath (5)		Kalyanwala (2), Banerjee (38), Jejeebhoy (39), Kalyanwala (40)			Jejeebhoy et al (39)		Pradhan et al (37)				Jejeebhoy (39), Kalyanwala (40)	Noznesky (1)		Kochar (54)		Pradhan et al (37)				Malaviya et al (66)	
mHealth and ICT		Dandona et al (62)	Das et al (35)							Agarwal (29), Das (35), Awasthi (105)		Mohanan et al (27)		Malaviya (46)	Ranga (75), Neogi (86)		Dogra et al (68)	Mohanan (27 & 80)						Bhunia (85), Boelaert (95)	
Mass Media					Amardeep Thind (109)													Banerjee and Duflo (17)							
Health Financing			Leone (98)											Rout (34)	Shailender (72)								Khan (15), Shailender (72)	Meheus et al (19)	
Community-based Health Insurance							Raza (48, 50)				Panda (31, 81)			Panda (31)	Panda (81), Dror (113)							Panda (31, 81), Raza (48)	Raza (48, 50), Panda (81), Binnendijk (111), Dror (113)		
Community Awareness	Choudhury (12), Ganatra (13), Thacker (18)				Ganatra (13), Jejeebhoy (64)				Choudhury (12), Thacker (18)						Dehury and Samal (63)	Dehury and Samal (63)				De and Bhattacharya (21)		Anant (47)			
Community Participation and Accountability	Burtscher (110)				Daniel (122)				Burtscher (110)		Pradhan (37), Subramanyam (53)	Pradhan (37), Subramanyam (53)	Pradhan (37)		Awasthi (119)	Kumar and Raj (22)					Chand (42)	Subramanyam (53)			
Training of Service Providers	Balasubramaniam (14), Agarwal (29), Kalita (79), Gautam (115)		Agarwal (29)						Kalita (79), Gautam (115)	Agarwal (29)					Walker (76)			Walker (76)						Das (112)	
Interpersonal Communication (IPC) Approaches	Banerjee(26)				Jejeebhoy (64)		Banerjee (26)		Banerjee (26)	Subramanyam (53)	Subramanyam (53)	Subramanyam (53)						Banerjee and Duflo (17)			Shinde (93)	Banerjee (26)			

Topic/ Area	Knowledge & Attitudes		Care Practices				Behaviour		Quality of Care & Satisfaction		Community Participation and Accountability			Health Systems		Health Outcomes						Cross-Cutting		Others	
	Knowledge & Attitudes of Individuals, HH and Service Providers	Social Norms in the Community for RMNCH	Maternal Care	Antenatal Care	Family Planning Method Use	Abortions for Unmarried Pregnant	Routine Care-Seeking Behaviour	Care-Seeking for Complications - Illness	Perception of Quality of Care & Services	Provider Communication and Engagement Skills	Community Capacity	Participation in Program Planning	Social Accountability	Governance	Access to Heath Care	Maternal Health	Child Mortality	Child Growth and Development	Adolescents Psychosocial Assets and Wellbeing	Increase in Immunization	Child and Adolescent Health	Role of Women	Cost	Visceral Leishmaniasis	Arsenic
Community Mobilization Packages					Jejeebhoy (64)		Goel (28)		Burtscher (110)						Kocha (54)			Kochar (54)			Goel (28), Wendy (41)				
Curriculum																			Leventhal (16, 104)						
Service Delivery	Acharya (73)		Kumar (23), Kosec (118)						Banerjee (38), Acharya (73), Karvande (103)					Kumar (25), Rudra (43), Tigga (70), Kumar (84)	Kundu (24), Babiarz (97), Jejeebhoy (108), Kosec (118)		Dandona (101)			Sharma (82)	Fraker (78)			Hasker (61)	
Tobacco	Sorensen (91)																				Shinha (96)				
Role of Civil Society, NGOs & INGOs																	Dogra (68)			Haenssgen (51)					
Role of Private Sector			Kumar (23)			Banerjee (38)									Kundu (24), Ranga (75)										
Teacher Training								Nagler et al (20)																	
Cash Transfer			Boyce (11)																						
Groundwater																							Perry (107)	Kumar (7), Chakraborti (8 9 10 44 45), Agarwal (68), Raghavachari (106), Perry (107)	
Cost Effectiveness															Rheingans (33)					Rheingans (33)					
Socio-Economic and Demographic Conditions														Pradhan (77), Rasul (99)			Arokiasamy (69)	Larson (56), Goswmai (88)		Kumar (89), Ghosh(90), Patra(100)	Jha (74)			Sheets (52), Mishra (58), Martinez (60)	
Early Marriage																					Goli (94)				

For this section[7], 124 peer-reviewed articles, eight impact evaluation studies, and forty-eight systematic reviews were considered, to understand and categories the existing evidence.

[7] For More Information – Appendix - 4

A large number of articles address the issues of child and maternal nutrition. As per National Family Health Survey (4), Bihar, with a high incidence of child malnutrition (48.3% of the children below the age of 5 are stunted and 43.9% being underweight), is currently into the under-nutrition trap (Swati, 2015). Several programmes[8] and platforms already exist for delivering effective interventions to improve the nutritional levels. However, the coverage and quality of these interventions is very poor. The studies related to child malnutrition state that unfavourable nutritional policy environment and unavailability of quality protein and nutrients are one of the main reasons for high incidence of malnutrition in the state (Choudhary, 2001). Apart from that, Noznesky (2012) and Kumar (2014) identify a number of factors and actors that create barriers to the delivery and uptake of interventions. The studies also revealed that poor policy outcomes are always associated with poor service delivery, which points to the need for paying more attention to the quality of services at the facility level. However, a few articles put forth the view that the problems and challenges in the implementation of several government flagship programmes are one of the main reasons of the high prevalence of malnutrition (Fraker et al, 2013). However, two interventions - the *Gram Varta* Programme (Subramanyam et. al, 2017) and the *Uddeepaan* programme (Kochar, Sharma and Sharma, 2017) led to significant improvement in child nutrition in Bihar. The reason for the success of these programmes was that these were community-driven and tried to cover all the immediate, intermediate, and underlying causes of malnutrition.

Burtscher and Burza (2015) stated that in Bihar, undernutrition was never viewed as a disease; instead, local disease concepts were identified that described the clinical spectrum of undernutrition. These concepts informed perception, so caregivers were unlikely to consult health workers if children were 'only skinny'. The study reaffirms how health education and "community management of acute malnutrition (CMAM) programme should encompass local disease concepts, beliefs and motivations to improve awareness that undernutrition is a disease and one that can be treated. Later on, CMAM is well accepted by the community; however, programmes must do better to engage communities, including traditional healers, to enable development of a holistic approach within existing social structures.

In Bihar, 3 out of every 5 women in reproductive age (15-49) are anaemic. Apart from that, a large-scale experiment was conducted in the Bhojpur district of Bihar, to study whether selling or giving away Iron and Iodine Fortified (DFS) salt can reduce anaemia in the general population. The results show that selling or giving away iron-fortified salt did not reduce anaemia. Also, no significant effects were found on general health among household members (Banerjee, et al., 2018). However, Mason et al, (2012) suggest that anaemia among women can be reduced by iron-folate supplementation but for successful implementation, better awareness about the intervention must be there among the community at the local level (Mason et al, 2012). As per Gali, Rammohan and Singh (2015) and (Chand 2016) child marriage is one of the main reasons of high prevalence of anaemia among adolescent. The studies related to child and maternal nutrition state that unfavourable policy environment and lack of awareness are one of the main reasons for high incidence of malnutrition in the state (Choudhary, 2001).

Mental health problems are one of the most neglected issues among adolescent. Mortality and morbidity due to mental disorders in adolescents increased and topped in recent years. Leventhal (2015) and Shinde (2017) stated that school based life skills programmes create positive impact on adolescents which lead to improve health outcomes and reduce mental health problems. Apart from that, we found no studies or impact evaluations of sexual health services and counselling provided in schools, or of improvements in hygiene and sanitation as an outcome of programme interventions. While the latter is less surprising, it is an evidence gap as no studies even look at outcomes related to menstrual hygiene.

A large number of articles provide detailed insights into issues of abortion and adolescent pregnancy. Jejeebhoy (2015) states that among young married women with no children in Bihar and Jharkhand, 51% report having had an abortion because the pregnancy occurred too soon after marriage or when

[8] Integrated Child Development Scheme (ICDS) and National Rural Health Mission (NRHM)

they were too young. According to Banerjee (2013), partnerships between and within healthcare sectors (public-private and private-private) may offer a way to improve access to abortion services in Bihar. Currently, many public facilities do not provide abortion services and many of them are either not registered to do so or are not accessible because of cost and location. The state government of Bihar developed a programme in 2011 called Yukti Yojana ("a scheme for solution"), which accredits private facilities and supports them in providing free abortion services to low-income groups of women.

A vast majority of interventions that target women during the antenatal period apply strategies for Behaviour and Communication Change (BCC) that specifically involve birth and newborn care preparedness, and nutritional counselling (Pallikadavath et.al., 2004, Vilms 2017). With regard to interventions in the intrapartum period, many studies were limited themselves only to clean delivery practices, except for one study that utilised skilled attendants at delivery (Das, 2017). A few studies also specify that community-based intervention packages reduce neonatal mortality (Dogra, 2015). When the impact is evaluated separately for packages that implement both preventive and therapeutic care versus those that involve only preventive care, it is found that mortality rates are reduced sharply in the former (Arokiasamy and Gautam, 2007). Although cost-benefit analysis is not one of the main objectives of this review, it plays a crucial role in selecting and bundling intervention packages for scaling up and tailoring interventions to available health system resources. Only some studies talk about this aspect. Therefore, cost-effectiveness is a priority area for future research.

While analysing the factors affecting immunisation programmes in Bihar, several studies show that on demand side - mother's literacy, knowledge and awareness about immunisation, parent's exposure to mass-media use to create a positive effect which increases the immunisation coverage (Patra, 2005; Kumar and Mohanty, 2011; Ghosh, 2015) and in supply side, poor administrative follow-ups, poor service provisions (De and Bhattacharya, 2002), limited human resources and capacity and poor incentives (Sharma, 2016) are the main determinants for poor immunisation coverage. Furthermore, the majority of studies on immunisation investigates the attitudes and perceptions of community members, to estimate the impact and cost-effectiveness of vaccinations. One study in particular gives insights into the impact of a women's empowerment programme in Bihar on child immunisation rates (Janssens, 2011). Health finance is a complex issue especially for a poor state like Bihar – where public health provisions and services are in the challenge. Khan (2017) stated that vaccination price and administrative cost of the delivery services vary across states. In poor state like Bihar, expenditure in public health care and service delivery is way below the national average (Rout, Pradhan and Choudhury, 2016; Meher and Patro,2014) but Leone, James and Padmadas (2013) in their study showed that expenditure for delivery of quality care in public health facilities in Bihar is substantially higher than the national average.

A small number of articles on water and sanitation and hygiene (WASH) state that contextual factors create a positive effect on the supply of water and sanitation. The existing evidence shows that a bottom-up approach is more effective and leads to some improvement in outcomes across multiple dimensions of access such as connectivity, adequacy, and affordability, whereas top-down approach fails to create a positive effect (Chowdhury and Roy, 2017). With regard to adolescents, Jejeebhoy (2010) and Shinde (2017) assess a school-based health intervention to impart core educational messages and address pre-existing ideas about sexual health and sexually transmitted disease (STD) prevention practices. No studies could be identified that measure the effects of a curriculum covering the elements of sex education and in Bihar. The same is true for private sector mapping, health finance, and private sector investments in health. In addition, there is a dearth of evidence around the use of community health workers and home visits specifically for adolescents, and on the use of vouchers and subsidies to affect sexual and reproductive health outcomes.

3.3 Evidence Availability - Agriculture and Financial Inclusion: For this section, 78 peer-reviewed articles and three impact evaluation studies were reviewed. Bihar has a strong agriculture base with 77% of the work force employed in the sector, while it only contributes approximately 24% to the

State Gross Domestic Product (GSDP)[9]. During the 1980s, there was stagnant growth in the agriculture sector in Bihar, mainly on account of lack of public sector investments in physical and institutional infrastructure, poor economic incentives like unfavourable output-to-factor price ratios, slowdown in growth fertiliser use, and inadequate electric power supply and irrigation (Kishor, 2004; Chand, Raju and Pandey, 2007). Looking at the role of irrigation in agriculture, Shah and Ballabh (2000), in their study conducted in the Muzaffarpur district of Bihar, show that the role of pump irrigation is highly beneficial. Also, crop yield and intensity with the use of pump irrigation is far superior to that of non-irrigators (Shah and Ballabh, 1997). Another study by Kishore, Joshi and Pandey (2017) suggests that solar-powered pumps in Bihar have a bigger impact on the productivity of rice–wheat cropping system as they are easy to use and manage, and work well in all seasons of the year (Kishore, Joshi and Pandey, 2017). Besides irrigation, the agriculture sector in Bihar is very sensitive to and greatly influenced by climate change and variability (Sikka, Islam and Rao, 2016). A study of climate change on Indian agriculture conducted by the Indian Council for Agriculture Research (ICAR) shows that yield of wheat in Bihar may decrease by 5% to 6% due to changes in maximum temperature by the end of 2080 (Kumar et al, 2011). However, the impact of climatic change and variability can be mitigated to a great extent by adopting region-specific adaptation measures like soil moisture conservation, pruning and canopy management, mulching, growing intercrops, water and nutrient management, and pest management (Kumar, 2014; Kumar and Kumar, 2016). Designing appropriate agrarian strategies and adopting modern technologies that can tackle the problem of climate change and variability can enhance crop productivity in Bihar (Kumar, 2016, Mehar, Mittal and Prasad 2016). However, a long-term study is required for better understanding of the soil changes related to different rice establishment technologies in the Gangetic plains of Bihar (Mondal, et al., 2016).

In terms of the role of technology in dealing with climate change and associated risks in the agriculture sector in Bihar, Tesfaye (2017) describes the different risks to farmers due to climate change and develops a model that can be locally adapted to minimise the negative effects of climate change. Lopez-Ridaura (2018) develop an innovative food security model that can be used to explore and assess the impact of 'climate smart' agricultural (CSA) practices and climactic shocks on the food security of farm households on an ex-ante basis. On the other hand, Mittal (2016), shows that with precise and timely weather-based agro-advisory messages through mobile solutions to women farmers in Bihar, women farmers can take informed decisions about input use, leading to savings in irrigation and reduced cost of other inputs such as pesticides and fertilisers. These interventions targeted at women farmers help improve their knowledge about climate-smart technologies (Mittal, 2016).

Looking at Greenhouse Gas (GHG) emission and global warming potential (GWP), Gupta et al (2015) suggest that site-specific intervention of Resource Conserving Technologies (RCTs) like zero tillage (ZT), integrated nutrient and pest management may lead to reduction in GHG emission in different parts of the Indo-Gangetic plains in Bihar (Gupta et al, 2015).

On the role of technology in agricultural productivity, Singh et al (2014) analysed DSSAT v 4.5/CERES-Rice (Decision Support System for Agro-technology Transfer/Crop Estimation through Resource and Environment Synthesis) to validate rice productivity in Bihar and find that the model is capable of estimating, with reasonable accuracy, growth stages and grain yield of rice in different climatic conditions of Bihar, and hence can be used as a tool in making various strategic and tactical decisions related to agriculture planning in the state. ZT is a proven technology for enhancing wheat productivity and hence, food security in the Indo-Gangetic plains. Therefore, there is a need to develop business models that enhance the social inclusiveness of ZT services, and expansion the network of service providers, which will help reduce the transaction costs of reaching smallholders (Keil, D'Souza and McDonald, 2015, 2016, 2017). There is also a need to develop an adaptive strategy such as a thermos-insensitive rice-wheat high-yielding varieties, which is one of the suitable strategies for the sustainability of rice and wheat productivity under extreme temperature conditions due to climate change (Subash, Singh and Priya, 2013).

[9] Department of Agriculture, Government of Bihar. URL: http://krishi.bih.nic.in/ (Accessed on March 25, 2018)

Chart 8 – Evidence Availability – Agriculture and Financial Inclusion

Topic/ Area	Changes in Productivity	Changes in Income	Cost Effectiveness	Cropping Patterns	Crop Intensity	Farmers Costs	Farmer's Risks	Financial Inclusion	Fisheries and Livestock	Gender and Agriculture	GHG Emissions	Growth in Agriculture	Sources of Finance	Smallholder Farmers	Yield
Public Works Programme		Rodgers (1)													
Crop + Index Insurance	Jangle et. al. (13)						Jangle (13)								Winkler et al (11)
Access to Credit										Tiwari (18F)			Bista (1F), Pallavi (2F), Kumar (3F), Pandit (9F)		
Cash Transfer/ Subsidy		Kishore (20)													Kishore (20)
Role of Technology & Inputs	Shah (2), Kumar (8), Keil (28), Shirsath (36), Duncan (38), Keil (40)	Shirsath (36), Keil (40)		Shah (2), Gupta (27)	Keil (28), Duncan (38)				Kumar et al (7)	Mittal (37)	Gupta (27), Shirsath (36)	Sikka (16)		Jain (32), Keil (40)	Shah (2), Kishore (29), Jain (32), Keil (41)
ICT												Sajjad (10)			
Co-operatives and SHG		Singh (9), Kumari (31)							Singh (9), Kirti (4F)	Kumari (31), Hoffmann (12F), Dutta(14), Tiwari (15F), Gangadharan (16F)				Tiwari (5F)	
Land Reforms															Banerjee (5)
Infrastructure in Agriculture					Chand (4)							Chand (4), Singh (23), Sugden (6)			
Climate Change and Disaster	Kumar (12), Tesfaye (15), Kumar (21), Subas (24), Subash (34)	Lal et al (26)				Lal et al (26)	Tesfaye (15), Lal (26), Jha (33)		Kumar et al (7)			Sikka (16), Kumar (30)		Bhatta (17)	Kumar (12), Singh (18), Kumar (30)
Socio-Economic and Demographic Factors								Kuri (6F), Dixit (7F) , Chakravarty (8F)							

It is also important to note that 91% of the farm holdings in Bihar are constituted by marginal farms, which are small in size and geographically scattered. Using micro-satellite data, Jain et al (2016) show that small-holders can be mapped with field-level characteristics, which can be used to map their crop production statistics.

Index-based insurance schemes can cover smallholders' risks and prevent them from falling into poverty trap due to unforeseen shocks. However, the uptake of index-based insurance schemes is low, mainly because of problems in the insurance models. Normalised Difference Vegetation Index (NDVI[10]) (Windler et al 2015) and Climate Cost of Cultivation (CCC[11]) (Jangle, Mehra and Dror, 2016) models have been used in the design of index-based agriculture insurance in Bihar. While both these models are relevant in designing such insurance schemes, neither is able to predict the impact of climate change and variability like an unexpected increase in temperature and incidence of floods.

In 2008, the Government of Bihar launched a conditional cash transfer (CCT) scheme to subsidise diesel for irrigation in drought-affected areas. Kishore, Joshi and Pandey (2015) carried out a primary survey in the Nalanda district of Bihar and show that low awareness and penetration among smallholders, alongside uncertainties and delays in the disbursal of the subsidy are the key factors for ineffectiveness of the programme. Therefore, along with further interventions for increasing awareness among the beneficiaries, establishment of a sustainable M&E system is required to make the programme effective. In terms of investment in agricultural research and development (R&D), Bihar continues to under-invest in R&D relative to other states (Singh and Pal, 2015).

The Report of the Committee on Financial Inclusion (2008) defines financial inclusion as "the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at affordable cost" (Rangarajan, 2008). Universal access to banking facilities, financial literacy, and access to credit are the main objectives of financial inclusion. Kuri and Laha (2011) construct an Index of Financial Inclusion (IFI) and Modified Human Development Index (HDI) and show that Bihar is in the low-category state in both IFI and HDI (Kuri and Laha, 2011). Dixit and Ghosh (2013) also show that financial literacy and level of awareness regarding the usage of financial services/products continue to remain an issue in Bihar (Dixit and Ghosh, 2013). Chakravarty and Pal (2013) develop an axiomatic measure of financial inclusion and show that financial inclusion in Bihar has declined between 1991 and 2001. Also, its performance in Social Banking Policy[12] has not been impressive during this period (Chakravarty and Pal, 2013).

Providing micro-credit facilities, especially from institutional sources, is an effective intervention for financial inclusion. More than one-third of Bihar's potato farmers rely on non-institutional sources like fellow farmers, moneylenders, input traders, etc. Banks and cooperative societies need be strengthened in the Bihar. They should also render counselling to distressed farmers, which could sort out many of their difficulties (Pandit et al 2007). As far as institutional sources for credit are concerned, the Government of India introduced the Kisan Credit Scheme (KCC) in 1998-99 in which timely and adequate credit support to the farmers from the formal banking system is provided in a flexible, hassle-free, and cost-effective manner. The KCC scheme in Bihar has played a significant role in farm operation and income of farmers. However, the growth rate in the amount per account advanced under KCC has been negative for cooperative banks. The distribution of credit under this scheme has been less skewed in Bihar. One of the reasons is requirement of heavy margins and

[10] The normalized difference vegetation index (NDVI) is a simple graphical indicator that can be used to analyze remote sensing measurements, typically, but not necessarily, from a space platform, and assess whether the target being observed contains live green vegetation or not.

[11] Climate Cost of Cultivation (CCC) is a new multi-parameter index (using both climatic and non-climatic parameters) and propose a new risk transfer solution for crop insurance

[12] Social banking policy played a crucial role in fostering financial inclusion across Indian states during 1977-1990. The government launched the policy to provide banking services in unbanked areas of the country. It was marked by the introduction of the 1:4 license rule by the Reserve Bank of India in 1977, which mandated banks to open branches in four unbanked locations to get license to open a branch in an already-banked location. In addition, much emphasis was given to ensuring that credit needs in rural and semi-urban areas are adequately addressed.

collaterals, which precludes landless farmers and smallholders from accessing credit under this scheme. Therefore, to bring more farmers under the scheme the process of opening accounts needs be simplified (Bista, Kumar and Mathur, 2012; Kumar, Singh and Kumar, 2017).

For increasing micro-credit and micro-savings especially among women in rural areas, the state government of Bihar launched JEEViKA-Bihar Rural Livelihoods Promotion Project (BRLP)[13]. BRLP is a state-led women self-help groups (SHGs) initiative in 2007 that aims to provide equal opportunities for livelihoods among the rural community, particularly for the poor. Investment as well as return in dairy activity practiced by the beneficiaries under JEEViKA has a positive effect on the life of project beneficiaries (Jirli et al, 2017). In an impact evaluation study of JEEViKA in Bihar, Hoffmann et al (2017) find that JEEViKA interventions led to a dramatic increase in SHG membership and access to credit through these groups, along with a corresponding decline in the use of informal credit. JEEViKA has led to improvement in socioeconomic conditions of beneficiaries. A higher percentage of women under this project in Bihar can read numbers, letters, and signs (Datta, 2015). Further, JEEViKA has led to increase in micro-savings in the rural community, especially among women (Tiwari, 2013).

In conclusion, most of the studies focused on the agricultural sector in Bihar are related to the impact of climate change and the role of technology. But very few studies have been done on smallholder farmers, especially with regards to the risks related to the use of index-insurance schemes in Bihar. Also, a few studies exist on the effectiveness of different CCT schemes in rural areas, especially for small and marginal farmers in the state. Finally, despite some studies on the role of technology in dealing with climate change, little has been done on interventions to improve the knowledge of farmers in directly dealing with climate-smart technologies. A small number of studies have been completed on the impact of JEEViKA projects on micro-savings and dairy farming activities among rural women in Bihar. However, very few studies have been done on banking facilities and access to credit, especially from commercial banks in rural areas. Also, more studies are needed on financial viability, that is, financial capacity and the status of financial literacy in Bihar. These two are very important components of financial inclusion. Financial education, awareness of different schemes related to formal sources of financing, access to banking facilities in rural areas, and role of technology in improving financial inclusion, are the main research areas which need to be worked on for improving financial inclusion especially in rural areas of Bihar.

3.4 Gaps in Evidence: As mentioned earlier, for this scoping paper, we identified 200 peer-reviewed articles, 12 impact evaluation studies, and 102 systematic reviews in order to capture the current state of evidence in the priority sectors and identify gaps where future research is needed. This section discusses these gaps.

There is little evidence on the effects of mass media or mHealth[14] and other ICT approaches on health outcomes, health services, and agricultural and environmental outcomes in Bihar. One study does measure the effect of a mobile phone programme on improvement in intrapartum practices in Bihar (Das et al. 2017). Another assesses the effect of mobile phone in making agriculture more gender-inclusive (among other outcomes) (Mittal, 2016). While having stakeholder conversations, it became clear that there is a strong interest in more evidence on these types of interventions.

There are very few studies that measure effects at the community level (including community based organisations (CBOs)), such as changes in norms, attitudes, or behaviours. While 12 articles provide insights into an intervention focused on community mobilisation and dialogue, most of them measure effects on adolescents and maternal health only. Just three of those studies measure the effects on

[13] The Government of Bihar (GoB), through the Bihar Rural Livelihoods Promotion Society (BRLPS), an autonomous body under the Department of Rural Development, is spearheading the World Bank aided Bihar Rural Livelihoods Project (BRLP), locally known as JEEViKA with the objective of social & economic empowerment of the rural poor.

[14] mHealth (mobile health) is a general term for the use of mobile phones and other wireless technology in medical care. The most common application of mHealth is the use of mobile phones and communication devices to educate consumers about preventive health care services.

parents. Only one study surveys the community, measuring attitudes and knowledge among adult community members, on early marriage, reproductive health, nutritional status, and empowerment of girls (Goli, 2015). There is considerable interest among UN (United Nations) agencies and government (Women and Child Development (WCD) and Social Welfare) for generating more evidence in the area of child marriage, especially on interventions creating normative change. We find the lack of reporting on effects in these outcome areas to be an important evidence gap. In addition, we note a dearth in evidence around the use of community health workers and home visits in health and adolescent programmes. Only one study included here evaluates this type of intervention.

Seven studies focus on community-based health insurance. The studies highlight the fact that the community-based health insurance schemes, which are customised to suit the needs of the community, can sustain only with effective participation. Participation will, in turn, be beneficial in increasing access to healthcare and utilisation of healthcare facilities by those enrolled. This also influence others to come forward and enrol, thereby reducing catastrophic expenses in case of illness. However, there have been very few studies which have tried to carry out an impact evaluation of the schemes on the target population; more and more such studies can be a part of scope for future research on Bihar.

Apart from that, we found no studies or impact evaluations of sexual health services and counselling provided in schools, or of improvements in hygiene and sanitation as an outcome of programme interventions. While the latter is less surprising, it is an evidence gap as no studies even look at outcomes related to menstrual hygiene. The lack of studies on sexual health services provided at educational and community platforms is surprising. We do not believe this is due to a dearth of programmes or interventions, but it is possible that it is challenging to identify a counterfactual in this case. There are also very few studies on changing attitudes towards adolescents' access to sexual and reproductive health (SRH) services and contraception, and there was considerable interest among UN Agencies and government (WCD and Social Welfare) for generating more evidence in the area. There is very little evidence on how health and adolescent programmes in Bihar address the issues of abortion rates. Only two studies retrospectively asked participants if they had ever had an abortion, but do not provide any discussion or analysis of this outcome (Kalyanwala, 2010 and Jejeebhoy, 2010). This is, perhaps, not surprising given social norms around abortion, particularly so for an adolescent population.

Apart from these, there are studies related to contraceptive use and family planning methods. Many studies take a general approach to family planning and issues related to contraception, including a wide range of topics such as sexual behaviours, the delay and prevention of pregnancy, and so on. However, most of the studies are unable to clarify what works for preventing and delaying early and unwanted pregnancy. Evidence on effectiveness of interventions currently does not clearly distinguish between delaying pregnancy for an unmarried and a married couple. In terms of outcomes, it is difficult to single out the intention of a measurement of condom use, as this indicator is often used in studies related to pregnancy prevention. Overall, this is a large evidence gap that needs to be addressed. Additionally, we did not find any studies on private sector investment in health; migration and its impact on health outcomes; and mental health status of adolescents.

Despite the importance of gender in the priority sectors, much of the current studies, impact evaluations and systematic reviews do little to take gender into account. The majority of studies provide, at most, a cursory mention of gender and the implications strong social norms around gender have on health needs, access and care. Pradhan (2010), looking specifically at health systems, recommends incorporating gender analysis into the content, process, and outcomes of research through ensuring gender-responsive research questions. While reviewing each article for these aspects did not fall into our project scope, we nevertheless observe that almost no study uses a gender analysis framework to understand the role of gender in the evaluated programme or in the evaluation itself. We found there is a large gap in evidence for sub-populations. Currently, there is an increasing focus on the need for inclusive health programming that specifically targets marginalised sub-populations. However, there is a need for more evidence on what works for these specific population groups.

We noted that there is insufficient high-quality evidence on routine immunisation. High-quality evidence that can causally relate changes in immunisation coverage to specific programmes and interventions that use community engagement approaches, is clearly scarce. Most of the evaluations in this area use a before-and-after design. A number of respondents highlighted the role of technology in improving service delivery and tailoring services so that they meet the needs of the beneficiary communities. One possible way in which technology, especially mobile technology, may help is by reminding parents about the vaccination schedule, especially for vaccines that have a relatively long interval between doses. Information technology can also play an important role for community mapping. The role of technology-based interventions was highlighted by many respondents in the expert and stakeholder interviews. However, it is important to keep in mind the feasibility of using technology-based approaches in the community context.

While reviewed articles related to WASH, we realised that the existing evidence is not very rigorous. We found only one experimental study and no quasi-experimental studies. Most of the literature appears to report the results of various socioeconomic surveys of the hygiene and sanitation situation, with few studies focusing on specific interventions. Given the historical entrenchment of open defecation, social norms (particularly those pertaining to gender), natural habits and sanitation behavior, should be addressed with greater rigour. More research is needed on methods to inform and engage individuals in the design process for their toilets and create a sense of ownership.

With regard to agriculture, as stated earlier, the majority of respondents pointed to the need for more rigorous evidence on the impact of different products on smallholder farmers. Most existing evidence is based on study of outcome variables that can be measured in a short time horizon. Examples include productive investments, farm investments, changes in cropping patterns, access to finance, and consumption. While these are no doubt important, concurrently investigating welfare impacts of FARM products (for example, health and education) would also be valuable. Apart from that, very few studies have examined product quality and we were not able to find rigorous evidence on this aspect. Almost none of the included articles and studies were able to provide insights into the cost efficiency of FARM products, or technological innovations such as the use of digital education. As per the stakeholder conversations, there is a demand of research on product quality and cost efficiency of FARM. Besides, very little evidence exists on the interactions between FARM tools and public policy instruments, such as using insurance as part of a social safety net scheme. The role played by public policies is central to achieving impact, either through the signals given to farmers when big disasters occur, through the prevailing regulatory environment, or by relying on public subsidies, as previously mentioned. This scoping paper highlights the increasing interest in FARM instruments among researchers, decision-makers, and practitioners. Although inputs and practices are always a well-studied intervention category, within it we observe some important gaps. The subcategories 'land management practices' and 'planting techniques and practices' represent interventions that are minimally analysed across the studies. For instance, if the evidence is concentrated on the adoption of seeds but little is known about how farmers use those seeds, a significant gap arises; thus, generating evidence on this particular area becomes important (Keil, 2017 and Kumar, 2016).

A major gap is observed in a number of studies related to cost-effectiveness analysis and rural credit markets. Only two studies include a cost-effectiveness analysis and not a single one on rural credit markets. So, we may have evidence on what works to increase farmers' technology adoption, but we have limited evidence on what the most cost-effective policies are and how farmers' choice in terms of access to finance affects technology adoption. There is a lack of evidence on how information is transmitted across the farmers' network, and this is a potential area for research.

With a high participation of women in agriculture, it is important to introduce a gender perspective in the research. (Although this gap map does not account for studies that engage in a gender analysis.) In rural Bihar, women play a crucial role in agricultural production; it is important for future research to focus a part of the analyses on how interventions affect gender roles and perceptions.

Quite a few studies exist on the impact of JEEViKA project on micro-savings and dairy farming activities for rural women in Bihar. However, very few studies are there on banking facilities and access to credit especially from commercial banks in rural areas. Also, more studies are needed on financial viability, that is, state financial capacity and on status of financial literacy in Bihar. These two are very important components of financial inclusion. Financial education, awareness of different schemes related to formal sources of financing, access to banking facilities in rural areas, and role of technology in improving financial inclusion, are the main research areas that needs to be addressed for improving financial inclusion, especially in rural Bihar.

4. Evidence Need and Suggested Research Areas:

Through the evidence gap map and in-depth stakeholder consultations, a number of concrete areas that need urgent attention for further research were identified. The below list should guide the process of planning and prioritising research commissioning (in alphabetical order). These were selected on the basis of the frequency and importance with which stakeholders stated them as priority topics, and the lack of reliable and robust existing evidence on them.

Table 3 – Suggested Research Areas

Theme (A)	Area (B)	Example of Possible Research Areas Suggested (C)
Adolescent	Abortion	The effectiveness of health and adolescent programmes to address the reduction of abortion rates
	Child Marriage	The effectiveness of interventions for normative change
	Health and Programmes	The effectiveness of abortion-related services – private clinics vs. government hospitals
		The changing fertility patterns and parents' investments in children's human capital
		The effectiveness of school-based health programmes – any causal link with sexual and reproductive health and rights (SRHR) outcomes
		The effectiveness of SABLA (Rajiv Gandhi Scheme for Empowerment of Adolescent Girls)
		Impact evaluation of child marriage programme – the effectiveness of media campaign in reduction of child marriage
		Skills training programme and changing attitudes and behaviours of adolescents
		Weekly iron and folic acid supplementation (WIFS) and Anaemia
Agriculture and Financial Inclusion	Access to Credit and Agriculture Pricing	Impact evaluation of access to credit in terms of household consumption and indebtedness
		Access to credit and women's participation in household decision-making
	Adoption Process	Farmers' willingness to adopt hybrid seeds
	Climate Change	Impact of technology transfer and climate change on unskilled agriculture labour force, and relationship with economic growth
	Role of Technology	Impact of technology transfer on agriculture productivity and unemployment
		The effectiveness of the "aquifer storage and recovery (ASR)" technologies for converging agriculture and drinking water solutions in southern Bihar
	Cost Effectiveness	Factors affecting farmers' choice with regard to finance and technology adoption and Assessment of Agriculture Value Chain
	Crop Insurance	Low financial literacy and its impact on index crop insurance
	Farm	Impact of relief programmes on welfare and productivity; How do these programmes affect investment decision?; Welfare impact of farm technologies on smallholders
	ICT and Technology	Technology, consumption patterns, and risk and relationship with income
	Policy + Regulation	Determinants of product take-up by smallholders
		APMC Act
		The role of public policy - do crop insurance programmes provide better value for money for policymakers than post-disaster compensation schemes?
		Land Records Management System and its impact on the livelihood of the people and land security
	Rural Credit Linkages	Impact of rural credit markets in Bihar after demonetisation
		Factors – Access to Banking Facilities
Gender	Prohibition	Prohibition and its impact on domestic violence, and household expenditure on health and education

	Gender	Impact of the reservation of women in Panchayati Raj Institutions on Bihar's health outcomes; Changes in household decision-making processes
	Social Protection	Gender and social protection in Bihar - empirical evidence on empowerment and evaluation of Gender Resource Centre
Health, Nutrition, and Sanitation	Cash Transfers	Causality between cash transfer programmes and female schooling
		The impact of the female school stipend programme on enrolments and learning outcomes
	Community Platforms and Participation	Effect of community platforms on norms, attitudes, and behaviours (SRHR and contraception)
	Community-based Health Insurance (CBHI)	The impact of CBHI on marginalised populations for better health outcomes
	Family Planning	The effectiveness of family planning programmes for delaying pregnancy
	Health Financing	
	Health Policy Evaluation	Impact of state health insurance for reducing out-of-pocket expenses on healthcare
	Home and Facility Visits	Health workers home visits and their effect on health outcomes; Health workers' qualification and health outcomes
	Mass Media and ICT	Effect of mass media and ICT on health outcomes and health service delivery
	Menstrual Hygiene	The effectiveness of menstrual hygiene scheme
	Mental Health	Mental health situation of adolescents
		Migration and mental health condition of spouse
	Migration	Migration and nutritional outcomes
	Nutrition - Stunting and	The effectiveness of therapeutic food for coming out of malnutrition
	Governance	Nutrition governance
	Policy + Regulation	Causality between quality of standards and quality of care in Bihar
		Effective ways to structure contracts with private providers for improving quality of healthcare
		Role of government in the context of an expanded role for private service provision and financing of healthcare
	Private Sector	Factors influencing patients' decision to avail private health facilities
		Private health insurance and out-of-pocket expenses
		Private sector mapping in Bihar's health sector
		Role of private providers in standard medical practice
	Quality of Care	Adequate infrastructure and quality of care
	Role of Technology	The effectiveness of electric medical records for improving primary health care systems
		The effectiveness of telemedicine for improving quality of care
	Routine Immunization	Incentivising vaccination and immunisation rates
	Service Delivery	Impact of free anti-TB (tuberculosis) drugs in Bihar
		Impact of free diagnostic tools on private healthcare delivery
	WASH	The effectiveness of market-based sanitation models in Bihar
		Social norms and sanitation practices
		Detection and remediation of fluoride from subsurface system using carbon-based materials

*Potential Areas of Research – Not Limited Area

Based on several discussions with stakeholders, for the research commissioning, IGC will only mentioned column A and B in the call for proposals. As mentioned earlier also, the list of topics included above have been suggested by stakeholders and have been arrived at after reviewing extant literature. The list will inform the IGC and BMGF over research funding but will not limit its scope to focus only on the topics included.

5. Limitations of the Scoping Paper:

There may, of course, be several other research papers and sources of evidence on the priority sectors but for this paper, only peer-reviewed articles and impact evaluation studies have been captured. As stated earlier also, the team would like to emphasise that for this scoping paper, they didn't review any currently on-going research studies, research studies which will publish soon or any grey literature or working paper on the priority sectors. In this process, it is possible that some issues were erroneously excluded at the title or abstract level and thus not screened at the full text level. In order to maintain the quality, the team only reviewed peer-reviewed articles.

With regard to the evidence needs, this paper primarily relied on information provided by the stakeholders who are currently working in Bihar, and not thoroughly capturing the full scope of programming by smaller implementers, which may have biased the overall perception. Because of the number of additional stakeholders not captured, it may be that the reach of our networks is not fully representative of all implementers, policymakers, and experts in the priority sectors in the state.

6. Conclusion:

This scoping report seeks to provide the IGC and BMGF with a detailed assessment of the current state of evidence on the priority sectors in Bihar, which will be used to prioritise future investments in research. It also provides local and international researchers with insights into the evidence gaps in the priority sectors, as demanded by policy stakeholders in the state.

While there is already a considerable evidence base of impact evaluations pertaining to the priority sectors, much of it is concentrated on a small number of topics and focused on specific programmes, answering only a subset of crucial research questions. During the stakeholder consultations, only a few of them felt that, on average, across all interventions, there is sufficient evidence to inform priority sector programming and policy.

Furthermore, several articles and evaluation studies include inadequate descriptions around the context of the evaluation, the interventions, and associated theories of change. In areas for which there is already a sizable evidence base, the research is generally specific to a very particular context or topic and not able to provide broader critical insights.

Hence, there are several opportunities for researchers to contribute new high-quality research, evaluating, for instance, the latest curricula. A wide range of qualitative and quantitative evidence is needed to help us understand the complexities and nuances of the effects of priority sectors' programming in Bihar. The importance of rigorous, well-designed and well-reported research and impact evaluation studies in the field cannot be over emphasised. Stakeholders want more nuanced evidence that focusses not just on whether a programme works, but which interventions are most effective, for whom, and at what cost.

Bibliography

- Acharya, R. & Kalyanwala, S., 2015. Physicians' and non-physician's views about provision of medical abortion by nurses and AYUSH physicians in Maharashtra and Bihar, India. Reproductive Health Matters, pp. 36-46
- Agarwal, A. et al., 2015. Pesticide residue in water—a challenging task in India. Environ Monit Assess, 187(54), pp. 1-21
- Agrawal, D., Kumar, P., Avtar, R. & Ramanathan, A., 2011. Multivariate Statistical Approach to Deduce Hydrogeochemical Processes in the Groundwater Environment of Begusarai District, Bihar. Water Qual Expo Health, pp. 119-126
- Agrawal, N. et al., 2016. Effectiveness of virtual classroom training in improving the knowledge and key maternal neonatal health skills of general nurse midwifery students in Bihar, India: A pre- and post-intervention study. Nurse Education Today, pp. 293-297
- Arokiasamy, P. & Gautam, A., 2008. Neonatal Mortality in the Empowered Action Group States of India: Trends and Determinants. J.BioSoc.Sci, pp. 183-201
- Awasthi, S. et al., 2015. Revisiting Community Case Management of Childhood Pneumonia: Perceptions of Caregivers and Grass Root Health Providers in Uttar Pradesh and Bihar, Northern India. PLoS One, pp. 1-18
- Awasthi, S. et al., 2017. Developing effective health communication messages for community acquired pneumonia in children under five years of age: A rural North Indian qualitative study. Clinical Epidemiology and Global Health, pp. 107-116
- Babiarz, K. S., Suen, S.-c. & Goldhaber-Fiebert, J. D., 2014. Tuberculosis treatment discontinuation and symptom persistence: an observational study of Bihar, India's public care system covering >100,000,000 inhabitants. BMC Public Health, pp. 1-13
- Balasubramaniam, S. M. et al., 2018. Blending virtual with conventional learning to improve student midwifery skills in India. Nurse Education in Practice 28, pp. 163-167
- Banerjee, A., 1999. Land Reforms: Prospects and Strategies. Massachusetts Institute of Technology, Department of Economics, Working Paper 24
- Banerjee, A., Barnhardt, S. & Duflo, E., 2018. Can iron-fortified salt control anemia? Evidence from Two Experiments in Rural Bihar. Journal of Development Economics
- Banerjee, S. K., Andersen, K. L., Navin, D. & Mathias, G., 2015. Expanding availability of safe abortion services through private sector accreditation: a case study of the Yukti Yojana program in Bihar, India. Reproductive Health, pp. 1-11
- Banerjee, S. K., Andersen, K. L., Warvadekar, J. & Pearson, E., 2013. Effectiveness of a Behavior Change Communication Intervention to Improve Knowledge and Perceptions about Abortion in Bihar and Jharkhand, India. International Perspectives on Sexual and Reproductive Health, 39(3), pp. 142-152
- Bhatta, G. D. & Aggarwal, P. K., 2016. Coping with weather adversity and adaptation to climatic variability: a cross-country study of smallholder farmers in South Asia. Climate and Development, 8(2), pp. 145-157
- Bhunia, G. S. et al., 2012. Seasonal relationship between normalized difference vegetation index and abundance of the Phlebotomus kala-azar vector in an endemic focus in Bihar, India. Geospatial Health, pp. 51-62
- Binnendijk, E., Gautham, M., Koren, R. & Dror, D. M., 2012. Illness Mapping: a time and cost-effective method to estimate healthcare data needed to establish community-based health insurance. BMC Medical Research Methodology, pp. 1-10
- Bista, D. R., Kumar, P. & Mathur, V., 2012. Progress and Performance of Kisan Credit Card Scheme with a Case Study of Bihar. Agricultural Economics Research Review, 25(1), pp. 125-135
- Boelaert, M. et al., 2009. The poorest of the poor: a poverty appraisal of households affected by visceral leishmaniasis in Bihar, India. Tropical Medicine & International Health, 14(6), pp. 639-644
- Boyce, S. C. et al., 2017. Associations of intimate partner violence with postnatal health practices in Bihar, India. BMC Pregnancy and Childbirth, pp. 1-14
- Burtscher, D. & Burza, S., 2015. Health-seeking behaviour and community perceptions of childhood undernutrition and a community management of acute malnutrition (CMAM)

programme in rural Bihar, India: a qualitative study. Public Health Nutrition, 18(17), p. 3234–3243
— Chakraborti, D. et al., 2003. Arsenic Groundwater Contamination in Middle Ganga Plain, Bihar, India: A Future Danger? Environmental Health Perspectives, 111(9), pp. 1194-1201
— Chakraborti, D. et al., 2016. Arsenic contamination of groundwater and its induced health effects in Shahpur block, Bhojpur district, Bihar state, India: risk evaluation. Environ Sci Pollut Res, Volume 23, p. 9492–9504
— Chakraborti, D. et al., 2016. Arsenic groundwater contamination and its health effects in Patna district (capital of Bihar) in the middle Ganga plain, India. Chemosphere, Volume 152, pp. 520-529
— Chakraborti, D. et al., 2017. Groundwater arsenic contamination and its health effects in India. Hydrogeol J, Volume 25, pp. 1165-1181
— Chakraborti, D. et al., 2013. Groundwater arsenic contamination in Ganga–Meghna–Brahmaputra plain, its health effects and an approach for mitigation. Environ Earth Sci, Volume 70, p. 1993–2008
— Chakraborty, S., D'Souza, S. A. & Northrup, R. S., 2000. Improving private practitioner care of sick children: testing new approaches in rural Bihar. Health Policy and Planning, 15(4), pp. 400-407.
— Chakravarty, S. R. & Pal, R., 2013. Financial inclusion in India: An axiomatic approach. Journal of Policy Modeling, Volume 35, pp. 813-837
— Chand, M. I. A., Nandan, M. & Mukherjee, B., 2016. A study of prevalence of anaemia and sociodemographic factors associated with anaemia among adolescent girls in rural area of Katihar, Bihar. J. Evolution Med. Dent. Sci., 5(74), pp. 5470-5473
— Chand, R. & Chauhan, S., 1999. Are Disparities in Indian Agriculture Growing? pp. 1-6
— Chand, R., Raju, S. S. & Pandey, L. M., 2007. Growth Crisis in Agriculture: Severity and Options at National and State Levels. Economic and Political Weekly, 42(26), pp. 2528-2533
— Chaudhuri, S., 2015. Excess Female Infant Mortality and The Gender Gap In Infant Care In Bihar, India. Feminist Economics, 21(2), pp. 131-161
— Chaudhuri, S. & Roy, M., 2017. Rural-urban spatial inequality in water and sanitation facilities in India: A cross-sectional study from household to national level. Applied Geography, pp. 27-38
— Chavan, P., 2007. Access to Bank Credit: Implications for Dalit Rural Households. Economic and Political Weekly, 42(31), pp. 3219-3224
— Choudhary, R. P., 2001. Anthropometric indices and nutritional deficiency signs in preschool children of the Pahariya tribe of the Rajmahal Hills, Bihar. Anthropologischer Anzeiger, pp. 61-71.
— Choudhury, P. et al., 2011. Attitudes and perceptions of private pediatricians regarding polio immunization in India. Vaccine, 29(46), pp. 8317-8322
— Dandona, R., Kochar, P. S., Kumar, G. A. & Dandona, L., 2017. Use of antiseptic for cord care and its association with neonatal mortality in a population-based assessment in Bihar State, India. BMJ Open, 7(1)
— Dandona, R. et al., 2017. Identification of factors associated with stillbirth in the Indian state of Bihar using verbal autopsy: A population-based study. PLOS Medicine, 14(8)
— Daniel, E. E., Masilamani, R. & Rahman, M., 2008. The Effect of Community-Based Reproductive Health Communication Interventions on Contraceptive Use Among Young Married Couples in Bihar, India. International Family Planning Perspectives, 34(4), pp. 189-197
— Daniel, E., Masilamani, R. & Rahman, M., 2008. The effect of community-based reproductive health communication interventions on contraceptive use among young married couples in Bihar, India. International Family Planning Perspectives, 24(4), pp. 189-197
— Das, A. et al., 2017. Evaluation of the mobile nurse training (MNT) intervention – a step towards improvement in intrapartum practices in Bihar, India. BMC Pregnancy and Childbirth, pp. 1-11
— Das, V. N. R. et al., 2014. Impact of ASHA Training on Active Case Detection of Visceral Leishmaniasis in Bihar, India. PLOS Neglected Tropical Diseases, 8(5)
— Datta, U., 2015. Socio-Economic Impacts of JEEViKA: A Large-Scale Self-Help Group Project in Bihar, India. World Development, Volume 68, pp. 1-18
— Dehury, R. K. & Samal, J., 2016. Maternal Health Situation in Bihar and Madhya Pradesh: A Comparative Analysis of State Fact Sheets of National Family Health Survey (NFHS)-3 and 4. Journal of Clinical and Diagnostic Research, 10(9), pp. 1-4

- De, P. & Bhattacharya, B., 2002. Determinants of child immunization in four less-developed states of North India. Journal of Child Health Care, 6(1), pp. 34-50
- Dixit, R. & Ghosh, M., 2013. Financial Inclusion for Inclusive Growth of India - A Study of Indian States. International Journal of Business Management & Research, 3(1), pp. 147-156
- Dogra, V. et al., 2015. Neonatal mortality in India's rural poor: Findings of a household survey and verbal autopsy study in Rajasthan, Bihar and Odisha. Journal of Tropical Pediatrics, pp. 210-214
- Dror, D. M. et al., 2016. Impact of community-based health insurance in rural India on self-medication & financial protection of the insured. Indian J Med Res, pp. 809-820
- Duncan, J. M., Dash, J. & Atkinson, P. M., 2014. Spatio-temporal dynamics in the phenology of croplands across the Indo-Gangetic plains. Advances in Space Research
- Dutta, S., 2015. Identifying Single or Multiple Poverty Trap: An Application to Indian Household Panel Data. Social Indicators Research, 120(1), pp. 157-179
- Datta, U., 2015. Socio-Economic Impacts of JEEViKA: A Large-Scale Self-Help Group Project in Bihar, India. World Development, Volume 68, pp. 1-18
- Espie´, E. et al., 2011. Acute Malnutrition and Under-5 Mortality, Northeastern Part of India. Journal of Tropical Pediatrics, 57(5)
- Fraker, A., Shah, N. B. & Abraham, R., 2013. Quantitative assessment: Beneficiary nutritional status & performance of ICDS Supplementary Nutrition Programme in Bihar. International Growth Centre
- Ganatra, B., Manning, V. & Pallipamulla, S. P., 2005. Availability of Medical Abortion Pills and the Role of Chemists: A Study from Bihar and Jharkhand, India. Reproductive Health Matters, 13(26), pp. 65-74
- Gangadharan, L., Jain, T., Maitra, P. & Vecci, J., 2014. The behavioral response to women's empowerment programs: Experimental evidence from JEEViKA in Bihar. International Growth Conference (IGC), Working Paper, pp. 1`-27
- Gargano, L. M. et al., 2012. Attitudes of Pediatricians and Primary Health Center Physicians in India Concerning Routine Immunization, Barriers to Vaccination, and Missed Opportunities to Vaccinate. The Pediatric Infectious Disease Journal, 31(2), pp. 37-42
- Gautam, A. et al., 2016. Leveraging existing virtual platform for training medical officers on Non-Communicable Diseases; an experience from Bihar, India. Indian Journal of Community Health, pp. 364-368
- Ghosh, A., 2015. Status of Preventive Health Care in Bihar: A District Level Study. Journal of Health Management, 17(2), pp. 178-194
- Goel, S. et al., 2012. Effectiveness of Muskaan Ek Abhiyan (The Smile Campaign) for Strengthening Routine Immunization in Bihar, India. Indian Pediatrics, Volume 49
- Goli, S., Rammohan, A. & Singh, D., 2015. The Effect of Early Marriages and Early Childbearing on Women's Nutritional Status in India. Matern Child Health J, p. 1864–1880
- Goswmai, S. & Das, K. K., 2015. Socio-economic and demographic determinants of childhood anemia. Journal de Pediatria, 91(5), pp. 471-477
- Gupta, D. K. et al., 2015. Global warming potential of rice (Oryza sativa) wheat (Triticum aestivum) cropping system of the Indo-Gangetic Plains. Indian Journal of Agricultural Sciences, 85(6), pp. 807-816
- Haenssgen, M. J., 2017. Impact of high-intensity polio eradication activities on children's routine immunization status in Northern India. Health Policy and Planning, 32(6), pp. 800-808
- Hasker, E. et al., 2010. Management of visceral leishmaniasis in rural primary health care services in Bihar, India. Tropical Medicine and International Health, 15(2), pp. 55-62
- Hoffmann, V. et al., 2017. Poverty and empowerment impacts of the Bihar Rural Livelihoods Project, 3ie Grantee Final Report, New Delhi: International Initiative for Impact Evaluation (3ie)
- Hooda, S. K., 2017. Out-of-pocket Payments for Healthcare in India: Who Have Affected the Most and Why? Journal of Health Management, pp. 1-15
- Jain, M. et al., 2016. Mapping Smallholder Wheat Yields and Sowing Dates Using Micro-Satellite Data. Remote Sensing, pp. 1-18
- Jangle, N., Mehra, M. & Dror, D. M., 2016. "Climate Cost of Cultivation": A New Crop Index Method to Quantify Farmers' Cost of Climate Change Exemplified in Rural India. The International Association for the Study of Insurance Economics, Volume 41, pp. 280-306

— Janssens, W., 2011. Externalities in Program Evaluation: The Impact of A Women Empowerment Program on Immunization. Journal of the European Economic Association, 9(6), pp. 1082-1113
— Jejeebhoy, S. J., 1998. Adolescent Sexual and Reproductive Behavior: A Review of The Evidence from India. Soc. Sci. Med., 46(10), pp. 1275-1290
— Jejeebhoy, S. J. et al., 2012. Feasibility of expanding the medication abortion provider base in India to include ayurvedic physicians and nurses. International Perspectives on Sexual and Reproductive Health, 38(3), pp. 133-142
— Jejeebhoy, S. J. et al., 2010. Experience seeking abortion among unmarried young women in Bihar and Jharkhand, India: delays and disadvantages. Reproductive Health Matters, pp. 163-174
— Jejeebhoy, S. et al., 2015. Meeting contraceptive needs: Long term associations of the PRACHAR project with married women's awareness and behavior in Bihar. International Perspectives on Sexual and Reproductive Health, 41(3), pp. 115-125
— Jha, C. K., Gupta, V., Chattopadhyay, U. & Sreeraman, B. A., 2018. Migration as adaptation strategy to cope with climate change A study of farmers' migration in rural India. International Journal of Climate Change Strategies and Management, 10(1), pp. 121-141
— Jha, K. K. et al., 2017. Prevalence of Depression among School-going Adolescents in an Urban Area of Bihar, India. Indian Journal of Psychological Medicine, pp. 287-292
— Kalita, A., Zaidi, S., Prasad, V. & Raman, V., 2009. Empowering health personnel for decentralized health planning in India: The Public Health Resource Network. Human Resources for Health
— Kalyanwala, S., Zavier, A. J. F., Jejeebhoy, S. & Kumar, R., 2010. Abortion Experiences of Unmarried Young Women in India: Evidence from a Facility-Based Study in Bihar and Jharkhand. International Perspectives on Sexual and Reproductive Health, 36(2), pp. 62-71
— Kalyanwala, S., Jejeebhoy, S. J., Zavier, A. J. F. & Kumar, R., 2012. Experiences of unmarried young abortion-seekers in Bihar and Jharkhand, India. Culture, Health & Sexuality, pp. 241-255
— Karvande, S., Sonawane, D., Chavan, S. & Mistry, N., 2016. What does quality of care mean for maternal health providers from two vulnerable states of India? Case study of Bihar and Jharkhand. Journal of Health, Population and Nutrition, pp. 1-10
— Keil, A., D'Souza, A. & McDonald, A., 2015. Zero-tillage as a pathway for sustainable wheat intensification in the Eastern Indo-Gangetic Plains: does it work in farmers' fields? Food Sec., Volume 7, pp. 983-1001
— Keil, A., D'Souza, A. & McDonald, A., 2016. Growing the service economy for sustainable wheat intensification in the Eastern Indo-Gangetic Plains: lessons from custom hiring services for zero-tillage. Food Sec., Volume 8, pp. 1011-1028
— Keil, A., D'Souza, A. & McDonald, A., 2017. Zero-tillage is a proven technology for sustainable wheat intensification in the Eastern Indo-Gangetic Plains: what determines farmer awareness and adoption? Food Sec., Volume 9, p. 723–743
— Khan, M., Sharma, S., Tripathi, B. & Alvarez, F., 2017. Budget impact of polio immunization strategy for India: introduction of one dose of inactivated poliomyelitis vaccine and reductions in supplemental polio immunization. Public Health, pp. 31-38
— Kishore, A., 2004. Understanding Agrarian Impasse in Bihar. Economic and Political Weekly, 39(31), pp. 3484-3491
— Kishore, A., Joshi, P. & Pandey, D., 2017. Harnessing the sun for an evergreen revolution: a study of solar-powered irrigation in Bihar, India. Water International, 42(3), pp. 291-307
— Kishore, A., P.K., J. & Pandey, D., 2015. Drought, distress, and a conditional cash transfer programme to mitigate the impact of drought in Bihar, India. Water International, 40(3), pp. 417-431
— K., Jirli, B. & Mandal, P. K., 2017. Comparison among investment and return in dairy activity by beneficiaries of Jeevika project in Bihar state, India. Asian J. Dairy & Food Res, 36(3), pp. 195-196.
— Kochar, A., Sharma, A. & Sharma, A., 2017. Impact of the Uddeepaan programme on child health and nutrition: evidence from India, New Delhi: International Initiative for Impact Evaluation (3ie)
— Kochar, P. S., Dandona, R., Kumar, G. A. & Dandona, L., 2014. Population-based estimates of still birth, induced abortion and miscarriage in the Indian state of Bihar. BMC Pregnancy and Childbirth, pp. 1-9

— Kosec, K. K. et al., 2015. Predictors of Essential Health and Nutrition Service Delivery in Bihar, India: Results from Household and Frontline Worker Surveys. Global Health: Science and Practice, 3(2), pp. 255-273
— Koul, D. N., Singh, S., Neelam, G. & Shukla, G., 2012. Traditional water management systems - An overview of Ahar-pyne system in South Bihar plains of India and need for its revival. Indian Journal of Traditional Knowledge, 11(2), pp. 266-272
— Kumar, A., 2007. Health inequity and women's self-help groups in India: The role of caste and class. Health Sociology Review, pp. 160-168
— Kumar, A. & Mohanty, S. K., 2011. Socio-economic differentials in childhood immunization in India, 1992–2006. J Pop Research, pp. 301-324
— Kumar, A., Singh, D. K. & Kumar, P., 2007. Performance of Rural Credit and Factors Affecting the Choice of Credit Sources. Indian Journal of Agricultural Economics, 62(3), pp. 297-313
— Kumar, A. et al., 2016. Adoption of Modern Rice Cultivation Practices in Bihar, India: Micro-level Evidences from Village-Level Studies. Agric Res, 5(4), pp. 433-439
— Kumar, A., Tripathi, P., Singh, K. K. & Mishra, A. N., 2011. Impact of climate change on agriculture in eastern Uttar Pradesh and Bihar states (India). Mausam, 62(2), pp. 171-178
— Kumar, G. A. et al., 2014. A population-based study of neonatal mortality and maternal care utilization in the Indian state of Bihar. BMC Pregnancy and Childbirth, pp. 1-10
— Kumari, B. & Malhotra, R., 2016. Impact of Women Dairy Co-operative Societies on Income and Employment of Women in Begusarai District of Bihar. Agricultural Economics Research Review, 29(2), pp. 313-318
— Kumar, M., Rahman, M. M., Ramanathan, A. & Naidu, R., 2016. Arsenic and other elements in drinking water and dietary components from the middle Gangetic plain of Bihar, India: Health risk index. Science of the Total Environment, Volume 539, pp. 125-134
— Kumar, M. & Raj, A., 2013. Development in Bihar: Predicaments and Prospects of Health Indices. Journal of Health Management, 15(3), pp. 415-430
— Kumar, R., 2014. Effect of Climate Change and Climate Variable Conditions on Litchi (Litchi chinensis Sonn.) Productivity and Quality
— Kumar, R. et al., 2015. Adoption of health technologies among goat farmers in different Agro-climatic zones of Bihar. Journal of Applied Animal Research, 43(1), pp. 46-51
— Kumar, S. & Kumar, S., 2016. Assessment of impact of climate change on rice and wheat yield in sub humid climate of Bihar. Journal of A Agrometeorology, 18(2), pp. 249-251
— Kumar, S. & Prakash, N., 2017. Effect of political decentralization and female leadership on institutional births and child mortality in rural Bihar, India. Social Science & Medicine, pp. 171-178
— Kumar, S., Roy, R. & Dutta, S., 2015. Scaling-up public-sector childhood diarrhea management program: Lessons from Indian states of Gujarat, Uttar Pradesh and Bihar. Journal of Global Health, 5(2), p. 020414
— Kundu, S., 2010. Differentials in Health Care Access in India. Indian Journal of Gender Studies, 17(1), pp. 105-133
— Kuri, P. K. & Laha, A., 2011. Financial Inclusion and Human Development in India: An Inter-State Analysis. Indian Journal of Human Development, 5(1), pp. 61-77
— Lal, S., Kadian, K., Kale, R. B. & S., 2016. Friedman based analysis of perceived constraints among dairy farmers affected by national calamity in India. Indian J Dairy Sci, 69(6), pp. 725-727
— Larson, L. M. et al., 2017. A Cross-Sectional Survey in Rural Bihar, India, Indicates That Nutritional Status, Diet, and Stimulation Are Associated with Motor and Mental Development in Young Children. The Journal of Nutrition, pp. 1578-1585
— Leone, T., James, K. & Padmadas, S. S., 2013. The burden of maternal health care expenditure in India: multilevel analysis of national data. Maternal and Child Health Journal, pp. 1622-1630
— Leventhal, K. S. et al., 2016. A psychosocial resilience curriculum provides the "missing piece" to boost adolescent physical health: A randomized controlled trial of Girls First in India. Social Science & Medicine, Volume 161, pp. 37-46
— Leventhal, K. S. et al., 2015. Building psychosocial assets and wellbeing among adolescent girls: A randomized controlled trial. Journal of Adolescence, pp. 284-295

- Lopez-Ridaura, S., Frelat, R., Wijk, M. T. v. & Valbuena, D., 2018. Climate smart agriculture, farm household typologies and food security an ex-ante assessment from Eastern India. Agricultural Systems, Volume 159, pp. 57-68
- Malaviya, P. et al., 2013. Village health workers in Bihar, India: an untapped resource in the struggle against kala-azar. Tropical Medicine & International Health, 18(2), pp. 188-193
- Malaviya, P. et al., 2014. Health & Demographic Surveillance System Profile: The Muzaffarpur-TMRC Health and Demographic Surveillance System. International Journal of Epidemiology, 43(5), p. 1450–1457
- Malaviya, P. et al., 2011. Monitoring drug effectiveness in kala-azar in Bihar, India: cost and feasibility of periodic random surveys vs. a health service-based reporting system. Tropical Medicine and International Health, 16(9), pp. 1159-1166
- Mane, P. & Aggleton, P., 2017. Enabling positive change: Progress and setbacks in HIV and sexual and reproductive health and rights. Global Public Health, pp. 1-17
- Martínez, F. P., Picado, A., Roddy, P. & Palma, P., 2012. Low castes have poor access to visceral leishmaniasis treatment in Bihar, India. Tropical Medicine & International Health, 17(5), pp. 666-673
- Mason, J. et al., 2012. Opportunities for Improving Maternal Nutrition and Birth Outcomes: Synthesis of Country Experiences. Food and Nutrition Bulletin, Volume 33
- Mehar, M., Mittal, S. & Prasad, N., 2016. Farmers coping strategies for climate shock: Is it differentiated by gender? Journal of Rural Studies, Volume 44, pp. 123-131
- Meher, R. & Patro, R. P., 2014. Interstate Level Comparison of People's Health Status and the State of Public Health Care Services in India. Journal of Health Management, 16(4), pp. 489-507
- Meheus, F., Boelaert, M., Baltussen, R. & Sundar, S., 2006. Costs of patient management of visceral leishmaniasis in Muzaffarpur, Bihar, India. Tropical Medicine and International Health, II(II), pp. 1715-1724
- Menon, P. D. A. &. B. A., 2009. India State Hunger Index: Comparisons of Hunger Across States, s.l.: IFPRI
- Mishra, R. N. et al., 2010. Lay perceptions of kala-azar, mosquitoes and bed nets in Bihar, India. Tropical Medicine and International Health, 15(2), pp. 36-41
- Mishra, R. & Kumar, G., 2014. Epidemiological Report on Acute Encephalitis Syndrome (AES)/Japanese Encephalitis (JE) Outbreak in Bihar & Planning Perspectives for Its Control. [Online] Available at: http://article.sciencepublishinggroup.com/pdf/10.11648.j.ajhr.20140206.24.pdf [Accessed 7 2 2018].
- Mittal, S., 2016. Role of Mobile Phone-enabled Climate Information Services in Gender-inclusive Agriculture. Gender, Technology and Development, 20(2), pp. 200-217
- Mohanan, M. et al., 2016. Effect of A Large-Scale Social Franchising and Telemedicine Program On Childhood Diarrhea And Pneumonia Outcomes In India. Health Affairs, pp. 1800-1809
- Mohanan, M. et al., 2017. Evaluation of a social franchising and telemedicine programme and the care provided for childhood diarrohea and pneumonia, Bihar, India. Bulletin of The World Health Organization, 95(5)
- Mohanan, M. et al., 2015. The Know-Do Gap in Quality of Health Care for Childhood Diarrhea and Pneumonia in Rural India. JAMA Pediatrics, 169(4), pp. 349-357
- Mondal, S. et al., 2016. Effect of different rice establishment methods on soil physical properties in drought-prone, rainfed lowlands of Bihar, India. Soil Research, Volume 54, pp. 997-1006
- Murhekar, M. V. et al., 2014. Measles Case Fatality Rate in Bihar, India, 2011–12. PLoS One, 9(5), pp. 1-9
- Nagler, E. M. et al., 2013. Designing in the social context: using the social contextual model of health behavior change to develop a tobacco control intervention for teachers in India. Health Education Research, pp. 113-129
- Neogi, S. B. et al., 2014. Setting up a Quality Assurance Model for Newborn Care to Strengthen Health System in Bihar, India. Indian Pediatrics, pp. 136-138
- Noznesky, E. A., Ramakrishnan, U. & Martorell, R., 2012. A Situation Analysis of Public Health Interventions, Barriers, and Opportunities for Improving Maternal Nutrition in Bihar, India. Food and Nutrition Bulletin, Volume 33

— Pallikadavath, S., Foss, M. & Stones, R. W., 2004. Antenatal care: provision and inequality in rural north India. Social Science & Medicine, 59(6), pp. 1147-1158
— Panda, P., Chakraborty, A., Raza, W. & Bedi, A. S., 2016. Renewing membership in three community-based health insurance schemes in rural India. Health Policy and Planning, p. 1433–1444
— Panda, P. K., Chakraborty, A., Dror, D. M. & Bedi, A. S., 2014. Enrolment in Community-Based Health Insurance Schemes in Rural Bihar and Uttar Pradesh, India. Health Policy and Planning, 29(8), pp. 960-974
— Pandit, A. et al., 2007. Financing Agriculture: A Study of Bihar and West Bengal Potato Cultivation. Indian Journal of Agricultural Economics, 62(3)
— Patel, L. et al., 2009. Support for provision of early medical abortion by mid-level providers in Bihar and Jharkhand, India. Reproductive Health Matters, pp. 70-79
— Patra, N., 2005. Universal Immunization Programme in India: The determinants of childhood Immunization. pp. 1-70
— Perry, M. R. et al., 2015. Arsenic Exposure and Outcomes of Antimonial Treatment in Visceral Leishmaniasis Patients in Bihar, India: A Retrospective Cohort Study. PLoS Negl Trop Dis, 9(3), pp. 1-17
— Pradhan, N. et al., 2011. Expanding and improving urban outreach immunization in Patna, India. Tropical Medicine & International Health, 17(3), pp. 292-299
— Pradhan, R. P., 2007. Gender Development in Education and Health: A Study of Indian States. Journal of Health Management, 9(1), pp. 1-14
— Pradhan, R. P., 2008. Quality of life in north-eastern India: The totally fuzzy analysis. Social Change, 38(2), pp. 163-183
— Rains, E. & Abraham, R. J., 2018. Rethinking barriers to electrification: Does government collection failure stunt public service provision? Energy Policy, Volume 114, pp. 288-300
— Ranga, V. & Panda, P., 2016. Private non-degree practitioners and spatial access to out-patient care in rural India. GeoJournal, 81(2), pp. 267-280
— Rasul, G. & Sharma, E., 2014. Understanding the poor economic performance of Bihar and Uttar Pradesh, India: a macro-perspective. Regional Studies, Regional Science, 1(1), pp. 221-239
— Raza, W. A., Poel, E. V. D., Bedi, A. & Rutten, F., 2016. Impact of Community-based Health Insurance on Access and Financial protection: evidence from three randomized control trials in rural India. Health Economics, pp. 675-687
— Raza, W. A. et al., 2016. Healthcare seeking behaviour among self-help group households in Rural Bihar and Uttar Pradesh, India. BMC Health Services Research, pp. 1-13
— Rheingans, R. et al., 2014. Estimated impact and cost-effectiveness of rotavirus vaccination in India: Effects of geographic and economic disparities. Vaccine, pp. 140-150
— Rodgers, G. B., 1973. Effects of Public Works on Rural Poverty: Some Case Studies from the Kosi Area of Bihar. Economic and Political Weekly, 8(4), pp. 255-268
— Rout, S. K., Pradhan, J. & Choudhury, S., 2016. Estimating financial resources for universal access to sexual reproductive health care: Evidence from two states in India. Sexual & Reproductive Healthcare, pp. 1-6
— Sajjad, H., Nasreen, I. & Ansari, S. A., 2014. Assessing Spatiotemporal Variation in Agricultural Sustainability Using Sustainable Livelihood Security Index: Empirical Illustration from Vaishali District of Bihar, India. Agroecology and Sustainable Food Systems, Volume 38, pp. 46-68
— Sarnoff, R. et al., 2010. The economic impact of visceral leishmaniasis on rural households in one endemic district of Bihar, India. Tropical Medicine and International Health, 15(2), pp. 42-49
— Shah, T. & Ballabh, V., 1998. Water Markets in North Bihar: Six Village Studies in Muzaffarpur District. Economic and Political Weekly, 32(52), pp. A183-A190
— Sharma, A., Kaplan, W., Chokshi, M. & Zodpey, S., 2016. Role of the private sector in vaccination service delivery in India: evidence from private-sector vaccine sales data, 2009–12. Health Policy and Planning, 31(7), pp. 884-896
— Sheets, D., Mubayi, A. & Kojouharov, H. V., 2010. Impact of socio-economic conditions on the incidence of visceral leishmaniasis in Bihar, India. International Journal of Environmental Health Research, 20(6), pp. 415-430

— Shinde, S. et al., 2017. The development and pilot testing of a multicomponent health promotion intervention (SEHER) for secondary schools in Bihar, India. Global Health Action, pp. 1-13
— Shirsath, P. B., Aggarwal, P., Thornton, P. & Dunnett, A., 2017. Prioritizing climate-smart agricultural land use options at a regional scale. Agricultural Systems, Volume 151, pp. 174-183
— Siddiqui, N. A. et al., 2016. Snowball Vs. House-to-House Technique for Measuring Annual Incidence of Kala-azar in the Higher Endemic Blocks of Bihar, India: A Comparison. PLOS Neglected Tropical Diseases, pp. 1-15
— Sikka, A. K., Islam, A. & Rao, K., 2018. Climate-Smart Land and Water Management for Sustainable Agriculture. Irrigation and Drainage, Volume 67, pp. 72-81
— Singh, A. & Pal, S., 2015. Emerging Trends in the Public and Private Investment in Agricultural Research in India. Agric Res, 4(2), pp. 121-131
— Singh, A., Singh, A. & Mahapatra, B., 2013. The Consequences of Unintended Pregnancy for Maternal and Child Health in Rural India: Evidence from Prospective Data. Matern Child Health J, pp. 493-500
— Singh, K. M., Meena, M. S., Bharati, R. C. & Kumar, A., 2012. An economic analysis of milk production in Bihar. Indian Journal of Animal Sciences, 82(10), pp. 1233-1237
— Singh, P. et al., 2014. Crop yield prediction using CERES-Rice vs 4.5 model for the climate variability of different Agro-climatic zone of south and north-west plane zone of Bihar (India). Mausam, 65(4), pp. 529-538
— Sinha, D. N. et al., 2002. Tobacco Use among School Personnel in Bihar, India. Tobacco Control, pp. 82-83
— Sorensen, G. et al., 2005. Teacher tobacco use, and tobacco use prevention in two regions in India: qualitative research findings. Preventive Medicine, pp. 424-432
— Srikanth, R., 2013. Access, monitoring and intervention challenges in the provision of safe drinking water in rural Bihar, India. Journal of Water, Sanitation and Hygiene for Development, pp. 61-69
— Srivastava, P. et al., 2013. Molecular and serological markers of Leishmania donovani infection in healthy individuals from endemic areas of Bihar, India. Tropical Medicine & International Health, 18(5), pp. 548-554
— Subash, N., Singh, S. & Priya, N., 2011. Extreme rainfall indices and its impact on rice productivity—A case study over sub-humid climatic environment. Agricultural Water Management, Volume 98, pp. 1373-1387
— Subash, N., Singh, S. S. & Priya, N., 2013. Observed variability and trends in extreme temperature indices and rice–wheat productivity over two districts of Bihar, India—a case study. Theor Appl Climatol, Volume 111, pp. 235-250
— Subramanyam, M. et al., 2017. Impact of the Gram Varta programme on health, nutrition and women's empowerment in India, 3ie Grantee Final Report, New Delhi: International Initiative for Impact Evaluation (3ie)
— Sugden, F., 2017. A mode of production flux: the transformation and reproduction of rural class relations in lowland Nepal and North Bihar. Dialect Anthropol, Volume 41, pp. 129-161
— Sundar, S. et al., 2000. Short-course, cost-effective treatment with amphotericin B-fat emulsion visceral leishmaniasis. TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, pp. 200-204
— Tesfaye, K. et al., 2017. Climate Variability and Change in Bihar, India: Challenges and Opportunities for Sustainable Crop Production. Sustainability, pp. 1-22
— Thacker, N. et al., 2012. Comparison of attitudes about polio, polio immunization, and barriers to polio eradication between primary health center physicians and private pediatricians in India. International Journal of Infectious Diseases, Volume 16, pp. 417-423
— Thind, A., 2005. Female sterilization in rural Bihar: what are the acceptor characteristics? Journal of Family Planning and Reproductive Health Care, , 31(1), pp. 34-36
— Tigga, N. S. & Mishra, U. S., 2015. On Measuring Technical Efficiency of the Health System in India: An Application of Data Envelopment Analysis. Journal of Health Management, pp. 285-298
— Tiwari, M., 2013. The global financial crisis and self-help groups in rural India: are there lessons from their micro savings model? Development in Practice, 23(2), pp. 278-291
— Tiwari, M. & Ibrahim, S., 2012. Sustainable Human Development at the Grass Roots: Different Contexts, Similar Ingredients? Oxford Development Studies, 40(1), pp. 69-85

— Vass, K., Tyagi, R., Singh, H. & Pathak, V., 2010. Ecology, changes in fisheries, and energy estimates in the middle stretch of the River Ganges. Aquatic Ecosystem Health & Management, 13(4), pp. 374-384
— Vilms, R. J. et al., 2017. Gender inequities in curative and preventive health care use among infants in Bihar, India. Journal of Global Health, 7(2), pp. 1-10
— Walker, C. L. F. et al., 2015. Public sector scale-up of zinc and ORS improves coverage in selected districts in Bihar, India. Journal of Global Health, 5(2), pp. 020408-020408
— Wendt, A. et al., 2015. Individual and Facility-Level Determinants of Iron and Folic Acid Receipt and Adequate Consumption among Pregnant Women in Rural Bihar, India. PLoS One, pp. 1-25
— Winkler, I. et al., 2015. Assessing the Applicability of NDVI Data for The Design of Index-Based Agricultural Insurance in Bihar, India. IGARSS, pp. 854-857

International Growth Centre (IGC) India
ADRI
BSIDC Colony, Boring Patliputra Road, Patna
800 013