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A DESCRIPTIVE STUDY TO ASSESS THE KNOWLEDGE OF HEALTH-CARE PERSONNEL REGARDING MAINTENANCE OF COLD CHAIN SYSTEM IN SELECTED HEALTH-CENTRES OF SONIPAT DISTRICT OF HARYANA

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Abstract

Over the past decade, the world has invested enormous resources and energy into the development of new and lifesaving vaccines. Current vaccination programmes save more than three million lives per year, and new vaccines that focus on diseases affecting people in the world's poorest countries can protect millions more. But it's not just about developing safe and effective vaccines. It's about getting vaccines to the right place, at the right time, in the right condition. And that means delivery systems that are as advanced and innovative as the vaccines they support. The Health Care Services Organization in the country extends from the national level to village level. Health care in India is delivered through a three tier structure comprising the primary, secondary and tertiary health care facilities to bring health care services within the reach of the people. The primary tier is designed to have three types of health care institutions, namely, a Sub-Centre (SC) for a population of 3000-5000, a Primary Health Centre (PHC) for 20000 to 30000 people and a Community Health Centre (CHC) as referral centre for every four PHCs covering a population of 80,000 to 1.2 lakh. The district hospitals were to function as the secondary tier for the rural health care, and as the primary tier for the urban population. The tertiary health care was to be provided by health care institutions in urban areas which are well equipped with sophisticated diagnostic and investigative facilities.

Keywords: *Assess, Knowledge, Health-Care, Personnel, Maintenance, Cold Chain System*

INTRODUCTION

An Expanded Program on Immunization (EPI) was launched in 1974 by the World Health Organization (WHO) with the aim of controlling vaccine-preventable diseases, such as tuberculosis, diphtheria, peruses, tetanus, polio and measles. Immunization has been proved to be one of the most cost-effective parts of health promotion since in many countries after achieving high immunization coverage, the morbidity and mortality rates of vaccine-preventable diseases tend to decline. On the other hand, vaccine-preventable diseases have remained a serious concern in some areas where immunization coverage is not high. Published studies have shown inadequate Knowledge and Practice of health-care workers regarding Immunization and the Cold Chain System in many places in the world, especially in remote areas was the leading cause of death in under five children. A previous study found that increasing Knowledge regarding Immunization and the Cold Chain System among personnel could increase vaccination coverage and increase the efficiency of Immunization and Cold Chain Practice.[1]

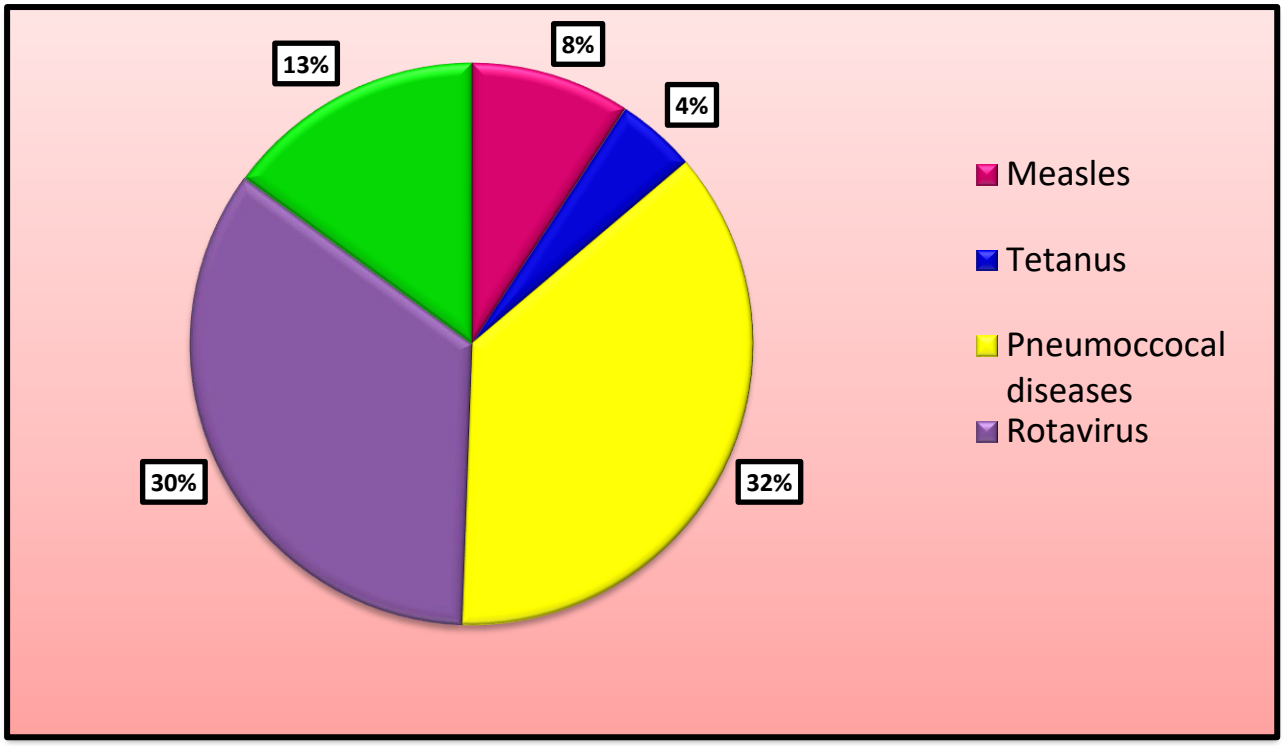

Figure 1: Percentage Distribution of the Estimated Deaths among Children Under 5 years of Age, from Diseases that are Preventable by Vaccination in 2008

In WHO South-East Asia Region there are eleven Member States these are Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, and Timor-Leste. According to the data obtained from the World Health Organization, population of the WHO South-East Asia Region is 1,671,903,660. The percentage of the world's disease burden contributed by countries of the region is 64% of measles, 36% of Tuberculosis, 33% of upper respiratory infections, 52% of dengue and 28% of diarrhoeal disease. Some of the highest annual incidences worldwide of diarrhoeal diseases, lower respiratory infections, malaria, measles and dengue appear in the region. Clearly, communicable diseases present a mixture of challenges for the region, with a variety of them falling under all three World Health Organization (WHO) categories mentioned above: diseases with high mortality and morbidity, those that can potentially cause epidemics and those that can be controlled with available and proven interventions.

India has one of the largest Universal Immunization Program (UIP) in the world in terms of quantities of vaccines used, number of beneficiaries (27 million infants and 30.2 million pregnant women), geographical spread (29 States and 6 Union Territories) and manpower involved. India spends more than US$ 500 million every year in immunization program for immunizing children against vaccine preventable diseases including polio eradication program. The country is advancing new strategies to increase immunization coverage and reach more children with quality vaccines. Cold Chain being the most important component to ensure that quality vaccine reached to each and every child immunized. This is also important in light of new costly vaccines introduction and also thrust on reduction and elimination of certain diseases like Measles, Tetanus etc.

Since the inception of Universal Immunization Programme, a wide network of Cold Chain stores have been created consisting of Government Medical Supply Depots (GMSDs), State, Regional/Divisional Vaccine stores, District and Primary Health Centre/Community Health Centre vaccine storage points.

Cold Chain network in the country has been the backbone to ensure that right quantity and right quality of vaccine reaches the target population. With the given four tier vaccine store network, there were 66,765 refrigerators and freezers installed and operational in the country. The Cold Chain equipment in the country has been installed based on population density of each district. Out of total 66,765 equipment, 63,726 (95%) were placed in 20 larger states and rest of 5% equipment was installed in smaller states and Union Territories. In addition, India also had a total 199 cold rooms and freezer rooms. Figure 2 shows the proportion of Cold Chain equipment installed in each states of the country.

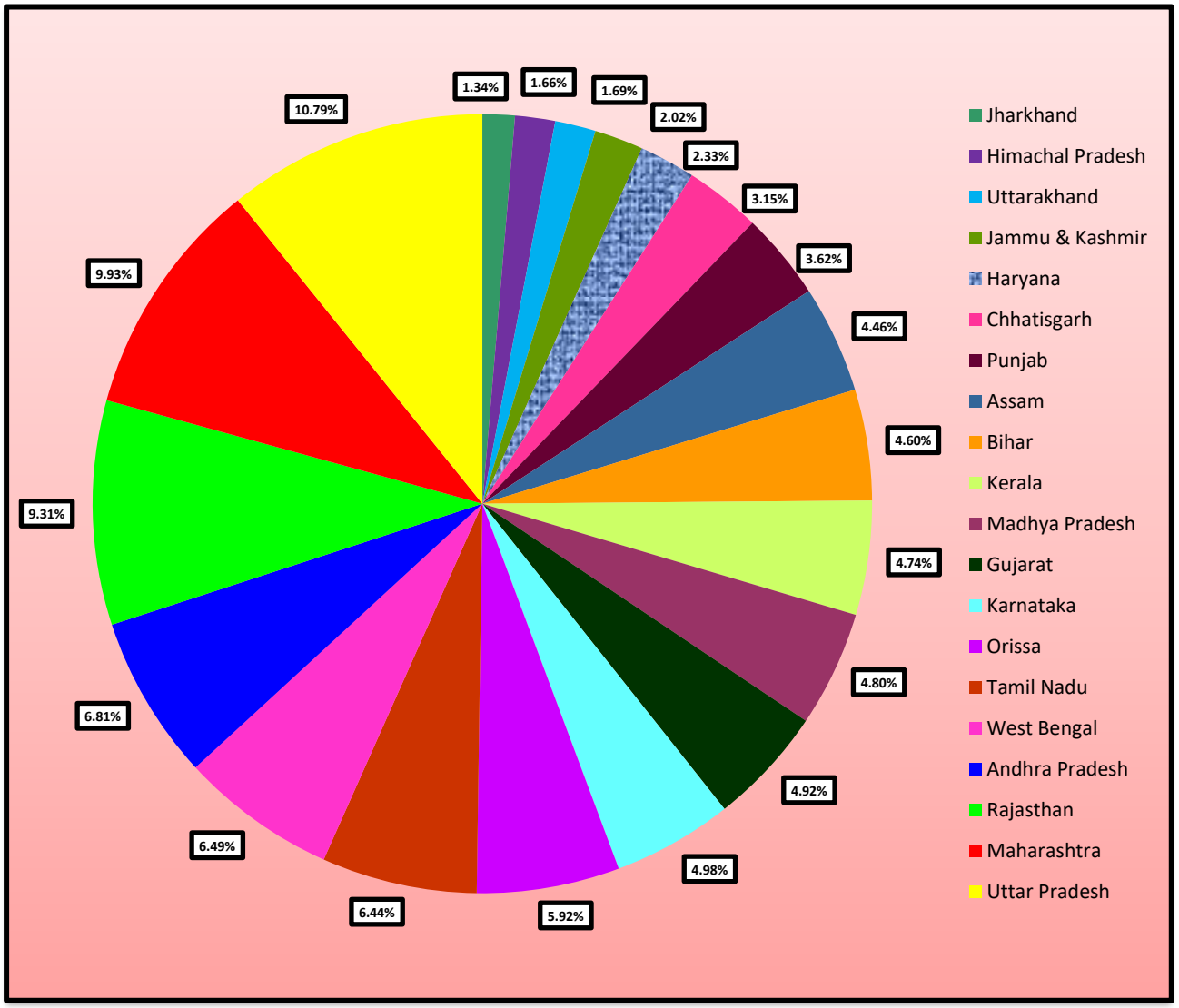

Figure 2: Showing the Proportion of Cold Chain Equipment Installed in each States of the Country

In Haryana, there are 21 districts having 86 Community Health Centres and 411 Primary Health Centres. There are 33 large Ice Lined Refrigerators, 829 small Ice Lined Refrigerators, 66 large Deep Freezers, 554 small Deep Freezers installed in whole of the state. The cold boxes are required to transport vaccine to regional, district vaccine stores, Community Health Centres and Primary Health Centres. There are total 100 large cold boxes with 20 litres of storage capacity and zero small cold boxes of 5 litres of storage capacity. Large cold boxes are typically needed at intermediate stores and small cold boxes at Primary Health Centres. Vaccine carriers are used for outreach and campaign immunization sessions by vaccinators. There are total of 20,500 vaccine carriers in Haryana.[2]

NEED FOR THE STUDY

The vaccines play a major role in preventing major communicable diseases which leads to a significant number of deaths every year. It is necessary to provide vaccines against these diseases but the maintenance of the vaccine potentiality is most important because if we give non potential vaccines it will not protect people from killer diseases, in order to maintain potentiality of vaccines the maintenance of the Cold Chain System is necessary.

Cold Chain System is necessary because the vaccines are sensitive to heat; if the vaccines are exposed to heat they will have shortened life. Some vaccines are more sensitive than others. Polio is the most sensitive to heat. When the vaccines lose their potency they can no longer protect individuals from diseases. Vaccines potency cannot be regained once it is lost. Returning vaccines to the refrigerators will not restore its potency; all vaccines retain their potency at temperature between 2oC to 8oC, so the vaccines must stay cold or maintain optimum temperature to the actual vaccination site all the way from manufacture, storage and transportation.[5]

In India 15% to 30% cases of poliomyelitis occur in children who have received primary immunization with the oral polio vaccine.18 Literature concerning vaccination rates in India indicates a considerable disparity between children in urban areas and rural areas. In addition, 75% of the health infrastructure, medical personnel, and other health resources are concentrated in urban areas of India, whereas only 27% of the population lives in the urban parts of the country. The weak health infrastructure and unsanitary conditions contribute to the increased incidence of diseases like polio, cholera, and hepatitis in rural compared with the urban areas. The rural manifestation of polio in India is confirmed by the number of polio cases reported in prevalence studies and independent reports on polio.[4]

REVIEW OF LITERATURE

An intervention study was conducted on assessing Cold Chain status in a metro city of India. Intervention consisted of reorganization of Cold Chain points and training of health manpower in Kolkata Municipal area regarding immunization and Cold Chain following the guidelines as laid by Government of India. Re-evaluation of Cold Chain status was done at 20 institutions selected by stratified systematic random sampling after the intervention. Results of the study revealed significant improvement in correct placing of Cold Chain equipment, maintenance of stock security, orderly placing of ice packs, diluents and vaccines inside the equipment, temperature recording and maintenance. But awareness and skill of Cold Chain handlers regarding basics of Cold Chain maintenance was not satisfactory.[7]

A study was carried out on improving vaccination Cold Chain in the general Practice setting. Temperature data loggers were set to serially record the temperature within vaccine refrigerators in 28 general Practice, recording at 12 minute intervals over a period of 10 days on each occasion. A survey of vaccine storage Knowledge and records of divisions of general Practice immunisation contacts were also obtained. There was a significant relationship between type of refrigerator and optimal temperature, with the odds ratio for bar style refrigerator being 0.005 (95% CI: 0.001–0.044) compared to the purpose built vaccine refrigerators. Score on a survey of vaccine storage was also positively associated with optimal storage temperature.[8]

A study was conducted to monitor temperatures in the vaccine Cold Chain in Bolivia. This study monitored vaccine Cold Chain temperatures during routine DTP-HB-Hib vaccine shipments from central stores to 11 communities in 3 provinces of Bolivia. In all 11 monitored shipments, vaccines were

exposed to freezing temperatures at one or more points. In each of the shipments, temperatures below 0oC were recorded for 2–50% of the monitoring period. Freezing occurred at almost every level of the Cold Chain distribution system, especially during district and health centre storage and during transport to the province and district levels. Seven of the 11 shipments were exposed to temperatures above 8oC, although none were exposed to excessive heat longer than 1.3% of the total monitoring period.[9]

A study was conducted to assess Knowledge and Practice in primary health care facilities related to Cold Chain management in Nissan, Mozambique. Data collection methods included questionnaires, observations and document analysis in 44 health facilities, 12 of which in district capitals, and the remaining 32 in peripheral health facilities in Nissan province. The results of the study revealed that the principal explanatory variable for the inadequacies of the system was the location of the health facility as health workers in the peripheral health facilities were in general less educated, had less work experience and their Knowledge of Cold Chain was not as per required levels to support effective Cold Chain management.[10]

A study was conducted on awareness about Vaccine Vial Monitor at Pulse Polio Booths. All members present on booth, working on National Immunization Day during January and February, 2007 were interviewed by using predesigned and pretested questionnaires to assess their awareness regarding type of OPV and VVM in urban areas of Val sad district. Correct identification of trivalent OPV was highest (54.8%) among health staff members working at booths, but for monovalent OPV it was poor (38.7%). More than half (51.6%) of staff members interviewed had not heard of VVM. Awareness was very poor for VVM among those who have heard regarding its function, how to read VVM and when OPV should be discarded.[11]

RESEARCH METHODOLOGY

Research methodology indicates the generalized pattern of organizing the procedure for gathering valid and reliable data for investigation. It includes the strategies to be used to collect and analyze the data to accomplish the research objectives and to test research hypotheses. It includes research approach, research design, setting of the study, the sample and sampling technique, development and description of tools, data collection and plan for data analysis.

POPULATION

The need for defining a population for the research project arises from the requirement to specify the group to which the results of the study will be applied.

The population for the present study includes Health-care Personnel working at Health-centres. The target population for the present study includes Health-care Personnel working at Health-centres of Haryana. The accessible population for the present study includes Health-care Personnel working at Health-centres of Sonipat district of Haryana.

SAMPLE SIZE

Forty five Health-care Personnel were selected by convenience sampling technique.

ANALYSIS AND INTERPRETATION OF DATA

Table - 1: Frequency and Percentage Distribution of Demographic Variables of Health-care Personnel

N=45

Demographic Variables	Frequency (f)	Percentage (%)
1. Age in years		
a. 20-30	12	26.7
b. 31-40	28	62.2
c. 41-50	03	6.7
d. Above 50	02	4.4
2. Professional Qualification		
a. Diploma in Nursing/Pharmacy	35	77.8
b. Graduation and above	10	22.2
3.Personnel involvement in maintenance of Cold Chain System		
a. Nurse	27	60
b. Pharmacist	18	40
4. Work experience		
a. 1-5 years	24	53.3
b. 6-10 years	12	26.7
c. 11-15 years	07	15.6
d. 16 years and above	02	4.4
5. Training related to maintenance of Cold Chain System		
a. Yes	19	42.2
b. No	26	57.8
6. Working Place		
a. Sub-centre	25	55.6
b. PHCs/CHCs	20	44.4

Majority of the Health-care Personnel (62.2%) were in the age group of 31-45 years. Most of the Health-care Personnel (77.8%) had education up to Diploma in Nursing/Pharmacy. Data presented in the table further shows that majority of the Personnel involved in maintenance of Cold Chain are nurses (60%). In working experience, most of the Health-care Personnel (53.3%) had work experience of 1-5 years. Majority of the Health-care Personnel (57.8%) did not undergo any training related to maintenance of Cold Chain System and most of the Health-care Personnel (55.6%) are working at Sub-centers.

Table 2: Frequency and Percentage Distribution of Health-care Personnel based on Level of Knowledge regarding Maintenance of Cold Chain System

N=45

Level of Knowledge	Range of Knowledge Scores	Percentage (%)	Frequency (f)	Percentage (%)
Below average	0-20	<50%	0	0
Average	21-24	51%-60%	5	11
Good	25-30	61%-75%	12	27
Very good	31-40	>75%	28	62

Majority 28(62%) of the Health-care Personnel show a very good level of Knowledge, followed by 12(27%) of Health-care Personnel showing a good level of Knowledge and 5(11%) of Health-care Personnel showing an average level of Knowledge, none of them are there in the category of below average.

Table 3: Range, Mean, Median and Standard Deviation of Knowledge Scores of Health-care Personnel regarding Maintenance of Cold Chain System

N=45

Range of Knowledge Scores	Mean	Median	SD
21-36	30.36	31	4.07

Maximum score: 40 **Minimum score: 0**

The Mean Knowledge score was 30.36. The Median and SD for Knowledge score was 31 and 4.07 respectively and range of Knowledge Scores were (21-36).

Table 4: Area wise Mean, Median, Standard Deviation, Mean Percentage Score and Ranking of Knowledge of Health-care Personnel regarding Maintenance of Cold Chain System

N=45

Area	Mean	Median	S.D	Mean % score	Rank
Concept of Cold Chain System and vaccines	10.20	11	1.78	78.46	2nd
Storage and equipment's	17.36	18	3.02	75.47	3rd
Transport and Cold Chain failure	2.80	3	0.40	93.33	1st

The mean Knowledge Scores of Health-care Personnel as evident by area wise ranking of mean percentage obtained on Structured Knowledge Questionnaire. The highest mean percentage was found in the area of transport and Cold Chain failure (93.33%) ranked as 1st. The second highest percentage was found in the area of Concept of Cold Chain System and vaccines (78.46%) were ranked as 2nd. The mean percentage score obtained in the area of storage and equipments (75.47%) was ranked as 3rd. (The area with the lowest mean percentage indicates the highest deficit area and with highest mean percentage indicates the lowest deficit area). Hence it is inferred that Health-care Personnel were having inadequate knowledge regarding storage and equipments followed by concept of Cold Chain System and vaccines.

Table-5: Association of Knowledge of Health-care Personnel with Selected Variables

N= 45

Variables	Knowledge	Above Median	Below Median	Chi Value (χ^2)
1. Personnel involvement in maintenance of Cold Chain System	a) Pharmacist	8	10	0.06^{NS}
	b) Nurse	13	14	
2. Work experience	a) 1-5 yrs	12	12	0.23^{NS}
	b) 6- 10 yrs and above	9	12	
3. Training related to maintenance of Cold Chain System	a) Yes	10	9	0.47^{NS}
	b) No	11	15	
4. Working Place	a) Sub-centre	12	13	0.04^{NS}
	b)PHC/CHC	9	11	

The association of Knowledge of Health-care Personnel with selected variables. The findings suggest

that the computed Chi-square value of Personnel involvement in maintenance of Cold Chain System (0.06) and work experience (0.23) was found to be statistically not significant at 0.05 level.

The data further shows that Chi-square value of Training related to maintenance of Cold Chain System (0.47) and working place (0.04) is not found to be statistically significant at 0.05 levels. This shows that there was no significant associationof Level of Knowledge of Health-care Personnel with selected variables i.e. Personnel involvement in maintenance of Cold Chain System, work experience, training related to maintenance of Cold Chain System and working place.

FINDINGS OF THE STUDY

a. Majority of the Health-care Personnel (62.2%) were in the age group of 31-40 years.
b. Majority of the Health-care Personnel (77.8%) had education upto Diploma in Nursing/Pharmacy.
c. Majority of the Personnel involvement in maintenance of Cold Chain are nurses (60%).
d. Most of the Health-care Personnel (53.3%) had work experience of 1-5 years.
e. Majority of the Health-care Personnel (57.8%) did not undergo any training related to maintenance of Cold Chain System.
f. Most of the Health-care Personnel (55.6%) are working at Sub-centres.
g. Majority 28(62%) of the Health-care Personnel had very good level of Knowledge with the range of scores in between 31-40.
h. The highest Mean Percentage of scores is in the area of transport and Cold Chain failure (93.33%) followed by the area of concept of Cold Chain System and vaccines (78.46%).

CONCLUSIONS

The highest Mean Percentage of Knowledge Scores is in the area of transport and Cold Chain failure (93.33%) followed by the area of concept of Cold Chain System and vaccines (78.46%).
Association of Knowledge of Health-care Personnel with selected variables was found to be statistically not significant at 0.05 level. Thus Knowledge of Health-care Personnel regarding maintenance of Cold Chain System was independent of their selected variables such as Personnel involvement in maintenance of Cold Chain System, work experience, training related to maintenance of Cold Chain System and working place.

A similar study can be conducted for a larger sample covering the entire Health-centres of Haryana as well as other parts of the country to validate and generalize the findings.

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