Antibiotic Smart Communities- 34 initial indicators

Domain	Indicator	Measurement	Categories	Reason for inclusion
Human Health	Awareness about antibiotic use and antibiotic resistance among general public	Standardised 10 point questionnaire administered to 100 residents using a stratified random sampling methodology. The stratification can be done based on gender and occupational background. Average Scores above 66.6% will be classified as high awareness, 33.4% to 66.6% as reasonable awareness and up to 33.3% as low awareness	High (3) Reasonable (2) Low (1)	Improving awareness and understanding of Antibiotic Resistance (ABR) is one of the strategic objectives of the Global Action Plan on Antimicrobial Resistance, published by the World Health organization.(1) Also, there has been multiple surveys to gauge the level of awareness of general public about ABR and most of them have shown a need for incorporating this into public health initiatives. The awareness about the issue is lower in low-resource settings(2)
Human Health	Over-the-counter availability of antibiotics in retail pharmacies in the area	Personal visit up to 10 retail pharmacies to buy commonly used antibiotic 'Amoxicillin+Clavulanic Acid' for Upper respiratory Infection.Exhaustive sampling if the number of retail pharmacies are less than 10. Classification based on the responses given by dispensers about giving antibiotics without prescription. a) Up to 30% pharmacies- Poor OTC availability b) 31% to 80% pharmacies- Partial OTC Availability c) 81% or more- OTC freely available	Poor OTC availability(3) Partial OTC availability(2) Free OTC availability(1)	Self medication with antibiotics and over-the-counter sales of antimicrobial products are a problem which exacerbates the ABR issue in many countries with poor regulatory systems.(3) This kind of antibiotic use is often irrational and contributes to the environmental selection pressure for development of resistance. We have now ample evidence to show that higher consumption of antimicrobials is associated with a higher incidence of resistance. This can be true for the individuals, community and the country; and increases in consumption increases the probability of resistant infections. (4) Therefore, measuring the over-the-counter antibiotic sales using surrogate makers become an essential step.

Human Health	Proportion of HCFs which has **implemented** a written Infection Prevention and Control (IPC) plan	A short audit of at least 10 healthcare facilities for the presence of a written Infection Prevention and Control plan. All healthcare facilities with a medical practitioner or administering injections will be included in the sampling frame. Exhaustive sampling will be done if the number of HCFs is less than 10. The classification will be done as below: a) Up to 30% HCFs- Poor IPC implementation b) 31% to 80% pharmacies- Reasonable OTC implementation c) 81% or more- Good IPC implementation	Good (3) Reasonable (2) Poor (1)	Healthcare Associated Infections (HAIs) contribute to increased antibiotic use, especially those considered as reserve drugs. This is because the resistance profile of HAIs are consistently worse than Community Acquired Infections.(5) Due to this reason, Infection Control programs are generally complementary to Antimicrobial Stewardship, in rationalizing/reducing antibiotic use in healthcare settings.(6)
Human Health	Proportion of population using safely managed drinking water services	Short survey of 30 households selected using some random sampling methodology. WHO/UNICEF JMP definition for Safely managed drinking water services will be used "Drinking water from an improved water source which is located on premises, available when needed and free of faecal and priority chemical contamination". If 100% households have access, it will be classified as All. Any value between 51% to 99% will be classified as Most, and up to 50% will be classified as Some.	All (3) Most (2) Some (3)	The Global Action Plan on AMR mentions that better hygiene and infection prevention measures are needed to limit the transmission of antibiotic resistant microorganisms. Better food and water safety is an important pillar of infection prevention in the community.(1) Poor quality of drinking water is associated with higher incidence of diarrheal illnesses and enteric fever in many developing countries; and these are independent risk factors for increased use of antibiotics. Also, there is increasing evidence that water has a role in propagating antibiotic resistance.(7) In many cases, water also carries Antibiotic Resistant Genes (ARGs) bringing them to households; and septic tanks often act as genetic reactors for development of new resistance patterns.(8) Therefore, quality of water is an integral component of any holistic intervention on AMR.

Human Health	Proportion of healthcare facilities with a written antibiotic protocol for at least three disease/syndrome conditions caused by bacteria.	A short audit of 10 randomly selected healthcare facilities for the presence of a written antibiotic protocol for at least three disease/syndrome conditions caused by bacteria. All healthcare facilities with a medical practitioner or administering injections will be included in the audit. Exhaustive sampling will be done if the number of HCFs is less than 10. Antibiotic protocols which has not been re-evaluated or revised in the last 5 years will not be considered.	All (3) Some (2) None (1)	Antibiotics are highly prescribed in primary and secondary care settings in low-middle income countries. Though most of the prescribed antibiotics are from the Access group (as per WHO's AWaRe classification), the increased use of antibiotics contribute to greater selection pressure in the environment.(9) The impact of treatment protocols or standard treatment guidelines on streamlining care for infectious diseases and reduction of antibiotic prescriptions, has been well demonstrated in studies.(10) Hence regularly updated treatment guidelines form an important component of any antimicrobial stewardship efforts in healthcare facilities.
Human Health	Percentage of Access antibiotics (as per AWaRe classification of WHO) in total antibiotics dispensed in out-patient settings at healthcare facilities	Data collected from 30 consecutive antibiotic prescriptions which are dispensed from each healthcare facility. The percentage of Access, Watch and Reserve antibiotics will be calculated. If the proportion of Access antibiotics is 60% or above, the area will be classified as High. If the value is between 30% and 60%, it is reasonable. If the overall DoT is less than 30%, it is Low.	High (3) Reasonable (2) Low (1)	WHO introduced AWaRe (Access, Watch and Reserve) classification of antibiotics in 2017, as a part of its Essential Medicines List. The objective was to ensure access to quality assured and affordable antibiotics to all; and ensure rational use of antibiotics. WHO also said that at least 60% of the overall antibiotic consumption at a country level should be from the 'Access' list.(11) Some studies have shown that 'Watch' antibiotics are available and used more often than 'Access' antibiotics, in countries like India.(12)

Human Health	Proportion of Healthcare facilities which are accredited by any standard agency (government/private) for quality assurance in delivery of services	A short audit at least 10 randomly selected healthcare facilities for their accreditation status. Exhaustive sampling will be done if the total number of HCFs is less than 10. The accreditation shall be for quality assurance in service delivery and should be done by any standard government/private agency. The accreditation should be valid at the time of audit. All healthcare facilities with a full time medical practitioner will be included in the audit.	All (3) Some (2) None (1)	There is evidence that accreditation of healthcare facilities is one of the key factors in creating an enabling environment for rollout of antimicrobial stewardship. The process of accreditation requires preparation of several guidelines, especially around infection control and standardized care. This can improve the quality of service delivery and possibly the healthcare associated infections.(13) Also, some accreditation processes require formation of bodies like antimicrobial stewardship committee and hospital infection control committee, which are essential to rationalize antibiotic use in hospital settings.
Human Health	Percentage of suspected Urinary Tract Infections (community or healthcare-associated), being subjected to culture and sensitivity testing.	“Data collected from 10 consecutive out-patient records of suspected/ confirmed Urinary Tract Infections from each healthcare facility. Exhaustive sampling to be followed if the number of HCFs is less than 10. If more than 50% of cases have a urine culture/sensitivity report, it is classified as “High”. If its between 25% to 50%, it is “Reasonable” and less than 25% is “Low”.	High (3) Reasonable (2) Low (1)	Surveillance of resistance is one of the measures in quantifying the problem in the community and also for evaluating the impact of the interventions. Over the years, several bacterial markers have been used for surveillance, like *Streptococcus pneumoniae*, *Staphylococcus aureus* and gram negative organisms.(14) Optimal use of culture and sensitivity is also needed to ensure that antibiotics are not used empirically all the time. Though it is difficult to arrive at a consensus regarding the proportion of patients subjected to culture and Drug Sensitivity Testing, (15)

Human Health	Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age	Data will be collected from local self-government bodies, local health authorities or agencies with public nutrition as mandate (like ICDS in India). If no organised data is available, a public survey with 30 randomly selected children can be undertaken. The results can be analysed using WHO Anthro software. If less than 20% of the children are stunted, the area is classified as Low, if 20% to 40% are stunted it is Significant and If more than 40% are stunted, it is High	Low (3) Significant (2) High (1)	Stunting is generally considered as a marker for social inequalities and a reflection of the overall well-being of children. The global health community has started to focus on this issue, as stunting can also lead to long term neurocognitive and physical problems. Stunting has been used by several development programs as an indicator of impact; though can be crude.(16) Conversely, antibiotics can act as a growth stimulant in pre-pubertal children. The effect of antibiotics is felt more in ponderal than linear growth; and the impact is pronounced in African countries.(17) Therefore infections, antibiotic use and child nutrition has a very complex relationship.
Human Health	Average under-5 mortality rate (number of deaths among children under 5 years of age compared to number of live births) in the area for the last 3 years	Data will be collected from local self-government bodies, local health authorities or registration offices. If the under-5 mortality rate is at least 10 per thousand below the national statistic, it is classified as Low. If the rate is +/- 10 per thousand of national statistic, it is classified as Reasonable. If it is at least 10 per thousand higher than the national rate, it is classified as High.	Low (3) Reasonable (2) High (1)	Under Five mortality is influenced by poverty, access to healthcare, educational status of mothers, nutrition, access to safe drinking water and quality of healthcare services.(18) Studies have shown that in low resource settings, child mortality is strongly influenced by access to healthcare and health seeking behavior. Though access to health is multidimensional in nature, it has a protective effect on child mortality and morbidity.(19) This shows that Under Five Mortality Rate (U5MR) is a robust indicator to show the strength of health systems in developing countries.

Human Health	Average Out-Of-Pocket expenditure on healthcare by households in the area	Short survey of at least 30 households, to find out the amount of money spent by them for accessing healthcare services. The survey should collect information on direct expenditure of all individuals in a household with reference to hospitalization episodes and out-patient visits in the last one year. Any reimbursement, if availed, should be adjusted later. This expenditure should be compared against the total household expenditure during the period. If average proportion is less than 5%, it is classified as Low, 5% to 10% is classified as Reasonable. And, more than 10% is classified as High.	Low (3) Reasonable (2) High (1)	Out Of Pocket (OOP) expenditure in healthcare has significant implications on poverty and future access to healthcare. Increase in OOP can result in an increase in poverty headcount and deepening of poverty, especially in the most economically vulnerable regions.(20) Some studies have shown that more than 15% of the households in developing countries incur catastrophic health expenditure, pushing most of them into deep poverty.(21) This shows the need for financial risk protection against OOP and catastrophic health expenditures. Universal Health Coverage is seen as a possible solution to these issues though it involves significant investments from the country governments. The Alma Ata declaration of 1978 called for 'Health for All'; and this message was reinforced by the Millennium Development Goals and Sustainable Development Goals. Universal Health Coverage is now seen as an 'indicator and instrument' of national development.(22)
Human Health	Coverage for paediatric vaccines listed in the immunization schedule published by the competent national authority.	Data will be collected from local self-government institutions or local health authorities. If the age-appropriate coverage of all vaccines listed in the national schedule is above 95%, it is classified as High. If the coverage of all vaccines are above 85%, it is classified as reasonable. If at least one vaccine has a coverage of less than 85%, it is classified as Low.	High (3) Reasonable (2) Low (1)	Vaccines have a role in reducing the use of antibiotics and thereby slowing the emergence of AMR. For example, *Haemophilus influenzae* Type b and *Streptococcus pneumoniae* vaccines have shown efficacy in preventing fatal infections and reducing the use of antibiotics in children.(23) In some High Income Countries, there is evidence that influenza vaccines have managed to reduce influenza-related antibiotic prescriptions.(24) Therefore, a robust vaccination coverage among children may be associated with lower levels of antibiotic use.

Human/Animal/Environmental Health	Educational initiatives in the last one year to increase awareness about antibiotic or biocide use among farmers	The information can be collected from farmers' representatives, local self-government institutions and local agriculture extension workers. If there is a written plan for educational campaign and at least three contact sessions were organised in the last one year, it is classified as Fully Functional. If one or two sessions were organised and/or if a written plan is not prepared, it will be classified as Semi-Functional. No contact sessions and/or no written plan, it is labelled as Not Functional.	Fully Functional(3) Semi-functional(2) Not functional(1)	Educational initiatives directed at various target groups are effective in reducing use of antibiotics. However, some groups have deeply established views and behaviors on antibiotic use. This necessitates constant efforts to reinforce the messages on prudent use of antibiotics.(25) Some studies have shown that inadequate knowledge among farmers result in poor practices related to antibiotic use in farms.(26) Though the literature available in this regard is scarce, there is evidence to show that training of farmers is associated with reduced use of antibiotics in LMICs.(27)
Human/Animal/Environmental Health	Use of Highest Priority Critically Important Antibiotics in agriculture	Short survey of at least 10 farms, using some random sampling methodology. Ask the farmers, inspect the premises or look at labels (including feeds) for Highest Priority Critically Important Antibiotics.If use is found in 50% and above farms, it is labelled as High, 1-49% being Some and 0 being None.	None(3) Some (2) High (1)	The World Health Organization has been publishing a list of antibiotics since 2005 and classifying them into 3 based on their importance to human medicine. The Critically Important medicines in the list has been further sub-classified into Highest Priority and High Priority.(28) Studies done in developing countries have demonstrated high rates of use of polymyxins, 3rd & 4th generation cephalosporins and quinolones, all of which is classified among Highest Priority Critically Important antibiotics for human medicine.(29) This shows the need to assess and document the nature of antibiotic use in farms of a region.

Human/Animal/Environmental Health	Regulatory oversight regarding best farm management practices and biosecurity measures	Short survey of at least 10 farms, using some random sampling methodology. Ask the farmers about visits or inspections from government bodies in the last one year to evaluate farm management practices and biosecurity measures. If 80% or more farms report visits, the classification is High. If up to 80% farmers report visits, classification used is Some. If no farm is reporting visits from government agencies, the area can be classified as None.	High (3) Some (2) None (1)	It has been observed that some form of quality assurance at the farm level through any good farm practice system or routine oversight, results in better animal health, higher animal welfare practices and improved environmental hygiene.(30) Training of farmers on prudent use of antibiotics is now a part of efforts undertaken by several High Income Countries to reduce overall use of antibiotics in the farm sector.(31) Countries like Denmark has achieved low levels of antibiotic use in livestock production because of more efficient farming systems and low incidence of infections. This was done primarily through better cooperation between farmers and the government.(32)
Human/Animal/Environmental Health	Presence of veterinary health facilities in the community	The information can be collected from farmers' representatives, local self-government institutions and local agriculture extension workers. If there is veterinary centre with a qualified veterinarian, it is classified as Fully Functional. If there is services of a veterinary extension worker and no qualified veterinarian, it will be classified as Semi-Functional. Absence of a veterinary centre, veterinarian and extension workers will qualify as Not Functional.	Fully Functional(3) Semi-functional(2) Not functional(1)	Access to veterinary care can be limited by economic, geographic and knowledge based barriers, even in the context of High Income Countries. In developing countries, there are several individual, institutional and systemic problems which complicate the issue of access to veterinary care.(33) Robust access to veterinary professionals is essential to maintain the health of livestock and livelihood of people. But there are serious access issues in low-resource setting, which can affect the productivity of farms. Some of this gap between demand and supply can be bridged by veterinary paraprofessionals and community animal health workers.(34) Several papers have argued for a comprehensive policy for human resource development in veterinary sector in Low Middle Income Countries, with an aim of increasing access.(35)

Human/Animal/Environmental Health	Vaccination coverage for farm animals in the community	Short survey of at least 10 farms, using some random sampling methodology. Ask the farmers about vaccine coverage of farm animals, with reference to recommended vaccines for that particular region. If at least 80% of the farms are fully immunized as per local recommendations, it is classified as High. If there is full vaccination coverage in farms is between 40% and 79%, it is Reasonable. If the coverage is less than 40%, it is low.	High (3) Reasonable (2) Low (1)	Several studies have shown that vaccines are effective in decreasing morbidity among farm animals and reduce the use of antibiotics. But not all animal vaccines are cheap or easy-to-use, making the vaccine coverage sub-optimal in many low-resource settings.(36) While vaccines are not meant to replace antibiotics fully, the wider use of safe and effective vaccines can reduce antibiotic use in farm animals. This is the reason behind several emerging international collaborations for vaccine R&D in agricultural sector.(37) There are several examples of vaccination drastically reducing the use of antibiotics like Atlantic Salmon farming in Norway.(38)
Human/Animal/Environmental Health	Government Subsidies or Incentives for infrastructural improvement in farms for better infection control practices	The information can be collected through triangulation from farmers' representatives, local self-government institutions and local agriculture extension workers. If government subsidies or incentives are available to all farmers, it is classified as Freely Available. If government subsidies are incentives are available only to certain type of farmers, it is classified as Partially available. If no such schemes are available, it is labelled as Not available.	Freely available(3) Partially available(2) Not available(1)	Various economic instruments have been used historically to cover for sustainability costs incurred by farmers, especially with regards to environmental degradation, waster usage and human-wildlife conflicts. Usually the costs involved in such measures are minimal when compared to the larger benefits expected from the initiative.(39) It is a well-known fact that various infrastructural and operational biosecurity measures in farms will reduce the need for antibiotics in farms. But many of them are human resource intensive or require investment.(40) This is difficult in many developing country contexts where farm incomes are stagnating and rural small holder farmers struggle for their livelihood.(41) Therefore, government subsidies in improvement of farm infrastructure may be vital in ensuring proper biosecurity in farms in LMICs.

Human/Animal/Environmental Health	Availability of veterinary laboratory services for disease diagnostics	The information can be collected from farmers' representatives, local self-government institutions and local agriculture extension workers. If there is a system to collect samples from possible infections and send it to the nearest lab, it is classified as Fully Functional. If some samples are sent through ad-hoc mechanisms, it is called Semi-Functional. If no provision is available to send samples, it is labelled as Not Functional	Fully Functional(3) Semi-functional(2) Not functional(1)	Robust laboratory systems for human and animal health is needed for antimicrobial susceptibility testing and surveillance of drug resistance. The susceptibility testing is critical for rationalizing the use of antibiotics. However, these systems are deficient in many developing countries and the biggest gap is seen in the case of animal disease diagnostic facilities.(42) The reports from Veterinary Diagnostic Laboratories are used for taking management decisions. But in several contexts, the laboratories are not quality assured and the reporting is not standardized.(43) In some other regions, particularly in rural contexts, there is very poor diagnostic capacity in the veterinary sector.
Human/Animal/Environmental Health	Incentive system for farmers who make products without routine use of antibiotics	Short survey of at least 10 farms, using some random sampling methodology. The farmers will be asked about any system in place to certify their produce or offer them incentives, if they decided to stop routine use of antibiotics. The certification system can be international, national or local; and need not be linked to any laboratory tests. The incentives for farmers can be financial or non-financial. If more than 80% of the farmers report such a system, it is classified as Functional. If up to 80% farmers are aware of it, it is Semi-Functional. If no farmer is aware, it is classified Not-functional	Fully Functional(3) Semi-functional(2) Not functional(1)	The food safety angle of AMR has been highlighted in several policy documents. This approach can potentially mobilize consumer advocacy groups and consumers; and can possibly translate to an increase in awareness of AMR among general public.(44) There are several certification systems available for food produced without routine use of antibiotics. Several large poultry producers have adopted it and the system provides an independent verification system.(45) But these systems are still not accessible to most small farmers from developing countries. But farmers can earn higher prices for their products made without routine use of antibiotics, only if its linked to a certification system.

Human Health	Presence of schemes to promote local or household-based production of food	The information can be collected from farmers' representatives, local self-government institutions and local agriculture extension workers. If there are any schemes to augment or subsidise backyard or sustenance production of food, with an established procurement system, it is labelled as Yes. If there is such a scheme, but no procurement/distribution system, it is classified as Partial. If no such scheme or procurement system is there, the classification is No.	Yes (3) Partial (2) No (1)	Urban agriculture or backyard farming is supposed to have numerous benefits, including social capital, household food security and better health. Some studies have shown that those households engaged in such practices have a less mean Body Mass Index and overall stress levels, as compared to households which do not practice such farming.(46) There are several initiatives across the world which has successfully promoted backyard/urban farming. Some of them involve children in farming and some others focus on recycling waste for manure. But all of them have contributed positively to environmental sustainability and food security.(47) The Food and Agriculture Organization has supported this approach as it can reduce poverty and improve food security in the most vulnerable households.(48)
Environment	Proportion of wastewater treated using any established wastewater treatment technologies, as per WHO's guidelines on Sanitation & Health (2019)	Data from local self-government institutions and/or through a short survey of 30 households selected using some random sampling methodology.. The objective is to look at the percentage of waste water generated from households which are safely treated. If 100% waste water is treated, it will be classified as All. Any value between 51% to 99% will be classified as Most, and up to 50% will be classified as Some. On-site facilities for treatment are also included in the assessment	All (3) Most (2) Some (3)	Wastewater generated from households, farms and economic activities can be a potential public health threat, if not treated using scientific methods. Many water borne diseases like diarrhea and parasitic infections can affect the health of the community. Studies have also shown an increase in skin and reproductive tract infections in those exposed to untreated waste water.(49) Several aerobic and anaerobic methodologies have been used for treatment of domestic waste water; and most of these technologies have high efficiency in retention of pathogens and recycling of nutrients. But some of these are energy intensive and have obvious cost disadvantages.(50) Therefore, most of the developing countries do not have centralized waste water treatment plants and domestic waste water is used for minor irrigation or as surface run-off, risking the water quality in the area.(51)

Environment	Biomedical waste management system in healthcare facilities	A short audit of the healthcare facilities for the presence of a biomedical waste management plan or system. All healthcare facilities with a medical practitioner or administering injections will be included in the audit. If 100% or more health care facilities have a plan in place, the classification is All. If one or more healthcare facilities (but not all) , classification used is Some. If none of the healthcare facilities have a plan or system, it is classified as None.	All (3) Some (2) None (1)	Biomedical waste management is a public health priority as the waste generated from heath care facilities can contaminate the environment and pose a threat to health of people.(52) But in many developing countries, the level of awareness of Biomedical Waste Management Rules among healthcare workers seems to be low. This reflects in the poor attitude and practices towards waste management in healthcare facilities.(53) In some surveys, it was found that only around 30% of the health care workers seems to think that individuals too have a responsibility in biomedical waste management; and not just government and hospital managements.(54) One of the preliminary steps in improving adherence to waste management rules is to have proper plans in place in healthcare facilities and also training all levels of staff.(55)
Environment	System for disposal of antibiotics and other medicinal waste generated from households	Data from local self-government institutions and/or through a short survey of 30 households selected using some random sampling methodology. If the community has a system to collect left-over or expired antibiotics (and other medicines) at regular intervals and dispose them through incineration, it is classified as Fully Functional. If there is a system of collecting antibiotic or medicinal waste along with general waste, it is labelled as semi-functional. If there is no system to collect antibiotics or medicines	Fully Functional(3) Semi-functional(2) Not functional(1)	Improper disposal of unused, expired or left-over antibiotics is one of the drivers of antimicrobial resistance problem, especially in countries where antibiotics are freely available over-the-counter. Like other drugs, antibiotics are also thrown into garbage or sewers.(56) Regulatory agencies in several High-Income Countries have put in place systems for safe disposal of antibiotics.(57) Though there has been initiatives in developing countries to collect unused or expired antibiotics from the public and dispose it scientifically, these are at very early stages.(58) Having a functional system to collect unused or expired antibiotics from households and retail pharmacies; and provision for it to be disposed without contaminating the environment, is the only way forward.

		from households, it is Not functional		
Environment	Use of chemical/synthetic pesticides, herbicides and other biocides in farms	Short survey of at least 10 farms to ask about use of pesticides, herbicides and other biocides in their farms. If 80% or more farmers have used any one biocide in the last one year, it is classified as High. If between 20% and 80% of farmers report use, it is classified as Significant. If less than 20% of the farms report any use of biocides in the last one year, it is classified as Low.	Low (3) Significant (2) High (1)	There is evidence that use of biocides can also result in cross resistance to antibiotics and there is a need for greater stewardship of biocides.(59) Though in some countries, there has been a marginal reduction in overall pesticide usage after introduction of Genetically Modified crops, this trend is not visible everywhere.(60) There are several other healthcare issues, including cancer, which are associated with pesticide usage in crops. But the average farmer in developing countries tend to be unaware of the long term consequences of chronic pesticide exposure.(61)
Environment	Farm waste contaminating water resources in the community	Short survey of at least 10 farms, using some random sampling methodology. Ask the farmers about methods followed by them to dispose organic waste generated at their farms. If 80% or more farms dispose their waste as per standards laid down by national governments or agencies at least 40 feet away from water bodies, the classification is High. If less than 80% of the farmers dispose their waste at least 40 feet away from water bodies, the classification used is Some. If no farm is reporting scientifically sound disposal at least 40 feet away from water bodies, the area can be classified as None.	High (3) Some (2) None (1)	Waste management is not seen as a priority in many small farms and often the manure end up contaminating the water resources around it. Farms discharge a lot of organic matter, agrochemicals and drug residues into the environment; and unscientific agricultural intensification contributes to water quality degradation. The FAO states that around 38% of the water bodies in Europe are under threat from agricultural pollution.(62) The situation may be much worse in developing countries. Studies have found the presence of multi-drug resistant bacteria in the farm environment and that can easily spread into the water bodies. Manure from farms also contribute significantly to antibiotic resistance as it serves as a medium for dissemination and a contributor to antibiotic selection pressure in the environment.(63)

Human Health/Environment	Proportion of households having access to Individual Household Latrine (IHHL) with water supply, within the premises of their house	Data from local self-government institutions and/or through a short survey of 30 households selected using some random sampling methodology. If 100% households have access to IHHL, it will be classified as All. Any value between 51% to 99% will be classified as Most, and up to 50% will be classified as Some.	All (3) Most (2) Some (3)	In developing countries, it has been demonstrated that lack of access to an improved latrine is significantly associated with incidence of diarrhea and childhood mortality.(64) Diarrhea kills more people than HIV, Tuberculosis and Malaria combined; and more than 2 million deaths per year can be averted if everyone has optimal access to safe latrines and clean drinking water.(65) The access to improved latrines has been increasing consistently across the developing world through various innovative methodologies and incentive schemes, but is still far from 100%.(66)
Social Protection	Proportion of population covered by at least one social insurance or assurance schemes for health protection	Data from local self-government institutions and/or through a short survey of 30 households selected using some random sampling methodology. Social insurance schemes for health protection can be any programme in which the government or the community fully or partially pay for protecting the health of a person. If 100% adults are covered, it will be classified as All. Any value between 51% to 99% will be classified as Most, and up to 50% will be classified as Some.	All (3) Most (2) Some (1)	There are several social and community-based health insurance systems working across the world. Many of them have proven to be quite successful in the context of High-Income Countries. But the quality and coverage is sub-optimal in many developing countries and this results in high Out-Of-Pocket expenditure.(67) Though there is little evidence to show that community-based health insurance systems improve efficiency of healthcare delivery, it has a significant impact on preventing catastrophic health expenditure and can prevent households from falling into poverty.(68)
Social Protection	Proportion of population below the nationally accepted poverty line	Data from local self-government institutions or through a short survey of 30 households selected using some random sampling methodology. If above 90% of households are above poverty line, it	Low (3) Reasonable (2) High (1)	Poverty is significantly associated with ill-health and there is a bidirectional causality in this relationship. Poverty affects a household's capacity to buy healthcare services and also limits the quality of nutrition. Ill-health causes a loss of productivity and is a drain on household resources, driving them into

		will be classified as Low. Any value between 51% to 90% will be classified as Reasonable, and up to 50% will be classified as High.		poverty.(69) Studies have also demonstrated that AMR is closely linked to the overall development process and with poverty. There is an inverse relationship between Gross National Income per-capita and rates of Methicillin Resistant *Staphylococcus aureus* or 3rd Generation Cephalosporin Resistant *Escherichia coli* infections.(70)
Social Protection	Proportion of children between ages 5 and 14 receiving nutritional support from government.	Data from local self-government institutions or government offices administering social security programs. If such data is not available, a short survey of 50 randomly selected households can be done for the study. If more than 90% of the children receive some form of nutritional support, either through mid-day meals or rations, it is classified as High. If between 50% and 90% of children receive the same, it is classified as Reasonable. If less than 50% of the children receive nutritional support, it is classified as Low.	High (3) Reasonable (2) Low (1)	There is strong evidence to show that community based nutritional programs directed at children results in healthier young people 'who can thrive'. Investing in these programs can reduce the proportion of underweight children in the community and reduce the overall morbidity. Often, the most effective nutritional interventions are a part of a larger spectrum and is multi-faceted in character.(71) Besides, better nourished children are healthier and are less likely to suffer from infectious diseases. Therefore the requirement of antibiotic use will come down significantly.(72) In developing countries, nutritional support schemes have successfully reduced the prevalence of wasting, nutritional anemia and nutritional blindness in children, but the coverage is often patchy.(73)

Human Health	Female Literacy Rate	Data from local self-government institutions or government offices managing census data. If such data is not available, a short survey of 50 randomly selected households can be done for the study. If more than 90% of the females aged 15 years or above can read and write any language, it is classified as High. If between 70% and 90% of females can read and write, it is classified as Reasonable. If less than 70% of the females can read and write any language, it is classified as Low.	High (3) Reasonable (2) Low (1)	In many developing countries, it has been observed that female literacy rate is a strong predictor for several health outcomes like Infant Mortality and Crude Birth Rate.(74) Even when we look at patients and not populations, those with low literacy are 1.5 to 3 times more likely to suffer from adverse health outcomes. This shows that overall literacy will significantly improve the health of populations and result in better health outcomes in patients accessing healthcare.(75) The rapid improvement of health outcomes and life-expectancy in countries like Sri Lanka is partly attributed to the benefits of increased literacy rates, especially in the female population.(76)
Human Health	Access to Health	Standardised 10 point questionnaire administered to 100 residents using a random sampling methodology. The questionnaire will have 3 domains- to measure access parameters, power difference between providers & patients and trust in the care provided. Average Scores above 66.6% will be classified as high awareness, 33.4% to 66.6% as reasonable awareness and up to 33.3% as low awareness	High (3) Reasonable (2) Low (1)	Universal access to effective antibiotics is an integral aspect of any public health measure to contain the AMR threat. This arises from the knowledge that more people die of lack of access to antibiotics than as a result of AMR.(77) Lack of access also gives rise to higher level of treatment failures, which reduces the overall trust in the formal healthcare system.(78) In many developing countries, this loss of trust can drive people to informal healthcare providers, who are more likely to prescribe antibiotics irrationally. There are studies to show that more broad spectrum antibiotics are prescribed by informal care providers; and patient's preference for them is influenced by various access issues.(79)

Human Health	Availability of laboratory services in HCFs within the community	A short survey of at least 10 HCFs will be done, to find out the presence of laboratory facilities. If the total number of HCFs is less than 10, exhaustive sampling will be undertaken. If at least 50% of the HCFs have in-house functional laboratories and there is provision of sending culture/sensitivity in any one HCF, it is classified as Good. If either of the above criteria is satisfied, it is classified as Reasonable. If both the criteria are not satisfied, it is classified as Inadequate.	Good (3) Reasonable (2) Inadequate (1)	Laboratory systems are an integral aspect of antimicrobial resistance containment efforts. It helps in judicious use of antibiotics and in surveillance efforts. It also provides critical support to infection prevention and control programs.(80) Lack of diagnostic capacity can increase prescription of broad spectrum antibiotics and most of the patients will be subjected to empiric therapy. There are studies showing that antibiotics are prescribed to minor infections of viral origin, in the absence of robust laboratory capacity in low resource settings. (81)
Human/Animal/Environmental Health	Hygiene facilities in primary and secondary schools in the community	A short survey of at least 10 primary and secondary schools will be undertaken, looking for presence of gender-specific latrines with running water supply and handwashing facilities with soap. Exhaustive sampling will be done if the total number of primary and secondary schools is less than 10. If all the schools have gender specific latrines with running water supply and handwashing facilities with soap, it is classified as Good. If all the schools satisfy one of the above criteria, it is Reasonable. If all schools do not have gender specific latrines with running water or if any school lacks handwashing facilities with soap, it is classified as Inadequate.	Good (3) Reasonable (2) Inadequate (1)	Water Sanitation and Hygiene (WASH) in schools presents a big challenge and is acknowledged in the SDG indicators. Besides being a foundation for establishing a healthy learning environment, it also contributes to a positive towards hygiene and infection prevention in adulthood. It also reduces the likelihood of infections acquired in school environment and is essential for Menstrual Hygiene Management (MHM) (82) Optimal access to high quality handwashing facilities is a determinant for infectious diseases in schools and the quality of facilities available can affect its usage. There are issues with quality of handwashing facilities in schools even in the context of High-Income Countries.(83)

Process of evaluation of each indicator

- The indicator framework will be forwarded to a list of selected reviewers, with detailed instructions.
- Appropriateness of the indicator in the overall context of AMR (Scores between 1 to 5)
  Feasibility of measurement in LMIC contexts (Scores between 1 to 5)
  Validity of the indicator in measuring changes in the community setting (Scores between 1 to 5)
- The reviewer has to justify the scores and give specific reasons.
- The reviewer can also suggest modifications to the indicators

Link for the notes from second call :

https://drive.google.com/file/d/1IZG1CReLXVjXUrBXfYQmT05aiUKXD3Nh/view?usp=sharing

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