**March 20, 2024 LQAS Webinar Questions and Answers**

**Q1: Are supervision areas similar to low coverage areas?**

**A:** Supervision areas are defined by how the services are delivered. They are the parts of the health system that deliver services and are the entities that LQAS classifies as reaching or not reaching a target. If I have a vaccination squad in an area, that's the production unit. For example, in Nigeria, where we worked, an LGA had several ward level teams covering the villages with vaccinations. The wards were the supervision areas in that case. So, supervision areas have high areas of coverage or adequate areas of coverage, and lower areas of coverage. Therefore, a group of supervision areas can include some that inadequately covered the population as well as the adequate ones, depending on whether their results reached the decision rule or not.

**Q2: It seems there's a third classification above 80%, below 50%, and in between. If so, what's the interpretation of the third classification category in terms of, for instance, recommendation to programs?**

**A:** LQAS classifies in a binary manner. A supervision area is classified as either reaching or not reaching a predetermined target. If you use the calculator (bit.ly/LQAS\_Sample\_Size\_Calculator), you'll see this is all laid out very nicely in an Operating Characteristics Curve (OCC) that defines the gray area which I think you are referring to. What it shows for Supervision Areas (SA) with any level of coverage, the probability of being classified as acceptable. Those SA that are near to but not at either end of the distribution will have a higher likelihood of being classified as either on the acceptable or the unacceptable side depending on the side of the OCC they are close to. Typically, if true coverage is in the middle of the OCC the side they are classified as a flip of the coin.

Let’s take the example of the real coverage in an SA being near to 80%, but not reaching 80%. It is likely that it will be classified as having reached the 80% target. If it is higher than 50%, but near to 50%, then the likelihood is, it will be rejected and classified on the 50% side. LQAS identifies SA which are among the best of the best and the worst of the worst. Those that have low coverage, but not among the worst, the worst, will most likely be classified among the worst. They do have low coverage, and therefore, they are identified as priorities areas for improvement, and an investment is made to improve the coverage. The point is it is very likely you're not investing into those that have high coverage. As conditions improve and the coverage target increases, those you have missed will eventually be prioritized for improvement. But to answer your question directly: you don't know which SA are in the gray area using the classic form of LQAS.

**Q3: If aggregating results from supervision areas to determine prevalence of a district/region, and you can't assess all the supervision areas in a discrete time period (e.g. a month or quarter) what are implications for interpretation if the data are collected as a rolling sample over a longer period (e.g. one year)?**

**A:** That's a really good question. That's one reason why Large Country LQAS (LC-LQAS) was developed. As an example, take Kano state in Nigeria which has 44 LGAs. We had 7 States to work in, including Kano, all of which had several LGAs. To train and manage teams in every LGA would have been very expensive and incredibly challenging. The question we asked was: is it necessary to organize an LQAS in all LGAs assuming that we also wanted to measure state prevalence in addition to classifying LGAs? Large Country LQAS (LC-LQAS) allows us to answer the question of what is the minimal number of LGAs we need to sample in order to get an accurate prevalence measure of the state as well as to assess a respresentative number of LGA (SA) according to a performance target.

Then, we sample in those LGAs or supervision areas only. In the next round of LC-LQAS, we take another random sample, but without replacement to capture other remaining supervision areas. By doing this over a period of time, however that is defined (e.g., one year or 6 months), you would be able to then have a continually populated map showing the classifications of all the SAs and the corresponding estimate of coverage at the state level. In each round of LC-LQAS, the state teams are able to analyze feedback and use it for decision making so that action can take place. The number of LGAs that are sampled depends on how heterogeneous a given state is. We use the error terms, from the most recent DHS to drive the LC-LQAS calculations. Kano was quite homogeneous and we needed to sample only 12 of the 44 LGAs, but in Gombe, which had much more heterogeneity a larger number of LGAs is sampled. (See <https://bit.ly/LC-LQAS-Sample-Size-Calculator>)

There are also other strategies for reducing the workload and to create a rolling sample such as focusing on half of the catchment area in one round and then another half in another round.

**Q4: Please explain decision rule.**

**A:** A decision rule is a statistically determined cut off point. So, if I take a sample of 19 kids and assume my target is 80% DPT3 vaccination coverage, I know that the LQAS decision rule is 13; once I reach the 13th child in my sample that has the trait of interest, I can classify the area as having reached the target. That simply means that, as I am analyzing the data, as I did in the Eritrea slide in my presentation, I can identify rapidly those areas that have not reached the decision rule to classify them as unacceptable and focus on them for improvement. It's a statistically determined cutoff that is determined using the cumulative probabilities of binomials. Normally, even though you have a cut off value, you collect all the data so you can have a precise prevalence measure. Also, because you're measuring more indicators that DPT3 coverage, maybe 40 indicators, some will have succeeded and others not. Not all will use the same coverage target and therefore, they will have different decision rules. Therefore, we normally collect all the data.

**Q5: Regarding aggregation for provincial or national coverage, should the data be weighted and how? What all processes (weighting/others) are involved in combining the lots for a representative coverage estimate of the larger area?**

**A:** Normally, we weight by the population size of the SAs. Given that we'd used probability proportional to size to identify the sampling locations, we have those weights which go into the calculation in the normal manner. While the crude coverage can be used in a field setting, for anything formal, such as national reporting to donors, we encourage weighting the results. You could see in the slides for Eritrea the difference between the crude and the weighted results was about one percentage point. The crude prevalence measure will probably provide sufficient information to make a local program decision.

**Q6: This question is on LQAS in a health facility, where the facility (or a group of facilities) would be the Supervision Area. Could you consider either consecutive patients or some other sample based off a client list to be an adequate estimation of an SRS to be used for LQAS?**

**A:** That is an HFA question as well as a community LQAS question at the same time.

There are 2 circumstances to consider. The first involves a waiting room that is already crowded with children in the age range of interest and with the presenting condition of interest, whilst in the second is there are few children present. In the first situation we ask mothers with the inclusion criteria to identify themselves and their child. We then sample SRS. In the second situation, we sample consecutive patients as they come into the sick child clinic and who satisfy the inclusion criteria. We assume there is no pattern in the timing of their arrival and therefore we suggest that this approach is a randomizing method. When you say you have a client list, I presume you mean that the clients are present at the time of sampling so that their care can be assessed, or they can be interviewed. Such information is comparable to a community survey. It is similar to client exit interviews used to assess their retention of information and the quality of the consultation they have just had.

I would hesitate to use a client list to sample in the community. It will only include individuals on the list who attended the health facility. If I did that in South Sudan, I would underrepresent the population considerably. If I use a list within the village based on what the village chief reports, it needs to be reviewed very skeptically because there are reasons why people are put on lists or excluded from lists. I found that segmentation sampling is so easy to use in the field. You get a good layout of the community by so doing and involving the leaders in making that rough map which takes about 40 min. It is worth taking the time for. I'm just very skeptical of using lists of almost any kind except in exceptional circumstances such as sampling among the military.

**Q7: Some people change the target after the data for the 19. The sample is collected and try to judge which level of target the observed sample is close to. What do you say about that?**

**A:** Let us assume that you already set a target but before the data are analyzed, you decide to change the target. Yes of course that is fine. But now let us assume that if I classified my supervision areas and find that they all fail, I may have set the target too high for any of them to be accepted. As I haven’t detected any variation among the supervision areas, I don't know which SAs are my priorities. I want to change the target by gradually reducing it to see if I can get more variation that way. I must say that even though you should only use data once for doing any type of statistical test in terms of practical LQAS, it's very difficult to set targets. You can take the average coverage among all the SAs, and then use LQAS to identify those which are below average. This is a useful approach. LQAS is intended to be practical and used for management; identifying the priority areas is indeed essential for program management.

**Q8: How do you identify the 19? Is it a set of conveniently located 19 households? Is it random? What sort of sampling method is involved?**

**A:** Randomization is critical. And one needs to train the team on how to collect a random sample. The randomizing technique we use typically is segmentation sampling. The idea is that you make a hand drawn map with the help of leaders within the community using landmarks initially: road, footpath schools, mosque, church, football pitch, graveyard, big stone, prominent tree, for example. The leaders then estimate the approximate number of houses or compounds in the areas depicted on the map. Sometimes, if the culture you’re supporting is not numerate, as was in the case of Northern Uganda, the data collectors ask the leaders to place a number for each house. The number of stones represent the density of the houses in each area of the community. That method works very well. You then divide the community into segments of approximately equal sizes and then you enumerate them. Next, you select one of the segments randomly using a random number table which data collectors are trained to use. It's quite easy to use in a field setting. If the selected segment has less than 30 or less than 20 houses then you enumerate the houses and select one randomly. Otherwise, you can further segment the selected segment and select one randomly. I like segments that have 15 or fewer houses. At the next step, you go to the selected house, which we refer to as the reference house. You don't start your interviews there. Because there's a chance that houses were missed and not represented on the map, we recommend going to the next nearest house. Therefore, houses that had 0 probability of selection have a chance of being included in the sample. That house is where we start the data collection.

Segmentation sampling works like a charm, especially when you have houses and slums that are built on top of each other or unusual terrain or if you're working with apartments as we did in Armenia.

**Q9: Can you use LQAS to conduct patient chart reviews at health facilities?**

**A:** The client exit interview is very, very useful for having mothers respond to their assessment of the quality of care. You ask them, did they get the medication? Did they know how to use it? And they tell you how to use it. Here you are asking about using information on a medical chart. We have used them in Costa Rica where we took a sample of them and compared the service delivery results with a community survey. The records were reasonably representative of the community. However, Costa Rica had very high coverage and people readily accessed health posts. Most countries are not like this. However, when we looked deeper into the results, when we checked the medical records of the individuals who said they had low coverage (had not received a service), they actually had received the service. Similarly, many of them who said that they had received a service had no such service received in their medical record. These errors were off setting when calculating overall coverage.

Medical records can be very, very difficult to read. You can have multiple people reading the same records, who come up with different interpretations of the same record. But it would depend on what you are going to use the record for? Is it for a diagnosis? Is it for prescribing a medication? What is the purpose? If I am assessing the quality of services, I'm a fan of direct observation even though people know that they're being observed. I have the Hawthorne effect working in my favor here. If the service delivery is the best they can do, and I find problematic behavior, it's going worse when I'm not there watching.

**Q10: is LQAS appropriate for DHS or mortality survey in conflict areas, meaning it's not to supervise intervention coverage? Could it be used for aggregate national level measures?**

**A:** I can't speak for DHS which is the gold standard that has the benefit of having a methodology that is comparable across time and across locations. Could LQAS be used for aggregating national level measures? Yes, in short. We have done this several times in South Sudan and Eritrea for example. Should it replace DHS, that's someone else's decision. But is it accurate? We did a comparison in Southwest Uganda with the Harvard Bio Statistics department comparing LQAS results with DHS results because we had every district in the Southwest Uganda sampling domain covered with LQAS at approximately the same time. The results compared very well. There are 2 indicators that did not work well, and one was because the questions being asked were different than in the two instruments, but otherwise they track very well together. That paper is available[1]. We have other papers that show that local data collectors collect data that has equal quality to disinterested data collectors. We've done that twice, again with USAID support in in Uganda. Those are published and available, too [2, 3].

**Q11: Regarding the decision rule, if we take a practical example of measles vaccination and if out of 19 kids, you have 13 who have not been vaccinated, then that is a low coverage area. Is that right?**

**A:** If you have not reached 13, if 80% is the target then the SA is classified as not reaching the target. So yes, that's the way the decision rule would work.

Other useful papers: [4] [5][6-8] [9]

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