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General, Target, and Accessible Population: Demystifying the Concepts for Effective Sampling

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Abstract

In this paper the concepts of general, target and accessible population are explained in response to misconceptions and controversies associated with them, and the fact that the relationships between them have not been explained in the context of qualitative enquiry in any formal study. These concepts are discussed in this study based on a general scenario. We basically attempt to explain the importance of specifying the general, target and accessible populations in a qualitative study when the study population is large. The study depicts how the research goal, contexts and assumptions can dictate the content and concentration of the target and accessible population in qualitative inquiry. It also poses the sampling implications of our explanations and highlights the stages and levels of what we refer to as population refinement.

Keywords

General Population, Target Population, Accessible Population, Sampling, Population Refinement

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In this paper the concepts of general, target and accessible population are explained in response to misconceptions and controversies associated with them, and the fact that the relationships between them have not been explained in the context of qualitative enquiry in any formal study. These concepts are discussed in this study based on a general scenario. We basically attempt to explain the importance of specifying the general, target and accessible populations in a qualitative study when the study population is large. The study depicts how the research goal, contexts and assumptions can dictate the content and concentration of the target and accessible population in qualitative inquiry. It also poses the sampling implications of our explanations and highlights the stages and levels of what we refer to as population refinement. Keywords: General Population, Target Population, Accessible Population, Sampling, Population Refinement

In researchers' quest to contribute to academic debate and knowledge, they gather data or information from participants. These participants belong to the research population, which is the group of individuals having one or more characteristics of interest. It is therefore understandable why research findings are attributed to the population either by linking them to specific or all participants. Yet as the source of evidence reached in a research study, a population may be more important than can be imagined.

Credibility is of essence to every research study. Of course, if a study is not credible, the futility of efforts expended by the researcher, donor(s) and other stakeholders in executing it is evident. Additionally, data integrity drives the credibility of findings. As the primary source of data therefore, the population can influence research credibility on the basis of the researcher's understanding, definition and choice of it. Many researchers (Banerjee & Chaudhury, 2010; Lunsford & Lunsford, 1995) have admitted that sampling bias characterizes a good number of studies, including peer-reviewed journal articles; and is influenced by researchers' misunderstanding of the concepts of general, target and accessible population.

Apart from the need for researchers to sufficiently understand their study population, they are expected to succinctly and clearly define it at the stage of documenting the research. A proper definition or specification of the population is critical because it guides others in appraising the credibility of the sample, sampling technique(s) and outcomes of the research. Evidently, understanding the research population and knowing how to document it objectively and clearly are independent and weighty responsibilities of the researcher. Banerjee and Chaudhury (2010) and Pernecky (2016) are some of the researchers who lamented at the pre-eminence of flaws associated with population specification in the literature.

After a thorough perusal of various peer-reviewed journal articles and informal studies, we agree with Banerjee, Chaudhury, Singh, Banerjee, Mahato and Haldar (2007), Baškarada (2014), and Denzin and Lincoln (2011) that the difference between two types of population, namely target and accessible population, confuses many researchers and accounts for issues

relating to poor population specification and sampling bias. Possibly, the differences are even more subtle and difficult to tell if “general population” is brought into the loop. It may be herculean indeed for researchers to appropriately define their population when the concepts of general, target and accessible population are not well understood by them; especially in view of the fact that knowledge of one or more of these concepts would form the basis for effective population definition.

Başkarada (2014) has observed that the qualitative research paradigm has increasingly served as a unique option for knowledge sharing and academic debate over the years. Moreover, the volume of peer-reviewed journal qualitative studies has increased significantly in the last three decades (Pernecky, 2016). As research instructors and supervisors, we have observed in the last decade a remarkable increase in the number of students conducting pure qualitative studies. We have consequently developed fondness for qualitative enquiry and are concerned about the small body of studies defining key methodological concepts in a qualitative research context. We have also observed many students struggle to specify their study population and sampling procedure in qualitative studies. So while recognition for the qualitative research paradigm in the academic domain is on the ascendency, we are of the view that studies focused on explaining some methodological concepts, particularly population and sampling, in a qualitative context are urgently needed. As proponents of qualitative inquiry, we wish to share in the responsibility of improving knowledge of methodological concepts, specifically population, sampling and the connection between them. We are also poised to contribute to addressing the necessity for key concepts to be aligned with qualitative enquiry, especially those common to both quantitative and qualitative approaches and may consequently be misapplied in qualitative studies.

Population specification is a requirement in the documentation of both qualitative and quantitative studies. Moreover, the concepts of general, target and accessible population often apply to both designs. However, population specification is not guided by the same principles in qualitative and quantitative studies (Creswell, 2003; Denzin & Lincoln, 2011). For instance, qualitative studies focus on relatively few participants who have the ability to describe their experiences and/or knowledge with respect to some research questions or phenomenon (Başkarada, 2014; Creswell, 2003). In addition, the description of experiences in ample depth by participants form the basis of addressing qualitative research goals. Quantitative studies, on the other hand, demand the participation of a sufficiently large number of individuals who are basically not required to extensively describe experiences and phenomena in the study (Creswell, 2003; Williams, 2007). Qualitative and quantitative designs would therefore apply different protocols and criteria in selecting population members. This being the case, the concepts of general, target and accessible population would not be the same for qualitative and quantitative studies. There is no doubt that some studies (Banerjee & Chaudhury, 2010; Mahoney & Goertz, 2006) have discussed these concepts in both qualitative and quantitative contexts; but little emphasis has been placed on qualitative study, particularly those associated with large study populations. This situation is deemed a major problem given the increasing recognition for qualitative research approaches in academia.

Additionally, the qualitative design differs from its quantitative counterpart in terms of the sample size required (Allwood, 2012; Creswell, 2003; Williams, 2007). This difference is rational on the basis of the absolutely unique goals pursued by qualitative and quantitative researchers. Unfortunately, one of the proceedings that remain inconclusive among academics is the delineation of sampling in the context of qualitative inquiry with respect to the concepts of the general, target and accessible population. Of course, if these types of population are often not the same for the two main research designs, it is logical to say sampling in qualitative and quantitative studies accompany different goals and principles. Drawing from some studies (Başkarada, 2014; Ralph, Birks, & Chapman, 2014), academic debate has not linked the three

types of population to sampling in qualitative research. As a result, many qualitative researchers conduct sampling based on quantitative principles (Baškarada, 2014; Williams, 2007).

It is impressive that efforts have been made by some researchers (Banerjee & Chaudhury, 2010; Bartlett, Kotrlik, & Higgins, 2001; Creswell, 2003) to explain the three types of population in relation to sampling. Nonetheless, their efforts lack focus on qualitative study, resulting in an insignificant remedy of the problem. In addition, an insignificant number of studies have explained target and accessible population in relation to the general population in the context of qualitative enquiry. So, it is still not clear how to distinguish general population from target and accessible population in the context of a qualitative study. Secondly, previous studies are deficient of practical illustrations that can facilitate readers' understanding of these concepts and their nexus with sampling. We are of the view that using illustrations would make the concepts and their connection with sampling more understandable, particularly when linked to a context that sufficiently focuses on qualitative study.

More importantly, a qualitative researcher may face the need to draw a relatively small sample from a large study population entirely made up of fairly eligible members. Assuming that all members of such a population are willing to provide access to information at their convenience in harmony with the schedule and interest of the researcher, it may become necessary for the researcher to think of drawing "the most appropriate" sample from this population to maximize the credibility of study results. "The most appropriate" sample in this paper represents individuals with the ability and opportunity to provide the most accurate information or data. It stands for the most eligible and convenient sample or participant group. Since clustering can make it difficult for the researcher to readily identify members of "the most appropriate" sample for a large study population, it would be helpful to apply a more systematic and organized approach in selecting study participants. We argue in this study that the hierarchical specification of the general, target and accessible populations is an effective way of making a relatively large study population handy for qualitative sampling. Given this viewpoint, qualitative researchers must be able to specify these three types of population, not for drawing samples for the purpose of generalizing study results, but for screening large populations for the best and most convenient group of participants.

Qualitative researchers must be concerned about drawing study participants from large populations because it has time, cost and data quality implications. In addition, if the above-mentioned systematic approach is not applied in selecting study participants from a large population, data collection in a qualitative study could delay unnecessarily, and the researcher may suffer an oversight of individuals who can provide superior quality information under more convenient conditions. As a consequence, the researcher may incur avoidable costs. We are also of the view that specifying the general, target and accessible populations in a qualitative study would enable the researcher to become adequately familiar with characteristics of the study population, making it possible to avoid bias choices of participants. Similarly, the tradition of using few most qualified and convenient participants in qualitative enquiry could be made more scientific and less subjective.

In view of the above concerns, academic debate should be able to proffer the concepts of the general, target and accessible population as a basis of providing insights into the foregoing systematic approach for selecting participants from large populations in qualitative enquiry. Studies are also expected to focus on explaining these methodological concepts for deployment in qualitative enquiry. In this paper therefore, the authors attempt to contribute to a remedy of this issue using a special scenario. This paper is directed at both readers and researchers.

The Scenario

To reiterate, propositions in this study may be better understood when made based on a suitable scenario, which represents a potential real-life situation that best describes and communicates the essence of the theoretical framework discussed in this study. In addition, every study is associated with a context or group of contexts; hence concepts in this study will be more comprehensive if presented in the light of a uniquely chosen context. It is worth indicating that the scenario chosen in this study are specially deployed to expound our subject matter. The scenario embodies the variable to be assessed, the research goal/objective, and context/assumptions.

The Variable to Be Assessed. An interesting concept that has caught the attention of many academics is Emotional Intelligence (EI). According to Goleman's (1995) theory, EI predicts several performance indicators such as leadership behavior, job satisfaction and performance. The large body of empirical studies confirming this theory has encouraged many researchers (Freshman & Rubino, 2002; Nwankwo, Obi, Sydney-Agbor, Agu, & Aboh, 2013) to admit that EI is a skill needed in the healthcare profession. Emotional intelligence is nevertheless a relatively new concept in the literature, and its research is yet to develop roots in many jurisdictions (Nwankwo et al., 2013). There is also a paucity of qualitative studies dedicated to assessing individuals' emotional intelligence (Farooq & ur Rehman, 2011).

Research Goal/Objective. To assess experiences towards deeply understanding what constitutes the emotional intelligence of health workers. The study seeks an answer to this question: *to what extent are health workers emotionally intelligent in the five hospitals?*

Context/Assumptions. The assumed study area is made up of healthcare institutions in Jackson, Mississippi, United States. The study also assumes that Jackson has a total of five healthcare institutions. Goleman's (1995) theoretical argument that every human is born with some level of EI is pivotal to our assumed research goal, which has much to do with in-depth assessment of EI in terms of the five theoretical dimensions developed by Goleman (1995). An interview is chosen as the appropriate data collection instrument. This study also assumes the application of a qualitative research approach to better orient discussions for qualitative enquiry. Daily communication with customers (i.e., patients) and other stakeholders (e.g., relatives of patients, co-workers) who directly engage with patients has been the basic way the relevance of EI to healthcare delivery has been explained in the literature (Freshman & Rubino, 2002; Nwankwo et al., 2013). Any assessment of emotional intelligence in a healthcare setting must therefore focus on individuals who engage in daily communication with patients, relatives and other co-workers. Our scenario also assumes that the study is an academic work expected to be submitted in six months. The study is also focused on the five hospitals in Jackson as a result of financial constraints. This notwithstanding, the study area is considered large and consequently contains a large number of potential participants.

With the above scenario (i.e., research objective) and context well identified, a study's population can be acceptably specified and linked to sampling. Invariably the context and scenario provide a basis for population specification and enable the researcher to clearly identify his general, target and accessible populations and the appropriate sampling procedure and sample. Having disclosed the scenario and context used to delineate our concept, the general population is defined in the next section.

The General Population

General population is probably what is universally known and specified by researchers, though it makes little sense without being specified alongside target and accessible population. It is the largest group of potential participants of a qualitative study, which Banerjee and

Chaudhury (2010) defined as “... an entire group about which some information is required to be ascertained” (¶ 5). Participants in the general population must share at least a single attribute of interest (Bartlett et al., 2001; Creswell, 2003). It is this attribute that makes participants eligible as population members. With this definition in view, what might be the study or general population of our scenario?

With reference to our scenario, the general population constitutes ‘health workers’ in all healthcare institutions in Jackson. People in this population share at least one basic characteristic, which is the fact that they are health workers. Education, tenure and gender can be other attributes shared by population members, but being a health worker in a healthcare institution in Jackson is the most primary common characteristic of interest, considering our research goal. Qualitative researchers can therefore identify and specify their general population by identifying the most primary characteristic implied by the research topic and goal. Figure 1 depicts the general population as an embodiment of the target and accessible populations.

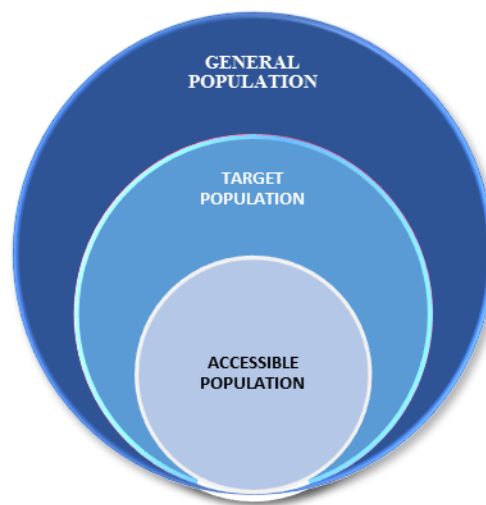


Figure 1. A Conceptualization of the Relationship between General, Target and Accessible Populations

It is also worth considering why the general population is limited to health workers in healthcare institutions in Jackson, or why the population is not health workers in institutions in the whole of Mississippi. To understand the reason, one may have to recall the research context and assumptions. The main constraint associated with our scenario is lack of adequate funding. The study is also being carried out as an academic study whose report must be submitted in six months. These constraints may have given rise to the need to limit the general population to Jackson, considering the fact that available resources would not have sufficed a larger general population.

Apart from research constraints, the purpose of the study may also determine the need to limit the general population to Jackson. For example, the government of Mississippi may want to apply findings of the study in healthcare policy development and implementation, exclusively in Jackson. In this situation, there is no need to extend the general population to other towns of Mississippi State – in fact doing so can yield findings not necessarily applicable to policy development and implementation in Jackson. From this point of view, there is no alternative to focusing on Jackson, not even when resources are in excess, except when the research goal requires comparing Jackson to one or more other towns in the State.

As illustrated in Figure 1, the general population is the largest vis-à-vis the target and accessible population. It contains the largest number of participants who share some basic attributes of interest and therefore constitutes the target and accessible population. With respect to our scenario, it is simply all health workers in Jackson's healthcare institutions, regardless of their demographic attributes and conditions such as being ill or absent at work. Apart from the factors already mentioned (e.g., funding, time and level of applying findings), the research technique being employed can influence determination and specification of the general population.

Target Versus Accessible Population in Qualitative Enquiry

The general population is characteristically crude in the sense that it often contains participants whose inclusion in the study would violate the research goal, assumptions, and/or context. With respect to our scenario, members of the general population are health workers in all healthcare institutions in Jackson. Thus, every employee in these institutions who directly or indirectly contributes to healthcare delivery is a health worker and is therefore a member of the general population. By virtue of one of our research contexts, however, not every health worker can participate in the study. This context has to do with the need for EI to be measured as a cognitive skill deployed by health workers when interacting with patients, co-workers, bosses and other stakeholders – this is the only perspective from which EI can be assessed. In other words, EI must be sufficiently used by health workers in facilitating the development of positive interpersonal relationship with patients and colleagues on daily basis to set the basis for its assessment.

It is nevertheless unfortunate that not all health workers have the opportunity of interacting with patients and other stakeholders in the healthcare institutions. Cleaners, security personnel, and some administrative workers (e.g., clerks who hardly communicate with patients and other workers) are examples. Though they are health workers, their inclusion in the study population violates one of our main research contexts and assumptions, and may badly affect the research outcome. We therefore need to refine the general population by eliminating individual employees belonging to such categories.

Refinement of the general population is necessary in many instances like ours, and it would be executed by taking all individuals (i.e., from the general population) whose involvement in the study violates the research goal, assumption or context. The part of the general population left after its refinement is termed *target population*, which is defined as the group of individuals or participants with the specific attributes of interest and relevance (Bartlett et al., 2001; Creswell, 2003). The target population is more refined as compared to the general population on the basis of containing no attribute that controverts a research assumption, context or goal.

For a large study population, applying a set of criteria to select participants without specifying the target and accessible populations may result in oversight of the most eligible and convenient participant group and may not allow the qualitative researcher to reach “the most appropriate” sample. It is therefore advisable for the researcher to think of what should be the selection criteria for determining each of the target and accessible populations after specifying the general population. As indicated earlier therefore, the specification of the target and accessible populations is necessary if the study population is large.

Qualitative researchers can draw their samples from the target population using general qualitative sampling methods depending on its size and complexity, and whether or not every member in it is willing to participate in the study. It is incumbent on the researcher to identify any individuals who are unwilling to participate in the study or will not be available at the time of data collection. If the researcher finds out that the target population is small enough to select

participants from and all its members are both willing and available to participate in the study, there is no need specifying the accessible population. The *accessible population* is reached after taking out all individuals of the target population who will or may not participate or who cannot be accessed at the study period (Bartlett et al., 2001). It is the final group of participants from which data is collected by surveying either all its members or a sample drawn from it. It represents the sampling frame (Bartlett et al., 2001), if the intention is to draw a sample from it.

With respect to the given context, the interest of the researcher is to understand what constitutes the emotional intelligence of health workers in the five hospitals in Jackson. By virtue of the research goal, any individual who is not a health worker would not be part of the study. Ideally, the general population is all health workers in the five hospitals. The researcher therefore has the responsibility of deciding who a health worker is, and whatever decision is made must be consistent with his research goal, context and assumption(s).

In view of this study's context, the researcher may decide to define "health workers" as individuals directly providing health services to patients. This definition suggests that cleaners, messengers and other administrative staff who do not engage directly with patients are not part of the general population. Including these staff in the general population violates the research context, which requires focusing on workers who deploy their EI in addressing patients, relatives, and co-workers. In essence, the primary way to determine the general population in a qualitative enquiry is to define the social group implied by the research goal/objective and context. Invariably, definition of the participant group should be aligned with the goal/objective, context(s) and assumption(s) of the study.

In a qualitative inquiry, determination of the target population would take into account the fact that the researcher focuses on participants who can best share experiences and thoughts to address the qualitative research goal. To determine the target population therefore, the researcher ought to identify and eliminate individuals of the general population who may not have the ability to share experiences and thoughts in ample clarity and depth. It is therefore at the stage of specifying the target population that the researcher considers factors such as ability to recall and relate to real-life experiences as well as the capacity to logically reason and communicate thoughts in an appropriate language. As a result, education and experience in the appropriate field (i.e., healthcare) would have to be considered in selecting members of the target population.

The ability of participants to provide information is of higher importance in qualitative studies as compared to quantitative studies. For instance, some quantitative studies (e.g., pure experiments) only require participants to receive some treatments. Cross-sectional quantitative designs also only require participants to check each item of certain measurement scales and thus do not demand much of their writing and speaking abilities. Qualitative studies, on the other hand, require their participants to deeply reason and speak/write extensively. So, attributes relating to education, experience and communication skills more strongly influence the determination of the target population in qualitative enquiry.

With respect to the population refinement process discussed later in this study, the target population is determined by using selection criteria that uncover the most eligible potential participants. These criteria should be developed to prioritize individuals who are not only health workers but have other attributes that make them potentially the best sources of information, taking into consideration the quality, depth and quality of information needed to address the qualitative research goal. Educational level, job tenure, languages fluently spoken, and communication skills are some of the factors that might influence the development of the appropriate selection criteria.

The accessible population could be argued to be the same for both qualitative and quantitative studies. For both designs, members of the accessible population are individuals

who are eligible to participate in the study but are unwilling to participate or would not be available at the time of data collection. However, unlike quantitative studies, qualitative designs take much more of participants' time in brainstorming interviews and other data collection situations (Creswell, 2003; Pernecky, 2016). Participating in qualitative studies is also often perceived more burdensome by participants (Creswell, 2003; Williams, 2007). As a result, members of the target population are less likely to agree to participate in a qualitative study. So, willingness to participate in a study by members of the target population is likely lower for qualitative designs. Transition from the target to accessible population in qualitative enquiry may therefore have a higher possibility of participants expressing unwillingness to participate. Considering the systematic process in which the target population is reached in qualitative studies (this is discussed later in this study), the accessible population is also likely to be smaller for qualitative designs.

To recap, the general population is determined by defining participants generally implied by the research goal/objective. The ability of the participants to share experiences and thoughts is however not factored into determining the general population. The target population is determined using selection criteria to select individuals of the general population who can, at best, share experiences and thoughts under the most convenient conditions. The interest of the researcher in selecting members of the target population is to reach candidates who can describe their experiences to address the research goal. The accessible population is composed of members of the target population who are willing to participate and will be available at the time of the study. It is often smaller than the target population because the transition to it is potentially characterized by a significant number of individuals opting out of the study. Table 1 illustrates the contrast and similarity between the qualitative and quantitative design in terms of the three types of population explained. We compared and contrasted the two designs in this table to better highlight the essence of our argument for qualitative enquiry.

Table 1. Comparing and Contrasting Quantitative and Qualitative Designs in Terms of the Three Types of Population

Type of population	Similarity	Difference	
		Quantitative	Qualitative
General	Both are determined based on the research goal/objective, context and assumptions	This may be larger because quantitative studies, particularly cross-sectional studies, theoretically require larger participant groups	This may be smaller given that qualitative studies are theoretically associated with smaller participant groups
Target	Both uses selection criteria to eliminate individuals of the general population who cannot provide accurate and/or adequate information	This is determined based on whether or not the selection criteria are met by members of the general population. Once a member satisfies these criteria, he or she is included. The ability to respond is of little or no importance; hence few selection criteria may be applied	Several criteria are systematically used to scrutinize the general population towards the most eligible set of individuals. The ability to respond is of significant importance; hence this might apply more selection criteria
Accessible	Both are formed after taking out members of the target population who are unwilling to participate or will not be available to participate	This is often larger and is more complex to sample. It may require stratification and clustering to sample	This is often smaller and is simpler to sample. Does not need clustering and stratification to sample. However, some qualitative studies accompany large accessible populations

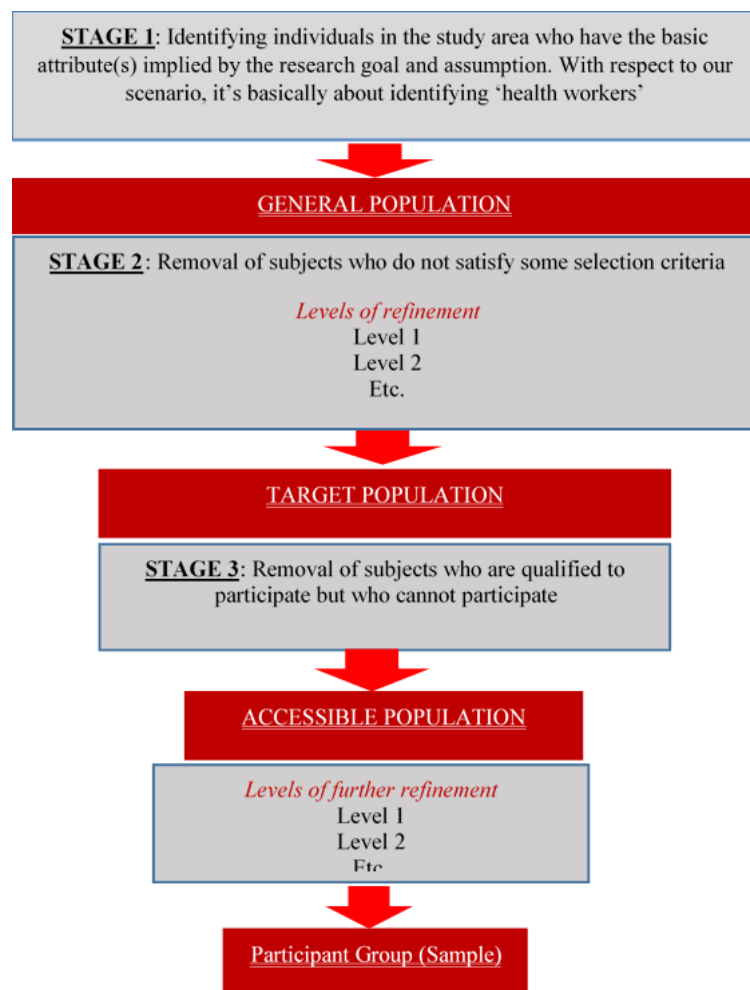
NOTE: There are often instances when the general, target and accessible populations of a qualitative study are large. Our propositions in this study are, at best, valid from the point of view of such large populations.

Discussions so far have clarified the three types of population from a qualitative research perspective. Noteworthy is the fact that considerations for developing each type of

population in a study are made at three key stages, which constitute the main levels of population refinement in this study. These levels are discussed in the next section.

Population Refinement and the Noteworthy Levels

Specification of the accessible population is a precursor of sampling. Until the accessible population is well identified and understood, any attempt to sample may lead to unwanted outcomes such as having inaccessible individuals in the sample, and having a considerable number of such individuals in the sample will lead to the generation of incomplete data and failure to satisfy sample size requirements. More noteworthy is the fact that specification of the study population has different implications for sampling in qualitative enquiry.



NOTE: The refinement process continues after specifying the accessible population until the participant group or sample is reached. A key attribute of the process is the fact that the selection criteria become increasingly stringent from stage 2 to the level where the ultimate sample is determined. It is worth noting that the criteria used at each stage are aimed at reaching the most qualified, accessible and convenient group.

Figure 2. A Framework of Population Refinement for Sampling in Qualitative Studies

Unlike their counterpart quantitative designs, qualitative research designs are often associated with relatively small sample of cases or individuals (Lunsford & Lunsford, 1995; Allwood, 2012). In addition, qualitative researchers seek to use samples of few most qualified

individuals rather than using a large representative sample. For this reason, the general population needs to be properly scrutinized towards determining the sample. This paper views *systematic and organized specification* (SOS) of the general, target and accessible population (shown in Figure 2) as a necessary way to render a large population handy for qualitative sampling. With reference to Figure 2, SOS is a stepwise population refinement process that starts with the definition of the target population and ends with the determination of the accessible population.

The process is characterized by three stages. At the first stage, the general population is defined in accordance with thoughts shared earlier in this study. The second stage is focused on determining the target population using criteria that scrutinize the general population with respect to the research goal and assumptions. The third stage is aimed at determining the accessible population by taking out those who are unwilling to participate or will be unavailable during data collection. However, if the accessible population is still too large, stage 2 could be repeated (as shown in Figure 2) based on more stringent selection criteria.

For our scenario, let us assume that we need thirty (30) most qualified health workers to respond to interviews. In the face of this assumption, the general population can be seen as the crudest group of potential respondents, and our goal is to interview the most qualified and accessible health workers based on the research goal. Hence after determining the general population, criteria can be used at stages 2 and 3 (see Table 2) to determine the participant group, though this approach is only applicable if there is complete information on members of the general population.

In real life situations, it is almost impossible to come across a general population that can be wholly surveyed or sampled. Virtually all instances would require a refinement of the general population on the basis of the fact that some participants do not have the characteristics of interest. In this paper, *population refinement* is synonymous to the SOS and is a term we use to describe the process of ridding the general population of individuals who fail to satisfy the selection criteria and those who will not participate in the study. It is about removing those who are less eligible until the most eligible, accessible and convenient participant group is reached. Population refinement can be complicated on the basis of the extent of heterogeneity of the general population and the sampling protocol dictated by the research goal.

With respect to the SOS, the second and third stages in which the target and accessible populations are determined respectively have something in common; participants are removed from the general population to improve it. We would want to refer to these two stages as the *subject extraction stage* of general population refinement. Yet the two sub-stages of the subject extraction stage can have various levels as shown in Figure 2. To illustrate, the first level of determining the target population (i.e., Level 1) may involve taking out cleaners as the most ineligible category of health workers. The second level (i.e., Level 2) may be concerned with taking out security officers. Similarly, the first level of specifying the accessible population may involve taking out those who are unwilling to participate, whereas the second level may have the goal of taking out those who are willing to participate but will or may be indisposed.

Table 2 demonstrates the difference between the three types of population by showing how population size changes across them for each of the five hospitals. In this table, the corresponding population sizes are fictitious. As shown in both Figure 2 and Table 2, the researcher can set selection criteria at various levels to squeeze out health workers who are less eligible until the finest sample, which is characterized by the ability to offer the best quality data under the most convenient conditions, is reached. At the first level, health workers may be required to have obtained a first degree. At the second level, they may be required to have worked for at least five (5) years. At the third level, preference may be given to those who had received at least one EI-focused training. These and more levels are to be executed until the researcher is sure members of the target population are very qualified to share experiences and

thoughts. If the accessible population size is larger than the expected number of participants as seen in Table 2, the researcher should either continue the refinement process by using more stringent criteria or adopt an appropriate qualitative sampling procedure to select members of the participant group.

Table 2. An Illustration of the Three Types of Population

Population	Stage	Attribute/characteristic applied	Corresponding criteria	Population size		
				Hospital	NIE	NINE
General population	-	Health worker	A participant must be a health worker with respect to the research goal and context	Hospital 1	136	34
				Hospital 2	204	45
				Hospital 3	231	53
				Hospital 4	129	32
				Hospital 5	157	37
Target population	1	Educational level	A participant must have a minimum of a first degree in a health subject	Hospital 1	114	22
				Hospital 2	187	17
				Hospital 3	220	11
				Hospital 4	113	16
				Hospital 5	137	20
	2	Tenure	A participant must have worked in the healthcare sector for at least 5 years	Hospital 1	88	26
				Hospital 2	161	26
				Hospital 3	189	31
				Hospital 4	92	21
				Hospital 5	112	25
	3	Access to EI training	A participant must have received at least one EI-focused training within his tenure	Hospital 1	47	41
				Hospital 2	92	69
				Hospital 3	137	52
				Hospital 4	55	37
				Hospital 5	81	31
Accessible population	-	Unwillingness to participate	Any individual who is unwilling to participate in the study must be removed	Hospital 1	41	6
				Hospital 2	88	4
				Hospital 3	130	7
				Hospital 4	53	2
				Hospital 5	77	4
	-	Unavailability at the time of data collection	Any individual who will be unavailable at the time of data collection must be eliminated	Hospital 1	39	2
				Hospital 2	86	2
				Hospital 3	127	3
				Hospital 4	52	1
				Hospital 5	75	2
Total				379	10	

KEY: NIE = number of individuals eligible (included); NINE = number of individuals not eligible (included).

NOTE: The accessible population has 379 members. A qualitative study is unlikely to interview all 379 individuals; hence an appropriate sampling procedure would need to be applied. The researcher can resort to the systematic process used to create the target population to reach his sample if the judgmental/purposive sampling is to be used. The researcher may also decide to choose the appropriate number of participants at his convenience.

The discussion so far in this section suggests that for qualitative studies, refinement of the general population may continue after reaching the accessible population until the best sample is established. So, like the stage of subject extraction, the third stage of population refinement per our theory involves the elimination of participants at various levels using selection criteria aimed at enhancing the ability of members of the participant group to provide quality data and the level of convenience under which this data is obtained, unless the researcher has insufficient or no information on the population of participants. Arguably, the refinement process that leads to the formation of the accessible population is as good as any qualitative sampling process. This argument is premised on the fact that any qualitative sampling method is aimed at drawing the most eligible and convenient participant group, which is the basic goal of SOS. From this perspective, our proposed SOS is interwoven with qualitative sampling. Hence, it is acceptable to continue with the refinement process after the accessible population is specified if the remaining number of population members needs to be further reduced to reach the sample size.

Incomplete Specification of the Study Population – A Subtle Flaw

The type of population from which a sample is drawn is often misconceived by many researchers to be the target population and sometimes the general population. Banerjee and Chaudhury (2010), for example, state that the target population is the group from which the sample is drawn. But as implied by our discussions so far, the general and target populations are not necessarily the source of the sample. In practice, there are few instances when the general and target population serve as the direct source of the sample.

Moreover, many qualitative researchers do not clearly communicate information on their population on the basis of failing to differentiate their general, target and accessible populations even when their study population is significantly large. Worse yet, these researchers do not provide reasons for failing to specify each of the three types of populations. Often, researchers present the general population and sometimes the inclusion criteria but do not indicate how the application of these criteria led to the target and/or accessible populations. This approach, however, conceals a lot of information needed by readers to align the population structure to the sampling technique used. It is therefore a flaw that undermines the distinctive role of specifying each of the three types of population and the relevance of this specification to appraising the rigor and appropriateness of the sampling method employed.

Failure to clearly specify the three types of population, if necessary, is a fatal compromise that may compel readers, especially novices, to misconstrue specification of the target and accessible populations as non-probability sampling methods (e.g. purposive sampling), considering the fact that these methods are primarily applied based on criteria that are aimed at selecting participants with specific attributes. Unfortunately, this common mistake can be identified with many formal and informal studies, which are not identified in this paper to avoid conflict of interest. There is therefore no doubt that even peer-review journals undermine this error.

Conclusion and Implication for Future Research

The general, target and accessible populations are not the same. In most real-life situations, the general population would have to be refined into the accessible population before sampling can take place. Even so, the researcher's knowledge of the stages and levels discussed earlier must be deployed to tailor the most comprehensive framework of what is expected to be the study's population identification and specification. Going forward, therefore, researchers must thoroughly specify their study population by clearly defining the general,

target and accessible populations, if need be, and communicate the distinction between them. All inclusion criteria must be spelt out with their respective stages and levels of population refinement in order to equip readers to better appraise the appropriateness and rigor of sampling methods applied.

Future researchers are expected to define or specify their study population in the light of knowledge about their research goals, assumptions, contexts and other conditions. Once the study population is defined in isolation from the research conditions, a researcher is likely to suffer an oversight of necessary steps and requirements for effective specification of his study population. Also important is the researcher's understanding of each of the three types of population and the relationship between them. We would want to summarize the relationship between the three types of population using the following conceptual equations:

1. General population (GP) = members of the general population who are not eligible to respond in view of the research goals + participants in the target population (TP) who cannot participate for several reasons + accessible population (AP)
2. $TP = GP -$ members of the GP who are not eligible to respond in view of the research goals
3. $AP = GP -$ members of the GP who are not eligible to respond in view of the research goals – participants in the TP who cannot participate for several reasons
4. $AP =$ study or specific population (SP), which is the population from which a sample is drawn
5. $AP = TP -$ participants in the TP who cannot participate for several reasons
6. $TP = AP$, if and only if every member of the target population can participate in the study
7. $GP = TP$, if and only if all members of the general population are eligible to respond in view of the research goals
8. $GP = AP$, if and only if all members of the general population are eligible to respond in view of research goals, are willing to participate, and are not prevented by any condition from participation.

The 6th, 7th and 8th equations are rarely encountered in practice. Even so, the 8th equation is almost impossible to meet in real life. In many instances, a specified study population would reflect the first five equations.

Limitations Within Our Thinking and Framework

The authors would want to acknowledge key limitations within their thinking and framework. First, the researcher is obliged to properly define the participant group (e.g. who constitutes a health worker) in order to ensure that every potential participant is included in the general population. Factually, a poor definition in this vein could disenfranchise some highly potential individuals from participating in a study, and ineligible individuals could also be incorporated in the general population. Unfortunately, the researcher may wrongly define the participant group if he knows little about the research goal/objective, context and assumption. While thorough literature review can enable the researcher to coin a good definition, his subjectivity and lack of creativity is likely to hamper the formulation of a good definition. This study does not provide adequate guidelines for reaching a suitable definition.

Even after the researcher has developed a suitable definition to identify who belongs to the general population, the need to identify each individual in this population with key characteristics, particularly those applicable to determining the target population (e.g. education, tenure, experience in a field, etc.), is evident. In many instances nonetheless, the general population reached would be considerably large, making it very difficult for the researcher to properly understand the characteristics of individuals in it. In fact, it would be impossible to understand an extremely large general population in terms of its relevant characteristics. Since these characteristics form the basis of the systematic process of developing the target population, this situation would limit the transition from general population to target population within our framework. The same issue could constrain the conduct of a systematic judgmental/purposive sampling, which follows the determination of the accessible population.

The use of attributes of individuals in the target population to generate the target population through the systematic process recommended could be really helpful in screening the general population for sampling. Sadly, this study does not provide any protocol that unfolds the order in which these characteristics should be applied. The researcher may be confounded by these questions: what attribute and its corresponding criterion should be used at the first stage of the screening and which should be used at the second, third and other stages? Answers to these questions are very important because the order in which these characteristics influence the screening process affects the content of the eventual target population. For instance, if the researcher decides to select individuals with a certain level of education at the first level, the result would be different if a different variable such as experience in the relevant field is used. We are however of the belief that future research can be geared towards improving our framework by contributing to a remedy of these and other possible weaknesses of this study.

Last but not least, our theory is of little or no significance if the study population is relatively small. Thus, for small populations, it is unnecessary to draw the target and accessible populations out of the general population since the researcher can easily identify individuals who make up the ideal participant group.

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