Health Research Fundamentals
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Lecture - 03
Literature Review

Hi, welcome to Health Research Fundamentals, NIECer 101. I am Dr. Ganeshkumar from ICMR School of Public Health, National Institute of Epidemiology. This ascent is about literature review. Literature review is an important step in any health research because this is an important link between what is known and what is not known. Basically, research is a systematic investigative process to increase our existing knowledge about your concern subject of interest or to revise our existing knowledge. So, it may be basic or applied, where basic is increasing an existing knowledge, where applied is that applying this basic research to develop new processes, new products, new knowledge or throw your light over an unknown area.

In this context, literature review is an important step in any health research, where it is going to tell us, where it helps and aids us to tell us to guide us, what is already existing knowledge about your concern subject. So, here in this session the most important learning objectives are why we require a literature review? What is a literature review? How a literature review is performed? And what are the steps of the literature review and certain ethical concerns in a literature review?

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Why we require a literature review? As we already explained in the definition of a research that, it gives important link between what is known and what is not known. So, for to know that we require this important step called literature review, where it saves lot of time in your research and secondly, it know the subject matter better. So, this throws what is our existing knowledge about the concerned subject and it suggests new research topics and questions.

For example, how it saves yourself from work? When you see; when you want to develop a questionnaire for a physical activity. So, you review a literature, you can come across an already existing standardized, regionalized questionnaire for physical activity. So, you can use that which you no need to spend lot of time to develop your new questionnaire to measure the physical activity of an individual. Of course, it paves a way and throws the light of, to know the subject matter better and third by reading the existing articles you may find certain lacunae in the existing knowledge, which makes you to carry out your new research. So, it will aid you to carry out a new question, it aids you to develop new research questions, it aids you to develop new methods of an existing known subject.

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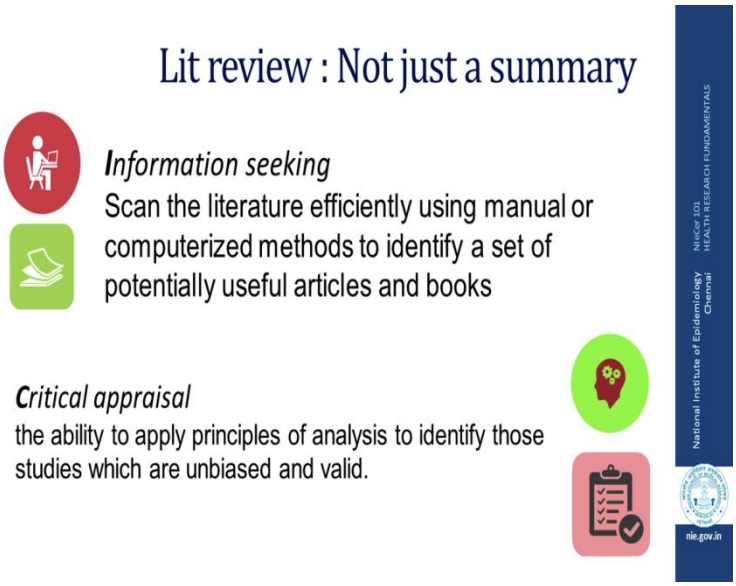

Is it a just a summary? So, we are going to read, whatever it is known and we are going to summarize it and tell, when this is what it is there in the existing literature or existing evidence. Now, it is not just a summary, it is first step, it is basically an information seeking. It scans the literature efficiently using manual or a computerized methods to identify a set of potentially useful articles, say like how we usually do in literature review is that, the whatever kind of a resources, valid resources over an existing subject, we need to retrieve the information from that. So, it may be a text book, it may be a manuscript, it may be a published article or it may be a conference proceeding. So, from there we need to go through that and we need to retrieve the kind of information from that and second thing is that after we have collected all those things, what we basically do is, not just summarize it.

We need to critically appraise, whatever the article we have collected so far. So, the critical appraisal is a most important step in literature review, which is an ability to apply principles of analysis to identify which is useful for you. So, these will be useful for me, this will not be useful for me, this is valid for this concerned subject, this is not valid for my point of view. So, likewise you need to critically appraise and existing collected literature.

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This is not just a summary. So, what it is then? It is the organized research, how organized it is? So, organized research is a systematic process, say like the first important thing is that, you need to organize the information whatever you have collected so far and you have to relate it to the concerned research question which you are trying to develop or which you have already identify it and second thing is that it helps synthesize the results of it, from this existing whatever information which we have collected. So, in that collected information you have to summarize it, what is and what it is not known. This is all summarizing that is called synthesizing the results.

The third step is that you need to identify the lacunae, when you synthesize the results, when you organize or when you synthesize the results, the third thing there you can see is that, which is the lacunae here as appears in the literature; that means, for example, after when you are trying to review the existing diagnostic tools of tuberculosis and after you have reviewed that there are many tools are available and this is the different cast of the different diagnostic tools and these are the different work easy friendliness, quicker the results and you can identify that there is no quicker tool, which is not available for specific type of tuberculosis. Now, this gives you lacunae of existing literature. This may be helping you and this will lead you to identify a new research question or identify a new research path in it. So, that is how it is an organized research, it is not just summarizing this existing articles and writing a kind of a paragraph.

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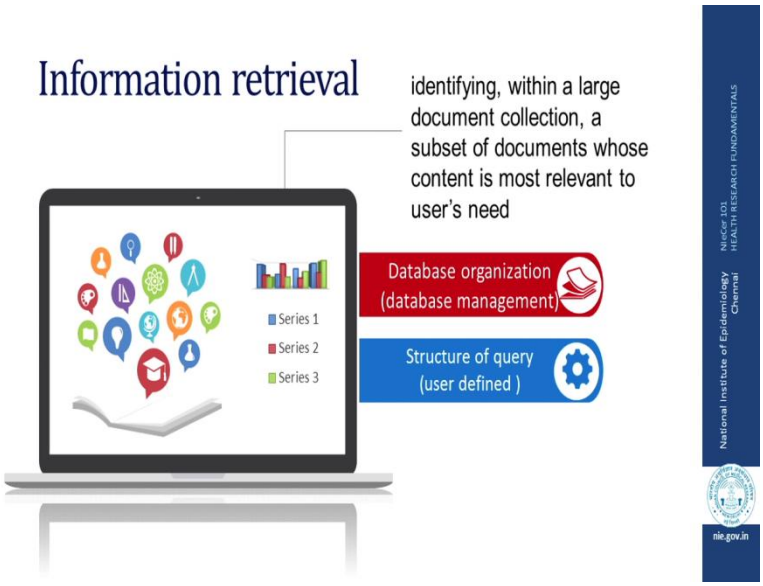

When you have seen that, you can see there is an information retrieval mechanism is inculcated in the literature review. Information literature, information retrieval in literature review what it is? It is basically identifying from a large database and from that by a set of queries, you are going to identify what are the documents which is a relevant for your needs. So, that is called information retrieval, that it happens from a big data base or it may be a huge database where all these articles are archived, collected or whichever is stored into that and from that you user by means of your set of query is seeking an information from this database. Now, this query system is user defined, it basically according to the need which a user is developing into that over the particular research question.

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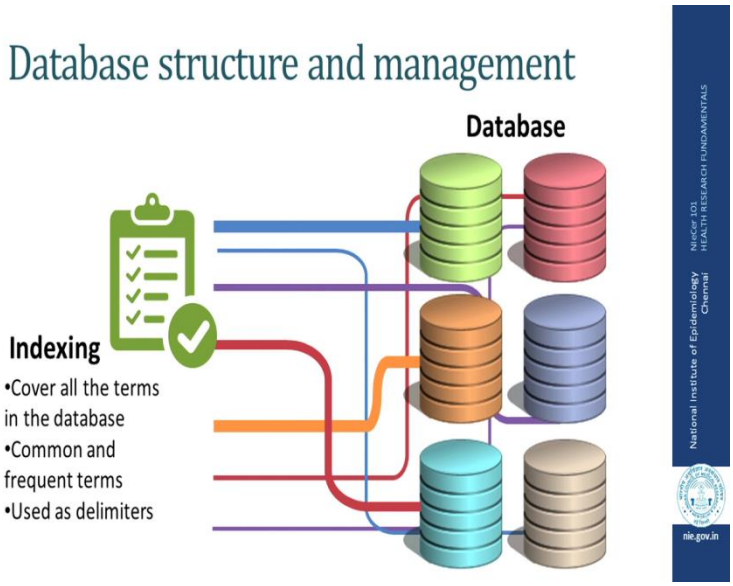

What actually is this database? And what actually is this database management? What is this a set of queries? So, you see here, all this information about a scientific knowledge in this information era is currently stored mostly in an electronized form. Even certain non-electronized form is also stored in term of books or in terms of printed journals or conference proceedings. All these things are collectively called as a database. For example, it may be e-library, for example, it may be a collection of citations.

This data base will be huge, from this, like a last page of your text book, you can see index which helps you to identify what you are trying to search. Likewise, there are certain indexing mechanisms for this database from where you are going to collect required information by means of set of queries. Now, that is called indexing. This set of query is what, user is defined to retrieve the required information from this huge data bases.

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Where we have to search? Which is appropriate place to search the required information? Where we need to search? It may be a general information about your specific health related event or a disease. For this, already we know that Google is a huge search engine, which has a huge database of the require information in it, but from all the Google results, we cannot rely entirely on that. So, there is a kind of an accreditation mechanism by a non-profit organization called Health on Net, this is called HON certified websites. This HON certified websites are those accredited websites, where you can get certain means of an authorized, certain means of reliable information about your specific health related events that is about general information, but by a professional, by a researcher.

What is a specifically when you want to retrieve an information, for example, I need to retrieve an information about all clinical trials about diagnostic test on tuberculosis. So, when I am going to do this kind of a specific query, this specific query has to happen over the specific scientific databases, which are PubMed, which is a huge database of scientific citations, biomedical citations. It may be a Scopus, which also have huge data base or even Google Scholar is also another URL, which is another portal where a huge collection of citations and abstracts across literature is available. So, from this specific query, you can retrieve the required article or the required manual script which you are trying to search.

Third, it may be from an archived full text articles, the archived full text articles are

usually available in free open access, directories of journals or it may be from your fee based libraries. And this libraries may be e-library or may be a physical library, which is present where full text articles are there. From there, we can able to get the required information, which we are intended to research over a concerned topic and finally, you want to take the articles or you want to review those articles which is evidence based, which was the highest level of evidence currently available is a systematic review and meta analysis. So, from this collection of systematic reviews and meta analysis also you can retrieve that information, which is available in Cochrane library and even certain database also have these collection like Map of Medicine is also a collection of evidence based medicine articles in that portal.

These are the places, where you can do a query search specifically by an indexing mechanism and the required information can be retrieved from these databases. The most popular among all these things is PubMed. So, PubMed is a huge database, which has a 25 million citations is available and another commonly used portal is Cochrane library, which is a collection of systematic reviews and meta analysis.

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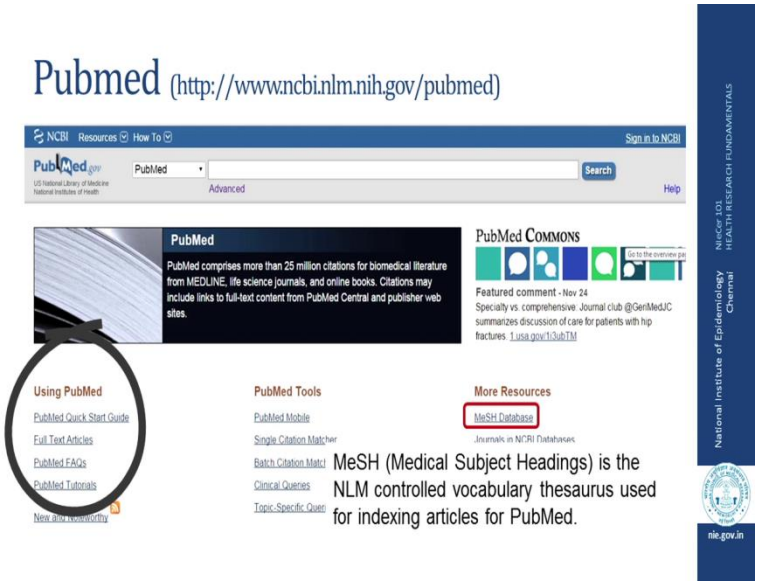

This popular PubMed, let see about it, what is this PubMed? So, PubMed, which comprises more than 25 million citations of biomedical literature. This PubMed is maintained by National Center for Biotechnology Information situated in US National Library for Medicine under National Institute of Health and this PubMed is free and

open to access. Each and every PubMed, it is a collection of abstracts and full text articles. Each abstract has a link out resource, where the full text article is available and there are certain articles where you can freely access in PubMed, through a portal called PMC, which is called PubMed Central. So, through this PubMed Central portal you can see the free full text articles about your concerned topic of interest or your research question.

There is a good tutorial which is available in the landing page of the PubMed, where you can see in the portal itself. Apart from that, this US National Library of Medicine is maintaining their own set of defined-predefined vocabulary called MeSH, which is called Medical Subject Headings. Medical Subject Heading is a National Library of Medicine controlled vocabulary thesaurus and which is, you can see as called keywords under any abstract. If your keyword is in concordance with NLM defined vocabulary called MeSH, then your article has higher chances of getting identified by a set of systematic query mechanism. So, that is why MeSH terminologies are very important, which you can access the entire MeSH database in the left side of your portal, a PubMed landing portal and when you see in the PubMed portal, there you can have a tutorial which is available.

This entire tutorial explains you, that using PubMed, how to make a search in the PubMed? How to make a search through MeSH terminology? How to search through a single citation manager? And how to search through an author, year wise search, article wise search, study design wise search? So, it aids you this entire tutorial, which has a quick tour video tutorial, is also available in the landing portal and when you access it, it gives you a good detailed form of how to perform a search in PubMed portal.

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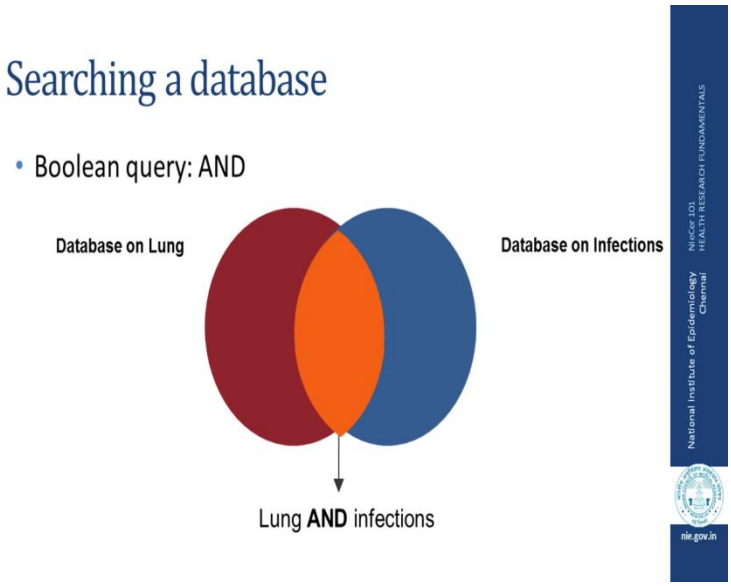

Now, I will explain you, basic search in your data base. How to do a basic searching in a database and this kind of search is called Boolean query, which is very common in any search engine, it may be web search engine, it may be Google or it may be Embase, it may be a PubMed. This Boolean query is standardized one, which uses this most important connections called and, or, not queries. In these Boolean queries, I will just give demonstration about, how actually when you are putting a query and how the information is retrieved. For example, here I am showing you two different database, one database is about lung another database is about infections, which encompass all infections and if I am putting a query, a Boolean query of lung and infections and how the query retrieve the result. It retrieves the result of lung and infection, which is those articles, those items which are specific to lung and infections.

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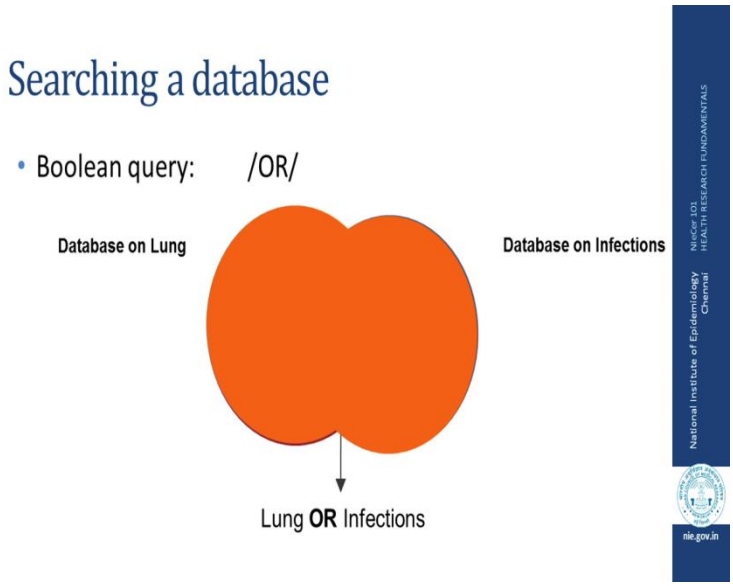

Whereas, when I am putting a query about lung or infections, what it gathers is, it gathers information about the entire items on lung, entire items on infections and even the items which is common that is lung and infections, which is lung infections. So, we get a huge search of results, when you are putting a query called lung or infections.

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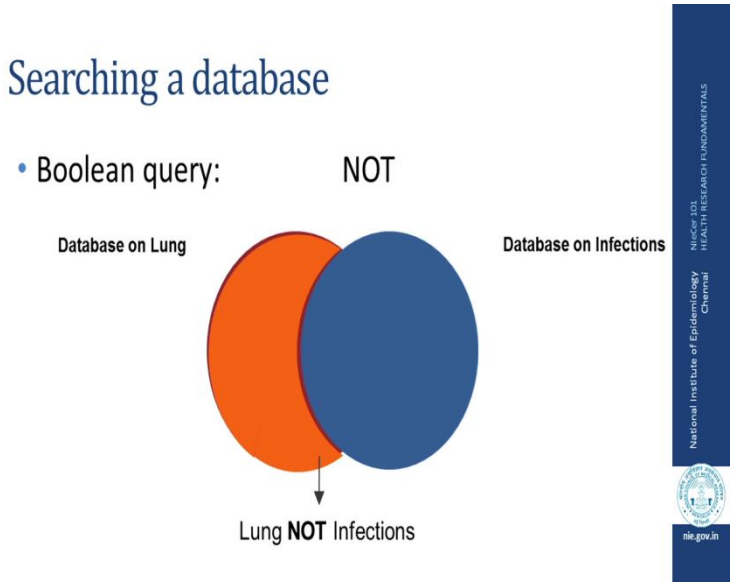

When you put query called lung not infections, so in this lung not infections, it totally remove this entire information related to infections from the whole search. Again, the infections related articles and items from the lung. So, what you get is results are the

items, which is related to all items, which is related to lung except infections. So, this is how, this Boolean query works and, or, not.

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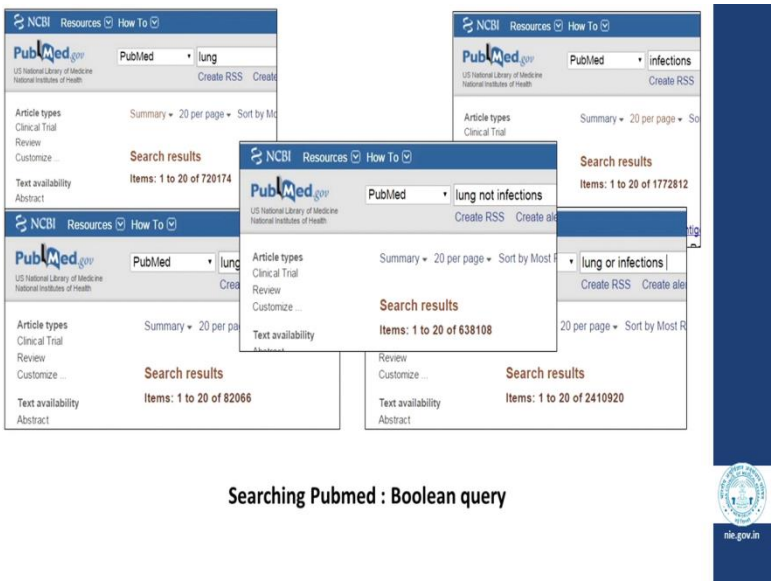

I will give a basic demonstration, similar to that how I did a Boolean query in PubMed. So, here you see, these are all the screen shots which I have cropped. When you see, when I made a Boolean query of only lung, what are the total numbers of items, which I have retrieved? The total number of items I have retrieved is nearly 7.2 lakhs. Only infections, the total number of items, which I have resulted is 17.7 lakhs. When I put a Boolean query of lung and infections, it resulted me, only 82000. So, 82000 articles are related to only lung and infections. So, it removes all other lung related, all other infection related and it resulted specifically to lung and infections.

Let say, this gives another screen shot, when I make a search of Boolean query of lung or infections, here you can see, where we get information of entire information on lung, all the items about infections and all the items related to lung and infections. So, total is that nearly 24 lakhs. So, that is how depends upon your Boolean query, say like lung not infections. In lung not infections, it removed all the infections related items and resulted only say like nearly 6.3 lakhs, which is only article related to lung except infections. So, this small demonstration which gives you an idea about how a Boolean query works; however, this is not a structured or a systematic way how to do a PubMed search. This session is not going to cover entirely, how to do MeSH search and all. So, the tutorials

are already available in the PubMed dot com landing page. This is how a Boolean query works in any search engine including PubMed.

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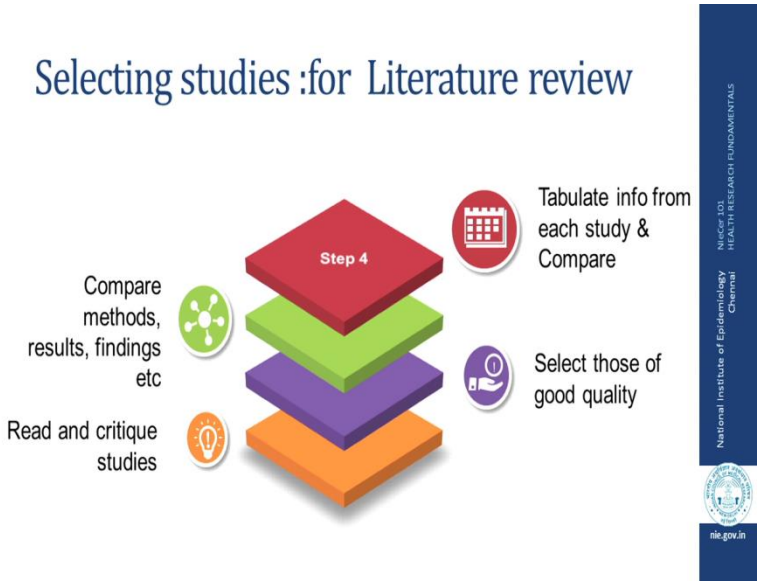

Now, what are the steps, how we have to do a literature review? Already, we know that after we have organized information is that, which are the studies is related to you? How we are selecting the studies? The step one is that by means of your Boolean query or by a structured query system, you have collected your specific articles related to do. For example, you are searching a Boolean query of same lung and infections; I want only RCT's about lung and infections, which is published in the past 5 years. Now, I have organized everything. So, what you need to do is that after you have organized it you need to read all those articles and critically appraisal it and how to do this, will be explaining you at the second step.

The second step is that, you have to select which is of those good qualities. Remember, here this critical appraisal should be scholarly, it should not be too critical. It should be scholarly, for example, an article is explaining about the randomized controlled trial about a therapeutic regimen over lung infections and which you have seen is that these RCT's which you have collected is addressing over only the western population and you have this lacunae. So, what you are going to critical appraisal is that the existing evidence is available over the western population and Asian population is not available and Indian population is not available. Those articles whichever is reported about Indian

populations are only quasi experimental studies, here it is scholarly critically appraisal.

You are not too critical; you are not finding a fault on it. Now, when you do a scholarly critical appraisal on it, you will identify your new area of research, you will identify what is existing lacunae, existing gap, which you can try to fill up by doing your new research. Third step is that, you need to compare the methods, results, findings of all those articles which you have organizing it. When you compare it, you can understand, what is an existing knowledge, about the different methodologies they have conducted in this particular topic?

So, that throws you a light, more about what is the methodology they have followed? So, far, in those kinds of your search query, for example, here when you want to do therapeutic regiments on lung infections, what are all the methodologies they have applied, while they want to test your therapeutic regiment for a lung infection? Likewise final step is that, you need to tabulate in your form, each study which has to be tabulated when you tabulate it, it helps you to organize. Number 2, it helps you to compare. Number 3, it helps you to compare the individual studies by itself and itself with other studies and it will give you good idea about and it will helps you to critically appraisal it. This is how, your model table looks like this.

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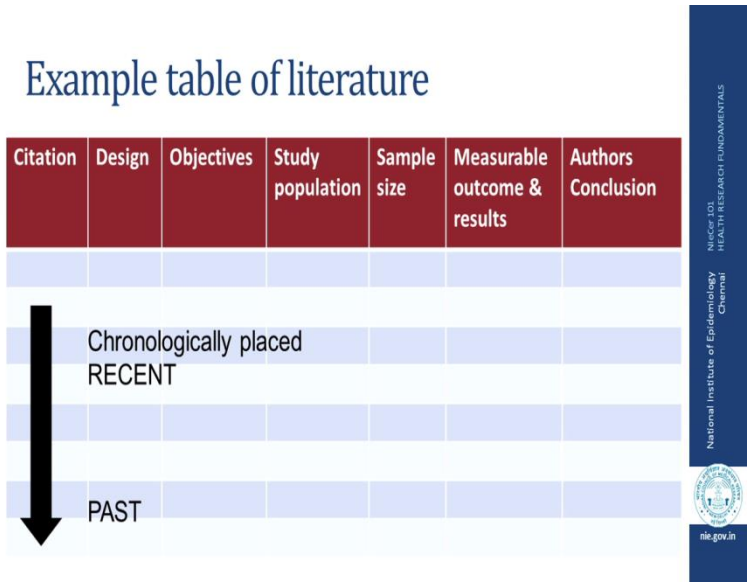

An example table of literature, where you can see, you can put up, add and delete your required columns. I made an example table; you can see citation, design, objectives,

study population, sample size. What are the measurable outcomes? What are the main findings? And what are the authors' conclusions? You can organize it in kind of your table, which gives you, helps you to critically appraise it and it is better when you organize this table chronologically, which is from recent to past. So, your recent studies can be tabled, can be made in their first initial rows. It helps you to select those recent evidences or recent existing knowledge about it.

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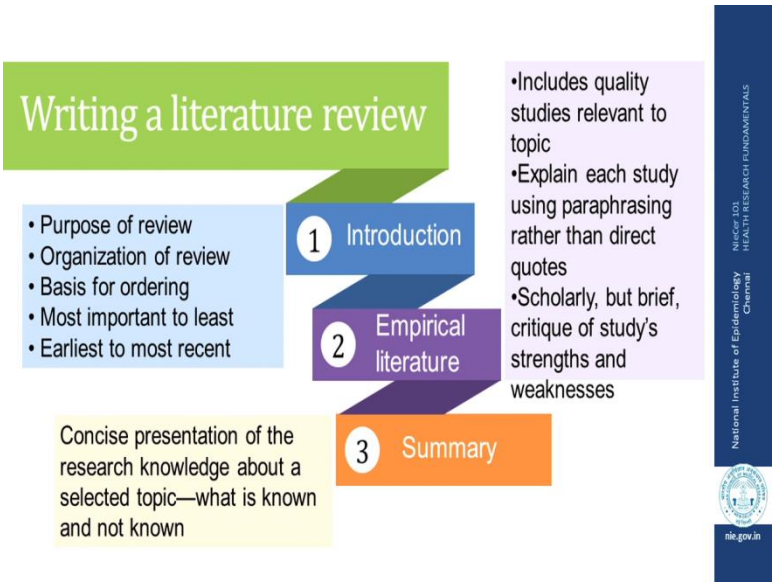

So, after you have organized all these, since you have tabulated it. Now, you need to write this literature review. In the literature review, in the write up part, these are the other three important parts. The first part is introduction, when you are writing a literature review, in the introduction; it gives you what is the purpose of the review? Why you are doing this? And how you have organized this review organization of the review? How you made the queries? How you have collected this information? And how you have organized it? That explains and basis of the ordering, most important to least and as well as what is the earliest to recent or recent to the earliest? How you have organized it? It gives you an introduction, how you have written? How you did this literature review?

Second is that, where you are actually writing all your existing information called empirical literature. So, it includes the quality studies, which is relevant to your research question or the topic and it explains each study about it is positive and in paraphrasing manner and your critical appraisal should be a scholarly way. So, that explaining it to

that, these are all the identified lacunae, these are all the strengths, these are the novel methods. This you need to write in this part. Finally, you need to summarize your existing this entire literature review and when you summarize it, it should be a concised way, where you are going to tell that, this is about your existing knowledge about your research question or your concerned topic and this is known and this is not known and this is lacunae of an existing literature. So, this is how you have to end a literature review write-up and there are certain ethical issues, which we need to concern when you are doing a literature review.

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Mostly, this problem is that when you are retrieving information from your specific manuscript or an article, the content from the study should be presented honestly. It should not be distorted, that you should not be read in between lines and taking only a part of your result as such. That is a most important thing. Second is that, any weakness of the study, again I am emphasizing it, that it should be very scholarly. You should not be too critical and it has to be addressed in a research point of view, that is scholarly point of view and finally, the source should be accurately documented.

There is a way how a source should be documented. There are different styles that are available, a very popularly followed style is Vancouver style, even Harvard style is available and based on that it has to be cited accordingly those sources. Finally, this is how a literature review can be done and this gives you a basic view about, what is a

literature review? Why this literature review has to be done? What are the steps in doing this literature review? And how you can write a literature review?

Thank you very much.