International Journal of Science and Healthcare Research
Vol. 9; Issue: 4; October-December 2024
Website: ijshr.com
Short Communication *ISSN: 2455-7587*

An Innovative Logic Model Design to Produce High Performing Public Health Programs: Focus on Need-Based Functional Model for Effective Management of COVID-19

Jasleen Kaur,[1,2] Mehak Imran,[2] Yashoodeep Gill,[1] Tripad Bhanushali,[2,3], Eby Aluckal,[2,4] Abe Abraham[2]

[1]BJS Dental College, Ludhiana, Baba Farid University of Health Sciences, Faridkot, Punjab, India
[2]Centre for Professional Education and Research, London, Ontario, Canada
[3]Ashok & Rita Patel Institute, Charusat University, Gujarat, India.
[4]Department of Public Health Dentistry, Mar Baselios Dental College, Kerala University of Health Sciences, Kerala, India.

Corresponding Author: Dr Eby Aluckal

DOI: https://doi.org/10.52403/ijshr.20240403

ABSTRACT

Logic models are valuable tools in the field of public health to picturize the relationships between program input, activities and desired outcomes. A logic model provides a clear and seamless method of designing, applying and analyzing public health programs. This article aims at understanding the different types of logic models and their use in different situations by taking into account the pros and cons of each type of model. A specific focus is placed on using Type III Logic model in preventing communicable diseases like Covid-19. This article tries to use this type of logic model in the planning phase to develop programs to address communicable diseases. Public health practitioners, managers and leaders could use this type of model in planning, implementing and evaluating their current and future health promotion and protection programs.

Keywords: Logic model, Public Health Programs, COVID-19

INTRODUCTION

Public Health is a dynamic evolving field with emerging population risks of communicable diseases like Covid-19. These risks could be mitigated to a greater extend by modifying current program logic models with newer types of models or designing a completely newer and innovative logic model. These logic models provide a clear and continuous method of establishing the logical flow of a program.[1] At its core, lies a logic that, in its broadest sense, refers to a way of thinking that is based on reason and good judgement. [2] This logic is generally conveyed in the form of a visual representation of a program's resources, activities and expected outcomes. Logic model can be used as a tool used to simplify complex relationships between various components and can be used to identify the impact of program planning, implementation, and evaluation of the desired outcomes. [3] A logic model examines the development of a new program and its intended effects while offering great learning opportunities, proper documentation,

and combined knowledge about the working of a program.

In public health and healthcare settings, a newer type of logic model clarifies the practitioner's perspective by strengthening their learning and utilizing these tools in the areas of planning, design, implementation, analysis, and knowledge development. With this knowledge, the organization can set the course of action and create an understanding of the obstacles, use of resources, and appropriate time to meet the goals.[4]

Logic models can be broadly classified into seven categories based on how they work.[1,5-8]

1. **Input-Output Models:**
   - Resources/Inputs: What resources are needed (e.g., staff, funding, materials).
   - Activities: What will be done with those resources (e.g., training, workshops).
   - Outputs: The direct products of the activities (e.g., number of workshops held, materials distributed).
2. **Outcome Models:**
   - Short-term Outcomes: Immediate effects (e.g., increased knowledge or skills).
   - Intermediate Outcomes: Subsequent effects (e.g., changes in behavior or practices).
   - Long-term Outcomes: Ultimate impacts (e.g., improved health, reduced poverty).
3. **Theory of Change Models:**
   - Focus on the underlying assumptions and the step-by-step pathway from activities to outcomes.
   - Often includes external factors and risks that might affect the pathway.
4. **Impact Pathway Models:**
   - Emphasize the causal linkages between activities, outputs, and outcomes.
   - Detail how each step leads to the next, showing the cause-and-effect relationship.
5. **Activity Models:**
   - Focus mainly on the activities to be undertaken and their immediate outputs.
   - Useful for project management and tracking progress.
6. **Results Chains:**
   - Similar to outcome models but presented as a linear chain of events.
   - Show a clear, step-by-step progression from inputs to long-term outcomes.
7. **Hybrid Models:**
   - Combine elements from different types of logic models to suit specific needs.
   - Tailored to complex projects that require a more nuanced approach.

Each type of logic model serves different purposes and can be chosen based on the specific needs of the project or program.

Components of a logic model:

The components of a logic model vary with the type of program, place of implementation and on the stakeholders. It can be simple or complex but easy to understand and engaging. Different logic models are used for different programs based on the needs of the organizations. While the implementation of logic models depends on continuous collaboration and takes practice, it is also imperative to understand the type of logic model to be used in different settings, best suited to cater to the needs of the situation. Therefore, they vary in their complexity and take many different forms, including flowcharts, tables, pictures, diagrams, and can include different components. [1,5-8]

Inputs:

Inputs refer to the resources that are needed to be invested in a program so that the program can perform its planned events. These resources can be human, financial, technology

and system, and estate and materials. Examples include material and non-material items, supplies, funding, and staff. [1,6-8] Further, human resources can be classified as workforce, capacity, capability, community capacity and networks, and end users. Financial resources can be splitted into existing investment, specific funding streams and contract values. Estates can be buildings, sites, or geographical communities.

Activities:

Activities implies what the program does with the inputs: the process, events and actions that are an intentional part of the program implementation. Examples include workshops, community meetings, physical activities. All activities are designed to be in direct relation to the desired outcomes, although the activity can sometimes lead to an intermediate or proximal outcome, eventually leading to the desired or distal outcome. [1,6-8]

Output:

Outputs can be tangible or non-tangible. Tangible outputs are the direct products of the program activities, usually measured in terms of the volume of work accomplished. For example, information materials, assistive technology like alarms, capital developments and specifications. Whereas, non-tangible outputs include availability of clinical advice, support, change in referral routes and provision of services. Intangible products often impact the experience of change.

Outputs can therefore be stated as quantifiable end products of activities and are often considered to be a major step in the direction of overall change. Therefore, they are referred to as 'milestone deliverables.[1,3,6-8]

Outcomes:

The benefits or changes in the program's target population. Programs often posit a chain of outcomes that are linked to each other in a logical sequence over time, with immediate outcomes to intermediate outcomes, which in turn leads to long term outcomes. Quick adjustments in the system or program practices are known as short term outcomes that occur shortly after participating. Modified behavioral changes can be known as intermediate outcomes. Long term outcomes are the impacts that have long lasting effects on the system and expected to improve conditions. [1,6,7,8]

Purpose of a logic model [1,8-10,12-15]

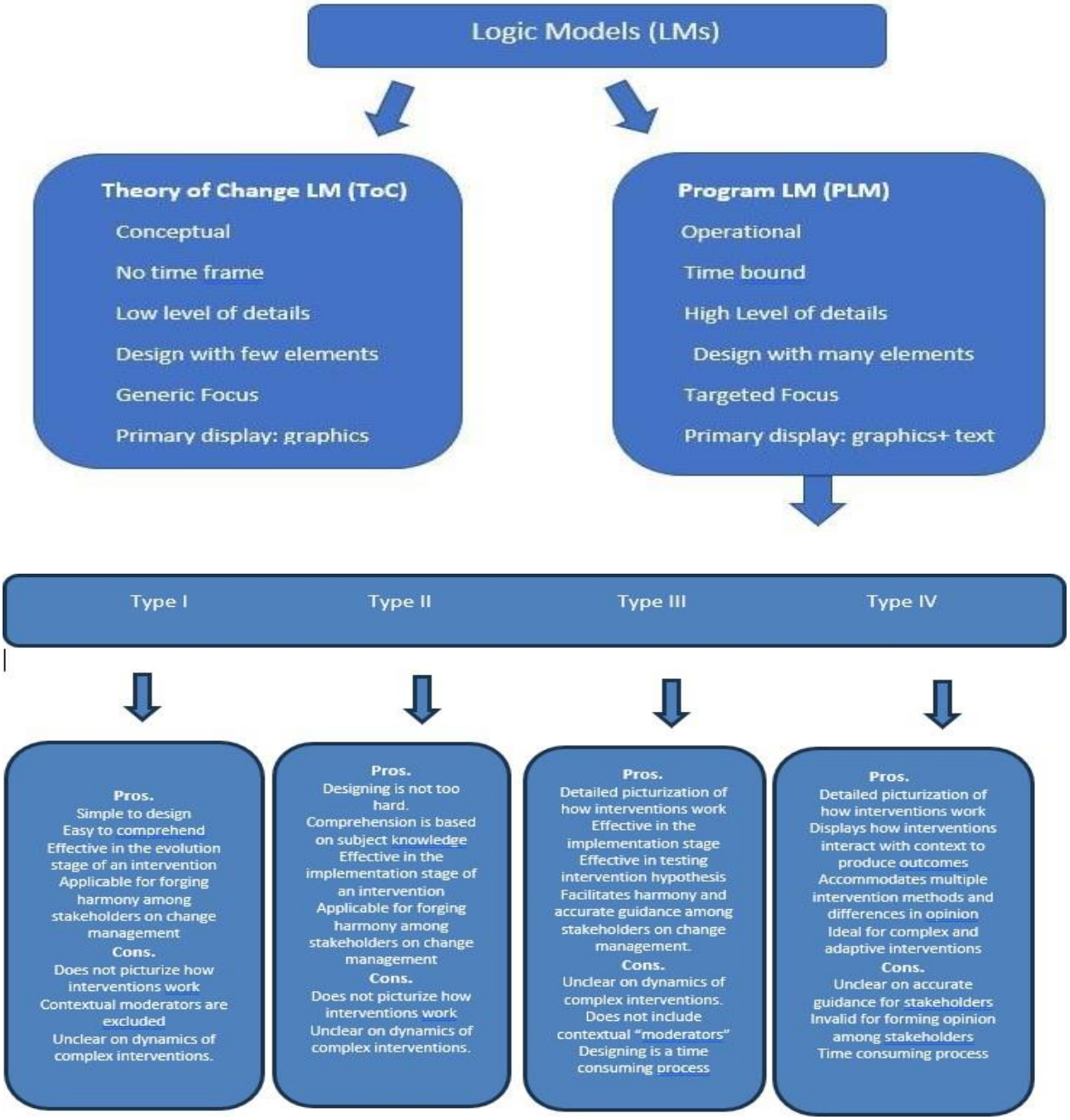
Review Program	Ensure Program Integrity	Tool for communication	Aids in Evaluation
• Clarify goals and assess the needs	• Monitor performance	• Provides clear and concise guidelines	• Improve program accountability.
• Plan the program structure.	• Assess if planned processes are being followed.	• Provides a strong platform for intra and inter team collaboration	• Targets the processes and outcomes.
• Evaluate the need for resources.	• Risk assessment of policies.	• Clear picture for team members & stakeholders	• Identify voids and areas of improvement
• Estimate the time period.	• Establish checks and balances.	• Effective in knowledge translation with funders	• Measure success.

Types of logic model based on its functioning methodology:

Type I logic model

Type I logic models are basic models that are simple to understand and easy to create. They are useful in the planning and developmental stage of intervention's life cycle because they are least resource intensive. Although this type of model is the most helpful in situations where a consensus needs to be reached among stakeholders. On the flipside, this model lacks contextual moderators and fails to display the functioning of interventions while hiding the dynamics of complex interventions. [8]

Figure 1: Classification of Logic Models based on conceptual designs (derived from Mills, Lawton & Sheard, 2019).



Type II logic model

Type II logic model is a system-based logic model that precedes from inputs to outputs in a linear manner. This model is useful at the implementation stage of the intervention cycle as it assigns separate categories to

interventions. However, this model poorly expresses the dynamics of interventions when used by researchers. [8]

Type III logic model

Type III logic model explains the functioning of interventions in detail. This type of model aids in developing and testing hypotheses linking the precise relationship between intervention components and outcomes. The focus of type III logic model is intervention rather than intervention settings and is practitioner-oriented model as it is used for consensus - building.

This model expresses the working of complex interventions across multiple domains in a single setting, along with interlinking actions that produce a range of outcomes. Furthermore, there are alternative casual strands incorporated in the model. The level of variation depends on the number of alternative strands included in the model. Although this model provides clear and concise guidance for stakeholders, it is not appropriate for complex interventions and does not include contextual moderators. [8]

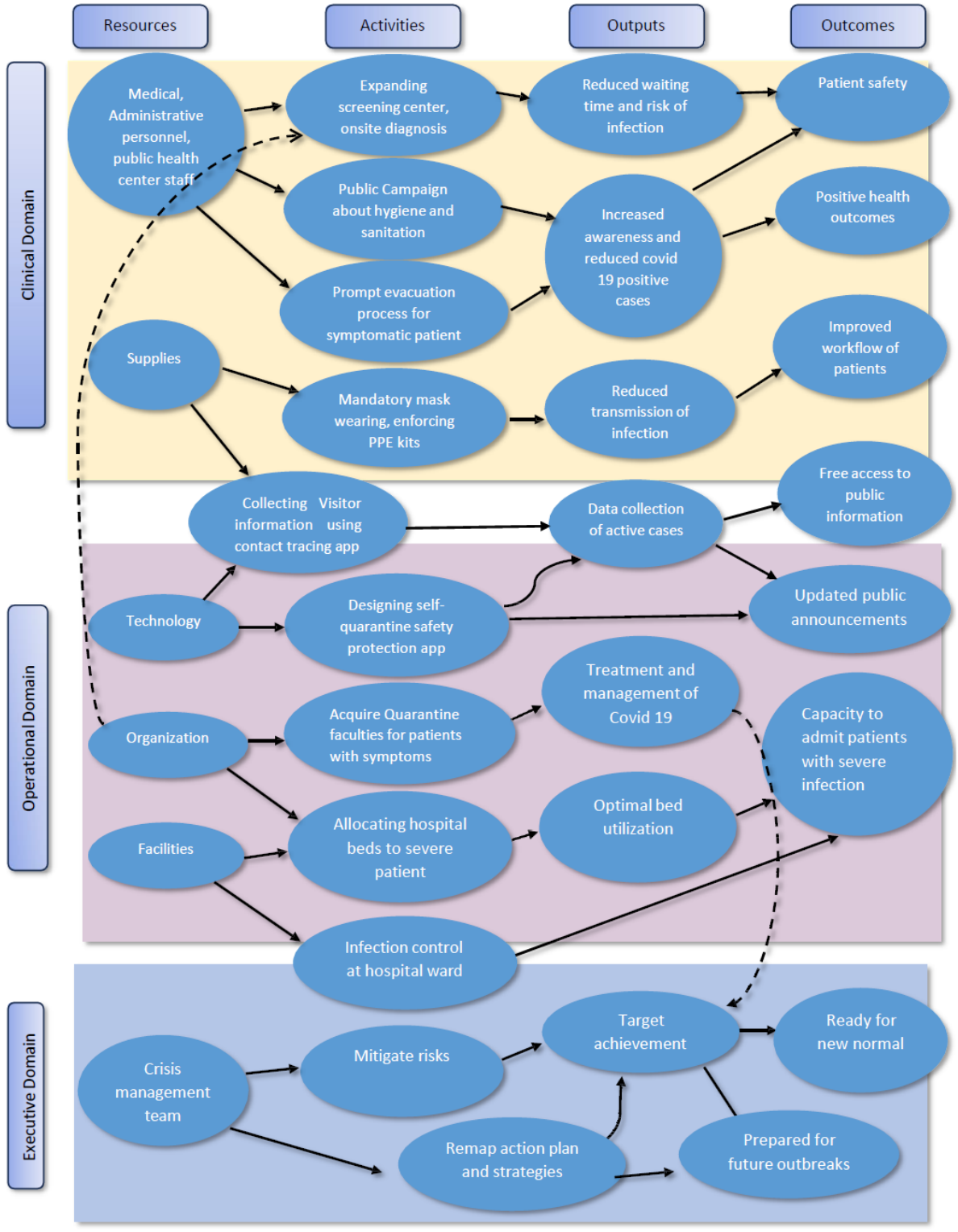
Type IV logic model

Type IV model depicts the interaction between the interventions and context to produce outcomes. This model is able to accommodate multiple interventions and differences of opinions in various settings. However, type IV logic models do not provide precise guidance to stakeholders, rather leave it to facilitators to decide how they should act while assessing the contexts in which they work. Therefore, this model cannot be used to establish agreement amongst stakeholders regarding the need for change. [8] This article focuses on type III Logic Model.

Difference between current and new Type III Logic Model (derived from Mills, Lawton & Sheard, 2019).

Current Logic Model (Type I)	New type of Logic Model (Type III)
Designing simple interventions	Designing complex interventions
Linear model	Multidirectional dynamic model
Plan-oriented design	Practitioner-oriented design
No information on how interventions produce outcomes	Focus on how interventions produce outcomes
Used for evaluating plain and unidirectional interventions	Evaluating complex and multidirectional interventions
Design focuses on quantitative components	Design focuses on qualitative component
Minimal engagement potential with stakeholders	Higher engagement potential with stakeholders
Low visibility on interaction of facilitation & moderation factors	Higher visibility on interaction of facilitation & moderation factors
Unable to develop and test hypothesis related to interventions	Can be used to develop and test hypothesis related to interventions between components and outcome
Model design unable to incorporate any strands or work process	Able to incorporate “alternative causal strand” enabling to convey how interventions work in different settings
Picturization of receptiveness of context for intervention difficult with this design	Facilitate picturizing how initial improvements and emergence of proximal outcomes create a more receptive context for intervention
Model design can accommodate interventions taking place on single form and primary setting	Design can accommodate interventions taking place on multiple forms and various settings
Model design not supporting incorporation of requirement of change and how to operationalize the change process	Can develop conscious building exercises about the requirement of change and how to go about it
Model design limited in options of contextualization	Can incorporate multiple contexts in the design
Poor expression of intervention dynamics	Intervention well expressed in most complex interactions
Leadership elements not incorporated in the model design	Model design incorporates elements of effective and collaborative leadership

Interventions for prevention of COVID-19 using Logic Model Type III (derived from Mills, Lawton & Sheard, 2019).



DISCUSSION

This type III model uses disease prevention focusing on hospitals and old age homes. This model can be applied to develop disease prevention in population levels too. This model is centered on three domains of executive, operational and clinical. The executive domain can be enhanced to develop prevention and protection programs at a macro level or population level. The operational domain could be enhanced to develop prevention and protection programs at big hospitals or at a mesolevel. The Clinical domain can be enhanced to develop

prevention and protection programs at a microlevel. Resources, activities, outputs and outcomes are assessed in all the three domains and applied in this simulated Type III logic model scenario of Covid-19 prevention and protection

CONCLUSION

There is a high potential to improve the effectiveness of current public health programs by using innovative logic models like Type III logic model by replacing previous older logic models.

Epidemiology of communicable diseases (like in case of Covid-19 pandemic) is constantly changing and evolving. This points towards the need of updating current models and designing new models embracing the evolving new epidemiological patterns. Designing new programs with innovative logic models like Type III models could serve as cornerstone in strengthening our public health programs at population level. This could enhance future population health characterized by reduced rates of incidence, prevalence, morbidity and mortality. Additionally, this innovative and contemporary logic model could support in planning for mitigating risks of future pandemics.

Declaration by Authors

Ethical Approval: Not Applicable

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Public Health Ontario. (2016). *Focus on: Logic Model - a Planning and Evaluation Tool* (pp. 2–12). https://www.publichealthontario.ca/-/media/documents/f/2016/focus-on-logic-model.pdf?sc_lang=en
2. Your guide to using Logic Models [Internet][cited 2024, April 7]. Available from: https://www.midlandsandlancashirecsu.nhs.uk/images/Logic_Model_Guide_AGA_2262_ARTWORK_FINAL_07.09.16_1.pdf
3. Focus On: Logic model-A planning and evaluation tool [Internet]. 2016. Available from: https://www.publichealthontario.ca/-/media/Documents/F/2016/focus-on-logic-model.pdf?rev=eb9525494b4f421eabfc78cf356582ca&sc_lang=en
4. W.K. Kellogg Foundation. Logic Model Development Guide [Internet]. wkkf.issuelab.org. 2004. Available from: https://wkkf.issuelab.org/resource/logic-model-development-guide.html
5. Ebenso B, Manzano A, Uzochukwu B, Etiaba E, Huss R, Ensor T, et al. Dealing with context in logic model development: Reflections from a realist evaluation of a community health worker program in Nigeria. Evaluation and Program Planning. 2019 Apr;73:97–110. Available from https://doi.org/10.1016/j.evalprogplan.2018.12.002
6. Savaya R, Waysman M. The Logic Model. Administration in Social Work. 2005 Feb 9;29(2):85–103. Available from https://doi.org/10.1300/J147v29n02_06
7. Chun H, Yoon K, Kim H, Cheon E, Ha J, Tak S, et al. Generic Logic Model for Coronavirus Disease-2019 Responses Based on the South Korean Experience. Risk
8. Management and Healthcare Policy. 2021 Nov; Volume 14:4765–74. Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8630429/
9. Mills T, Lawton R, Sheard L. Advancing complexity science in healthcare research: the logic of logic models. BMC Medical Research Methodology. 2019 Mar 12;19(1). Available from https://doi.org/10.1186/s12874-019-0701-4
10. The Compass for SBC. (2023, November 3). *How to Develop a Logic Model - The Compass for SBC.* https://thecompassforsbc.org/how-to-guide/how-develop-logic-model-0
University of Kansas: Developing a logic model or theory of change-Community Tool Box. (n.d.). https://ctb.ku.edu/en/table-of-contents/overview/models-for-community-health-and-development/logic-model-development/main.
11. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, Moore L, O'Cathain A, Tinati T, Wight D, Baird J. Process evaluation of complex interventions:

medical research council guidance. BMJ. 2015;350:1258.
12. Fletcher A, Jamal F, Moore G, Evans RE, Murphy S, Bonell C. Realist complex intervention science: applying realist principles across all phases of the medical research council framework for developing and evaluating complex interventions. Evaluation. 2016;22:286–303
13. Baxter SK, Blank L, Woods HB, Payne N, Rimmer M, Goyder E. Using logic model methods in systematic review synthesis: describing complex pathways in referral management interventions. BMC Med Res Methodol. 2014;14:62.
14. Belford M, Robertson T, Jepson R. Using evaluability assessment to assess local community development health programmes: a Scottish case-study. BMC Med Res Methodol. 2017; 17:70.
15. Cochrane. Developing Logic Models, Cochrane Infectious Diseases, Effective Healthcare Research Consortium, 2016

How to cite this article: Jasleen Kaur, Mehak Imran, Yashoodeep Gill, Tripad Bhanushali, Eby Aluckal, Abe Abraham. An innovative logic model design to produce high performing public health programs: focus on need-based functional model for effective management of COVID-19. *International Journal of Science & Healthcare Research.* 2024; 9(4): 15-22. DOI: *https://doi.org/10.52403/ijshr.20240403*

******