“FORMATIVE RESEARCH” FOR SYSTEMATIC BEHAVIOR CHANGE PROGRAM DESIGN

L. Kharal*

* Terre des hommes (www.tdh.ch), Bluebird Complex, Tripureshwor
Kathmandu, Nepal (Email: lkharal@tdh.ch)

ABSTRACT

We carried out a formative research for developing a structured hand-washing promotion in three municipalities of Bardiya district of Nepal. The research comprised of baseline survey in randomly selected 600 households along with survey on behavioral factors of RANAS (risks, attitude, norm, ability, and self-efficacy) and qualitative assessment of behavioral determinants of barriers and benefits among the doers and non-doers of hand-washing. The survey, assessment and subsequent intervention design were guided by different aspects we found relevant from the following theories and framework: (i) stages of change; (ii) diffusion of innovation; (iii) user centered design; (iv) social marketing; and (v) behavioral economics. The following have been identified among others to be considered while developing the promotion program in close consultation with the target audience: (a) to work on Attitude and Norm (shown by RANAS survey); (b) emphasize hand washing after cleaning child's bottom and before feeding a child (shown by baseline survey); (c) promote hand-washing stations (as 92% now wash their hands at the tube wells only); (d) target reducing perceived barriers and increasing perceived benefits (from social marketing), nudging (a concept from behavioral economics) where possible; and (e) work with innovators and early adopters first (from diffusion of innovation). A two pager guide with objectives, overall strategy (including for communication) and activities has also been prepared for piloting and further adjusting the strategy before scaling it in a larger area mobilizing a wider stakeholders (such as municipalities, health-posts and schools) and using mass communications and broader distribution channels.

KEYWORDS: BCC; Behavior and Social Change Communication; Social-Marketing; RANAS

INTRODUCTION

Terre des hommes (Tdh) under its SAFA project funded by Solaqua foundation carried formative research for developing a basis for behavior change intervention on “hand-washing with soap”. The research and subsequent program for piloting was based on the following theories and approaches related to Behavior Change: (a) stages of change; (b) diffusion of innovation; (c) RANAS behavioral factors; (d) behavioral economics; (e) user centered design; and (f) social marketing. These different theories and approaches have been found to be fitting into a comprehensive approach able to address all the aspects of programming. The initial field work comprised of the survey of 600 household from 12 to 18 January 2019 in the three municipalities (Badhaiyatal, Bansgadi, Barbardiya) of Bardiya district of Nepal along with qualitative assessment. Based on these a framework for piloting the hand-washing with soap program before scaling into a larger are have been developed. The paper also presents basis information on the different theories and approaches to behavior change adopted highlighting how they have been relevant along the methods and outcome of the field work and the outline of the framework for piloting the intervention.

BEHAVIOR CHANGE THEORIES AND APPROACHES APPLIED

Different theories and approaches applied are briefly presented in Table 1 with their relevance in the assessment and intervention design. The relevance varies from (a) context understanding (that enabled context specific questions to be asked to the target group) in case of “stages of change” and (b) basis for broader approaches such as with “social marketing”, to the (c) use in behavioral factors survey question formulation and direct reference for communication strategy in case of “RANAS” framework. The implication of (d) “behavioral economics” is found to be as an alert to be watchful for ‘some simple and unexpected interventions’ beyond the realm of traditional rational economic models that may be found to work very well. (e) “Diffusion of innovation” guided in the adoption of the strategy to begin working with the innovators and early adopters before scaling the intervention in a larger area using (f) “social norm”. Finally (i) “Design Thinking for user-centered-design” provided a framework for incorporating the needs and aspirations of target group and elements of innovative design in a structured way.

Table 1 Behavior Change Theories and Approaches applied

Theory/Approach	Relevance
<p>1 - Stages of change Suggests stages people go through during behavior change (Lee et al 2011): (1) Pre-contemplation; (2) Contemplation – when people acknowledge that they have a problem and begin to think about solving it; (3) Preparation; (4) Action – when the behavior and its surroundings are changed; (5) Maintenance; and (6) Termination – where the real change takes place.</p>	Understanding the target audience’s context and formulating relevant questions during “barrier” and “benefit” analysis ⁱ .
<p>2 - Diffusion of Innovation The population is divided into the following five groups based when a new behavior is adopted (Rogers, 1982; Lee et al 2016):</p> <p>(1) Innovators – 2.5% of the innovative-minded who first adopt the behavior; (2) Early adopters –13.5% that follow the innovators by the intrinsic value of the innovation; (3) Early majority – 34% of the population that follow the early adopters out of their need to match and imitate; (4) Late majority – that jump on the bandwagon; and (5) Laggards – the last group to adopt following suit.</p>	Used in the strategy on facilitating the propagation of the behavior, working with the innovators and early adopters first (similar in analogy to picking low hanging apples first) and then moving to early majority followed by the late majority and the laggards.
<p>3 - RANAS framework Based on theories at the individual level proposes the following five factor blocks to be relevant in WASH (Mosler, 2012): (a) Risk – understanding of the vulnerability, severity and how one could get the disease associated with a behavior; (b) Attitude (c) Norm – social pressure because of the perception of behavior performed by, and approved or disapproved by others; (d) Ability and (e) Self-regulation.</p>	-Design of survey questions on behavioral factors (given in Figure 2) - Communication strategy (given in Figure 3)
<p>4- Social norm As individuals in group/society behave following social norms (a factor in RANAS) its role in influencing behavior is very powerful. In sanitation, whereas social norms have been influencing open defecation, the Community-Led Total Sanitation (CLTS) has successfully used social mobilization techniques to move communities from ‘open defecation’ social norm to ‘universal latrine use’ (Devine, 2009). A social norm is formed due to an expectation about appropriate behavior in a group context and it subsequently serves as standards for the individual’s perception and judgment (Rachel et al, 2015)</p>	Priorities using “social norm” to influence others by exhibiting the new behaviors adopted by the innovators and early adopters while scaling up the intervention.

Theory/Approach	Relevance
<p>5 - ‘how we think’ from Behavioral Economics</p> <p>In addition to rational thinking humans also use the automatic ‘intuitive’ mode of thinking using simple thumb-rules (heuristics) when decisions are made in situations where rational processing is not possible such as due of lack of information or time leading to biases (as in the adjacent figure in which if the dimensions are not given we are led to believe that the two table tops are of different dimensions). Primingⁱⁱ and or Nudgingⁱⁱⁱ are two phenomena related to such automatic mode of thinking that are found to have been applied in the design of behavior change interventions.</p>	<p>Alert us to explore simple interventions that may work well and test nudges such as: increase in hand hygiene by (a) citrus smell and picture of male eyes^{iv}; and (b) bright pathways with painted footprints leading to the hand washing station^v.</p>
<p>6 - Social Marketing Here behaviour change viewed to occur through an offer (intervention) which the target group finds valuable enough in exchange for the behaviour. In its simplistic form here we having assessed the barriers and benefits perceived try to reduce the barriers and increase the benefits for the behaviour through the four Ps (Product^{vi}, Place^{vii}, Price^{viii} and Promotion^{ix}) (Mohr, 2011).</p>	<p>To guide throughout the design, implementation and monitoring as the overarching approach.</p>
<p>7 - Design Thinking for user-centered-design Design Thinking methodology based on innovative ideation process helps us in bringing the human factor in our design process responding to deeper user insights enabling us to prepare solutions that are adopted by our target group. (IDEO, 2009)</p>	<p>Use of creative ideation process within the overall Social Marketing framework</p>

THE SURVEY AND BASELINE OUTCOMES

The 600 households surveyed in the three municipalities were distributed randomly in numbers proportion to the population of the wards of the municipality. A group of five households located in close proximity were surveyed together in a cluster. For this, 120 random points (cluster centers) were established by generating two random numbers for a cluster center (its x and y coordinates) in respective ward maps prepared by importing their GIS maps in Google earth. During the survey the enumerator accessed the cluster centers using GIS software on a smart phone. The survey questionnaire developed and administered in Kobo using smart phones collected information on the status-of-water, hygiene, sanitation, household characteristics and RANAS behavioral factors of – risks, attitude, norms, ability and self-efficacy - for “hand-washing with soap^x”. The behavioral-factor questions produced here in Box 1 were asked to the groups of respondents that qualified as “Doer” and “Non-doer” of hand-washing with soap.

Table 2 Doers Non-doers grouping for Hand Washing with Soap

Criteria for Doer and Non-Doer	group
(a) Combined score of hand washing with soap “after defecation” and “before eating” on scales 0 to 4 is > 5; and (b) there is water and soap at the hand washing place;	Doer with water and soap
(a) Combined score of hand washing with soap “after defecation” and “before eating” on scales 0 to 4 is > 5; but (b) there is no water and soap at the hand washing place;	Doer without water and soap
(c) Combined score of hand washing with soap “after defecation” and “before eating” on scales 0 to 4 is 5 or less.	Non-doer

Whether a respondent would be qualified as Doer or Non-doer was decided based on the criteria shown in Table 2. The questionnaire in Kobo was coded with these criteria and whether a respondent fell under doer, non-doer or in-between appeared in the enumerator’s Kobo app.

Box 1 Behavioral Factor (RANAS) Questions on hand-washing with soap

RISK FACTORS (R) (1) How likely do you think that you may get sick by not washing hands with soap before eating and after defecation? [scale 0 to 4]; 2) What diseases do you think you may get by not washing hands with soap before eating and after defecation? [Multiple choice with Other option]

ATTITUDE FACTORS (A) (3) Do you think that always washing hands with soap and water takes a lot of Time? [scale 0 to 4]; 4) Do you think that always washing hands with soap and water is effortful? [scale 0 to 4]; 5) Do you think that always washing hands with soap and water is Expensive? [scale 0 to 4]; 6) How much do you Like or Dislike always washing hands with soap and water? [scale -3 to 3 including 0]; 6.1) Ask what the respondent Likes or Dislikes as relevant; 7) What Concerns do you have with washing hands with Soap [multiple choice with Other option]; 7.1) Mention Other Concerns

NORM FACTORS (N) (8) How many of your relatives and or neighbors wash hands with soap regularly before eating? [scale 0 to 4]; 9) How many of your relatives and neighbors wash hands with soap regularly after defecation? [scale 0 to 4]; 10) How many of your relatives and or neighbors have always Soap and Water available at the HW place? [scale 0 to 4]; 11) Do you think that, overall, people who are important to you rather Approve washing hands with soap at HWSs or wash basin? [scale 0 to 4]; 12) Do you think that, overall, people who are important to you rather Dis-Approve washing hands with soap at HWSs wash-basin? [scale 0 to 4]

ABILITY FACTORS (A) (13) Do you know how the hands need to be washed with soap before touching food and after contact with feces or dirt? [multiple choice with the six hand washing steps]; 14) How confident is the respondent in making HWS with bucket and faucet? [scale 0 to 4]; 15) Does the respondent think that washing hands at HWS or at wash basin can facilitate easy and regular hand-washing than at the water source (such as tube well) itself? [scale 0 to 4]

SELF REGULATION (S) (16) How often does it happen that you forget to make your Hand Washing Place with soap and water ready for the day's hand washing? [scale 0 to 4]; 17) How committed do you feel to maintain Hand Washing Place intact with water and soap for the day's hand washing by all the members of your hh? [scale 0 to 4]

Survey result – hand washing prevalence

The gender segregated response report on current practice of hand washing with soap at five critical times (**before:** eating, preparing food and feeding child; and **after:** defecation, and cleaning child's bottom) on 0 to 4 scale (low to high) is presented in Table 3 and Figure 2.

Table 3 Hand washing practice at five critical times

Category	After defecation			Before eating			Before Food preparation			After cleaning child's bottom			before feeding child		
	F	M	T	F	M	T	F	M	T	F	M	T	F	M	T
0 (never)	2	2	4	4	7	11	4	3	7	7	5	12	7	7	14
1 (some time)	3	4	7	37	28	65	56	34	90	51	35	86	23	24	47
2 (about half of the time)	13	9	22	33	24	57	37	53	90	34	39	73	31	34	65
3 (most of the time)	40	36	76	78	93	171	81	82	163	63	62	125	46	52	98
4 (all the time)	256	235	491	162	134	296	136	114	250	118	102	220	106	92	198
Not applicable (no child)	x	x	x	x	x	x	x	x	x	41	43	84	101	77	178
Grand Total (no)	314	286	600	314	286	600	314	286	600	314	286	600	314	286	600
Weighted Total score	93%	94%	93%	78%	78%	78%	73%	74%	73%	71%	73%	72%	76%	74%	75%

Figure 2 Hand washing practice at five critical times

The weighted scores for the prevalence of hand washing are: 93% highest, for hand washing with soap after defecation; followed successively by hand washing before eating (78%), before feeding child (75%), before food preparation (73%), and after cleaning child's bottom (72%). Findings on hand washing place and materials are presented below and the important inferences from the survey as recommendations for intervention design are presented in Box 2.

Hand washing place: 92% of the respondents wash hands at the water points (hand pumps); 2% at the hand-washing-stations/wash-basin; and the remaining 5% used a combination of the two.

Number of hand washing places: there was 1 hand washing place in 93% of the households (tube wells mostly), 2 in 5% (31), 3 in 1 household and none in 8%. In 14 households that had more than one hand washing place, one hand washing place each was designated exclusively for washing after defecation and before eating.

Hand washing material at the hand washing place: soap and water were present in 90%, 80% and 88% of the hand washing places in *Badhaiyatal*, *Bansgadi* and *Barbardiya* respectively.

Box 2 Recommendations from the baseline survey

(1) Hand washing with soap after cleaning child's bottom (72%) is less frequent than washing after defecation in case of adults (93%); and before feeding the child (75%) is also less frequent than before eating by the adults (78%). On the contrary, exposure to children's feces could be more risky than exposure to adult's feces (World Bank and UNICEF, 2015); and contraction of disease by children are more serious than by adults. Thus promotion of washing hands with soap after cleaning child's bottom and before feeding a child should be prioritized. .

(2) Presence of convenient hand washing stations lead to more frequent washing of hands and as 92% of the people have to wash their hands at the tube wells itself, promotion of hand washing stations so that people have at least one more place to wash their hands in the household other than at the tube wells should be other priority of the intervention.

OUTCOME OF SURVEY ON BEHAVIORAL FACTORS

As shown in Table 4, the survey of RANAS behavioral factors was administered to 152 (136 +16) Doers and 37 Non-doers of hand washing with soap. The table also shows the prevalence of hand washing with soap within the two groups of doers and non-doers.

Table 4 Doer Non-doer Hand Washing prevalence score

Doer Non-doer category	Hand washing aggregate frequency score						N
	(a) after defecation	(b) before eating	(c) before food preparation	(d) after cleaning child's bottom	(e) before feeding child	(a b c d e) Aggregate	
Doers with water and soap	3.9	3.6	3.4	3.3	3.3	3.5	136
Doers without water and soap	3.9	3.3	2.8	2.7	2.5	3.0	16
Non Doers	3.1	1.2	1.8	1.6	1.7	1.9	37
Score range	0-4	0-4	0-4	0-4	0-4	0-4	x

The outcome of analysis of data obtained on RANAS behavioral factors is summarized in Table 5 with the differences in the scores for the behavioral factors between the Doers and Non-Doers. Here the question on Descriptive Norm (norms that simply describe what people in a group do) was asked on hand washing before eating and after defecation and presence of soap and water at the hand washing place; and question on Injunctive Norm (norm that describes what people in a group should do) was asked on hand washing station or wash basin with water and soap. This was to obtain a balance between the hand washing behavior and hand washing place and material (water and soap), the latter (hand washing place and material) being a determinant and a proxy indicator of hand washing. From Table 5 (and its graphical representation of Figure 4) the top five factors of greater intervention potential (those with high percent difference between the Doers and Non-doers) are: (a) ATTITUDE: expensive – 69%, effortful – 63%; (b) DESCRIPTIVE NORM: Hand washing before eating – 37%; Presence of soap and water at the hand washing place – 36%; (c) SELF-REGULATIONS: commitment – 31%. These are the factors that must be prioritized during the intervention design.

Table 5 Behavioral Factors (RANAS) score difference between Doers and Non-Doers

Category	N	Risk Vulnerability	Attitude				Norm – Descriptive			Norm-injunctive		Ability making HWS*	Self-regulation	
			Time taking	Effortful	Expensive	Like	HW before eating	HW after defecation	Soap and Water	Approve HWSs	Dis-Approve HWSs		Remembrance	Commitment**
Washers with water and soap	136	3.2	1.1	0.4	0.7	2.5	2.9	3	2.8	3.2	0.9	2.2	3.6	3.2
Non-washers	37	2.7	1.4	0.6	1.1	2	1.8	2.2	1.8	2.4	0.8	1.7	2.6	2.2
Diff washer-non-washer	x	0.5	-0.3	-0.2	-0.5	0.5	1.1	0.8	1	0.7	0.1	0.5	1.1	1
Diff %	x	16%	-27%	-63%	-69%	20%	37%	27%	36%	24%	13%	24%	29%	31%

* With bucket and faucet; **to maintaining Hand Washing Place

Figure 4 Behavioral Factors (RANAS) sore difference between Doers and Non-Doers

QUALITATIVE ASSESSMENT OF THE BARRIERS AND BENEFITS

During the survey open questions were also asked to *non-doers* about what they perceived to be hindering them in washing hands with soap and making hand washing stations - the **barriers**; and to the *doers* on what they consider to be the **benefits** of washing hands and making hand washing place. Further, perceptions of **benefits** were also obtained from the *non-doers* by asking what they think they may get if they were engaged in the behavior. The barriers and benefits obtained are summarized in Table 6. N indicates the number of respondents.

Table 6 Barriers and Benefits (Subjective)

Determinant	Behavior	
	Hand washing	Making hand washing place
Barriers	lack of awareness-3; Cost-1; habit-1; Bothersome; old thinking and tradition ¹ -3; lack of capacity (N=5)	cost-11; not-needed -8; did-not-think/know-before-6; Laziness-5; habit-4; be-able-to-change-2; effort-1; need of proper place; awareness-2 (N=23)
Benefits (from Non-doers)	clean-hands-9; free from disease-6; health/healthy-life-4; wealth-1; get rid of smell from hands-1; free from germs -1 (N=13)	Ease in hand washing-3; time-saving-2; facilitates hand washing for children-1; demonstration of good practice; helps in habit-formation-3; free from disease-6; health-4 (N=12)
Benefits (from Doers)	free from disease -3; to be and feel clean (and beautiful)-2, satisfaction-1, prestige in the community-1; Health-1 (N=7)	Stops disease spread; one cannot be lazy to wash hands; Easy to wash hands, saves time, children can wash too, easy for relatives when soap and water are together (N=9)

¹ as people were not seen washing in the past

FRAMEWORK FOR PILOTING THE INTERVENTION

The pilot intervention design outline developed using the outcomes of the assessment and a positioning exercise carried out with the local team (from the assessment area) of enumerators engaged in the survey is presented in Figure 5. Beyond the elements taken from the assessment outcomes and concepts covered above (underlined) other important features of the framework have been taken from the positioning exercise and other concepts mostly from social marketing.

Figure 5 Framework for piloting “hand-washing with soap – campaign”

Target group: Mothers and household decision makers and influential people

Objectives:

- 1 – Increase knowledge that: (a) particularly the care givers of children should more frequently wash hands with soap particularly after washing a child’s bottom and before feeding a child; (b) as washing hands more frequently will not be possible if the hands are washed at the tube wells only, making additional hand washing place (hand washing station) with soap and water would make hand washing easy thus helping in developing habit of more frequent hand washing as well as saving time and water; and (c) The feces of children can pose more risk than that of adults.
- 2 – Target to increase (a) the number of hand washing places/stations with soap and water and (b) frequency of hand washing (particular after cleaning a child’s bottom and before feeding a child) than during the baseline

Activities with strategies:

- 1 – Provide Knowledge mentioned under objective 1 above and demonstrate how hand washing stations (“product” P of social marketing) can be made easily at low cost (after developing and testing relevant hand washing station models following users-centered design thinking process) – through community sessions.
- 2 – Assist the interested (innovators and early adopters) in making their plan for constructing hand washing stations and in working towards new habit formation of more frequent hand washing.
- 3 – Provide information on where the materials for making hand washing stations can be found easily at reasonable price (“price” P of social marketing) and if possible make arrangements for making them available in the community itself (“place” P of social marketing).
- 4 – Organize regular monitoring visits to provide necessary support and review the interventions.
- 5 – When the interested (innovators and early adopters) install new hand washing stations and begin using them, use their case to motivate others (as an emerging social norm) in the community. Alternatively use photo, video and data related to the public commitments made by the interested to influence others in the community.
- 6 – Mobilize influential people such as from health posts, schools, municipality in the dissemination of messages for installation of hand washing stations and more frequent hand washing (as emerging social norm). In the beginning such messages could be delivered verbally and with simple posters which later – after the target areas increases – could be replaced with more developed posters, photos, videos and mass communication events and activities (including internet).
- 7 – Reward publicly (social norm) those that have installed and brought into use new hand washing stations and committed to more washing of hands before feeding the child and after cleaning their bottom through influential personalities and disseminate messages relate to such events (captured through video and poster) to a wider audience.

The strategies to be followed while communicating on specific topics in the community during the piloting based on the behavior change techniques of RANAS framework (Mosler et al 2013) are presented in Table 7.

Table 7 Communication strategy on specific subjects

Subject	Communication Strategies
While providing the information that the “feces of children are more dangerous than that of adults”	<i>Personal risk information:</i> such as (a) giving qualitative and quantitative examples; and (b) letting people appraise their own susceptibility to lead to a discussion on their false beliefs about their vulnerability.
Those having the belief that making “hand-washing station with soap and water” takes effort and is costly.	<i>Provide Cost and benefit information.</i> <i>Use of Persuasive attributes:</i> such as (a) explanation of underlying novel and important information that have been found to be of high positive value for the target group; (b) giving opportunity to talk to others in favor of the relevance of hand-washing station (while trying to convince others the person herself or himself is subject to self-persuasion)
Those not liking this concept of making Hand-washing station and increasing the frequency of hand washing.	<i>Affective persuasion:</i> Assess the feelings of the group about performing the behavior and about the consequence of the behavior – and then try to present the behavior as pleasant and joyful acts or other award giving acts.

DISCUSSION AND CONCLUSISON

In this exercise we have been able to work on most of the important theories and approaches that exist related to behavior change and find their relevance to our intervention design from a programmatic perspective. We have been encouraged and have plans to further explore the subject while we implement it. We would particularly further explore the qualitative assessment of barriers and benefits which we believe could allow us to explore deeper the behavioral determinants building on those captured through RANAS survey. We would also explore potential partners to collaborate with particularly while scaling our learning in a larger area and for working on other relevant behaviors.

ACKNOWLEDGEMENTS

The author is thankful to (a) Terre des hommes (Tdh) for allowing and encouraging to explore this field of systematic evidence based behavior change approach; (b) Solaqua Foundation the donor of SAFA Water Project being implemented in Bardiya, Nepal under which this exercise was carried out, (c) the SAFA Water Project team from Tdh and GERUWA (our local NGO partner); and (d) John Brogan for his grammatical editing.

REFERENCE

- Daniel K (2011), *Thinking, Fast and Slow*; Penguin Random House, UK
- Dominic K et al (2015), “*Priming*” *Hand Hygiene Compliance in Clinical Environments*, American Psychological Association, Health Psychology, 2016, Vol. 35, No 1, 96-101.
- Dreibelbis R, Kroeger A, Hossain K, Venkatesh M and Ram P K (2016) *Behaviour Change without Behavior Change Communication: Nudging Hand-washing among Primary School Students in Bangladesh*; International Journal of Environmental Research and Public Health
- Dough McKenzie-Mohr (2011), *Fostering Sustainable Behaviour, An introduction to Community-Based Social Marketing*. New Society Publishers
- IDEO (2009) *Human Centered Design Tool Kit*
- Devine J (2009), *Introducing SaniFOAM: A Framework to Analyze Sanitation Behaviors to Design Effective Sanitation Programs*. Water and Sanitation Program, World Bank
- Lee N.R and Kotler P (2011) *Social Marketing Influencing Behaviours for Good*, Fourth Edition, SAGE Publications, Inc.
- Lee N.R and Kotler P (2016) *Social Marketing Changing Behaviours for Good*, Fifth Edition, SAGE Publications, Inc.
- Mosler H-J (2012) *A systematic approach to behaviour change interventions for the water and sanitation sector in developing countries: a conceptual model*, a review, and a guideline (Eawag, Swiss Federal Institute of Aquatic Science and Technology) International Journal of Environmental Health Research.
- Mosler H-J, Huber A, Inauen J, and Tobias R (2013) *A guideline for behavior change*, Eawag, Switzerland.
- Rachel I M and Crandall C S (2015), *Social norms and social influence*, Current Opinion in Behavioral Sciences 2015, 3:147–151; ScienceDirect.
- Rogers E M, (1982) *DIFFUSION OF INNOVATIONS* - Third Edition, Collier Macmillan Publishers, London.
- Thaler R H and Sunstein C R (2008); *NUDGE Improving Decisions About Health, Wealth, and Happiness*; Yale University Press New Haven & London
- World Bank and UNICEF (2015) *Management of Child Feces: Current Disposal Practices*

ⁱ For examples while identifying barriers related to hand washing station making the question could be (a) “what do they think you have to give up to make a hand-washing station?” in case the respondent is in a pre-contemplation stage; (b) “what concerns do you have regarding hand washing station?” in case the respondent is in the contemplation stage; and “why did you quit using hand washing stations?” in case the respondent had slipped down after trying in the past.

ⁱⁱ Priming happens when some subtle influences increase the ease with which certain information comes to our mind. For example recently seeing or hearing the word EAT is temporarily more likely to influence completing the word fragment SO...P as SOUP than as SOAP. The opposite would happen, if instead one has just seen or heard the word WASH. This is priming. The idea of EAT primes the idea of SOUP, and that of WASH primes SOAP (Thaler, 2008). Beyond language, humans can also be primed as follow: (a) *Priming by events one may*

not be aware of (such as an image of eyes looking directly at the observer posted above the price list of “self-help and self-drop the price in honey box” coffee machine led to collection of more money compared to when the image was that of flowers (Daniel 2011); (b) Priming by simply by asking (accentuated by further asking when and how); and (c) Priming by simply making certain objects visible and salient.

ⁱⁱⁱ The word “nudge” introduction by *Thaler* (2008) is for a small and apparently insignificant detail that impact people’s behavior by leading the focus and attention of users in a particular direction we want. Some simple environmental cues or any priming interventions can be instrumental in nudging people towards desired behavior.

^{iv} Increase in frequency of hand hygiene gel use due to the presence of citrus smell and placing of “male eyes” over the hand gel dispenser at a teaching hospital in Miami, Florida (Dominic *et al*, 2015).

^v Increase in frequency of hand washing due to paved pathways painted in bright colors with footprints connecting the latrines to the hand-washing station with handprints on it - in a test in Bangladesh (Dreibelbis *et al* 2016).

^{vi} Product - can be a combination of: expected benefits from washing hand with soap; the act of hand washing, hand washing stations, soap and water; and additional tangible objects and or services we offer.

^{vii} Place – include where and when the target audience will perform the desired behavior, acquire any related goods and receive any associated services.

^{viii} Price - can include monetary costs (such as cost of soap, water and hand washing station), monetary incentives (such as discount coupons for hand washing station for the poor), monetary disincentives (such as fines), non-monetary incentives (such as public recognition), and non-monetary disincentives.

^{ix} Promotion includes communication strategies through the combination of messages, messengers and communication channels including creative elements such as logo, taglines and graphics

^x RANAS survey was also administered for the behavior of “household water treatment” but this paper being about hand washing, other aspects of the study are not covered here.