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Towards Elimination of Maternal and Neonatal Tetanus in the Developing Countries: A Look at the Theory of Planned Behavior

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Abstract: To achieve the global maternal and neonatal tetanus (MNT) elimination, it is vital to develop an ideal theoretical framework that can be used for the disease elimination. The theoretical framework for this review is the Theory of Planned Behaviour (TPB), a modified model of the Theory of Reasoned Action (TRA). The TPB was meant to be applied to the prediction of purely volitional behaviors, and to help understand the psychological determinants of individuals. The TPB shows that the intention of human beings to perform a particular behavior and the conduct of that behavior are based on belief structures and determined by three independent constructs: attitude toward the behavior, perceived behavioral control, and subjective norms to perform the behavior. In relating TPB to the predictive model of NNT, there are various determinants of preventive behavioral intention among the women towards NNT. The beliefs of pregnant women on the outcomes of their pregnancies after they attend antenatal care, receiving tetanus toxoid (TT) vaccination and delivering in a hospital setting are all dependent on how the women value these which likewise determine their attitudes toward receiving a TT to prevent their unborn child from NNT.

Keywords: Neonatal Tetanus, Theory of Planned Behavior, Immunization, Antenatal Care Services

1. Introduction

It all started in 1988, when the WHO estimated that there were around 787,000 newborns deaths as a result of Neonatal tetanus (NNT), which indicates 6.7 deaths per thousand live births as an estimated proportionate mortality rate due to NNT[1]. This figure shows the high magnitude of NNT in global neonatal mortality. It is this alarming statistics that the 42nd World Health Assembly (WHA) held in 1989 called for the elimination of maternal and neonatal tetanus (MNT) by 1995[1], which was later reviewed to 2000, and subsequently 2015. Additionally, the NNT elimination strategy received another endorsement in 1991 at the 44th WHA[1].

There is no doubt that several efforts have been made towards improving the health of children across the globe, with notable results; this, however, is far from over as the developing countries are still having enormous challenges with high infant and neonatal death rates. It is estimated that 4 million out of the 10 million annual deaths of children under the age of 5 years across the globe, occur within the first 28 days of life of these children[2-4]. Importantly, two third of the neonatal deaths are preventable as are as a result of vaccine-preventable diseases, prematurity, and birth asphyxia. Sadly, 99% of these deaths are seen in the low and mid-income countries of the world[2-4].

The Theory of Planned Behavior (TPB) as a theoretical framework is a modified model for the Theory of Reasoned Action (TRA) that was meant to be applied to the prediction of purely volitional behaviors, and to help understand psychological determinants of individuals[5]. The TRA assumes human beings that behave in a rational manner also make systematic use of the information within their reach. The TRA also observes that most of the actions of subjects are built on volitional behaviors; thus suggesting that the intention of a person on performing or not performing a certain behavior determines his action. It implies that an

individual's intention depends on two essential determinants: the first is an attitude towards individual's behavior, which is vital in the evaluation of positive or negative attributes of the individual in performing the behavior; the second determinant is the perception of the social pressures on the person on performing or not to performing the behavior under study[5].

2. Historical Perspective of the Theory of Planned Behavior

In 1985, the TRA was later expanded to TPB with the addition of the concept of perceived behavioral control[6]. The expansion was because of the observation that many behaviors are not under complete volitional control[6]. The TPB aims to address some of the inadequacies of the TRA especially when dealing with uncompleted volitional control[7]. Thus, the emergence of TPB serves as a means of providing a framework that is better in understanding actions of the subjects more than the TRA. Additionally, the TRA/TPB highlights individual motivational factors that are considered key elements to the likelihood of performing an exact behavior focusing on the theoretical concepts[8]. Additionally, the TRA/TPB can predict the number of different health related behaviors to explain the variance in behavioral intention, and can also explain individual's social behavior using "social norm" as a variable.

3. The Theory of Planned Behavior

The TPB significantly emphasizes on how behavioral intention of humans can be carried out. TPB helps researchers to understand the distinction between what an individual intends to do and what the individual will do. It is often, expected that people will perform a particular behavior when they plan to attempt once again more especially when they believe to have control over it; this is notwithstanding the fact that behavioral intentions and expectations could differ based on the situation. Furthermore, the behavioral intentions of humans do change upon realizing that they do not entirely have the volitional control of their behavioral goal. Additionally, the actual behavior of individuals could be predicted more accurately based on their behavioral expectations better than their behavioral intentions[5].

Thus, both the TRA and TPB entails that the decision of each to perform a particular behavior is grounded on information available from external and internal sources. Accordingly, TPB shows that the intention of human beings to perform a particular behavior and the conduct of that behavior are determined by three independent constructs that are based on belief structures: attitude toward the behavior, perceived behavioral control, and subjective norms to perform the behavior[8]. These behavioral determinants are based on three belief structures, namely: behavioral beliefs, normative beliefs, and perceived beliefs. The behavioral beliefs are beliefs on the behavioral outcome as well as the outcome evaluations; the normative beliefs are concerned with the normative expectations of others, and the approval/disapproval on the behavioral performance, and perceived beliefs are concerned with the perceived factors, which impact on the easiness or difficulty of the performance of the behavior[8].

3.1. Attitude to Behavior

The first determinant of behavioral intention of an individual is the attitude. The measure of attitude also determined by behavioral beliefs, can be done using perceived positive as well as negative of performance of a particular behavior[9]. It underscores the fact that when an individual feels that the outcome of performing a particular behavior will turn out to be positive, the person will have a positive attitude towards performing that behavior. Additionally, if an individual feels that performing a certain behavior will turn out to be negative, the person will state the negative behavior that comes with that action[5].

Furthermore, the behavioral attempt of an individual is dependent on the several factors that include personal and external; this could influence control over a person's behavior. Thus, it is clear that using TPB, the determinants of an individual's attitude towards performing the behavior is different; an example to this is that the attitude of a person towards behavioral trial and success often differs from the attitudes towards behavioral trial and failure[5]. However, respective and subjective probabilities of the events could be used to weight these ideas. Once again, attitude towards the success and failure of behavioral attempts could also serve as the determinant of the beliefs of individuals. Hence, attitude could be regarded as a function of significant beliefs vis-à-vis the probable effects of success or failure in the behavioral performance. In absolute terms, and where success is discreetly assumed, these beliefs are more to do with performing a volitional behavior. In contrast, these beliefs are unlikely when looking at a person's thoughts; this is more so when the behavior is seen as failed performing volition[5].

3.2. Subjective Norm

This is the second determinant of a person behavioral intention. The subjective norm is considered an individual's perception of getting approval or disapproval in the performance of behavioral intention[8]. Importantly, subjective norm is determined by the individual's normative beliefs concerning a perceived social pressure from significant others; this motivates the behavior of an individual to be able to meet the expectations of the significant others. Additionally, if the significant others perceive a certain behavior to be negative, then the individual would state a negative subjective norm, in an effort to achieve their anticipations[8].

In the subjective norm, there is a need to underscore the fact that the referent factor is vital as it is serves as

recommending an effort for people to approve the behavior and believe on the likelihood of succeeding the effort[8]. Also, attempts to understand the determinants of subjective norm would require a person to elicit salient normative beliefs, which regards specific referents; this multiplies the behavior of a person with the corresponding motivation to comply with it[8].

3.3. Perceived Behavioral Control

This is the third determinant of the TPB. The concept of perceived behavioral control denotes appraisals of people's ability to perform behavior[6]. This construct aims to predict not behavioral intention but also when the perceptions of control by people correctly matches their control over the behavior. Thus, this should reflect the person's actual performance of the behavior. The perceived behavioral control reflects the actual behavioral control of a person. Additionally, perceived behavioral control is also underlined by control beliefs of factors (external or internal), which may inhibit or smoothen performance of the behavior; these factors include perceptions of barriers, inhibitions, talents, resources, and opportunities[6,10]. The perceived behavioral control also serves as part of the beliefs of individuals regarding the difficulty or easiness of performing a behavior[8].

People are more likely to perceive a high degree of behavioral control when they perceive they have access to the essential resources and opportunities with no obstacles towards performing the behavior[11]. It was observed that its perceived power weights each control factor in facilitating or inhibiting performance of the behavior by a person; this shows that perceived control often work in tandem with behavioral performance. However, this perception gets stronger when the perceived control tallies with a good reason for the actual control[8].

The need for people work on "self-efficacy" will support assessing the relationships of perceived control and behavioral performance towards overcoming certain phobias or strong habits[12]. Although there are differing views on evaluating the power of factors that could facilitate or inhibit performance of the behavior, this should be weighted by the frequency of their occurrence[11,13]. However, other researchers suggested that both constructs should be measured and that there is a need to distinguish perceived control over behavior (that is a variant of perceived behavioral control) from perceived confidence in one's own ability to perform the behavior (i.e. self-efficacy) [14]. The TPB considers the influence of the past behavior on present behavioral performance. The past behavioral performance of a person often has an influence on the present; this is independent of these constructs (behavioral intentions, attitudes, subjective norms, or perceived behavioral control). The past behavioral performance has an effect on the present behavior especially when somebody has complete control and deals with a volitional behavior[8].

4. Relating Theoretical Framework with the Research

The TPB as a theoretical framework has been used to predict a number of different human behaviors. Through the use of three predictors (attitude, subjective norm and perceived behavioral control), the TPB shows that the determinant of human behavior is the intention to perform the behavior[8]. Applying TPB to the predictive model of NNT, there are various determinants of preventive behavioral intention among the women towards NNT. The beliefs of pregnant women on the outcomes of their pregnancies after they attend ANC, receiving tetanus toxoid vaccination and delivering in a hospital setting are all dependent on how the women value these which also determine their attitudes toward receiving a tetanus toxoid vaccine to prevent their unborn child from the NNT[15]. Furthermore, the belief of women about their significant others also forms the subjective norms of women towards receiving the tetanus vaccination to serve as a means of protecting them as well as their unborn children. Additionally, the beliefs of a woman under the external and internal factors on whether to perform behavioral success forms the basis of the woman's perceived behavioral control regarding getting vaccinated with the tetanus toxoid to prevent them and their unborn children from the NNT[15].

In the assessment of perceived behavioral control vis-à-vis predictive intention and behavior in people, it was observed that to predict perception of control has significant contribution to intention towards reducing high risk behaviors[15]. It was also found that not all behaviors of humans that respond to certain actions that could be influenced by perceived behavioral control; this is because the behaviors of humans could occasionally be in the form "incomplete volitional control." Thus, applying TPB could help explain that the point that, through internal or external control factors, people could be faced with difficulties or feel ease to perform the behavior; this calls for the need to assess how perceived behavioral control is related to specific problems[6].

The TPB enable researchers understand their beliefs on the outcome of the pregnancies when they get vaccinated with tetanus toxoid during antenatal clinic visits; how they value getting vaccinated with the tetanus toxoid; and their attitudes towards vaccination with tetanus toxoid in preventing them and their unborn children from NNT. This theoretical framework would help to build a framework that would help ascertain key behavioral, normative, and control beliefs that affect behaviors; this would again help to design interventions that target women of childbearing age to change their beliefs on ANC and tetanus toxoid vaccine. It also helps to affect their attitude, subjective norm, or perceived control that changes their intentions and behaviors[8].

5. Theoretical Constructs

In TPB, the three main theoretical constructs that act

through a causal chain linking behavioral beliefs, normative beliefs, and control beliefs to behavioral intentions and behaviors are attitudes, subjective norms, and perceived control[16].

The role of women in a societal context as related to getting vaccinated with the tetanus toxoid to prevent NNT is that they are seen as a mother to the children, and wife as well as a household keeper to her husband. So, women are considered the backbone of every family circle. The contribution of women does not end at that, but they also contribute towards the upkeep of the family through some little income from trading, fetching water to cook for the family, washing her husband's clothes, as well as farming especially in some rural communities[16]. It is not surprising to see that the role of a woman changes based on the cultural norms. In spite the wind of social change blowing across the globe, the actual power in the family rests in the hands of the husband taking final decisions on issues that affect the family. Furthermore, women especially in the African culture are dependent on their husbands as they have little opportunity to study western education as men; this contributes to their lack of knowledge on issues that relate prevention and control of diseases[16,17].

In the developing countries especially the sub-Saharan African region, decision on health matters is the responsibility of the husband and not the wife thus putting some social constraints on a woman. The decision to visit the hospital when a woman is sick or to attend ANC services when pregnant is the sole responsibility of the husband thus making it difficult for women to get tetanus toxoid vaccines to protect themselves and their unborn children[18]. The theoretical constructs should underscore the strong influence of the social variables on health behavior of women, and that when women migrate to a new environment, there is possibility of them creating new social structures to suits them. Thus, when there are different social practices, the behavior of the woman changes as well.

6. The Intention of Women Towards Tetanus Toxoid Vaccine towards The Prevention Of NNT

The TPB construct shows that the intention of an individual is the immediate antecedent of behavior; this indicates that intentions can predict behavior. The TPB underscores the relationships amongst these constructs: belief, attitude, subjective norm, perceived behavioral control, and behavioral intention; these are very distinct in comparison to those factors, which determine the possibility of conceding the behavioral intention. In the study conducted in Istanbul, the capital of Turkey, the outcome showed that 94(94.9%) of the 99(100%) women plan to receive tetanus toxoid vaccination in their next pregnancies; this is indeed a remarkably high number of women, which hitherto was not the case[16]. However, the intention of these women was to prevent their newborn from getting NNT.

7. The Attitude of Women Towards Tetanus Toxoid Vaccine towards The Prevention Of NNT

The attitude of women towards having the tetanus toxoid vaccine to prevent their newborn from the NNT is a representation of their orientation towards the behavior as well as their readiness in responding to the behavior on getting the tetanus toxoid vaccine as a means of preventing their newborn children against the NNT. It is clear that there are different theoretical constructs through which attitude is measured. Using the TPB, attitude could be measured by combining outcome beliefs, outcome evaluation as well as perceived outcomes of the performance of a specific behavior whether positive or negative[18].

7.1. Perceived Negative Outcome of Vaccination with Tetanus Toxoid to Prevent the Newborn from Tetanus

Several literature shows that women refuse to get the tetanus toxoid vaccination because of their negative perception that the vaccine has some associated risks for their unborn child. In another that involved 1,176 clinically recognized pregnancies, it was observed that nearly 176 would result in miscarriages and that in the remaining 1,000 live births, 30–60 (3–6%) would have congenital anomalies[19]. This could explain the negative perception of the several women from the rural areas that the tetanus toxoid vaccination is the cause of their miscarriages. This explains some of the difficulties in having a positive attitude among some of these women to get the tetanus toxoid and protect their unborn children from the NNT. Similarly, women with fear against vaccine preventable diseases often get vaccinated, while women that have negative feelings about vaccine safety are unlikely to get vaccinated[20].

Furthermore, some pregnant mothers have fear on the vaccine side effects as a means of population control by rendering them infertile; the resultant negative effect of these mothers refusing the tetanus toxoid vaccines and further spreading rumors that tetanus toxoid vaccination would render the population infertile. Ironically, this phobia is more pronounced in women who are sub-fertile or have secondary infertility. Also, the method of the health promotion campaigns employed during some of these programs sometimes adds to these negative attitudes[21].

Other reasons for women refusing the tetanus toxoid vaccines are the immediate side effects such as soreness and pains at the injection site, anaphylactic reactions though rare but could be fatal[22]. These side effects could also be considered as barriers linking attitudes to getting vaccinated with the tetanus toxoid vaccine prevent NNT.

7.2. Perceived Benefit of Vaccination with Tetanus Toxoid as a Means of Prevention of NNT

There is no doubt that the tetanus toxoid vaccine has saved the lives of millions of newborns across the globe since the commencement of the global NNT elimination game plan[23].

It was estimated that between 1995 and 1996 in across 320 of the 560 countries, there was an estimated coverage of 80% (with at least two doses) of the tetanus toxoid vaccines in about 23 million women aged 18–35 especially in the developed countries[23,24]. The extensive tetanus toxoid vaccination coverage that saved the lives of millions has resulted in a positive attitude of women towards their behavior to have the tetanus vaccine as a means of prevention against NNT.

Furthermore, it is a government policy that tetanus toxoid is administered freely to all women of childbearing age; this also makes women develop the habit to perform behavioral intention towards getting vaccinated with the tetanus toxoid against the NNT.

8. The Subjective Norm of Women to Have Tetanus Vaccination to Prevent the Unborn from NNT

As assumed in the TPB, the subjective norms are a function of normative beliefs; this is the belief of a person that an individual or a group thinks whether a person should perform or not perform the behavior. This theory further showed that to an extent, subjective norms could determine intentions. On the question of existence of any relationship between behavioral intention of a woman to get vaccinated with the tetanus toxoid to protect her unborn child from disease, it is clear that women who are approached with the information are more likely to indulge in the vaccination practice much more than those that lack the information[18].

It is on record that in the developing countries of especially sub-Saharan Africa, culture and illiteracy are contributing factors to women not attending ANC services to get tetanus toxoid vaccination. As a result of these cultural beliefs women, especially in the rural areas, depend on their husbands for their source of livelihood. These women, who had little or no western education, almost have no knowledge of methods of disease prevention and control; however, decisions on health matters are purely that of the husbands[18,24]. Thus, the behavioral intention of these women on getting vaccinated with the tetanus toxoid to prevent their unborn children against NNT is largely dependent on their husbands and in some cases their relatives; this has great influences in the intention of these women. This was supported by a study, which showed that the intention of women to get the tetanus toxoid vaccine as a means of protecting the unborn child against NNT was an issue because their husbands told them to avoid vaccinations as it results in sterility[18,24].

8.1. The Perceived Behavioral Control of Women to Tetanus Toxoid Vaccine to Prevent the Unborn from NNT

As highlighted in the TPB, perceived behavioral control means the degree of beliefs of an individual on how difficult or easy the person feels regarding performing the behavior. However, internal and external factors have great influence on people's ability to perform behavioral intention. As observed, perceived behavioral control can directly or indirectly have an impact on behavioral intentions[25]. There is a need to underscore the point that there are difficulties in the performance of women's behavioral intention towards the tetanus toxoid vaccination as a means of preventing NNT if they could not get adequate information from health care providers. In a study to assess the knowledge and behaviors of women of childbearing age in relation to tetanus toxoid immunization in a rural China, it was observed that women are unlikely to accept the tetanus toxoid vaccine if they lack the understanding of its benefits; this is because of the misconception that immunization could result in infertility or the mental status of the unborn child[26]. The need for medical personnel to have sufficient knowledge of NNT that can be shared with mothers should not be over emphasized.

Adequate explanation on the health benefits of tetanus toxoid vaccination and the ill side of NNT directly or indirectly impact on the behavioral intention of women towards getting vaccinated with the vaccine. In the event where the health worker could not provide a convincing explanation to mothers, the resultant effect would be non-compliance with the tetanus toxoid vaccination regimen. The lack of knowledge among women on NNT, tetanus toxoid vaccine, and doses required to confer immunity to them and their newborn children against NNT also inhibits them from getting vaccinated with the right vaccine[16].

It has been shown that the women often lack adequate information on NNT, the benefits of attending antenatal clinics to get tetanus toxoid vaccination, and delivering in a hospital setting. Furthermore, women also lack information on to care for the umbilicus of the newborn child. In an attempt to obtain behavioral intention of these women, there is a need to supply the necessary information on NNT and the advantages of the tetanus toxoid vaccine to all eligible women. Effective communication of the right message in a simple and easy to understand way to these women is key. These should be done through all available channels ranging from mass media, health workers, social workers, religious groups, and influential people in the community. This would build up the knowledge of these women on NNT and tetanus vaccine to have a good perception that enables them to perform their behavioral intention[27,28]. When women have the necessary knowledge, and information on NNT and their ability to practice delivery through hygienic ways, their behavioral intention towards getting vaccinated with the tetanus toxoid vaccine tends to be improved. There are studies that indicated women with the ability to practice hygienic delivery are more likely to get the tetanus vaccine as a preventive measure towards neonatal tetanus as compared to those who did not have the ability[28-30].

8.2. The Conceptual Framework

The conceptual framework suitable for a study that aims to prevent MNT in women of childbearing age is shown in Figure 1. This framework acts in a causal chain that links

behavioral beliefs, normative beliefs, and control beliefs to behavioral intentions and behaviors through attitudes, subjective norms, and perceived control[11].

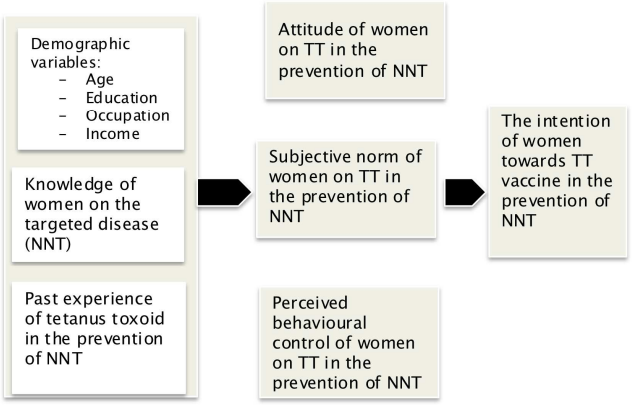

Figure 1. *Figure showing applicability of TPB as a conceptual framework in the prevention of NNT in women of childbearing age.*

The external variables, which are *demographic variables, the knowledge of women on NNT, and the past experience of tetanus toxoid in the prevention of NNT,* operate through model constructs without independently contributing to the likelihood of performing behavior; these variables are demographic variables, the knowledge of women on NNT, and the past experience of tetanus toxoid in the prevention of NNT.

9. Conclusion

This write-up was able to underscore the need for researchers to understand TPB and its applicability as the conceptual framework of choice in research studies on vaccine preventable diseases such as the NNT. The TPB is key towards understanding the participant's *attitude to behavior, subjective norm, and perceived behavioral control in* research studies on vaccine preventable diseases. Thus, selecting TRA and TPB towards NNT elimination as the framework of choice would help to understand the causal chain link of behavioral beliefs, normative beliefs, and control beliefs to behavioral intentions and behaviors through attitudes, subjective norms, and perceived control.

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