

From the Division of Global Health (IHCAR)  
Department of Public Health Sciences

Karolinska Institutet, Stockholm, Sweden

# **Evidence and context:**

## **Knowledge translation for newborn health in low-income settings**

Anna Bergström



**Karolinska  
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*Man måste ta ansvar för den övertygelse man består sig*

*One has to be accountable for the conviction one bestows upon oneself*

Edward Westermarck, Finnish philosopher (1862-1939)



# ABSTRACT

**Background:** Neonatal mortality (death within the first 28 days of life), presently accounts for 41% of the global burden of under-5 deaths. Estimates indicate that about two-thirds of the 3.1 million neonatal deaths could be averted with an increased implementation of existing evidence-based practices. Neonatal hypothermia, defined as body temperature  $<36.5^{\circ}\text{C}$ , contributes to the burden of neonatal mortality and can easily be avoided and managed by practicing delayed bathing and by applying skin-to-skin care of the newborn. However, neonatal care routines in many low-income countries do not yet adhere to these evidence-based practices. In addition, misconceptions - such as beliefs that skin-to-skin care enhances vertical HIV transmission and that early bathing is required continue to exist. These misconceptions further delay knowledge translation. The Promoting Action on Research Implementation in Health Services (PARIHS) framework is a conceptual framework that posits three interacting cornerstones: (1) Evidence, (2) Facilitation and (3) Context, that, taken together, influence implementation of new knowledge. Improved understanding of how contextual factors in healthcare organizations influence knowledge translation has led to the development of context assessment tools for high-income settings. There are no tools available for this purpose in low- and middle-income settings.

**Aims:** To increase the body of knowledge on thermal response in newborns and mothers to inform evidence-based clinical practices, explore perceptions around these practices amongst newly delivered mothers and, furthermore, to explore the perceived influence and relevance of factors in the organizational context on the implementation of evidence-based practices in low- and middle-income settings.

**Methods:** The studies employed both quantitative (I, III, V) and qualitative (II, IV-V) methods. Studies I-III were undertaken in Uganda and focused on generating evidence around thermal control of the newborn. Neonatal rectal and tympanic temperatures were measured at 5, 60, 70 and 90 minutes postpartum amongst 249 mother-newborns pairs. All newborns were subjected to skin-to-skin care. The pairs were randomized to either bathing in lukewarm water at 60 minutes ( $n=126$ ) or into continuous skin-to-skin care ( $n=123$ ) throughout the study period (I). In order to explore perceptions of skin-to-skin care, 30 purposively sampled women having participated in Study I were invited to participate in focus group discussions (II). In order to deepen the understanding of how skin-to-skin care affects the maternal temperature, maternal breast and axillary temperatures were assessed at fixed intervals postpartum whilst practising skin-to-skin care of the newborns (III). Studies IV-V focused on generating a better understanding of factors in the organizational context that influence the implementation of new knowledge. Focus group discussions and individual interviews were undertaken amongst health workers and managers in Uganda (IV) and content validity of available tools and developed items were assessed quantitatively and qualitatively amongst identified experts in Bangladesh, Vietnam, Uganda and Nicaragua (V). Descriptive statistics, chi-square test and logistic (I) and linear (III) regression analysis methods were applied to model the relationship between the dependent variable, temperature, and the explanatory variables. Content analysis was applied to the qualitative studies (II, IV-V). Rated content validity of context concepts were assessed by calculating content-validity index (CVI) (V).

**Results:** The effect of bathing resulted in a significant increase in point-prevalence of hypothermia at 70 minutes postpartum amongst newborns having been exposed to bathing compared to those who were not ( $p<0.001$ ). This difference amongst the two groups was sustained throughout the study period. Cultural beliefs and lack of knowledge were found to influence women's perceptions of skin-to-skin care (II). In study III, a rapid maternal thermal skin response was detected following the application of skin-to-skin care ( $p<0.0001$ ). In addition to the sub-elements of the context cornerstone in the PARIHS framework (leadership, culture and evaluation) we found that resources, commitment, informal systems and payment as well as community involvement were important aspects of context influencing knowledge translation low- and middle-income settings (IV-V). In study V, we found that all the assessed concepts were perceived as relevant and a total of 28/94 tested items were also rated as relevant (Item-CVI  $>0.78$ ).

**Conclusions:** Continuous skin-to-skin care reduces the prevalence of hypothermia but its application does not prevent the negative thermal effect of early bathing. There are misconceptions about thermal care of the newborn and there is a need to clarify how patient preferences are to be perceived as evidence in the PARIHS framework. In the studied healthcare settings, resources, community engagement and informal payment and commitment are relevant aspects of context, in addition to leadership, culture and evaluation, as suggested in the PARIHS framework. There is a need to adapt the PARIHS framework and tools to assess context and commitment to fit low- and middle-income settings.

**Keywords:** Neonatal hypothermia, newborn, knowledge translation, Uganda, PARIHS, context

# LIST OF PUBLICATIONS

- I. Bergström A, Byaruhanga R, Okong P. **Impact of newborn bathing on the prevalence of neonatal hypothermia in Uganda: A randomized, controlled trial.** *Acta Paediatrica* 2005; 94(10):1462-7
- II. Byaruhanga R, Bergström A, Tibemanya J, Nakitto C, Okong P. **Perceptions among post-delivery mothers of skin-to-skin contact and newborn baby care in a periurban hospital in Uganda.** *Midwifery* 2008; 24(2): 183–9
- III. Bergström A, Okong P, Ransjö-Arvidsson AB. **Immediate maternal thermal response to skin-to-skin care of newborn.** *Acta Paediatrica* 2007; 96(5): 655-8
- IV. Bergström A, Peterson S, Namusoko, S, Waiswa P, Wallin L. **Knowledge translation in Uganda: A qualitative study of perceptions among midwives and managers of the influence of contextual factors.** *Implementation Science* (Accepted September 2012)
- V. Bergström A, Tomlinson M, Squires J, Duc D. M, Hoa D. P, Källestål C, Persson L. Å, Pervin J, Peterson S, Nga N. T., Rahman A, Waiswa P, Zelaya E, Estabrook C, Wallin L. **Content validity assessment of the Alberta Context Tool and other concepts of organizational context in low- and middle-income settings.** *Submitted 2012.*

The publications and manuscripts will be referred to in the text by their Roman numerals (I-V).

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# LIST OF ABBREVIATIONS

AB	Anna Bergström
ANC	Antenatal care
COACH	Context Assessment for Community Health
FGD	Focus Group Discussion
I-CVI	Item-Content Validity Index
S-CVI	Scale-Content Validity Index (for the purpose of this thesis Scale is referred to as Concept)
LBW	Low birth-weight
MDG	Millennium Development Goal
NeoKIP	Neonatal Health - Knowledge Into Practice
PARIHS	Promoting Action on Research Implementation in Health Services
STS	Skin-to-skin
WHO	World Health Organization



# OPERATIONAL DEFINITIONS

Antepartum	Relating to the period before childbirth.
Context	The environment or setting in which the proposed change is to be implemented (in relation to knowledge translation).
Early neonatal death rate	Deaths amongst neonates occurring in the first 7 days of life per 1 000 live births.
Effectiveness	The impact an intervention has in ‘the real world’ under resource constraints, in a larger population than that studied.
Evidence	Sources of knowledge originating from research, clinical experience, patient preferences and locally derived information.
Facilitation	A technique by which one person makes things easier for others, achieved through support to help people change their attitudes, habits, skills, ways of thinking, and working.
Intrapartum	The period from the onset of labour to the end of the third stage of labour.
Knowledge translation	The synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people’s health.
Low birth-weight	Birth weight of less than 2 500 grams regardless of gestational age
Low-income, middle-income and high-income	Categorizations of wealth based on the gross national income per capita according to the World Bank. Low-income, GNI per capita of \$1 025 or less; middle-income, \$1 026 -12 475; and high income, \$12 476 or more.
Neonatal hypothermia	A body temperature <36.5°C.
Neonatal mortality rate	Deaths amongst neonates occurring in the first 28 days of life per 1 000 live births.
Neonatal period	The first 28 completed days after birth.
Perinatal period	Commences at 22 completed weeks of gestation and end at 28 completed days after birth.
Postpartum period	Although not officially sanctioned, traditionally the postpartum period is supposed to end at 42 completed days after birth.
Preterm birth	The birth of a baby of less than 37 completed weeks gestational age.



# PREFACE

This thesis is a product of my academic work over the last decade. It started with having the possibility to survey the prevalence of neonatal hypothermia within the first 90 minutes postpartum at San Raphael of St. Francis Hospital Nsambya, Uganda in the early 2000s.

After having calculated the mean temperatures and the prevalence of hypothermia amongst the newborns in this labour ward in the tropics, I found myself surprised to find that around 80% of newborns were suffering from hypothermia at 60 minutes postpartum<sup>1</sup>. My academic journey drifted through the experiences of where efforts to reduce the prevalence of neonatal hypothermia by introducing skin-to-skin care – that I, at the time, thought would be a smooth process – turned into a challenge. As the journey continued, it revealed an opportunity to visualize thermal changes in the maternal skin temperature through the use of infrared thermography. Maybe we could utilize the findings to convey convincing messages about the importance of skin-to-skin care to health workers, to pregnant women in the antenatal clinic and to newly delivered mothers?

As seen in Figure 1, infrared thermography makes it possible to see, and likely also possible to follow, the vasodilatation (seen as ‘white lines’ on the mother’s breast) occurring on the maternal chest, providing a strong visual element to support the findings. The un-published pilot study was undertaken at the neonatal unit in Akademiska Hospital, Uppsala, Sweden.

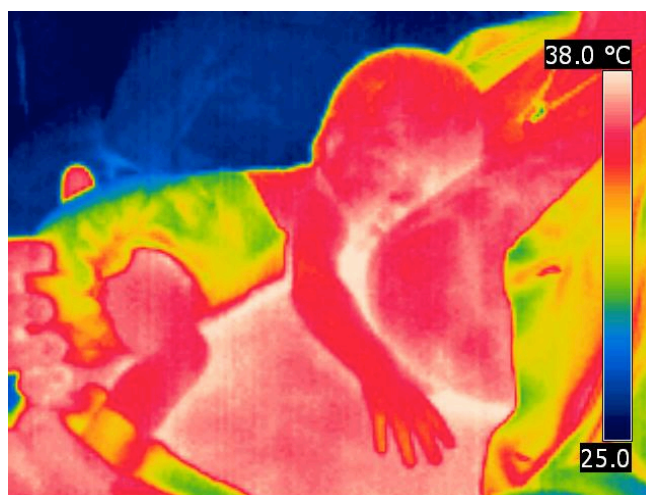


Figure 1: Thermal image of skin-to-skin care

Once back in Uganda, I was invited to participate in an ongoing study to improve neonatal health and survival. The project was partly aimed at increasing the knowledge on, and improving the attitudes and practices of, early neonatal health care practices amongst the health workers. At first, I observed ongoing practices in health facilities, for example, my observing that resuscitation of the newborn was undertaken by placing an oxygen tube under the nostril of the asphyxiated newborn and by compression of the neonatal chest. There were no resuscitation masks available and few of the midwives

working in the units were certain of how resuscitation should be properly carried out. In addition, no form of skin-to-skin care was applied and very few mothers initiated breastfeeding within one hour postpartum. Having had the initial objective of implementing skin-to-skin care in this healthcare setting, but also knowing from earlier efforts that implementation of evidence-based practices is a complex process, a much larger overarching question was now troubling me.

If there are simple evidence-based interventions that could lead to improved neonatal health and survival, there is a great need to better understand how they are perceived by people. If these interventions can be modified to suit a new context, which potential hindering factors might influence their implementation? In short, what, within the context, would influence change in the case of low-income settings? Therefore, my research work shifted its path from being interested in ‘disseminating’ knowledge to generating better understanding of what actually influences the implementation of known and effective practices in low- and middle-income settings, which would reduce the burden of morbidity and mortality among newborns.

The experiences I have had during the last decade have led me to conclude that implementation is a complex and challenging process, but also, that this is a field where it is meaningful and effective to invest time.

# BACKGROUND

The expanding medical evidence base has led to the development of ways to systematically appraise research results with as little bias as possible. Applying methods, which systematically summarise the evidence base, is fundamental in order to effectively inform policy and practice. Despite this fact, evidence-based innovations might fail to produce results when they are transferred into new contexts. In the case of neonatal deaths, the vast majority occur in low-income settings. Estimations indicate that up to 70% of the annual 3.1 million newborn deaths could be averted if there was a high level of implementation of existing evidence-based interventions<sup>2, 3</sup>. Madon et al. (2007) suggest that failing to introduce new knowledge in new contexts is primarily due to negligence towards learning how these innovations should be implemented, or if they suit the 'new' context<sup>4</sup>. Hence, implementation science, according to Madon et al.,

*... creates generalizable knowledge that can be applied across settings and contexts to answer central questions such as (1) Why do established programs lose effectiveness over time?, (2) Why do tested programs exhibit unintended effects when transferred to a new setting? and (3) How can multiple interventions be effectively packaged to capture cost efficiencies and to reduce the splintering of health systems into disease-specific programs?<sup>4</sup>.*

Translating knowledge into practice has been shown to be a slow and nonlinear process<sup>5</sup> and evidence on effective implementation strategies is scarce in the case of low- and middle-income countries<sup>4, 6, 7</sup>. The current lack of understanding of how to implement new knowledge leaves settings where the majority of the neonatal deaths occur, without empirical knowledge on how to translate evidence-based practices into routine practice<sup>8, 9</sup>.

In 2007, Leroy et al. studied the extent to which research funding for improved child health in developing countries focused on (1) developing better medical technology (improving old technology or creating new technology) compared to (2) researching how the technology should be delivered and utilized for improved child health<sup>10</sup>. Ninety-seven percent of grants were for developing new technologies, which could reduce child mortality by 22%. This reduction is one-third of what could be achieved if existing technologies were fully utilized globally.

## NEONATAL HEALTH AND SURVIVAL

To date, many countries are not on track to achieve the United Nations Millennium Development Goals (MDGs)<sup>11</sup>. The fourth MDG is to reduce child mortality by two-thirds, between 1990 and 2015. The Countdown report aims to track the progress towards the MDGs in the countries burdened by the majority of the global maternal and child deaths. As of 2012, Countdown tracks 75 countries which, together, account for more than 95% of all maternal, newborn, and child deaths<sup>12</sup>. According to the World Health Organization (WHO) and United Nations Children's Fund 2012 report, 23 of the

74 Countdown countries with available data are on track to achieve MDG 4 (separate data from South Sudan is not available)<sup>12</sup>.

Although under-five child mortality is reducing, the fraction of neonatal mortality, covering the first 28 days of life, is not reducing at the same rate, leading to it now becoming a larger contributing proportion of the under-five mortality rate. To date, the annual burden of neonatal mortality accounts for 41% of global under-five mortality (see Figure 2)<sup>13</sup>.

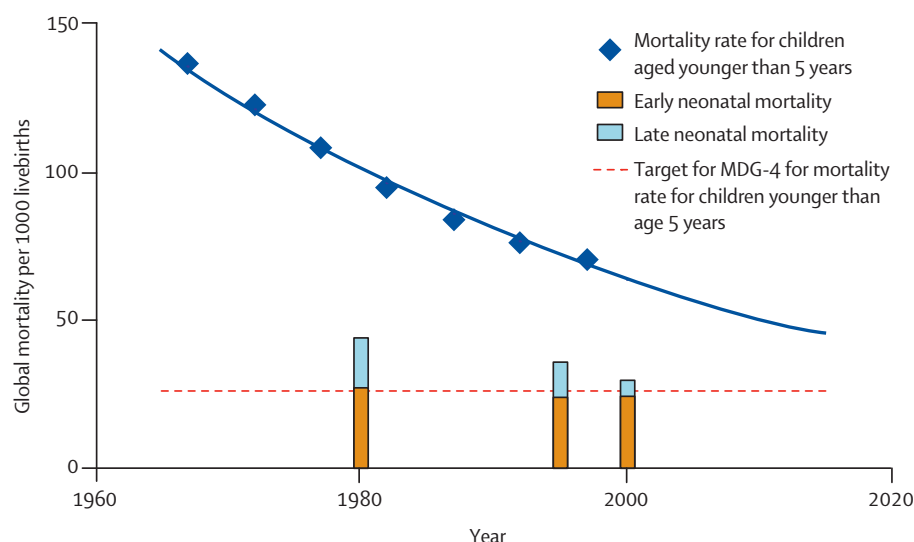


Figure 2: Under-5 and neonatal mortality rate mapped in relation to MDG 4<sup>14</sup>

Furthermore, knowledge exists concerning where, why and when the majority of these deaths occur<sup>14</sup>. On average, there has been no statistically significant reduction in neonatal mortality in Sub-Saharan Africa over the last decade<sup>15</sup>. Three causes of death account for more than 85% of all neonatal deaths: complications of preterm birth, infections and intrapartum-related causes ('birth asphyxia')<sup>3</sup>. As seen in Figure 3, mortality in the neonatal period is very high in the first 24 hours after birth<sup>14</sup>. Globally, some three-quarters of neonatal deaths happen during the first week of life.

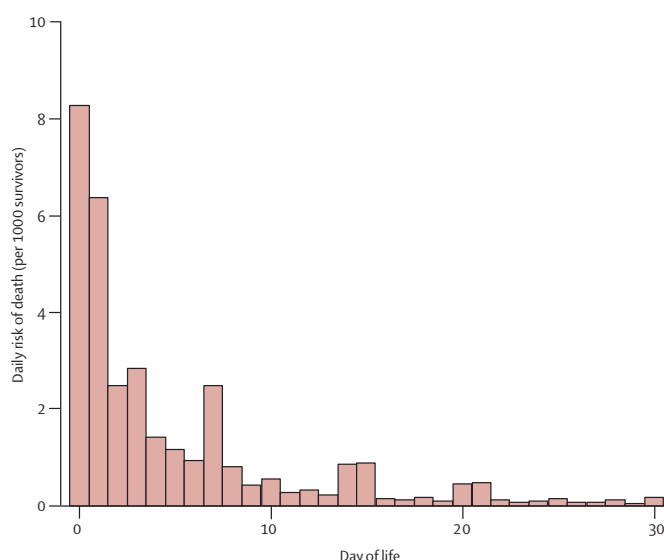


Figure 3: Neonatal mortality per day of life<sup>14</sup>

## Evidence-based interventions in the continuum of care

In order to reduce the burden of neonatal mortality interventions along the continuum of care, integrating care across a continuum of time periods, such as maternal health (antepartum), childbirth (intrapartum) and early neonatal care (postpartum), and service delivery mode, is needed<sup>16</sup>. In addition, the continuum can be seen as having long tails at both ends, one before the antepartum period – relating to the perceived importance of reproductive health – and one after the postpartum period – relating to the extent to which parents can avail resources to care for a child, thereby increasing its chances of survival, leading to decreased fertility rates. Across the continuum, there are a number of evidence-based interventions which have been identified as effective, thus having the potential to substantially reduce the global burden of neonatal mortality<sup>2</sup>.

One focus of this thesis is on the postnatal period, and, more specifically, on the effects of thermal protection of the newborn and the occurrence of neonatal hypothermia in a low-income setting. An overview of evidence-based interventions in the postpartum period relating to the focus of this thesis is found in Box 1.

Evidence-based interventions in the postpartum period relating to this thesis
<i>Breastfeeding</i> Immediate (within 1 hour after birth) and exclusive (no prelacteal feeds or other fluids/food) breastfeeding averts nearly 10% of all neonatal deaths.
<i>Prevention and management of hypothermia</i> Maintenance of room warmth, immediate drying and wrapping, prompt recognition of hypothermia, and re-warming of hypothermic infants avert up to 40% of neonatal deaths.
<i>Kangaroo mother care (for low birth weight newborns in health facilities)</i> Skin-to-skin contact between mothers and newborns, particularly low birth weight and/or preterm newborns, maintains warmth, encourages nursing, discourages over-handling, and enhances maternal recognition of newborn problems, reducing infection rate by about half.

Box 1: Adapted from Darmstadt et al.<sup>16</sup>

## Neonatal hypothermia

Insufficient thermal protection of the newborn results in neonatal hypothermia and does contribute to neonatal morbidity and mortality (see Box 1)<sup>16-22</sup>.

### *Neonatal thermoregulation*

At birth, the temperature of the fluid covering the newborn's skin drops from 37°C to around 25°C as the outer room air replaces the amniotic fluid. Heat loss, and the sensation of temperature drop, triggers a cold-adaptive response in the skin of the newborn, resulting in a response from sensors in the hypothalamus. A sensation of cold is important as it aids the term neonate's response to maintain a stable core temperature<sup>23</sup>. The term infant reacts to temperature drop by vasoconstriction of the skin. In addition, an isolating layer of white fat and the brown fat located on the axillary, mediastinal, paraspinal, perinephric, and interscapular regions of the newborn

assists in thermoregulation. The preterm or low birth-weight (LBW) newborn is more vulnerable due to the combined disadvantages of decreased fat for the preservation of body temperature, decreased glycogen stores, immature skin which increases water loss, and poor vascular control<sup>21</sup>.

#### *Development and definition of neonatal hypothermia*

The newborn suffers heat loss in four different ways (see Figure 4).

Evaporation normally occurs when the newborn is not adequately dried from amniotic fluids in the first few minutes after birth, or following inadequate drying after bathing. Conduction refers to heat loss when the newborn is placed on a cold surface such as a weighing scale. The newborn loses body heat through convection when in cold surroundings or when there is a draught. If the newborn is placed close to cold objects, such as a cold wall, the newborn will suffer heat loss through radiation<sup>24</sup>.

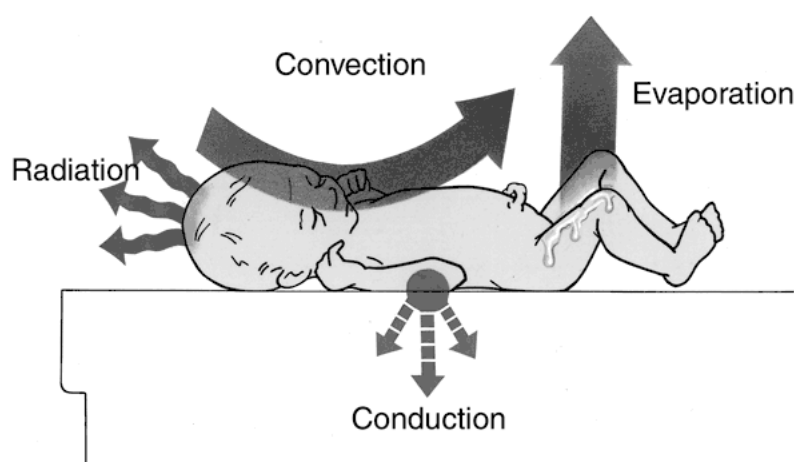


Figure 4: Development of neonatal hypothermia<sup>24</sup>

The WHO has defined neonatal hypothermia as a body temperature below  $36.5^{\circ}\text{C}$ <sup>24</sup>. Neonatal hypothermia has further been classified in three stages, as illustrated in Figure 5. We have demonstrated in Uganda that up to 80% of newborns suffered from hypothermia 60 minutes postpartum following routine drying and wrapping<sup>1</sup>. One recent study from Guinea-Bissau shows that of the newborns who suffered from hypothermia (defined as body temperature  $<34.5^{\circ}\text{C}$ ), 8% had a nearly fivefold increase in mortality during the first 7 days of life and a significantly increased mortality from 8 to 56 days of life<sup>20</sup>.

#### *Interventions to reduce neonatal hypothermia*

Maintaining a normal neonatal body temperature requires taking action against the different ways by which newborns lose heat. If the newborn is left wet and naked he/she cannot cope with an environmental temperature of less than  $32^{\circ}\text{C}$ <sup>25</sup>. But, if the newborn is kept skin-to-skin on the mother's chest and covered, the delivery room temperature can be as low as  $25\text{--}28^{\circ}\text{C}$ . Similarly, bathing should be delayed<sup>24</sup>. However, neonatal care routines in many low-income countries do not yet adhere to these evidence-based and appropriate methods for thermal protection<sup>26-29</sup>. Women and health workers alike may believe that skin-to-skin care enhances vertical HIV transmission, and that early bathing is required<sup>30</sup>.



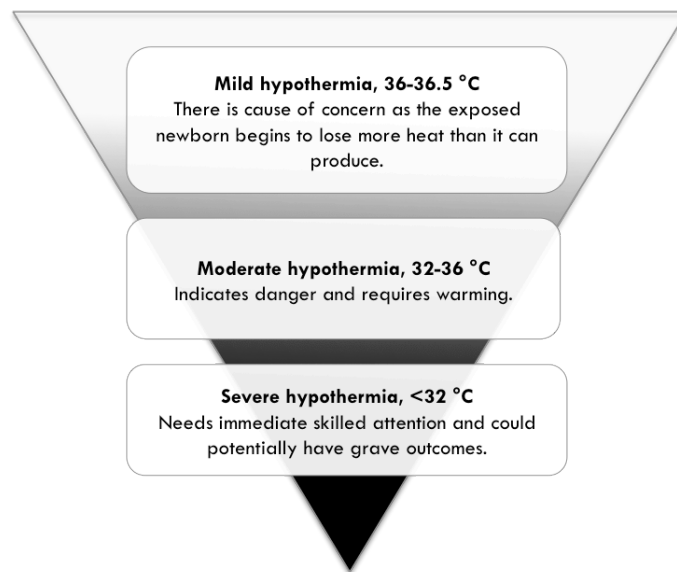


Figure 5: WHO definitions of neonatal hypothermia

Complications due to preterm birth are the commonest causes of neonatal mortality<sup>3</sup>. One of these complications is neonatal hypothermia. Hence, interventions such as continuous skin-to-skin care would enhance neonatal survival. In addition, continuous skin-to-skin care has been shown to reduce the risk of neonatal infection, which is another major cause of death among newborns<sup>3, 16</sup>. Hence, the implementation of proper thermal protection in general, and skin-to-skin care in particular, is of utmost importance for reducing the burden of neonatal mortality (see Box 1). The WHO has proposed the implementation of the ‘warm chain’: a set of procedural components that will reduce the risk of heat loss<sup>24</sup>. The warm chain consists of ten interlinked procedures, including: a warm delivery room, availability of dry towels and sheets, immediate drying, introduction of skin-to-skin care, early initiation of breastfeeding, delayed bathing, appropriate dressing, rooming-in, and warm transportation (see Appendix I). The warm chain procedures should be practiced for all newborns but are of greater importance for preterm and LBW newborns who are even less capable of generating and maintaining normal body temperature compared to the term/normal-weight newborn<sup>21</sup>.

I decided to study the thermal impact of interventions such as skin-to-skin care amongst newborns and mothers (I, III) and early bathing of the newborn (I). In study II, we explored perceptions around neonatal thermal healthcare practices amongst newly delivered mothers.

## KNOWLEDGE TRANSLATION

The gap between what is known and what is being practiced has led to ‘knowledge translation’ or ‘implementation science’ becoming a scientific field where efforts are directed towards understanding how to best introduce new knowledge into practice. The term ‘knowledge translation’ was coined by the Canadian Institute of Health Research in 2000<sup>31</sup>. In October 2005, the WHO, in collaboration with the Canadian Coalition for Global Health Research, convened a meeting on knowledge translation in

global health<sup>32</sup>. An outcome of the meeting was a definition of knowledge translation as “*The synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people’s health*”. This definition builds upon that of the Canadian Institutes of Health Research<sup>33</sup>. The term ‘knowledge translation’ has coexisted with several others, all expressing the process of implementing new knowledge into practice. In Europe, the terms *implementation science* and *research utilization* are commonly used, whereas terms such as *dissemination* and *diffusion*, *research use*, *knowledge transfer* and *uptake* are commonly used in the United States, and *knowledge transfer* and *knowledge exchange* are two terms commonly used in Canada<sup>34</sup>. In this thesis, the terms ‘implementation science’ and ‘research on knowledge translation’ will be used interchangeably.

The use of theory has been discussed within the knowledge translation community with groups arguing for both the advantage and the disadvantage of designing implementation studies informed by theories<sup>35, 36</sup>. A theory can be defined as “a coherent and non-contradictory set of statements, concepts or ideas that organizes, predicts and explains phenomena, events, behaviour, etc.”<sup>37</sup>. In 2005, Eccles et al. argued that previous implementation research has been expensive versions of trial and error, providing little or no knowledge about which factors successfully influenced implementation efforts<sup>38</sup>. Also, the development and usage of theory for knowledge translation has been argued to help the design and interpretation of findings of knowledge translation studies<sup>39, 40</sup>. On the contrary, Bhattacharyya et al. (2006) argued that: (1) the applicability of evidence is not necessarily eased by the presence of theory, (2) transferring theory to the design of studies is not straightforward and (3) there are many theories and it is not clear which ones should be given primacy<sup>36</sup>. They also argue that the application of theory should be used only when there is empirical evidence to support the superiority of theory-based interventions<sup>36</sup>. Another critique of using theory is that focusing the interpretation of findings based on any one selected theory might lead us to miss out on potentially beneficial factors that do not make up part of the chosen theory<sup>41</sup>. Whether one uses theory or not, one needs to identify how an intervention produces certain outcomes, explore by which processes change is brought about, and define which contextual factors that are critical for success or failure in order to better understand which interventions work where<sup>42</sup>.

Rogers, being a pioneer in the field of increasing the understanding of how knowledge moves into practice, was primarily focused on the *diffusion* of innovation, that is to say, its *spread*<sup>43</sup>. A recent bibliometric analysis over the knowledge utilization field found that Rogers has dominated the field since the mid-1960s<sup>44</sup>. In contrast to the *passive spread* of knowledge and innovation stands knowledge translation or, the *active and systematic implementation* of knowledge. Knowledge translation has been suggested to require active partnerships between individuals and structures, such as researchers, policymakers, managers, clinicians, patients and media<sup>45, 46</sup>. These partnerships also have the additional advantage of enhancing ownership and tailoring interventions to the local context<sup>47</sup>. The focus of this thesis is on knowledge translation, aiming at increasing the understanding of what influences active and systematic implementation of new knowledge.

In the field of knowledge translation, research, evidence and knowledge are commonly referred to as those elements that are to be ‘translated’ into practice. Viewed hierarchically, research is a form of evidence and evidence, in turn, is a form of knowledge<sup>48</sup>. Three types of classification of knowledge use have been proposed within the field of implementation science; (1) conceptual (indirect), (2) instrumental (direct), and (3) symbolic (persuasive or strategic)<sup>49</sup>. The term ‘conceptual knowledge use’ refers to the notion of knowledge that influences how users perceive an issue. ‘Instrumental knowledge use’ refers to the changes in practice that a practitioner makes, whereas ‘symbolic knowledge use’ could be referred to as that which influences the spread of the knowledge<sup>49, 50</sup>. Another important concept found in knowledge translation literature is ‘evidence-based practice’, defined as:

*The conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research<sup>51</sup>.*

Clinical expertise refers to the clinician's accumulated experience, education and clinical skills and the best evidence is usually found in clinically relevant research that has been conducted using sound methodology<sup>52</sup>. In addition to what the clinician can provide, the client brings to the encounter his or her own personal and unique concerns, expectations, and values.

There are four large types of models guiding our understanding of research utilization: (1) push models, where the researcher is driving implementation, (2) pull models, where the end user is driving the implementation (3) dissemination models, stressing that the utilization of knowledge is deemed to occur when a potential user becomes aware of the research results, and (4) interaction models, where the importance of active partnerships between researchers, decision makers and end-users is stressed<sup>53</sup>. In the 1990s, evidence-based medicine was primarily regarded from the perspective of the individual practitioner, who is the end user of research, that is to say, pull models. The focus of the paradigm was to direct efforts towards encouraging the end user of to implement new knowledge. These efforts were focused on identifying ways in which the practitioner would access, appraise and use relevant research<sup>54</sup>. Although the literature suggests that approaches to increase individuals accessing, appraising and using relevant research are related to a number of problems, such as the lack of autonomy amongst individual nurses and insufficient knowledge around how to appraise research, these approaches are still considered to be the leading models in terms of getting evidence into practice<sup>55, 56</sup>. Primarily, problems related to these types of models have been related to the view that implementation is rather linear and uncomplicated<sup>57-59</sup>.

Presently, push models and pull models have both been abandoned in favour of interactive models<sup>53</sup>. In addition, it might be worth mentioning that studies focusing on the perceived barriers to using guidelines amongst physicians and barriers to research use amongst nurses are partly reflecting the same patterns. The evidence should fit with their values and beliefs, there should be a clear link between how a certain change of behavior will change the outcome for clients, and contextual factors, such as having

time to keep up with knowledge around guidelines and new evidence, should be considered. Finally, one major barrier related to the implementation of new knowledge is when it requires changes in policy that are not under the control of the physician/nurse, for example, those governed by a health authority<sup>55, 60</sup>.

In addition to stressing the importance of active partnerships (interactive models), criticism relating to models primarily targeting the individual who is to use the new knowledge, models taking the context in which knowledge is being implemented into account have been developed. The focus of this thesis is based upon one of these models, the Promoting Action on Research Implementation in Health Services model (PARIHS)<sup>55</sup>, which will be further elaborated upon below.

## The Promoting Action In Health Services (PARIHS) framework

The PARIHS framework is a conceptual framework that posits three key interacting cornerstones: (1) Evidence, (2) Facilitation and (3) Context, which together, influence implementation of evidence-based practices. The cornerstones are hereinafter referred to as ‘concepts’. The rationale for choosing the PARIHS framework was foremost my notion that context influences successful implementation and that I found the content of the framework to possibly be transferrable into settings where my studies were undertaken.

The PARIHS framework was developed to enhance the understanding of successful implementation of evidence into practice and aims to guide the planning, process and evaluation of the implementation of new knowledge. The framework was originally inspired by Rogers’ *Diffusion of Innovation*<sup>43</sup>, various organizational theories and humanities<sup>61</sup>. The PARIHS framework was initially published in 1998<sup>62</sup> and was updated based on conceptual analysis in 2002<sup>63</sup>.

In 2010, Helfrich et al. published a critical synthesis of studies having used the PARIHS framework<sup>64</sup>. In total, the group included six core concept articles and eighteen empirical articles where the latter primarily used the framework to organize the analysis. One weakness identified was the fact that none of the identified studies prospectively applied the framework to design implementation. In terms of critique, the foremost common issue was the need for conceptual clarity regarding the definition of sub-elements and the nature of dynamic relationships<sup>64</sup>. Since the review, study protocols from two large implementation studies in Europe and Asia have been published<sup>65, 66</sup>. These studies utilized the PARIHS framework in the planning phase and in order to follow the process of change. The outcome of these two studies will likely contribute to the further refinements of the PARIHS framework. Contrasting the identified weaknesses, Helfrich et al. identified the flexibility of the framework, its intuitive appeal, the explicit acknowledgement of ‘successful implementation’ as the outcome and a more expansive view of what can and should constitute ‘evidence’ to illustrate the strengths of the PARIHS framework<sup>64</sup>.

### Evidence

Evidence, being the one of the concepts of the PARIHS framework, is, in the framework, defined as ‘sources of knowledge as perceived by multiple stakeholders’<sup>67</sup>.

The PARIHS definition of evidence challenges the more narrow definition of evidence, claiming that it only refers to empirical findings. Four sub-elements constitute the concept of evidence in the PARIHS framework: (1) Research evidence, (2) Clinical experience, (3) Patient preferences, and (4) Locally derived data.

### *Facilitation*

Facilitation has been defined as a “technique by which one person makes things easier for others,” achieved through “support to help people change their attitudes, habits, skills, ways of thinking, and working”<sup>62</sup>. In the PARIHS framework, a facilitator has a key role in knowledge translation whereby that person, being internal or external, can help individuals and teams to apprehend what needs to change and facilitate the process where they identify how it can be changed<sup>62, 68</sup>. The facilitator thereby holds an important position in the change process.

A broad set of skills and attributes is needed for good facilitation and should include: having a vision, being energetic, recognizing the skills and abilities of others, having good communication skills, being pragmatic, and able to take risks. There is, however, still little concrete evidence to support the relative importance of these different characteristics within effective facilitation<sup>68</sup>.

### *Context*

Commonly, context is referred to as environmental factors which influence the implementation and sustainability of interventions<sup>69</sup>. Context has been found to be a potent mediator of the successfulness of implementation of evidence into practice<sup>70, 71</sup>.

The meaning of context in relation to knowledge translation has been defined as “the environment or setting in which the proposed change is to be implemented”<sup>62</sup>. Although the definition might seem simplistic, and although knowledge translation is, of course, affected by both the ‘inner context’, such as care unit and department, and the ‘outer context’, such as the political environment, the Ministry of Health, or local and national NGOs, it is important to have a clear demarcation as to what is under study. The complex nature of contextual factors relating to knowledge translation challenges systematic approaches to implementing evidence into practice<sup>72</sup>.

In the PARIHS framework, the concept of context comprises four sub-elements; (1) Leadership, (2) Culture, (3) Evaluation, and (4) Receptive context<sup>55</sup>, as demonstrated below:

#### *Leadership*

Snowden and Boon (2007) presented four types of leadership, suited for four types of contexts<sup>73</sup>. Simple systems, being relatively stable with clear cause-and-effect relationships, are suited for traditional leadership styles in terms of command and control, delegation of tasks to well defined roles, organized structures and discrete evaluations. As systems get more complicated, there is an increased demand for the leaders to rely on the facilitation and empowerment of others, or, transformational leadership. Complicated systems are characterized by being self-organizing structures with participatory action and continuous

evaluation. Leaders in these contexts model the necessary openness, risk-taking and reflection needed to communicate the vision of the organization and provide the support needed to lead others towards it<sup>74</sup>. Health systems are closer to the complicated system rather than the simple one and there is still much to learn and do in order to understand what forms of transformational that are needed to create innovative learning organizations within the context of healthcare<sup>75</sup>. Further, the development and support of transformational leaders remains a challenge<sup>75</sup>. The PARIHS framework also harbours the role of the transformational leader as the person that has the ability to commit themselves and allow others to optimize their skills, abilities, knowledge and potential<sup>76</sup>.

### *Culture*

Culture has been regarded as both something an organization *is* as well as something that the organization *has*. When regarding the culture as something the organization *has*, the organization is viewed as being comprised of several characteristics that can be isolated, described and manipulated<sup>72</sup>. Organizational culture has been considered as the ‘glue’ that holds an organization together and stimulates the employees’ commitment to the organization to perform<sup>77</sup>. The researchers behind the PARIHS framework undertook a concept analysis of culture leading to them regarding it as a continuum based on the degree of clarity in values and beliefs, the level of regard for individuals, the organizational ‘drive’ (task versus learning), the degree of consistency in valuing relationships, teamwork, power, and authority, and the extent of recognition or reward that is provided<sup>78</sup>. The impact of culture on implementation has led to repeated statements that there is a need to understand the culture in which a particular innovation will be implemented prior to its implementation<sup>79-81</sup>.

### *Evaluation*

Evaluation in PARIHS framework comprises the utilization of locally derived process and outcome data in provided healthcare<sup>78</sup>, as locally derived data are an important type of evidence to support decisions about the performance of individuals and the organization<sup>78</sup>. Cultures allowing for this type of continuous monitoring of services embrace audits, user-led feedback and reflections of practice, and acknowledge these as sources of evidence along with evidence from systematic literature reviews and meta-analysis<sup>78</sup>.

### *Receptive context*

Originally, the concept of context had three sub-elements. Later, receptive context was added to cover “all the structural, resource related aspects of context”<sup>82</sup>. This sub-element has not been defined as clearly as the other sub-elements and has been criticized for including components which are also found in the other sub-elements, hence making the demarcation between the sub-elements challenging<sup>64</sup>.

### *Assessing context*

Graham et al. stress that assessment of context should be undertaken to develop a profile of the organization to characterize what will serve as either barriers or

supporting factors when integrating an innovation into clinical practice<sup>83</sup>. When barriers to the use of new knowledge have been identified in the assessment, proactive strategies can be mobilized to overcome them, hence, allowing for tailoring implementation strategies to the specific situation<sup>83</sup>.

The emphasis of understanding context prior to, in the process of, and during the evaluation of the implementation of new knowledge, has led to the development of three tools based on the PARIHS framework, namely: the Context Assessment Index<sup>84</sup>, the Organizational Readiness to Change Assessment<sup>85</sup>, and the Alberta Context Tool<sup>86</sup>. The Context Assessment Index aims to assess and understand the effect the context has on clinicians' use of evidence in practice. The tool has been suggested to raise awareness amongst clinicians to the context in which they work and the effect it has on their use of evidence in clinical practice<sup>84</sup>. The Organizational Readiness to Change Assessment was developed for diagnostic use, to identify needs or conditions that can be targeted by implementation activities or resources, and to provide a prognosis of the success of the change effort at the organizational level<sup>85</sup>. The Alberta Context Tool was developed on the assumption that context is a central influence on healthcare providers' effective use of clinically relevant research. It assesses the individual health care provider's perception of the complex healthcare context<sup>86</sup>. The Alberta Context Tool includes 56 items covering eight dimensions (see Figure 6) and is presently being utilized in several studies in high-income settings<sup>65, 87-90</sup>.

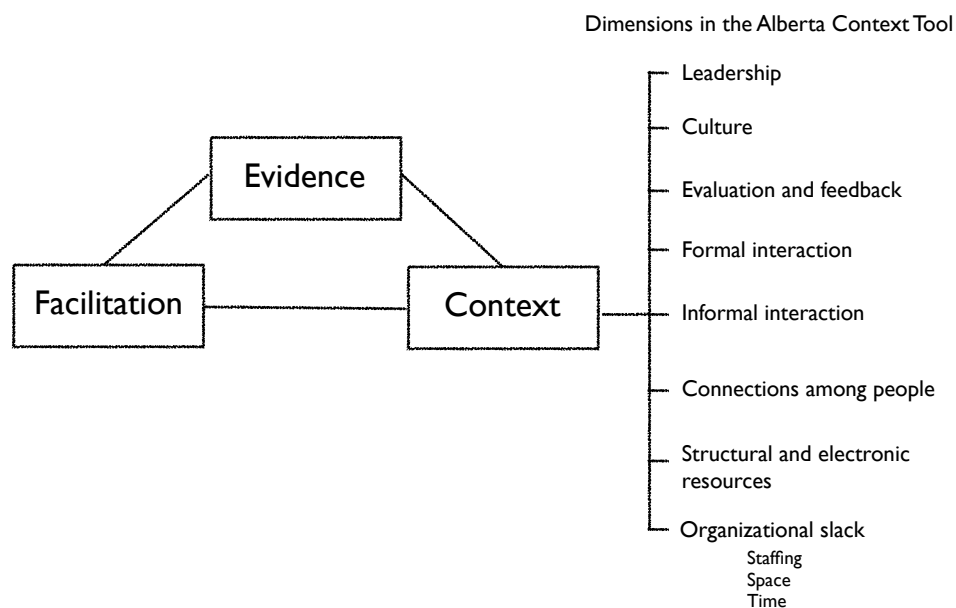


Figure 6: The three interacting concepts in the PARIHS framework and the eight dimensions in the Alberta Context Tool<sup>63, 86</sup>

I decided to explore the content of *context* as described in the PARIHS framework in a number of low- and middle-income settings in study IV and V but will also, for the purpose of this thesis, discuss the content of *evidence* as described in the PARIHS in relation to studies I-III.

## HEALTH SYSTEM – THE LARGER PICTURE

The health system forms the larger context in which evidence-based interventions to improve health and wellbeing are being implemented in and delivered through. In 2009, the WHO Alliance for Health Policy and Systems Research published the “Systems Thinking for health system strengthening” report<sup>91</sup>. The report outlines the

six interconnected building blocks of the health system (see Figure 7).



In the midst of the building blocks lies the fundamental block of people<sup>91</sup>. In this model, the element of ‘people’ refers not only to those who are beneficiaries of the health system, but also those who are active drivers of the health system. The concept of people in the model also reflects people as individuals, those who are part of an organization, and those who are stakeholders at different levels, for example, policymakers as well as health workers.

Figure 7: The health system building blocks as defined by WHO<sup>91</sup>

### Health system in Uganda

As the largest share of the thesis was undertaken in Uganda, its health system will be presented in greater detail. The health system in Uganda is decentralized in terms of management and service delivery and is composed of seven levels, as demonstrated in Table 1<sup>92</sup>. The governmental health sector has a hierarchical structure commencing at village level, where community health workers can undertake outreach services, reaching up to the two National Referral Hospitals, where advanced care is delivered.

In the last decade, the proportion of households living within a 5km radius of a health facility has improved from 49% to the current estimate of 72%. Although the target has been that 80% of the population of Uganda should live within a 5km radius of a health facility, and although new facilities have been constructed, priority has now been given to the consolidation of existing facilities, being that they are underfunded and lack proper water and energy supply, well-equipped theatres, essential drugs, equipment and human resources to cater for the needs of the population<sup>92</sup>.

In 2001, the Ugandan government abolished user fees. Although the abolition of fees initially increased utilization of public sector facilities amongst the poorest quintile, out-of-pocket health care expenditure increased as a result of stock-outs. Two examples of how stock-outs have affected service delivery is the fact that only 52% of health centres II were able to provide antenatal care and only 55% were in a position to offer child immunization<sup>93</sup>.



Table 1: Structure of the Ugandan health system

Health structure	Available services	Location	Availability, National standards <i>Current standard</i>	Total number of facilities
Health centre I	No physical structure. Served by community health workers functioning as a link between the community and the formal health system.	Village	1 000 <i>Unknown</i>	Not physical facilities
Health centre II	Outpatient care and community outreach services.	Parish	5000 <i>14 940</i>	3006
Health centre III	Basic preventive and curative care. Laboratory services for diagnosis and maternity care.	Sub-county	20 000 <i>84 507</i>	1082
Health centre IV	Maternity care, inpatient health services, surgery, blood transfusion and laboratory services.	County	100 000 <i>187 500</i>	190
General referral hospital	Preventive and curative maternity care, inpatient health services, surgery, blood transfusion, laboratory and medical imaging services.	District	500 000 <i>263 157</i>	129
Regional referral hospital	Comprehensive specialist services in addition to services provided by general hospitals.	Regional	3 000 000 <i>2 307 692</i>	
National referral hospital	Comprehensive specialist services in addition to services provided by general and regional hospitals.	National	10 000 <i>30 000 000</i>	

Sources: Government of Uganda: Health Sector Strategic Plan 2010/11–2014/15<sup>92</sup> and Ministry of Health Uganda: Uganda Health System Assessment 2011<sup>94</sup>.

Since the abolishment of fees, informal payments have been increasingly reported in public health facilities, one example being that informal payment demands were made to more than 30% of women attending antenatal care at public health facilities in the mid-2000s<sup>95</sup>.

In addition to the governmental health care facilities, three types of private health care sectors exist in Uganda: (1) the Private-Not-For-Profit facilities, commonly being faith-based, (2) Private Health Practitioners, and (3) Traditional and Complementary Medicine Practitioners (e.g. herbalists, traditional bone setters, traditional birth attendants, hydro-therapists, spiritualists and traditional dentists) from whom 60% of the Ugandan population seek services prior to seeking help from the formal health system<sup>92</sup>.

The reported proportion of women delivering with skilled attendants in Uganda ranges from 34% to 42%<sup>92, 96</sup>. Guidelines on reproductive health have been available in Uganda since 2001<sup>97</sup>. Following the publication of the Lancet neonatal series in 2005<sup>2,98</sup>, the Ugandan Ministry of Health acknowledged neonatal morbidity and mortality as a priority area. With support from Save the Children, the Ministry of

Health established a Newborn Steering Committee in 2006, consisting of members representing different institutions and organizations. Since the establishment of the Newborn Steering Committee, the group has been working on different emerging issues, including the development of national guidelines for newborn care<sup>92</sup>. In 2010, the Ugandan Ministry of Health presented the Standards for Newborn Health Care Services, a written statement of the minimum expected service practice to be met to ensure quality of care<sup>99</sup>.

# RATIONALE

Although there is significant empirical knowledge supporting thermal protection of the newborn, there are concurrent negative attitudes towards available evidence-based practices<sup>29, 30</sup>, illuminating the large disparity between empirical evidence and what is implemented in clinical practice. As routine management of the newborn, including bathing, had not been investigated, this project aimed to elucidate the impact of bathing in combination with skin-to-skin care and further, to generate knowledge on the immediate maternal thermal response to skin-to-skin care. Although it may help to enrich the pool of evidence in the management of neonatal hypothermia, the success of an intervention is dependent on the utilization of functional health units providing quality, evidence-based services. Hitherto, few studies have examined the implementation process in low- and middle-income countries and especially in the local health care context in which new knowledge is being implemented<sup>4, 6</sup>.

In order to promote the use and application of research, it is therefore crucial to focus more attention on the implementation of knowledge. There is need to generate knowledge concerning the most effective implementation strategies and to deepen the understanding of factors that influence such processes<sup>100-102</sup>. Whilst this has been studied in high-income settings, there is lack of knowledge from low- and middle-income settings<sup>7, 42</sup>. Thus, based on the PARIHS framework, this thesis explores factors in the organizational context that might influence the implementation of evidence-based practices in low- and middle-income settings.

# GENERAL AIM

The overall aim of this thesis is to increase the body of knowledge on thermal response in newborns and mothers to inform evidence-based practices, explore perceptions around these practices amongst newly delivered mothers and, furthermore, to explore the perceived influence and relevance of factors in the organizational context on the implementation of evidence-based practices in low- and middle-income settings.

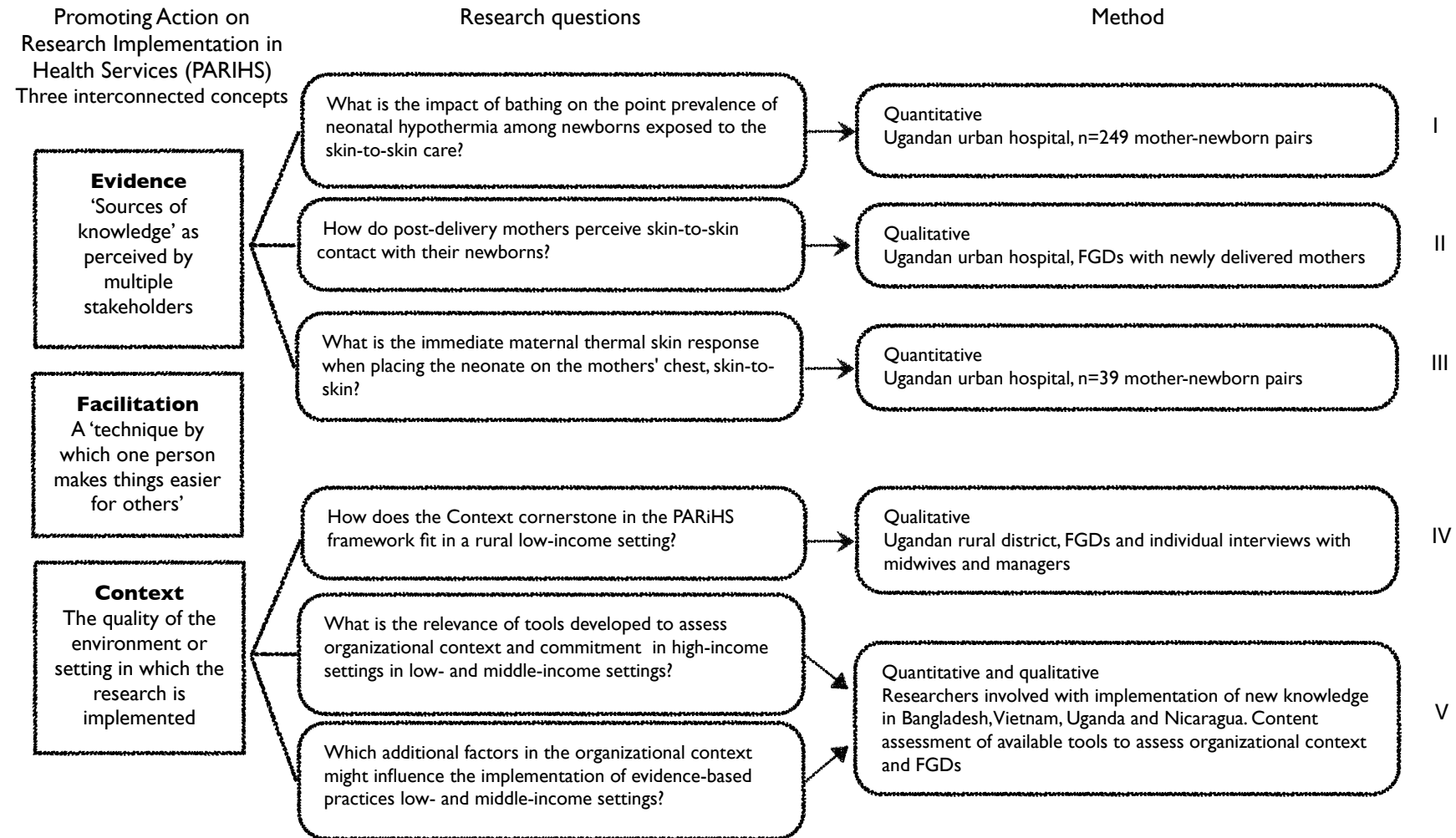
## SPECIFIC OBJECTIVES:

- To assess the impact of bathing on the point prevalence of hypothermia among newborn babies exposed to skin-to-skin care (I).
- To explore the perceptions among post-delivery mothers of skin-to-skin contact and newborn care (II).
- To determine the immediate maternal thermal skin response when placing the neonate on the mother's chest, skin-to-skin (III).
- To examine the perceived relevance of the sub-elements of the organizational context cornerstone of the PARIHS framework, and whether additional factors in the organizational context were perceived to influence knowledge translation in a specific low-income setting (IV).
- To evaluate the content validity of the Alberta Context Tool, the concept of commitment and additional items perceived to be relevant for knowledge translation in low- and middle-income settings (V).
- To explore whether additional contextual factors are perceived to influence the implementation of evidence-based practice in low-and middle-income settings. (V).

# METHODS

## OVERVIEW OF STUDY DESIGN

This thesis emerged from a set of research questions, which in turn guided the choice of methods.



This thesis is based on studies conducted in Uganda (I-V), Bangladesh (V), Vietnam (V) and Nicaragua (V).

In Uganda, studies I-III were conducted in San Raphael of St. Francis Hospital Nsambya. The hospital is a Private-Not-For-Profit facility with a bed capacity of 361 owned by the Catholic Church. The hospital is located in the peri-urban region of Kampala. St. Francis is a general hospital offering specialist services in surgery, obstetrics and gynaecology, internal medicine and paediatrics. The hospital has run nursing and midwifery training since 1919 and also serves as an internship hospital for medical graduates and postgraduate degrees of Master of medicine.

Figure 8: Map of Uganda

Study IV was undertaken in a typical rural district in Uganda. The district has about 20 health centres providing delivery services, including one general hospital with a bed capacity of about 100. The hospital has a catchment area beyond the district limits, and serves about 1.5 million individuals. The majority of people in the district earn their livelihood through farming. The rationale for not describing the study setting in greater detail is foremost to ensure the confidentiality of respondents in the study.

About one-fifth of births in Uganda were registered between 2000-2007<sup>96</sup>. Hence, the burden of neonatal mortality is based on estimations from a number of different sources<sup>103</sup>. Presently, neonatal deaths account for 28% of the under-5 deaths and the neonatal mortality rate (per 1 000 live births) is estimated at 26<sup>96</sup>. The total fertility rate (per woman) is 6.1<sup>96</sup>. Between the year 2000 and 2010, neonatal mortality in Uganda was reduced by 20%<sup>103</sup>. At the time of conducting studies I-III in this thesis, there were no national guidelines for newborn care available.

Study V was undertaken in Bangladesh, Vietnam, Uganda and Nicaragua. These different settings represent a range of different health systems and health status amongst the population (see Table 2).

Table 2: Country-specific economic and maternal/neonatal health indicators

	Bangladesh	Vietnam	Uganda	Nicaragua
<b>Gross national product per capita<sup>a</sup></b>	1 940	3 260	1 320	2 840
<b>Skilled attendant at delivery (%)<sup>b</sup></b>	27	88	42	74
<b>Estimates of maternal mortality ratio (maternal deaths per 100 000 live births)<sup>c</sup></b>	240	59	310	95
<b>Estimates of neonatal mortality rate (per 1 000 live births)<sup>b</sup></b>	27	12	26	12

<sup>a</sup> World Bank databank<sup>104</sup>

<sup>b</sup> UNICEF, Childinfo, statistics by country<sup>105</sup>

<sup>c</sup> WHO Trends in maternal mortality 1990 to 2010<sup>106</sup>

## DATA COLLECTION AND ANALYSIS

### Data collection methods

In this thesis I have used both quantitative (I, III, V) and qualitative methods (II, IV-V). Quantitative research aims at testing hypothesis whereas qualitative research aims to explore peoples' attitudes, beliefs, preferences, behaviours and perceptions around certain phenomena.

#### *Quantitative data collection (I, III, V)*

One method used in research is to select a representative sample of respondents and generate findings based on them at a given time. By doing so, the researcher can study, for example, the prevalence of an event at a given time or the prevalence of the event in exposed versus non-exposed instances. In this thesis, quantitative data collection and structured written questionnaires were used to collect cross-sectional data (I, III, V). Structured written questionnaires commonly use closed-ended questions, giving the researcher the possibility to analyse the collected material using quantitative methods.

#### *Focus group discussions (II, V)*

Focus group discussions (FGD) are considered to be a useful method for exploring knowledge and experiences, as group interaction produces insights into one's own perception of any given phenomenon<sup>107, 108</sup>. In addition, FGDs are useful tools to disclose cultural norms in relation to a certain topic<sup>109</sup>. For the purpose of this thesis, pre-developed guides with open-ended questions guided the discussion. This method resembles that of a *general interview guide approach*, allowing for further probing when something of significance is brought to the attention of the moderator<sup>110</sup>.

#### *Individual interviews (IV)*

Individual interviews should be utilized in order to gain insight into personal experiences, to avoid interpersonal bias and to enable discussion around sensitive topics<sup>111</sup>. As is common with quantitative approaches, there are various forms of conducting these interviews. For the purpose of this thesis, a *general interview guide approach* was adopted, as it is a quite flexible approach to data collection whereby the interview guide intends to ensure that information is gathered on the same general areas

from each participant<sup>110</sup>. However, this approach also allows for freedom and adaptability as the interviewer can be more spontaneous in directing the interview to gather the information from the interviewee. Individual interviews were undertaken in Study IV.

## Qualitative analysis

All qualitative studies (II, IV-V) in this thesis employed content analysis<sup>112, 113</sup>. Content analysis requires the researcher to read the transcripts several times to get a sense of the 'whole', to identify individual meaning units therein, and to assign codes to these. Following coding, the codes are compared and then grouped into descriptive categories (IV-V).

Content analysis, according to Graneheim and Lundman<sup>112</sup>, can either be manifest or latent. The manifest level of content refers to stopping the analysis at the level of categories, that is to say when the visible and obvious content has been discovered. Moving deeper into the text in order to understand its underlying meaning is called latent analysis<sup>112</sup>. When applying latent content analysis to data, categories are subsequently interpreted and organized into themes (II). The analysis of the qualitative data collected for the work presented in this thesis were inductive (II, IV-V) and/or deductive (IV-V) in kind<sup>114</sup>.

## Study I

To assess the impact of newborn bathing on the point prevalence of neonatal hypothermia we conducted a randomized clinical trial. Sample size calculations were informed by a study where the prevalence of hypothermia under routine management was assessed by the same group in the same setting<sup>115</sup>. In that study, the prevalence of hypothermia at 60 minutes postpartum was 83%<sup>1</sup>. The hypothesis was that the introduction of skin-to-skin care would reduce the prevalence of neonatal hypothermia by 20% and that bathing of babies 60 minutes postpartum would significantly worsen hypothermia by 20%. The sample size was estimated to 226 using a 95% CI and power of 80%. Assuming a 10% loss to follow-up/withdrawal, the sample size was increased by 24 to 250, with each of the two arms consisting of 125 mother-newborn pairs.

Pregnant women were consecutively approached in the St. Francis Hospital Nsambya labour ward and informed about the study. We included non-asphyxiated newborns born through spontaneous vaginal delivery. We informed women about the inclusion criteria during labour before delivery of the newborn. Following the birth, all non-asphyxiated newborns to consenting women were included and randomized into two groups by using sealed opaque envelopes indicating to which group the individual woman would be randomized (see Figure 9). The discrepancy in the actual numbers between the groups, group A, n=126 and group B, n=123, was due to the fact that a set of twins was obtained in group A, whereas two mother-newborn pairs withdrew from group B. All newborns were dried and kept skin-to-skin following delivery. Newborns belonging to group A were bathed and dried with a dry towel at 60 minutes post partum whereas group B newborns remained in skin-to-skin position until the end of the period studied.



The bathing of group A newborns was carried out in warm water using the elbow technique and the bath lasted for 1-3 minutes. Following bathing, newborns were thoroughly dried with a clean towel and placed in the skin-to-skin position. Neonatal rectal and tympanic temperature measurements were taken at 5, 60, 70 and 90 minutes postpartum. Temperature measurements and bathing were carried out according to standardized procedures by Anna Bergström (AB) assisted by two research assistants covering a 24-hour period. Romano Byaruhanga and AB trained midwives assisting in data collection in order to collect data around the clock.

Structured written questionnaires were used to collect data. Questionnaires were administered in face-to-face interviews. In study I, background characteristics of the study participants were summarized using frequencies and proportions for categorical and continuous variables. In the case of continuous variables, appropriate cut-offs were introduced for categorization.

Cut-offs used in studies I and III included:

*Hypothermia*: temperature  $<36.5^{\circ}\text{C}$ <sup>24</sup>

*Low birth-weight*: a weight  $<2500$  grams<sup>116</sup>

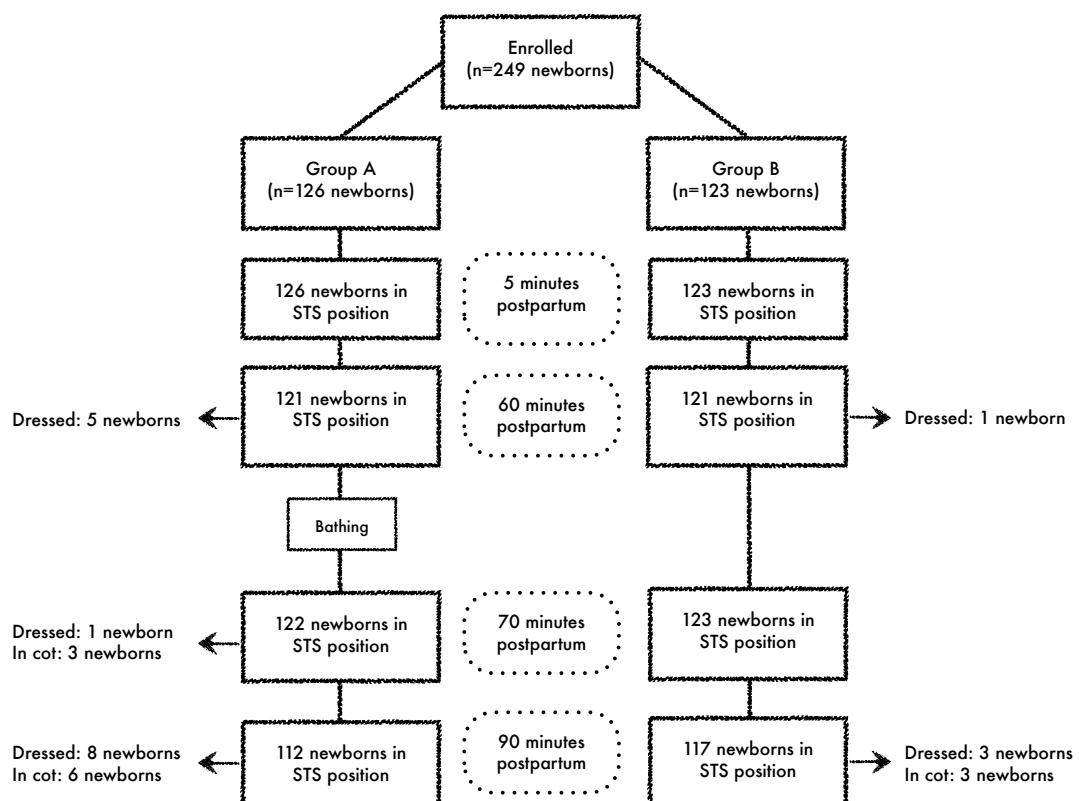


Figure 9: Trial profile study I

Study I was written up and published as a case-control study, whereas we have since come to realize that it was in fact a randomized clinical trial. From an epidemiological perspective the difference is clear; a case-control study is an observational type of design where subjects are not, as in our study, randomized into different groups. Following randomization, study participants received different interventions (bathing vs. non-bathing) but were followed up in exactly the same way. In the published study,

we reported odds ratios (OR), being the most common measure to report in case-control studies. Having realized that it was a randomized clinical trial, risk ratios (RR) and chi-square test were then calculated to assess the impact of bathing on the categorical variable *hypothermia* between the exposed to bathing group (group A) and the non-exposed to bathing group (group B) at different time intervals.

Intention-to-treat (ITT)<sup>117</sup> analysis was used, that is to say all study participants were included in the final data analysis according to the original treatment group to which they had been randomly assigned. Few missing data were present in the dataset. Because we had missing values and the outcome was binary, a longitudinal regression imputation was used to estimate RR taking into account missing data<sup>118</sup>. Estimations of RR were taken as the mean of 20 imputed datasets for each time; 5, 60, 70 and 90 minutes.

Relative risk ratios were calculated to study the risk of hypothermia relative to being exposed to bathing. For the purpose of this thesis, a mixed-effect logistic regression model was developed to study the impact of bathing on the prevalence of hypothermia. The mixed-effect logistic model takes the longitudinal nature of the data into account, thus providing more efficient and unbiased estimators than cross-sectional designs. Mixed-effect models are flexible in terms of individual trends of the outcome when taking repeated measures. Finally, we applied this model, taking into account the longitudinal nature of the data and the risk of hypothermia relative to a set of potential risk factors, such as: bathing (yes vs. no); mother's occupation (housewife vs. others); room temperature; birth weight; and sex of the newborn. Risk factors were identified by calculating crude and adjusted odds ratios (OR). The model developed takes the nature of the binary outcome into account (hypothermia 0/1) and the repeated measurements of the outcome individuals (i.e. four different temperature measurements of the same baby at four different time points). The longitudinal analysis was conducted using rectal measurements as rectal thermometry is widely regarded as the gold standard for routine measurement of body temperature<sup>119</sup>.

## Study II

In study II, we explored mothers' perceptions of skin-to-skin care by conducting FGDs. A semi-structured guide was developed for the purpose of the study; the guide covered the following areas: knowledge, attitudes, practices and beliefs regarding the skin-to-skin technique, antenatal care practices, birth preparedness, and HIV vertical transmission. We conducted five FGDs with 30 purposively selected women from the 249 women included in study I. Participants were approached and informed about the study in the St. Francis Hospital Nsambya postnatal ward and included in the study after having given their informed consent.

The FGDs lasted 60-90 minutes each and were conducted in the local language. The FGDs were conducted in a secluded area in the postnatal ward, moderated by a social scientist. The moderator guided the FGDs, whereas the two co-researchers (Romano Byaruhanga and a midwife) were responsible for observing participants' nonverbal communication and taking notes. Mothers were encouraged to express their opinions about the issues brought up by the moderator. The FGDs were audio recorded and

transcribed verbatim followed by translation into English. Latent content analysis according to Graneheim and Lundman<sup>112</sup> was applied to the collected data.

### Study III

To determine the immediate maternal thermal skin response when the newborn is in the skin-to-skin position we consecutively enrolled pregnant women in labour after they had given informed consent. The study was undertaken in St. Francis Hospital Nsambya. A total of 39 mothers, after spontaneous vaginal delivery to non-asphyxiated newborns, were included in the pilot. We measured maternal axillary and skin temperature using an electronic thermometer model DM 852 (Ellab®) immediately before skin-to-skin contact and then every 2 minutes thereafter for 20 minutes. A last maternal temperature recording was undertaken 10 minutes after removing the neonate. In addition to maternal temperature we recorded neonatal axillary and forehead temperature (using Thermo-Focus®) immediately before skin-to-skin contact, twice after initiation of skin-to-skin contact and 10 minutes after removing the newborn (see Figure 10). AB undertook the collection of data.

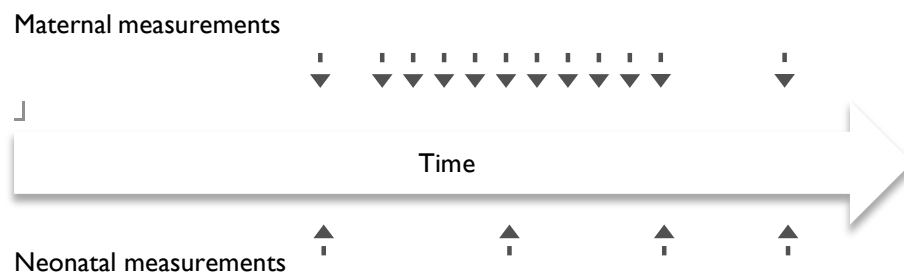


Figure 10: Undertaken measurements in study III

A mixed effect linear regression model was utilized to calculate the mean response profile. The data consisted of baseline temperature measurements (time = 0) together with the corresponding measurements for each individual of temperature progression over time across the study period. It was assumed that the residuals were approximately normally distributed with the same variance at the different time points.

Based on the estimated mean temperature levels, the mean response profile, together with 95% confidence limits, was calculated. Also, the change in mean temperature between time point 0 (baseline) and time point 2 was evaluated.

### Study IV

As a first step to developing a tool to assess contextual factors influencing implementation of evidence-based practices in low- and middle-income settings, we explored Ugandan midwives' and managers' perceptions of 'context' in the PARIHS framework. A semi-structured guide was developed inspired by the sub-elements forming context in the PARIHS framework and the three tools developed on its basis<sup>55,84-86</sup>.

Initially we planned to conduct FGDs with midwives and individual interviews with managers. However, having witnessed the difficulty of discussing leadership amongst

midwives working in the same unit, we opted to continue data collection by conducting individual interviews with midwives. Both FGDs and individual interviews were undertaken by AB and Sarah Namusoko. We conducted FGDs together, whereas individual interviews were undertaken by either one of us. Both FGDs and individual interviews were conducted in quiet areas where participants were not disturbed and did not feel that others could overhear what was said. Sessions lasted 45-110 minutes. All FGDs and interviews were audio-recorded.

Audio-recorded data were transcribed by AB. Transcripts were read thorough and the audio-recorded data were listened to repeatedly. All transcripts were imported and analysed in QSR NVivo 8 software. We applied directed content analysis, as suggested by Hsieh and Shannon<sup>113</sup>, to examine the perceived relevance of context, according to the PARIHS framework, in a low-income setting. Compared to inductive content, this approach implies a more structured process, guided by prior research and other relevant literature. In order not to miss out on other factors, those not part of the PARIHS framework but being of importance for knowledge translation in low- and middle-income settings, we further undertook inductive content analysis according to Graneheim and Lundman<sup>112</sup>.

## Study V

Study V was a mixed-method study employing both quantitative and qualitative methods.

The Alberta Context Tool<sup>86</sup>, parts of the Organizational Commitment Questionnaire<sup>120</sup>, the Affective Commitment Scale<sup>121</sup> and items/concepts developed by the research group, were gathered into one 'compiled questionnaire'. The Organizational Commitment Questionnaire and the Affective Commitment Scale will be referred to as 'Commitment items'. The compiled questionnaire was assessed for content validity with individuals in Bangladesh, Vietnam, Uganda and Nicaragua. Panellists included a mix of: (1) researchers with experience of large-scale implementation of interventions in healthcare, and (b) decision-makers that had led implementation in healthcare organizations. Based on the recommendations of the optimal number of panel participants needed to assess content validity, a panel of 8-11 individuals was established in each of the four settings<sup>122</sup>. Panellists in all settings were invited to individually rate the relevance of each item on a four-point scale: (1) not relevant, (2) somewhat relevant, (3) quite relevant, and (4) highly relevant<sup>122, 123</sup>.

The quantitative content assessment tested items and dimensions, including calculating item-content validity (I-CVI) and content validity across concepts (S-CVI). The content validity index method allows for easy interpretation and understanding of agreement on a conceptual-level and at item-level<sup>124</sup>. The I-CVI is a measure of the proportion of raters giving a certain item a rating of either 3 or 4. To consider an item to be relevant, the I-CVI should meet a minimum of 0.78<sup>124</sup>. To further assess content validity for each scale, in this case the concepts S-CVI/Universal Agreement (S-CVI/UA) and S-CVI/Average (S-CVI/Ave) were calculated. The S-CVI/UA reflects the proportion of raters in agreement (rating 3 or 4) across the concept, whereas the S-CVI/Ave is computed by calculating the mean I-CVI across the concept. The S-CVI/Ave should,

for new instruments, meet a minimum of 0.9, whereas the corresponding value for S-CVI/UA is 0.8<sup>124</sup>. The country-specific researchers in collaboration with AB undertook analysis of the quantitative data.

Following individual rating of the items in the content assessment questionnaire, one FGD with each country panel was conducted. The FGDs were moderated by the country-specific researcher and followed a developed semi-structured guide, primarily focusing on identifying aspects of context that were not present in the compiled questionnaire. All FGDs were audio-recorded and transcribed verbatim. Manifest content analysis according to Graneheim and Lundman<sup>112</sup> was applied to the qualitative data by the country-specific researchers.

## ETHICAL CONSIDERATIONS

All women, health workers and panel participants who participated in the studies presented in this thesis were informed about the purpose of the studies ahead of consenting to participate. As part of informing women about participation in studies I-III, we also explained all of the procedures that would be carried out on their newborns including demonstrating how the different thermometers functioned and the risk of injuring the rectal mucosa when using the rectal thermometer. For the tympanic and rectal thermometers we utilized polythene sheaths and plastic covers, which were changed after every reading.

All of the participants in the studies were informed that they had the right to withdraw from the study at any time. For studies I-III, participants were informed that withdrawal would not affect the care provided to them. Confidentiality was ensured to all participants in studies I-IV.

Ethical approval was obtained for studies I, II and III from St. Francis Hospital, Nsambya Institutional Review Board. Study IV obtained ethical approval from Makerere University, School of Public Health, Higher Degrees Research and Ethics committee and from the Uganda National Council of Science and Technology. Study V obtained ethical approval from; (1) The Ethical Review Committee of the International Centre for Diarrhoeal Disease Research in Bangladesh, (2) The Ethical Scientific Committee at Ministry of Health and The Provincial Health Bureau in Quang Ninh in Vietnam. Ethical approval for the study conducted in Vietnam was also obtained from the Research Ethics Committee at Uppsala University in Sweden, (3) The León medical faculty ethical board in Nicaragua. In Uganda, ethical approval was not considered necessary according to ethical guidelines<sup>125</sup>.

# FINDINGS

In studies I-III in this thesis we investigated the effect of skin-to-skin care on the neonate and the mother as well as the perception of the skin-to-skin routine amongst newly delivered women.

The third concept in the PARIHS framework, ‘context’, was the focus of studies IV and V. Context here refers to “the environment or setting in which the proposed change is to be implemented”. Both study IV and study V serve as a basis for a larger project aiming to develop the Context Assessment for Community Health (COACH) tool, a quantitative tool to assess contextual factors in the healthcare organization in low- and middle-income settings that influence the implementation of new knowledge.

## EVIDENCE

In total, 90% of the women in study I had attended antenatal care clinic. Despite efforts to encourage staff at the antenatal care clinic to inform pregnant women about skin-to-skin care of the newborn, only 28% had ever heard about the practice. Amongst these women, the vast majority had heard about it in the antenatal care clinic indicating that the practice was not known in the ‘general public’. We did not observe any differences in either the collected demographic characteristics or in the first two temperature measurements between the two groups. The effect of bathing, study I, resulted in a significant increase in point-prevalence of hypothermia at 70 minutes post partum, that is to say 10 minutes after bathing of newborns in group A (exposed to bathing) compared to group B (not exposed to bathing) (I). The difference amongst the two groups was sustained throughout the study period (see Table 3).

Table 3: The risk of hypothermia relative to being exposed to bathing or not, study I.

Prevalence of hypothermia	Group A n=126	Group B n=123	RR	95% CI	Missing values	p-value <sup>a</sup>
<i>5 min postpartum</i>						
Rectal temperature	43	30	1.39	0.93<RR<2.06	1	0.091
Tympanic temperature	84	62	1.32	1.06<RR<1.63	1	0.009
<i>60 min postpartum</i>						
Rectal temperature	62	54	1.12	0.86<RR<1.46	1	0.401
Tympanic temperature	71	57	1.21	0.95<RR<1.54	1	0.114
<i>70 min postpartum</i>						
Rectal temperature	83	48	1.67	1.29<RR<2.15	2	<0.001
Tympanic temperature	97	51	1.86	1.47<RR<2.35	3	<0.001
<i>90 min postpartum</i>						
Rectal temperature	71	36	1.95	1.42<RR<2.67	3	<0.001
Tympanic temperature	84	40	2.07	1.56<RR<2.75	3	<0.001

<sup>a</sup> Chi-Square test after multiple imputation.

The progression of hypothermia prevalence is presented in Figure 11 and the identified risk factors are presented in Table 4.

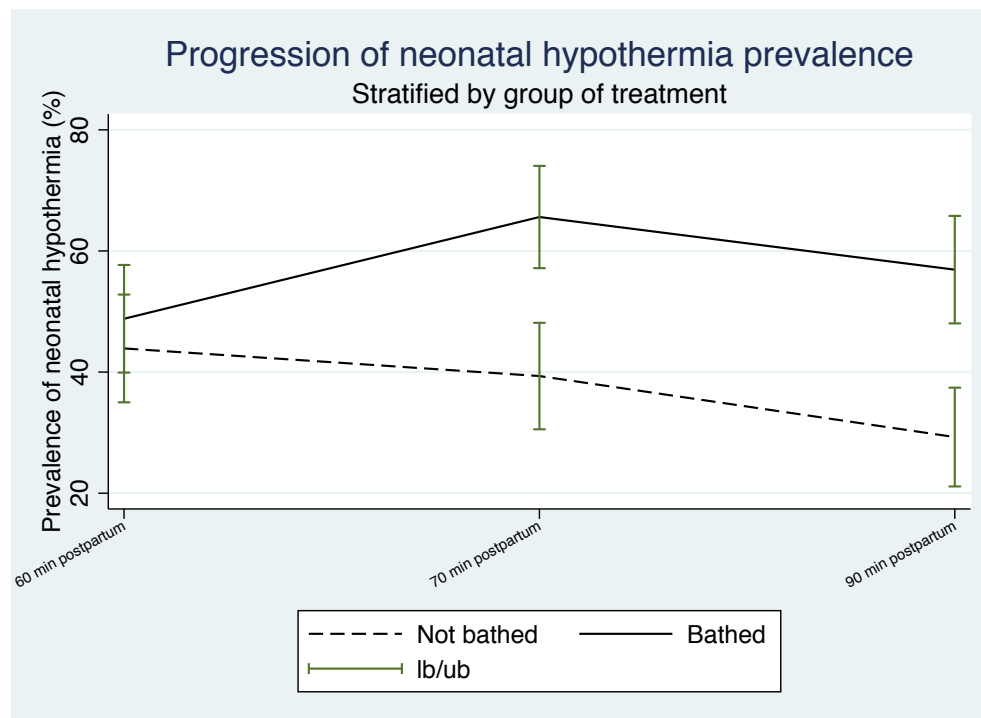


Figure 11: Progression of hypothermia prevalence stratified by group, study I.

Table 4: Mixed effect logistic regression model adjusted by potential risk factors on the binary hypothermia outcome, study I

Variable Sub-category	Bivariate		Adjusted	
	OR (95%CI)	p-value	Adj.OR (95%CI)	p-value
<b>Age</b>				
15-24	1			
25-34	0.44 (0.14;1.35)	0.15		
35+	2.93 (0.29;30.04)	0.365		
<b>Group</b>				
Not bathed	1			
Bathed	7.87 (2.65;23.4)	0.002	7.06 (2.4;20.77)	0.01
<b>Mother's occupation</b>				
Housewife	1			
Others (Employed)	0.18 (0.06;0.59)	0.005	0.22 (0.07;0.68)	0.038
<b>Room temperature</b>				
< 25 C°	1			
>=25 C°	0.58 (0.11;3.08)	0.524		
<b>Birth Weight</b>				
Normal birth weight	1			
Low birth weight	5.44 (0.56;53.02)	0.145		
<b>Sex of Baby</b>				
Male	1			
Female	2.33 (0.8;6.81)	0.12		
<b>Time</b>	0.86 (0.65;1.13)	0.278		

Hence, the risk of developing hypothermia is seven times higher amongst newborns exposed to bathing compared to not being bathed (I).

In the FGDs with mothers having practiced skin-to-skin care (II), two themes emerged in the analysis; (1) Acceptability of health practices are influenced by knowledge and sensitization, and (2) Pregnant women's choices are dependent on social, cultural and economic factors.

The knowledge and attitudes amongst participating women in study II towards the practice of skin-to-skin care ranged from knowing about it and having a positive attitude towards it to not knowing about it and perceiving it as a 'trick' whereby midwives would distract the woman from pain following delivery by placing the neonate on her chest. In addition, some women expressed concern regarding the safety of the practice with regards to the possibility of vertical transmission of HIV. Mothers were fearful of, and expressed concerns regarding, the spread of HIV infection to the child in cases where the mother was HIV seropositive. The skin-to-skin contact technique was thought to be a problem in such a scenario, as blood and fluid contact with the raw area of the umbilicus was possible.

*HIV infection can be prevented by stopping the mother from touching the baby, mostly the umbilical cord. That is why I got concerned when that thing was made to touch me. The baby can easily get HIV and that was what was happening. However, I had gone for the test and knew my status and it did not worry me.*

On the other hand, skin-to-skin was also perceived as a practice that facilitated bonding between the woman and her newborn baby (II). In addition, women also expressed that the practice assisted them in initiating early breastfeeding and was a good method to use to calm and soothe the newborn. Also, some women expressed that although they had been doubtful about skin-to-skin care, affection for their newborn came naturally once the newborn was lying on their chest.

*I think it teaches us to start loving our babies from the very beginning – from the day they are born because, like for my case, I told you already the pain had made me hate the baby. I even told the nurses in the labour ward “I do not think I will have love for this child.” However, to my surprise after telling them, they still place the baby on my chest and somehow the affection came naturally so I think it is good despite the umbilical cord.*

In general, women expressed that they themselves were not able to decide if and where to seek health care, hence, health-seeking behaviour was rather based on the choice of their husband and older female relatives (II). But also, once in the health facility, they expressed that health workers could treat them with negligence and that women were not always treated with respect, particularly if the woman and the health worker were not agreeing on a certain issue.

When investigating thermal response in the maternal skin temperature following the application of skin-to-skin care (III), we could demonstrate that there was a rapid



maternal skin response, whereby skin temperature rose by 0.5°C ( $p < 0.0001$ ) on average the first 2 min after initiation of skin-to-skin care. Ten minutes following removal of the newborn from the skin-to-skin position, maternal skin temperature fell by 0.5°C ( $p < 0.0001$ ). Maternal axillary temperature also rose 2 min after initiation of skin-to-skin care ( $p < 0.0001$ ) but stayed constant 10 min after removal of the newborn from skin-to-skin position (see Figure 12).

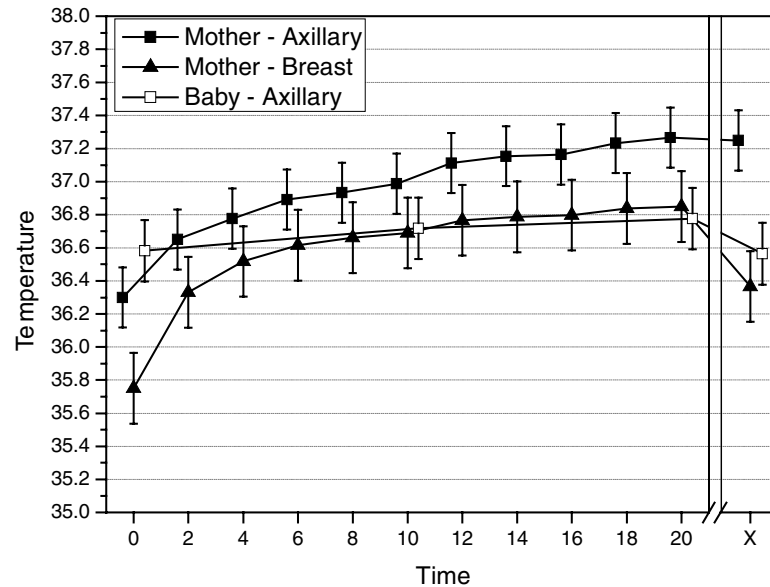


Figure 12: Maternal and neonatal temperatures, study III

## CONTEXT

In study IV we explored midwives' and managers' perceptions of the contents in the PARIHS concept of context. Further, we explored if there were additional aspects of context, which were not present in the PARIHS.

Although the components of organizational context as suggested by the PARIHS framework (receptive context, culture, leadership and evaluation) also appear to be relevant for midwives and managers in a low-income setting like Uganda, we further found that resources, being a component of the sub-element 'receptive context', need to have more 'weight' in relation to other components when applied in low-income settings (IV).

*... that week we had a problem, it started with lack of water, then eventually lack of soap, we could not sterilize our equipment. We had emergencies. Imagine, how do you repair a ruptured uterus? Instruments are there but you don't have linen! You don't have linen, sterilized linen. We ended up, however, improvising. But that week we had a lot of sepsis on the ward. A lot!*

In addition, we found that commitment and informal payment, as well as community involvement, were all components of context viewed in a knowledge translation perspective (IV). The commitment and informal payment factor was identified by the research group to influence both the individuals who are employed at different positions, but also how and to whom services are delivered.

Respondents revealed that patients belonging to a physician's private clinic could bypass the queue when seeking care from the governmental facility where the physician held a position. Also, drugs that should be available for free were not only inadequate in stock but were also sold to patients by health workers.

*We have to get a way of surviving, either sell the service or sell the drugs of the hospital. Drugs disappear, because we are poor ... that is how people are surviving.*

In study V, we found that 28/94 tested items in the compiled questionnaire were rated as relevant (I-CVI >0.78) by panellists across all four settings<sup>124</sup>. Divided by instrument, 16/58 Alberta Context Tool items, 2/8 Commitment items and 10/28 items developed by the research group were rated as relevant in all four settings. The corresponding proportions where panel participants from at least three out of four settings rated items as relevant were a total of 65/94 items, 35/58 Alberta Context Tool items, 6/8 Commitment items and 24/28 items developed by the research group. Hence, the majority of items are not suited to assess context in low- and middle-income settings. The qualitative exploration indicated that informal systems and informal payment were perceived as an additional factors influencing knowledge translation in the current settings. Also, leadership and teamwork was revealed as two very important features in the context that could facilitate, or hinder, the implementation on new knowledge (V).

# DISCUSSION

We have found that early bathing results in the development of neonatal hypothermia despite the application of skin-to-skin care prior to, and after bathing (I). In addition, we found resistance to accepting evidence-based thermal practices such as skin-to-skin care and delayed bathing amongst newly delivered women (II). However, we also found positive perceptions of skin-to-skin care (II) and we demonstrated a rapid increase in maternal skin temperature after the initiation of skin-to-skin care (III). The four sub-elements of organizational context in the PARIHS framework, leadership, culture, evaluation and receptive context, appear to be relevant in a low-income setting like Uganda (IV). However there were additional factors, such as access to resources, commitment and informal payment and community involvement that seem to play important roles for successful knowledge translation in low- and middle-income settings (IV-V).

## THERMAL PROTECTION OF THE NEWBORN

From study II in this thesis it can be concluded that early bathing is a common and valued routine amongst mothers in Uganda, which has also been found in other studies<sup>126, 127</sup>. Also, despite the application of skin-to-skin care prior to, and directly after bathing, hypothermia does develop (I). When comparing the 70 minutes postpartum prevalence of hypothermia amongst newborns in group A (i.e. 10 minutes after exposed to bathing) (I) with findings from a previous study from the same setting, but under what was routine thermal care at the time (drying and wrapping), the prevalence of hypothermia was lower amongst participants in group A (66%) as compared to newborns in the previous study at 60 minutes postpartum (80%)<sup>1</sup>. However, the prevalence of hypothermia in group B, having been subjected to continuous skin-to-skin care for 70 minutes, was 39% (I).

The above results indicate the relative power of skin-to-skin care as a means of thermal care of the neonate. Related to the effect of skin-to-skin care, and the bonding that was discussed in study II, study III in this thesis also piloted the maternal breast and axillary thermal response to the application of skin-to-skin care (III). Although we demonstrated a rapid maternal thermal response, we cannot, however, determine whether it is a physiological response to an 'affective' stimulus or if it is merely an effect of isolation warmth. Other studies have however shown that the application of skin-to-skin care facilitates breastfeeding and affectionate behaviour<sup>128-130</sup>. The physiological response to skin-to-skin contact is the release of oxytocin, which may cause the maternal temperature rise<sup>129</sup>. The possibility of portraying the maternal thermal reaction using infrared thermography (see Figure 1) might be one way of conveying information about thermal care of the newborn.

When planning study I, we identified a lack of knowledge and routine management of neonatal thermoregulation amongst staff involved in the care provided to the pregnant women and the newly delivered woman and her newborn in San Raphael of St. Francis Hospital Nsambya. Therefore, we initiated a training programme on thermal care of the newborn for midwives working in the hospital, thereby potentially bringing an

important source of knowledge to pregnant women and newly delivered mothers. Still, after the randomized controlled trial (I) we found that although 90% of women had attended antenatal care, only 19% had heard about skin-to-skin care in their antenatal care visits. Similarly, Dragovich et al. undertook a multi-country study (Brazil, India, Indonesia, Kazakhstan, Mozambique, Nepal and Zimbabwe) to evaluate the prevailing knowledge and practices in thermal control of the newborn relating to the different steps in the warm chain, and found they were insufficient across all settings<sup>131</sup>. However, the authors concluded that a one-day training course sufficed to increase the level of knowledge amongst the participating physicians, midwives and nurses and led to their recognition of the existing gaps and also their ability to identify appropriate interventions<sup>131</sup>. In our study, the majority of women had attended antenatal care clinics, but not necessarily in the hospital where the study was undertaken, and therefore, they might not have been sensitized about thermal protection of the newborn. Also, busy midwives might not have found a good way of incorporating appropriate thermal care as a routine part of the information provided to women during antenatal care visits.

## RESEARCH EVIDENCE VERSUS NORMS, ATTITUDES AND BELIEFS

Presently little is known about how Ugandan midwives and other health care professionals involved in newborn care perceive delayed bathing. What we do know from study II and what is further confirmed in latter studies, however, is that early bathing is widespread in this context as newborns are perceived to be ‘born dirty’<sup>30, 127</sup>. A recent study from Uganda illustrates a ‘window of hope’, especially with regards to care of the preterm newborn, as both health workers and community members were willing to adopt skin-to-skin and kangaroo mother care for this group of newborns<sup>126</sup>.

We found that 90% of the women thought that skin-to-skin care was good for them (I). This finding should be seen in relation to the explored perceptions of skin-to-skin care in study II that were conducted with a sample of the women from study I where several objections relating to the practice were raised. This finding may have several reasons: women might think that health workers would never expose them or their newborn to anything harmful, hence believing that the practice was good. Another reason is that women might fear health workers’ reaction in case they did not accept the practice. We found that women perceived that health workers lacked respect and dominated them when the health worker and the woman were in disagreement (II). There is growing evidence on how women may be abused in health care services in low-income settings, which might foster a culture within healthcare that hinders clients from expressing their wishes<sup>132, 133</sup>. Lastly, women might have perceived that the practice is good for their newborn but were themselves not sure about if the practice was good for them.

One basic assumption of the PARIHS framework is that research evidence is not the sole source of evidence, but that it constitutes evidence together with clinical experience or related professional knowledge; patient preferences and experiences; and locally derived information<sup>67</sup>. Although the relation of findings to how women perceived skin-to-skin care and how they acted might be contradictory, the findings shed light on the fact that the PARIHS definition of *Evidence*, being broad in sense, is

of great importance. In study II we found several misconceptions relating to skin-to-skin care. In the case of thermal protection of the newborn, *patient preferences*, being a ‘source of knowledge’ in the PARIHS framework, would not adhere to postulated evidence-based practices. In the case of misconceptions about an evidence-based practice there is a need to have a skilled health worker with the time and negotiation skills to explain to the client why the practice would benefit the client (or her newborn in this case)<sup>67</sup>. Similarly to the misconceptions identified in study IV, misconceptions relating to, for example, contraceptive use amongst adolescents in Uganda – such as “*pills burning the woman's eggs, result in the woman becoming infertile*”<sup>134</sup> – has recently been found. Based on these findings, I believe that it must be made clear what the sub-element, *patient preferences*, encompasses so that misconceptions are not included as *Evidence* although they may be seen as a source of knowledge from the perspective of clients. Hence, there is a need for exploring the sub-element patient preferences in order to clarify its role as evidence. For instance, clients must be informed about the rationale for, and the pros and cons with, a certain practice/treatment. Although the authors behind the PARIHS framework have debated what counts as evidence<sup>67</sup>, it is not evident which types of evidence are included when looking at the content of the evidence sub-element in the PARIHS framework as it looks now. We believe that well-informed clients are empowered to demand health services, all in all relating to the engagement of community members in the evaluation of health care, as suggested in studies IV-V. This relationship highlights the interactive nature of the concepts and sub-elements in the PARIHS framework.

## MOTIVATION AND COMMITMENT

In study IV, we identified commitment and motivation amongst health workers as aspects in that context that influenced the implementation of new knowledge. From an equity perspective, poor clients in high-mortality countries experience neglect, abuse, and marginalisation by the health system<sup>132</sup>. The lack of motivation and demoralization of health workers has been linked to the experienced inequalities amongst poor clients<sup>135</sup>. In 2009, McAuliffe et al. published a study focusing on motivation, a critical element in improving the efficiency and effectiveness of health system performance, amongst mid-level providers in Malawi<sup>136</sup>. They argued that there was a need to map the motivation of health professionals as quality of service delivery depends on the motivation of professional groups, or, as Gray puts it, the **P**erformance of individual health workers or teams can be seen as a function of **M**otivation, **C**ompetence and **B**arriers:  $P = (M \times C) / B$ <sup>137</sup>. Commonly, competences are assessed ahead of implementing new knowledge. According to the above, mapping, also of individual health workers motivation and barriers to good performance, would benefit our understanding of performance.

Skilled attendance by an accredited health professional, who has been educated and trained to proficiency in the skills needed to manage normal pregnancies, childbirth and the immediate postnatal period, is considered to be the single most critical intervention to increase maternal and neonatal health and survival<sup>138</sup>. The skilled attendants require resources, motivation and functioning systems to enable the provision of mortality-reducing services<sup>139</sup>. The findings from studies IV and V have generated insights on

these factors and the development of the COACH tool, aimed at assessing these factors, might be one important piece in the knowledge translation puzzle.

In the study IV setting, death reviews with an audit component had recently been implemented and were an appreciated method to identify shortcomings in provided healthcare. However, evaluation of provided healthcare, such as death reviews, as discussed in study IV, must be undertaken with great sensitivity, so as not to become a ‘blame-game’, but rather to focus instead on understanding the factors which influence their everyday practice. Similarly, the *Saving Babies Report*<sup>140</sup> from South Africa stresses the importance of having a proper evaluation system in place to enable targeted improvements in skills.

Currently, efforts have primarily focused on increasing the competence of staff rather than decreasing potential barriers to practice or increasing their motivation. I believe that health workers need to be committed to their work in order to find motivation to bring about change. Based on the findings in study V, we do not believe that all the tested concepts in the compiled questionnaire serve the purpose of assessing contextual factors that influence the implementation of evidence-based practices. The combination of the quantitative and qualitative findings in study V will be crucial for the future development of a context assessment tool for low- and middle-income settings, enhancing the mapping of contextual factors which influence health workers’ ability for knowledge translation.

## PEOPLE

In studies IV and V, community involvement was identified as one factor perceived to positively influence the implementation of new knowledge. In addition, teamwork and leadership were two aspects of context perceived to influence knowledge translation that were stressed in study V.

People are central in the WHO health system building blocks<sup>91</sup>. But who are these people and how do they relate to each other and to the health system? And is the interaction culture-specific? The World Value Survey ([www.worldvaluessurvey.org](http://www.worldvaluessurvey.org)) Cultural Map sets out to map culture on a Traditional versus Secular-Rational axis and Survival versus Self Expression values (see Figure 13).

Looking at Figure 13 we see how values and norms relate to contexts. The y-axis maps countries based on traditional versus secular values. In a setting where traditional values are harboured there is a tendency for one person to have the responsibility of the wealth and health of those belonging to the family<sup>141</sup>. Secular-rational values have preferences opposite to traditional values; these societies place less emphasis on traditional family values and authority.

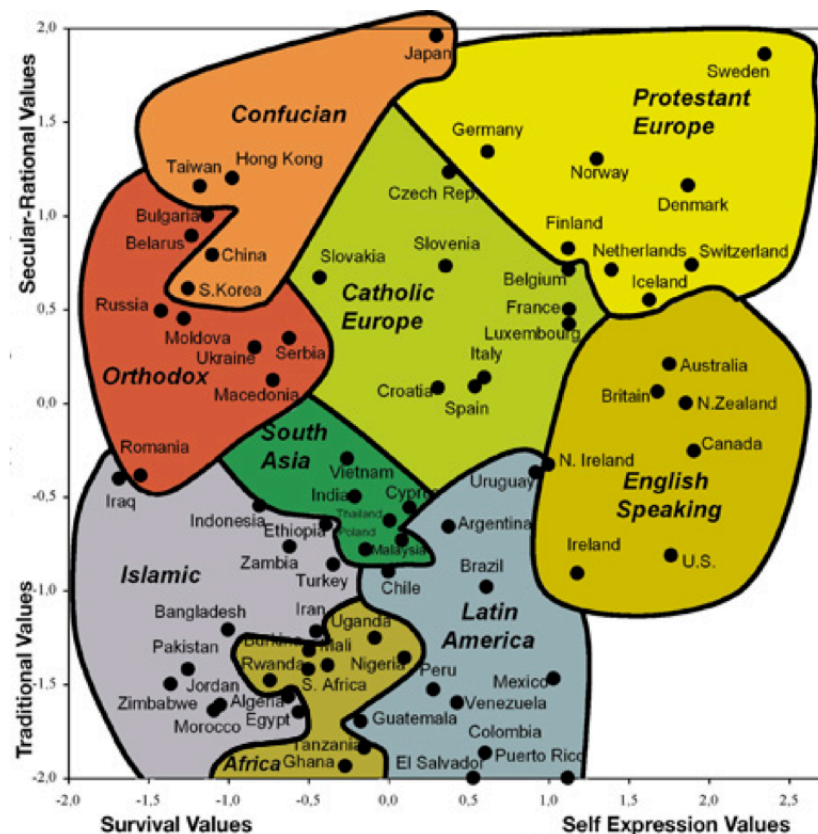


Figure 13: The World Value Survey Cultural Map

The x-axis maps countries based on survival (physical and economical security) versus self-expression (subjective well-being, self-expression and quality of life values). In the secular-rational settings where self-expressional values are harboured, the rights of people are fundamentally built on the perceived importance of legislation based on ‘all people should have the same rights’. In terms of advocating for rights – as the example of being end users of care, societies where traditional values are dominant depend on the group’s ability to mobilize and to advocate for improved healthcare services, contrasting the secular-rational societies where the health and well-being of a person will depend on his/her own ability to advocate for it.

The settings in which studies IV and V were undertaken are traditional rather than secular and people are still struggling to acquire better health and economical security. We identified that community involvement can function as a drive in healthcare provision (IV-V). When comparing this finding to what might be the case in a society based on secular values it is not far fetched to think that *individuals* in for example Sweden would demand service whereas it is more culturally accepted for a *community* to do so in societies based on more traditional values. In addition, it should of course also be mentioned that governments in democratic societies are accountable for how the health sector – be it public or private – is providing services for its population. The health system is not simply delivering technical interventions, but are purveyors of the prevailing societal norms and values<sup>142, 143</sup>. In democratic societies, politicians and other stakeholders are held accountable for providing services in accordance to the prevailing norms whereas the voices of the population in less democratic systems are less heard<sup>144, 145</sup>. Strengthening the linkage between primary health care centres and the community and strengthening the power and involvement of community members in

health service delivery led to a 33% reduction in under-5 mortality in Uganda<sup>146</sup>. It has also been suggested that improved care-seeking and demand for services can be achieved through better linkage between communities and health facilities<sup>2</sup>.

There is, however, still a need to better understand care-seeking patterns for neonatal illnesses in order to increase neonatal health and survival<sup>147</sup>. A recent study from Tanzania found that the most common reasons for delayed care-seeking for the neonate outside the home were lack of funds, the time needed to go to the health facility, a long distance to the referral health facility, preference of traditional healers for illness associated with spirits, and lack of knowledge of neonatal danger signs and symptoms of the illness<sup>148</sup>. With the widespread barriers to care-seeking for neonatal illness, community mobilization and empowerment of community members to recognize neonatal illnesses and demand for quality services that respond to their needs is needed. In studies IV and V, community involvement was identified as one factor (being part of evaluation) perceived to influence the implementation of new knowledge positively. Also, studies from Uganda showed that better facilitated linkage between communities and health centres assisted health workers on what to prioritize<sup>146</sup>. Furthermore, provision of health education targeting the health of newborns in antenatal and postnatal care through community interventions has been suggested as one important strategy to increase the care-seeking behaviour for neonatal illnesses<sup>2, 148</sup>. Health education concerning identification of neonatal danger signs and how to care for the sick neonate is of particular importance in settings with weak health systems and high burden of neonatal mortality<sup>2</sup>.

Although the World Value Survey can be criticized for being a blunt instrument, it crystalizes some differences between cultures. Health workers are also people, working within health systems that, on paper, are quite alike. The structure of the health system, the types of health workers working within them and the hierarchy amongst those workers may seem to be similar. However, it is yet not known how the health workers, as people, differ from each other, and – if there are differences – how those differences might influence the implementation of new knowledge. Are there different implementation strategies that work better in secular-rational societies as compared to traditional societies? Will the individual health worker perceive and act differently when acquiring new knowledge and skills? Are there differences in how change is happening on an individual level versus group level? Is teamwork as important in a secular-rational society as in a traditional one? Or was the perceived importance of leadership and teamwork, as found in study V, a reflection of having one leader leading change of a group that must cooperate – because that is how society works? Although these are only speculations, the outer context, that is to say, that outside the unit, is likely also to influence health workers' abilities to adapt to new knowledge.

## TRANSFERABILITY AND MODIFICATION OF THE PARIHS

I have used the PARIHS framework for inspiration. Although claims have been made that there is evidence to support the content and construct validity of the framework<sup>149</sup>, studies have almost exclusively emanated from high-income settings. What is the transferability of the PARIHS framework when applied in low- and middle-income settings?



Recently, the concept of facilitation as described in the PARIHS framework was applied as implementation strategy in the Neonatal Health - Knowledge Into Practice (NeoKIP) trial, a large-scale community-based trial in northern Vietnam<sup>66</sup>. The NeoKIP team found that facilitation as a method did function as implementation strategy in Vietnam, and the neonatal mortality rate reduced in the province where the NeoKIP project was implemented over the three years during which the intervention took place<sup>150</sup>. Eriksson et al. (2011) recognized that health workers in the NeoKIP uptake area belonged to two evidence-cultures (traditional and modern evidence-based)<sup>151</sup>. Although the two evidence-cultures co-existed without competition or conflict in some health centres, the NeoKIP group also recognized that some health workers found it difficult to determine which evidence to rely on. Hence, traditional medicine norms might function as a barrier to the implementation of new knowledge with delayed bathing as one example brought up by the authors<sup>151</sup>. In addition, the NeoKIP project identified that the Vietnamese healthcare context was centralized with a top-down decision-making processes. Hence, *democratic inclusive decision-making*, being a component of the context concept in the PARIHS framework, was not a norm in the studied Vietnamese setting<sup>150</sup>. Similarly, Weeks et al. (2004) studied the introduction of criterion-based audit in Ugandan maternity units and concluded that the strong hierarchies in African health systems might hinder the empowerment of junior health workers to innovate and change practices and that current systems require the participation of local government and hospital officials<sup>152</sup>.

This thesis has studied the two PARIHS concepts, evidence and context. It highlights a few areas of concern when applying the PARIHS framework in low-income settings. Foremost, it is unclear what the sub-element *receptive context* includes. When looking at different PARIHS publications it is clear that the sub-element has (1) no clear definition and (2) has not stabilized, for example, allocation of resources appear under the culture sub-element in a later version of the framework<sup>153</sup>. In the two studies focusing on investigating organizational context on low-income settings in this thesis (IV-V), resources come across as a crucial aspect of how context influences the implementation of new knowledge. Although *resources* is one component of receptive context, we found that it was of such weight in the settings where studies IV and V were undertaken that it must be given more attention, and definitely not be left out, as seen in some descriptions of the framework<sup>84, 86, 154</sup>. Instead, we argue that the availability of resources is of such weight that it might suit better as a sub-element of its own.

Relating to available resources, we identified informal payment as another aspect of context that was perceived to influence the implementation and utilization of new knowledge (IV-V). It is very important to get a better understanding of how much of a barrier informal payment is to the poor, especially in settings where policies of free provision of health services for vulnerable groups exist<sup>139</sup>. Informal payment can be seen as unethical if reducing the availability of health services for those in need, but may also be important for health workers' motivation and retention<sup>139</sup>. Also, if health workers do not perceive that their work is appreciated by the system, the values of the system will influence their treatment of clients, hence reproducing the societal norms<sup>155</sup>. In study IV, we identified that health workers would provide informal

payment to first obtain a position, and then again, to get on the payroll once having acquired a position: in that case, informal payment is imposed from above and it is not difficult to understand how that behaviour will continue to replicate further down in the health system's hierarchy.

In addition to resources, we found that the engagement of the community, members being the end-users of healthcare, was perceived as one important aspect of context. Currently, the engagement of the community is not present in the PARIHS framework. We propose that community involvement can be seen as part of evaluating the healthcare services, thus included in the evaluation sub-element of the framework (see Figure 14).

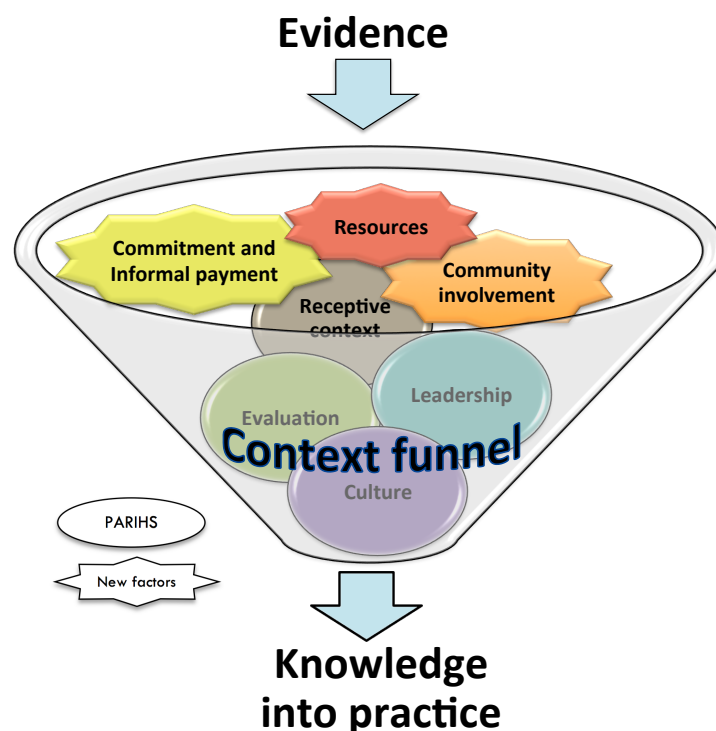


Figure 14: The PARIHS sub-elements and additionally identified factors, study IV

Perhaps it is lacking because certain components in the PARIHS framework, such as *valuing clients*, as part of the culture sub-element, and *evaluating clients' experiences*, as part of the evaluation sub-element<sup>61</sup>, could – in societies with more survival/traditional value systems - be seen as *valuing the community* and include *evaluating the community's experiences*? The rationale for rephrasing these two components is foremost to visualize that the PARIHS might be transferrable if we keep in mind that the framework was developed, and primarily used, in settings where self-expression value systems dominate. In self-expression dominated societies, priorities have shifted from emphasis on economic and physical security towards an emphasis on subjective well-being and quality of life. From a Swedish perspective it is clear that it is, foremost, the *individual client* who should be valued and whose experiences are of interest, whereas the findings in study IV and V indicate that it was the engagement and evaluation of the *community* that were important in their individual settings. By keeping these cultural differences in the back of one's mind it might be easier to transfer a framework such as the PARIHS into other settings.

## METHODOLOGICAL CONSIDERATIONS

The studies presented in this thesis employed different methods to elucidate aspects of evidence and context relating to the PARIHS framework. Methodological triangulation, referring to the use of multiple methods (e.g. quantitative and qualitative) to study a certain phenomena<sup>156</sup>, was used to highlight both the effect and the perception of skin-to-skin care in studies I and II and to explore the relevance of the Alberta Context Tool<sup>86</sup>, Commitment<sup>120, 121</sup> and items/concepts developed by the research in study V.

Investigator triangulation, referring to the engagement of two or more researchers with different backgrounds to study a particular phenomenon<sup>156</sup>, was a part of all the studies whereby the academic background, gender, cultural background and nationality of the investigators differed in each of the studies, thus enriching the discussions around the meaning of the findings in the different studies. This element is primarily important in the qualitative studies included in this thesis, as the researcher is the consistent tool applied throughout the entire process of planning and conducting the study as well as analysing the data.

In qualitative studies, trustworthiness should be considered in terms of credibility, dependability, transferability and conformability<sup>157</sup>. In studies II and IV, credibility was ensured by prolonged engagement whereby the investigators were familiar with the context in which the studies were undertaken. Although being engaged there were co-investigators who questioned the interpretation of the engaged investigators. In study II, the FGDs were conducted shortly after the 'event', that is to say the women had recently practiced skin-to-skin care, thereby reducing recall bias. In addition, credibility was enhanced by inviting mothers consecutively and by including both mothers from group A and group B in the FGDs. In doing so we believe that we broadened the scope of different perspectives around skin-to-skin care.

In the interpretation of qualitative data it is important to reflect on the reflexivity, in other words, there is a need to be aware of how the researcher and the research process influence the findings. In studies I-II there was incoherence concerning how mothers perceived skin-to-skin care. One possibility is that study participants in study I, who did not like the practice, were affected by social desirability, thus altering their responses in the direction they perceived to be desired by the investigator, by contradicting their own perception when stating that they did like the practice<sup>158</sup>. Another possibility, or in addition, women responding positively to the question in study I might be affected by what is sometimes referred to as positive satisfaction; respondents giving positive answers when answering questions on satisfaction<sup>158</sup>. This behaviour might further be affected by the interviewer whereby an interviewer who approves of the practice might give away his or her own attitude and preference for it, which might then be 'mirrored' in the response. We believe that the phrasing of the question and the conditions under which the question was posed resulted in a reported false positive attitude towards skin-to-skin care.

In study IV, some of the topics discussed were more sensitive than others, such as leadership under which one works and discussions of informal payment. Therefore, all FGDs and interviews were conducted away from the workplace. In study IV, AB and

SN were also partly engaged in another project where health workers were trained in life-saving skills aimed at newborns and providing health facilities with essential equipment. When reflecting on reflexivity it is therefore important to note that participants in study IV might have thought that stressing the lack of resources would lead to the other ongoing project delivering more thereof.

In both studies II and IV, agreement in the author group was sought in the latter parts of the analysis in order to ensure the trustworthiness of the analysis. This process was undertaken by moving back and forth between the developed themes and the original transcripts. Also, the guides developed for the interviews and focus group discussions in this thesis ensured all data collection opportunities to be similar in structure although interviews and discussions allowed for, and led to, probing.

The use of theory has, as described in the introduction, been discussed within the field of knowledge translation. In study IV we applied deductive content analysis, using PARIHS as a frame of analysis. In order to account for the risk of focusing the interpretation of findings based on the selected theory as described Oxman et al.<sup>41</sup>, we further applied inductive content analysis in an effort not to miss out on factors not being part of the theory used. Despite our efforts, there might still be other factors of organizational context, relevant for knowledge translation, which were not captured by the study. Although the guide used in interviews and FGDs was constructed using open-ended questions, we might have missed out on aspects of context that respondents never brought to our attention.

Study V included both quantitative and qualitative components. In this study there was a rather large group of diverse backgrounds involved in the interpretation of the qualitative findings, which was a strength of the study. The quantitative assessment of content validity might be questioned as it was based on small samples. It is, however, important to understand that panellists invited and included in studies utilizing this technique are chosen based on strict criteria. The method stands and falls with the identification of participants who have the knowledge and experience needed to judge the relevance of assessed concepts. Since study V is part of a larger project aiming to develop a context assessment tool for low- and middle-income settings, relevance of the tested material was undertaken in four different settings so as to facilitate space triangulation<sup>156</sup>. Although we cannot generalize our findings, they were strengthened by the fact that we undertook the same data collection in all four settings.

Lastly, generalizability and transferability of findings refers to the extent that the findings could be transferred into another setting. Therefore, the studies included in this thesis have tried to elaborate on the context in which these studies were undertaken. My hope is that the reader can, based on the descriptions, make sound judgements if these findings might also be of relevance in other settings.

# CONCLUSIONS

- Continuous skin-to-skin care reduces the prevalence of hypothermia (I-III)
- The application of skin-to-skin care does not prevent the negative thermal effect of early bathing (I).
- There are misconceptions around thermal care of the newborn (II)
- There is a need to clarify how patient preferences are to be perceived as evidence in the PARIHS framework (II).
- Contextual factors influencing implementation of evidence-based practices as suggested in the PARIHS framework, i.e. leadership, culture and evaluation, are relevant in low- and middle-income settings (IV-V).
- In addition to the contextual factors suggested in the PARIHS framework, resources, community engagement and informal payment and commitment are relevant aspects of context in healthcare in low- and middle-income settings (IV-V).
- There is a need to adapt the PARIHS framework and tools to assess context and commitment to fit low- and middle-income settings (IV-V)

## AREAS FOR FUTURE RESEARCH

There are a number of similarities to be found about which elements are perceived to influence knowledge translation between high-income and low-income settings (IV, V). However, having said this, we cannot apply frameworks and tools from one setting into another without caution. The last two studies in this thesis is a first attempt to develop a context assessment questionnaire and since the studies were undertaken, we have moved ahead in the development of the COACH tool. It was inspiring to us to find that many of the panellists in that study expressed that a tool of this kind would benefit them in the planning and evaluation of interventions. Further development and testing of the COACH tool will elucidate the COACH tool's ability to increase the understanding on how strengths and weaknesses of the local healthcare context link to the outcomes of trials in which it is applied. In addition, the application of the COACH tool might enable a structured way to address and act on locally identified shortcomings of the health system to increase organizational readiness for implementation of evidence-based practices.

In addition to contextual factors in the organization, individual factors have been demonstrated as important mediators of research use among nurses through statistical modelling<sup>159</sup>. Identifying individual factors that influence research use, in this case Canadian nurses, might render the development of a knowledge translation theory harbouring both individual and contextual factors, but might also lead to the development of different frameworks with different focus. Rycroft-Malone has suggested that *“the individual practitioner should be acknowledged as an actor in the context of practice”*. Future research in this area would probably benefit from multidisciplinary, whereby researchers with different backgrounds would together try to understand which and how individual factors influence knowledge translation. In addition, multidisciplinary amongst researchers would allow for studying how culture, the political system, prevailing norms and values – in short – how the outer context in which the health system is embedded influence the implementation of new knowledge.

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A handwritten signature in black ink, appearing to read 'Anna', with a stylized flourish above it.

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# APPENDICES

## APPENDIX I: THE WARM CHAIN

Adapted from WHO Thermal Control of the Newborn: A Practical Guide<sup>24</sup>.

1. Warm delivery room, at least 25 °C and free from draughts. Supplies such as towels and sheets should be available at time of birth.
2. Immediate drying of the newborn whilst placed on a warm surface such as skin-to-skin on the mother's chest or abdomen. Following drying the newborn should be covered with a dry towel and cap to cover its head.
3. Keeping the newborn in skin-to-skin contact. If skin-to-skin care is not acceptable the baby might be wrapped and kept on the mother's arm. During the health assessment of the newborn and postnatal care of the mother, such as delivering placenta and suturing of tears, health workers should undertake measures to reduce heat loss.
4. Early initiation of breastfeeding within one hour of the birth to provide both warmth and calories in form of colostrum being rich in both nutrients and antibodies.
5. Postponing bathing the newborn for the first 24 hours. Bathing of the newborn requires warm water followed by immediate drying, dressing and placing or the newborn close to the mother or positioning of the newborn skin-to-skin and covering. Weighing of the newborn should be postponed for several hours and should be undertaken whilst the newborn is well wrapped (by subtraction of weight of covers).
6. Dressing the baby in appropriate clothing/bedding at all times.
7. Keeping the mother and newborn together. Rooming-in facilitates breastfeeding on-demand. In institutions, rooming-in also reduces the risk of acquiring hospital-acquired infections.
8. Keeping the baby warm during transportation, preferably in skin-to-skin position.
9. Keeping the baby warm during any procedure, including resuscitation.
10. Training and awareness-raising amongst health care providers, families and communities.