Design for maternal health: collaborating with medical staff to facilitate community-centred and continuous maternity care

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ABSTRACT

The increase in health complications and poor birth outcomes associated with adolescent pregnancies in South Africa has become a matter of national concern. Therefore, the provision of youth-friendly, empathic, continuous, effective communication and engagement in antenatal care (ANC) services is essential to reduce pregnancy-related health risks. The present study outlines the development of context-specific visual materials to serve this purpose within the context of Promosa Community Health Centre (CHC), a primary healthcare clinic situated in the North-West Province. This is done within various theoretical frameworks, including that of human-centred design (HCD) and action research, using an adapted design thinking model. Medical staff members at Promosa CHC were consulted as part of the research, conceptualisation, and design process in order to construct a thick description from an emic perspective of the context in which the graphic design solution would function. The resulting *in safe hands* kit presented here, serves as a potential solution to the ANC communication challenges faced by staff at Promosa CHC.

Key terms: action research, antenatal care, communication, community health centre, design thinking, graphic design, medical staff, Promosa

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ABBREVIATIONS

ANC	Antenatal Care
ARV	Antiretroviral
AYFS	Adolescent and Youth-Friendly Services
BANC	Basic Antenatal Care
CHC	Community Health Centre
DCST	District Clinical Specialist Teams
FOTW	Fly-On-The-Wall
HCD	Human-centred design
DoH	National Department of Health
MDG	Millennium Development Goals
MCR	Maternity Case Record
MCWH	Maternal, Child and Women's Health
MMR	Maternal Mortality Ratio
PHC	Primary Health Care
PLR	Practice-led research
PNC	Postnatal Care
rPHC	re-engineering Primary Health Care
SIDS	Sudden Infant Death Syndrome
WHO	World Health Organisation

ROADMAP: RESEARCH PROJECT ORIENTATION

I. Introduction

This research report acts as an explanatory and navigational roadmap for the research project ***Design for maternal health: collaborating with medical staff to facilitate community-centred and continuous maternity care.*** This section offers an introductory overview of what the design project is about, the context in which it takes place and how the reader can navigate the report.

The research was written under the Graphic Design subject division of the research niche titled Visual Narratives and Creative Outputs through Interdisciplinary and Practice-Led Research (VINCO) of the North-West University's Faculty of Humanities. The Master's degree programme enables a creative practitioner to incorporate theory and practice into a design research framework as a method of investigating contexts, topics and visual communication problems. Graphic designers have the opportunity to research, engage with and reflect upon a communication environment through iterative design processes (Edelson, 2002:106,107). One can also explore and present considered and methodological graphic design practices relevant to the problem presented and the intended audience (see Lotz, 2014:vi,vii). This practice-led research approach to addressing a problem is a means of acquiring, producing and advancing new knowledge and creative research outputs in the graphic design field (Earnshaw *et al*., 2015:511; Barrett, 2007:2,4,5). As a result, a graphic designer can create meaningful design outcomes such as better services, products and experiences suitable for a specific target audience's context (Noble & Bestley, 2005:38).

This degree consists of four modules: Design Theory and Research Methodology (GRFN811), Research Report (GRFN873), Process Documentation (GRFN874)[1] and a Graphic Design Practical Portfolio (GRFN875). The first module, GRFN811[2], provides theoretical and practical guidelines on how to conduct design research and practice, as well as a platform to explore possible research topics towards the completion of a research proposal. To conclude this degree, the remaining outcomes of three modules were finalised and integrated into this project: GRFN873, GRFN874 and GRFN875. This report does not only aim to fulfil the GRFN 873 module, but also serves as documentation as it details the processes and outcomes of researching the visual communication problem. The objective is to critically reflect on the

1 The process work of this design project was documented extensively in supporting reflective journals (Phase 1-4) and field notebooks (DMHA 1 and DMHB 2-4). The discussion of each design phase is supplemented with excerpts of process documentation where necessary. Additional process work that is referred to in the course of reading the report is presented as **Addendum A: Process Work**.

2 Seminars, workshops, lectures and presentations were conducted and completed for the GRFN811 module.

contextual, thematic, theoretical and methodological underpinnings motivating the creative production process of this project.

My research began with a sense of discovery and a desire to productively raise awareness of a problem through graphic design. I was fuelled by my passion and concern for young people's well-being and the multi-layered challenges they face in South African communities. I was specifically interested in **adolescent pregnancies**. Adolescent pregnancies in South Africa remain a public health concern. Locally, the Promosa community, located in the Dr Kenneth Kaunda District of the North-West province, has been listed as a community prone to high numbers of teenage pregnancies, and also as not always having enough resources (cf. Syam, 2017).[3] I visited **Promosa Community Health Centre** (also referred to as Promosa Clinic) and was inspired by the discussions I had with a team of medical staff who are committed to maternal health. I also spent time with the staff in the clinic and consulted with them on the potential problems they faced when delivering maternity services to the young girls and women of their community. The staff showed great concern for their pregnant adolescent patients' antenatal period and agreed that they needed more youth-friendly, empathic and time-saving ways to communicate with their patients.

Accordingly, the **problem statement** of this research project became concerned with how graphic design practice can address medical staff's communication needs during the delivery of maternity services to facilitate community-centred and continuous care for better maternal health outcomes for pregnant adolescent patients.

II. Participants

The selected research participants of this study are **health professionals** comprising professional nurses, a doctor, mentor mothers and midwife, who are a part of the medical staff of the maternity unit of Promosa Clinic. The fieldwork took place at Promosa Clinic as the core location, consulting with health professionals throughout the initial design phases. The study relied on their inputs to determine specific communication needs as they are most knowledgeable about and aware of the challenges they face in the delivery of maternity services and communications. According to user involvement theory in design, the people affected by such challenges have more knowledge on how to define and solve their most

3 Unfortunately, current data on adolescent pregnancies beyond 2018 are not available. In 2018 the record of adolescent pregnancies in South Africa showed that 3235 adolescents between the ages of 10 to 14 years old and 107 548 young women between the ages of 15 to 19 years old gave birth (Statistics South Africa [Stats SA], 2018:9). This record indicates the high proportion of births registered to teenage mothers and the increase in adolescent pregnancies in South Africa (cf. Maqhina, 2019).

pressing concerns, and are therefore reliable primary sources of information (Wadell *et al*., 2010:1221; Kujala, 2003). In this study, working directly with the staff was paramount to understanding the factors and context surrounding their communication needs (cf. Keitsch, 2014). No patients or visitors were consulted for this project. Focus was placed on the medical staff's account, experience and reflection of their healthcare service delivery environment.

To facilitate an ethical design research process, approval was obtained from the Arts Research Committee (AREC) of the Faculty of Humanities at the North-West University (**Ethics number: NWU-00246-19-A7**) in order to conduct this study by involving the staff members of Promosa Clinic. The staff were provided with an information leaflet and a consent form to brief them about the contents of the project and inform them of their right to participate voluntarily in the study. All information gathered during the research process was anonymously processed into this research report and participants gave consent for any data, recordings and photographs to be used to this effect. The staff's inputs from field research are referred to as sources of information in applicable phases based on the coded database spreadsheet provided (refer to Table 1a of Addendum A). The staff collaborated and assisted in the project by participating in the selected research methods and tools such as immersion, observation, interviews and focus group sessions, in the production of relevant graphic design outcomes and solutions for maternity service delivery to their adolescent patients. In order to protect the participants, the acquired field and design research data are stored and archived at the NWU.

III. Research methods

Designing for maternal health in collaboration with staff entailed three salient aspects in the design research process. Firstly, the designer has a social and ethical responsibility towards the staff during the processes of investigation and decision-making (cf. Muratovski, 2016:33; cf. Warr *et al*., 2016:101). Secondly, the designer has the obligation to test and refine the functionality of probable design outcomes that would enable effective communication between a health professional and patient, as well as to increase awareness of a prevalent maternal health issue in the clinic (cf. Noble & Bestley, 2005:56,59). Thirdly, the designer has to exercise rigour and trustworthiness of research to ensure that the design research process and outputs of the project are transferable, credible, transparent, dependable and verifiable. [4]

4 Preferably, when approaching a social group with a challenge, one needs a second researcher to make sure that all steps are followed, and that no data are manipulated. To establish the transferability, credibility, transparency and dependability of the data of this study as a single researcher, it was ensured that all the research steps taken with participants were

The **theoretical concepts** and **practical approaches**, such as emic perspective, thick description, negotiated interactive observation, human-centred design and action research, inspired the specific methods of research towards understanding and designing for the specific demographics and context of Promosa Clinic. These methods involved exploring the context, defining a visual communication problem and, in response, executing a relevant design outcome together with staff on a consultative basis. In the process of exploring the context of medical staff and their embedded communication needs, it became clear that the staff were experiencing communication difficulties during the time-consuming task of discussing sensitive health topics and associated health risks with their adolescent patients during antenatal care (ANC) consultations. Sensitive health topics that need to be addressed during such consultations include substance abuse, mental health care, poor nutrition, unsafe sexual practices, discomforting body pain, poor hygiene and aggressive intimate relationships. This communication complication negatively affected imparting ANC education and information with the appropriate empathic transferral and engagement expected between staff and patients. Accordingly, **the communication goal of this study** is to explore, define, create and test graphic design processes and outcomes in the form of youth-friendly, visually engaging and time-saving graphic materials enabling medical staff to have sensitive discussions with their pregnant adolescent patients, and also inform and educate them during ANC consultations.

Central to this study is what Sullivan (2009:47) describes as "a dynamic structure that integrates theory and practice and contributes to personal, social and artefactual systems of understanding." In other words, the practical outcomes of the study were fluid and ever-changing, as the theory and practice mutually depended on and informed each other. The emphasis of this study is on the symbiotic nature of theory and practice within the context of practice-led research (PLR), and the final outcomes of the project were unknown until the creative production had been completed. The **practical outcome** of this study is a prototype for a communication kit named ***'in safe hands'***.[5] The *in safe hands* kit consists of eight communication tools which health professionals can use to identify and educate their adolescent patients on health risks and ways to improve their maternal health, therefore, creating a safe, reliable and confidential discussion space. The production of the communication tools and the final communication kit was guided by the designer's adapted action research creative production model, in order to produce relevant solutions through

audited and supported with sufficient descriptions and evidence to ensure that the data reflected the participants' views (cf. Lincoln & Guba, 1985; cf. Korstjens & Moser, 2018:121,122,123).

5 The use of lowercase lettering in the *in safe hands* text was motivated by the design decision to closely represent the brand identity and typographic treatment of the communication kit in written form as it is the case in its visual form. The italicised text is to denote and emphasise the title and name of the particular creative outcomes of this design project.

iterative and progressive design cycles. This model was inspired and adapted from other design thinking models such as IDEO's *Human-Centred Design (HCD) Process,* Design Council's *Double Diamond*, Hasso Plattner Institute of Design at Stanford University's *Design Thinking Process,* and Interaction Design Foundation's *Design Thinking Process.* Each cycle included the planning for production using the designer's knowledge, and implementation of the plan using the designer's expertise, as well as the observation of and reflection on preliminary outcomes from the perspective of the medical staff to apply adjustments and refinements towards the communication goal.

It is significant to note that this research was finalised during the COVID-19 world pandemic.[6] This project was subsequently interrupted and all fieldwork at the clinic was suspended in March 2020 for the sake of the safety of the health professionals and the researcher. As a result of the spread of COVID-19 and ensuing lockdown restrictions, the production of the final visual communication solution in direct collaboration with staff at the clinic had to be ceased. This unfolding of events placed a limitation on movements to the clinic and access to the staff. This issue was deliberated, and it was decided that the data collected from the staff prior to the restrictions had been sufficiently analysed, and that these outlined the staff's views and expectations in order to progress to the design and creation of a final prototype. As a result, further interaction with participants was not necessary and the remainder of the study could be completed remotely.

IV. Navigating the research report

This report is divided into four phases – Phase One: Discover; Phase Two: Define; Phase Three: Design, and Phase Four: Decode. **Phase One** discusses the preliminary research which led to the discovery of the problem statement and the research elements that were prepared in a design research framework enabling the designer-researcher to investigate the problem in more detail in the phases that would follow. **Phase Two** offers a discussion of the action research-oriented data gathering and analysis process leading to the definition of the visual communication problem, and subsequently, the visual communication strategy as well as the final concept in response to the problem statement. In **Phase Three**, the final concept

6 In January 2020, the World Health Organisation (WHO, 2020a) announced coronavirus (COVID-19) a global crisis and all countries were alerted of its devastating impact on people's health. South Africa responded from the 27th of March by enforcing a nationwide lockdown and schedule of services to be phased in according to the COVID-19 risk adjusted strategy to save lives and slow the spread of the virus (COVID-19 South African Online Portal, 2020). This restricted all human movement, activities and physical interactions, and civilians were only allowed to be in public spaces, with hygiene measures in place, for essentials such as medical care, municipal services and banking services (Government of South Africa, 2020; COVID-19 South African Online Portal, 2020).

is executed through action research-oriented design cycles of production towards a workable prototype fulfilling the communication goal and answering to the project objectives. **Phase Four** concludes the report by showcasing and reflecting on the final graphic design prototype and the design research as a whole. Each phase is illustrated and supported by a selection of process work imagery which displays the design development and decision-making processes. The organisation of this report simulates the design process which unfolds in the field and design workspace. The navigation of this report is based on how the designer-researcher moves and pivots between the interdependent stages of the design research process in the development of the prototype.

PHASE ONE: DISCOVER

This initial step focuses on posing a question, analysing a problem, or identifying a potential opportunity. (Visocky O'Grady & Visocky O'Grady, 2017:107)

1.1 Navigating Phase One

The first introductory phase of this design research process is called ***discover***. This phase introduces the reader to the context and the scope of the project. More specifically, this phase discusses what was discovered during the preliminary fieldwork and secondary research. The main objective of this phase is to frame the problem statement and orientate the research elements of the project. This is done by offering a design research framework underpinning the research and creative production processes that follow in Phases Two, Three and Four. Firstly, the theme of this study is presented. Hereafter, the research field of practice-led research is introduced wherein this study is located and addressed through research and practice. This is followed by a theoretical framework where the theories that informed the designer-researcher's approach to fieldwork and practice are detailed. Subsequently, an explanation of the methodological framework is offered along with the design thinking models that inspired the present model of this study. Additional process work is referred to where necessary in order to enlighten the argument. This phase concludes with a summary of the important points of Phase One in preparation for Phase Two.

1.2 Theme and context: adolescent pregnancies in South Africa

> "…when I missed my period, the clinic did tests and confirmed I was 16 and pregnant. They also tested for HIV and found I was HIV positive..." Fortunately for Nhlanhla, her viral load is undetected and is in good health during her pregnancy and receives support from a local group, Mother 2 Mothers which supports HIV positive girls and women. (Mkize, 2017)

The adolescent pregnancy rate in South Africa, according to Statistics South Africa (Stats SA, 2018:9), remains excessively high with the latest record of 107 548 teenage mothers between the ages of 15 to 19 years old giving birth in 2018. The IOL news agency ran a story in 2017 to illustrate a teenager's maternal experience and her increased vulnerability to health risks in present-day South Africa. The story of Nhlanhla is a reality for South African youths who fall pregnant at a young age and require additional antenatal care (ANC) support to avoid adverse

birth outcomes (cf. Mchunu *et al*., 2013:426). Adolescent pregnancy, more commonly known as teenage pregnancy, is defined by Kassa *et al.* (2018:196) as a pregnancy in young women aged between 10 to 19 years old. Pregnant youths are likely to face complications during the antenatal period and childbirth that can result in sicknesses or death (World Health Organisation [WHO], 2020b).

The prevalence of adolescent pregnancies in South Africa is a multifaceted public health concern. Adolescent pregnancies significantly contribute to the maternal and neonatal mortality and morbidity rates in health institutions (Jonas *et al*., 2016:2,12; Govender *et al*., 2018:1; Willan, 2013:4,16). According to Neal *et al.* (2018:2,7), adolescent pregnancies are associated with life-threatening health problems for both mother and infant. Bomela (2020:18), in accordance, states that an adolescent mother is more likely to die from complications related to pregnancy and childbirth, such as hypertensive disorders, miscarriage and obstetric haemorrhage.[7]

Babies born to teenage mothers are also at a greater risk of pre-term delivery, low-birth weight, birth defects and sudden infant death syndrome (SIDS)[8] (Statistics South Africa [Stats SA], 2015:12). These problematic maternal and neonatal health outcomes can be a consequence of a combination of preventable causes including the standard of ANC service delivery; the patient's use of ANC services; the management of pre-eclampsia[9]; adherence to antiretroviral (ARV) treatment in the case where the mother is HIV positive; the time of detection and referral of high-risk pregnancies to hospitals or specialists; and access to emergency transport services (Reddy *et al*., 2016:2; Panday *et al*., 2009:48; Govender *et al*., 2018:1). Tomlinson *et al.* (2014:277,278) report that pregnant adolescents can experience at least one risk factor such as depression, HIV infection, alcohol abuse and poor nutrition. In support of this observation, Hofhuis *et al.* (2003:1086) highlight how one risk factor during pregnancy, such as smoking tobacco, can be harmful. Smoking tobacco can adversely affect the neurodevelopment of the foetus and cause behavioural problems in future (in this regard also compare Wehby *et al*., 2011:207,208). As such, pregnant adolescents are predisposed to those health, psychological, biological, environmental, socio-economic and psychosocial-related risks which contribute to a lack of well-being and an endangered pregnancy. Another

7 Adolescent expecting mothers are susceptible to health complications during pregnancy due to their developing bodies which haven't yet reached maturity for childbearing, as well as other factors such as a lack of preparation for pregnancy or childbirth, HIV infections, delayed ANC, and discouraging healthcare service experiences (Thompson, 2020; Baxter & Moodley, 2015:949,950; Amnesty International, 2014; Department of Health, 2015a:13,14).
8 SIDS is defined as an inexplicable death of an infant in good health during their sleep (Kinney & Thach, 2009:795).
9 Pre-eclampsia is a precursor of eclampsia marked by high-blood pressure, damaged kidneys and swelling in certain areas in pregnant women, which can lead to convulsions or coma (cf. Mayrink *et al*., 2018:1).

factor to consider is that adolescent pregnancies require more careful evaluation and therefore need more antenatal health resources (Irvine *et al*., 1997:325).

In response to this crisis, the South African National Department of Health (DoH) has made concerted efforts to minimise obstetric risk factors and negative birth outcomes. The DoH's efforts include disseminating standardised guidelines, policies, targets and interventions on maternal health information with the central goal of improving maternity services in public health facilities (Department of Health, 2015b:36).[10] In 2007, the DoH introduced the basic antenatal care (BANC) approach as a primary intervention to promote principles and practices of good maternity care in ANC services in health facilities (Pattinson *et al*., 2019:16; Mulaudzi *et al*., 2016:2). This approach was implemented from 2008 in public health institutions nationwide (Ngxongo, 2018:5). The BANC approach is a means of ensuring that at least a minimal level of ANC is offered routinely to every pregnant woman in Primary Health Care (PHC) clinics (World Health Organisation [WHO], 2016; Ngxongo *et al*., 2016:1). The purpose of the BANC approach is to screen, diagnose, and manage risks, and to treat complications already present or that might develop in the pregnancy period (Pattinson, 2007:5). While this approach can lead to the current improvement of the general health of the patient, the end-goal is to eventually reduce maternal and neonatal deaths and improve maternal and child health outcomes (Hofmeyr & Mentrop, 2015:902). Beauclair *et al.* (2014:2) state that ANC can be a gateway to early specialist referrals, early detection of danger signs, and appropriate management of chronic conditions in high-risk pregnancies. Consequently, an effective ANC routine can reduce the risk of stillbirths and prevent labour complications from non-pregnancy related infections (Kaswa *et al*., 2018:1,2; Ngxongo, 2018:2,7). According to Ngxongo and Sibiya's (2013:5) 2013 study on the successful implementation of the BANC approach in the eThekwini Municipality PHC facilities, some facilities are able to make ANC easily accessible and available to pregnant women every day despite challenges such as a shortage of staff and lack of material resources (Ngxongo, 2018:9).

Promosa Clinic is a PHC facility that offers the BANC approach to the Promosa community. The Promosa community is located within the Dr Kenneth Kaunda District, in the town of

10 The DoH has been in the process of re-engineering Primary Health Care (rPHC) on all levels of care, which has prioritised women's health through the deployment of District Clinical Specialist Teams (DCST), with a focus on enhanced obstetric services and clinical governance (Department of Health, 2017b:29,30; Feucht *et al*., 2018:39). This innovation aimed to improve maternity service delivery and realise the World Health Organisation's Millennium Development Goals (MDG) of improving maternal and child health (Oboirien *et al*., 2018:2). The ultimate vision of the reformation of the public health sector through the rPHC strategy is to render accessible, equitable and integrated quality healthcare services to all (North-West Department of Health, 2015:14).

Potchefstroom in the North-West province.[11] A census conducted in 2011 by Statistics South Africa (Stats SA, 2011) showed that the Promosa community had a relatively large population of adolescents between the ages of 10 to 19 in comparison to other age groups (see Image 1.1). The Promosa Clinic specifically aims to serve the community's adolescent population by providing maternity services to young pregnant women and mothers with new-borns (see Image 1.2) (Promosa Clinic, 2016). One of the objectives of maternity services at the clinic is disease prevention and health promotion through the provision of early antenatal and postnatal care services (Le Roux & Couper, 2015:441; Department of Health, 2017b).

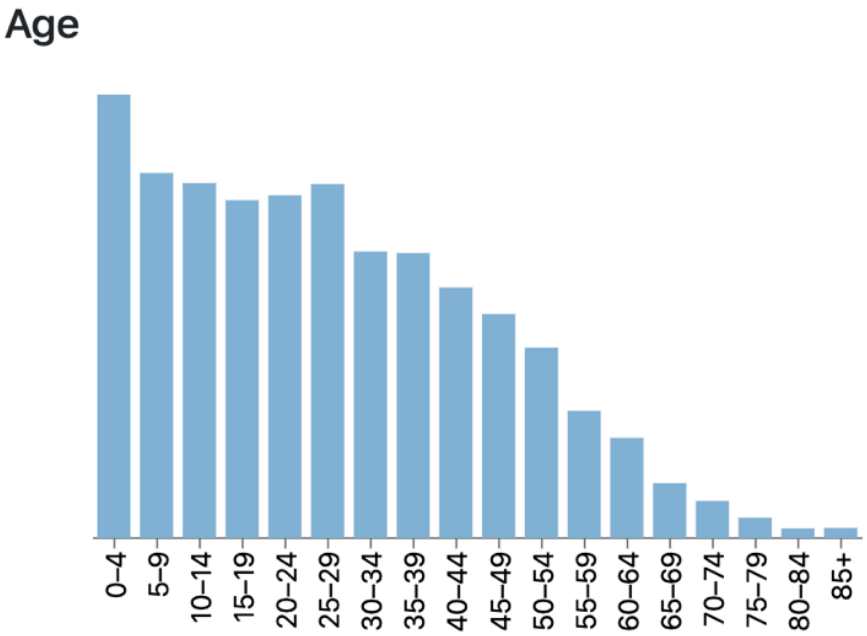

Image 1.1: A census indicating infants to adolescents as the most common age group in the Promosa community in 2011 (Statistics South Africa [Stats SA], 2011; also see Frith, 2011).

An observational site visit to Promosa Clinic was made at the commencement of this study (see Image 1.2). The goal of the initial site visits was to build rapport with the staff, get a general sense of how the clinic operates, and identify possible communication issues. During conversations and consultations with maternity staff members, they highlighted how understaffing and overworked health professionals constituted problems resulting in very long waiting times for pregnant women and new mothers with infants (DMHA Field notebook 1, 2019). According to Egbujie *et al.* (2018:311), patients in PHC clinics often experience long

11 This design project took place within the district boundaries of Promosa. Very little has been written and documented on the history, geography and demography of the Promosa Community. According to the most recent 2011 census, Promosa has a mixed population of 16 125 people where 51% are female and 49% are male (Statistics South Africa [Stats SA], 2011). Of these, 51% are Coloured and 48% are Black African (also see Frith, 2011). This census reflects the staff's' clinical environment and informs the research process of the design project.

queues and waiting times. These present challenges for the staff in terms of patient satisfaction. From a graphic design perspective, it became clear how the staff may need and could benefit from communication materials which could help them save time, detect problems, and educate on maternal well-being during clinical consultations.

Image 1.2: The area where patients wait to see a nurse in the maternity unit at Promosa Clinic in Potchefstroom. Photograph by and in possession of the researcher (Manyame, 2019).

Government-related health reports further reflected that the Dr Kenneth Kaunda District had the second highest maternal mortality ratio (MMR) in the country of 257.4 deaths per 100 000 live births between 2013 and 2014 (Massyn *et al*., 2014:101,596,597). Litty Syam (2017), an obstetrician on the District Clinical Specialist Team (DCST) of the Dr Kenneth Kaunda District, identified Promosa Clinic as a community health centre that was prone to high-risk pregnancies, and subsequently as being in need of better care and support strategies. At the initial site visit, the staff also reported that they had been experiencing an increased number of at-risk pregnant teenagers in a short space of time.

Promoting maternal and neonatal welfare is a human rights concern emphasising that women and children have a right to the highest attainable standard of health (Hunt & De Mesquita, 2007:3,5). Thus, encouraging positive adolescent birth outcomes and overall maternal experiences from a human rights perspective affirms the right of adolescent mothers to safe,

efficient, youth-friendly, and dignified maternity services. The alarming data on maternal deaths and high-risk pregnancies presented this researcher and designer an opportunity to advocate for adolescent maternal and neonatal well-being in Promosa Clinic by implementing effective and meaningful graphic design practices. The current state of adolescent pregnancies and the need for a socially responsive design[12] at Promosa Clinic inspired the research framework of the present study. It also served as inspiration to explore the theme of designing for maternal health to avert risks and negative birth outcomes in cases of adolescent pregnancies. The abovementioned preliminary research led to the identification of the context, theme, and concerns in the clinic which are articulated as the following **problem statement** for this study:

How can graphic design practice address the communication needs of medical staff in maternity services to facilitate community-centred and continuous care for better maternal health outcomes?

The problem statement presents a need for a research methodology and a broader field such as practice-led research (PLR) that can allow a designer to incorporate his/her practice into research. A PLR approach permits a designer-researcher to integrate methods, tools, and techniques that can facilitate a creative and iterative process of investigating the problem and making a suitable graphic design solution for a specific context (Candy, 2011). PLR is an appropriate research method and context in which the identified theme and topic can be explored, and the staff's communication needs can be addressed. In the following section, the research approach to this project is introduced.

1.3 Research approach: practice-led research

Practice-led research (PLR) is a relatively new field of investigation now gaining recognition in tertiary institutions as a way of furthering design research (Farber & Mäkelä, 2010:8; Van Zyl, 2010:125). A notable reason for this is that PLR incorporates a methodological framework where a practitioner-researcher can initiate and explore research questions emerging from, and through, design practice (Green, 2007:9; Biggs, 2004:7; Gray, 1996). The design of this study's PLR method takes into account how the identified problem statement occurs in a healthcare and social context. Therefore, a field-based, experimental, and open-ended

12 Socially responsive design refers to design practices and processes that seek to address and respond to context-specific social concerns with design solutions that can potentially drive impact and improvement in a community (Thorpe & Gamman, 2011:219).

approach to research and practice is required to explore the possibility of tangible and practical solutions that could better the staff's service delivery experience (cf. Skains, 2018:86; cf. Noble & Bestley, 2005:46). Sullivan (cf. 2009:48) describes this contextualised research approach as moving from the "unknown to the known". The project opens up to opportunities and imaginative possibilities towards the contribution of new insights and knowledge on practice. In this regard, the problem statement is a starting point for all the practitioner-researcher's inquiries on how to address the staff's communication needs. These interconnected questions or identified needs arising from the data collected in the field or from the use of graphic design practice methods in the studio are engaged with, and explored through, the dual role of a practitioner-researcher.

During the design research process, the graphic designer has, according to Gray and Malins (cf. 2004:20,21), a dual function: as a practitioner creating an artefact, and as a researcher conducting an in-depth and systematic inquiry on a subject of design practice. A practitioner-researcher coordinates the complex interplay between practice and theory (Nimkulrat, 2007:2). Central to a PLR study is how practice drives research; therefore, in this project, design practice is a primary method of exploring the problem and possible solution by reading, reflecting, making, and responding through preferred research methods and theories (Candy, 2006; Borgdorff, 2011:45,46; Scrivener, 2009:75). Marshall (2010:79,80) states that while producing a practical and creative response to a problem, the selected theory creates a symbiotic association with the practitioner's tacit knowledge and repertoire. Consequently, the theory informs the practical process with appropriate methods and techniques while the practitioner-researcher reflects critically on the application of theoretical concepts in practice (Biggs & Büchler, 2008:14; Marley, 2015:2). The synergy between theory and practice then gives rise to new insights and understanding about the particular practice and its product(s) (Scrivener & Chapman, 2004). In this study, other relevant and appropriate theoretical and practical concepts are explored to answer the questions arising from practice and the interpretation of data collected from the medical staff during the design thinking process. A design project undertaking in the context of PLR is a dynamic, interactive, reflexive and reflective framework and discourse in action as the practitioner-researcher investigates the problem and appropriate response (Mäkelä, 2010:65; Gray & Malins, 2004:22; Candy, 2011).

After the field research and design practice undertaking, the identified questions, needs, and project goals are answered by the research outputs generated from the creative production process in a textual and visual format (Nimkulrat, 2007; Gray & Malins, 2004:20). According

to Finley (2005:682), PLR's creative approach is not restricted to the traditional qualitative research outcomes of written forms of presenting knowledge. Haseman (2007:149,150,156) argues that the explicit representation of design knowledge in the form of textual exegesis is essential to provide interpretation and guideposts for understanding the intricacies of creative work. In favour of that view, Biggs and Büchler (2008:14) add that a lack of reason and discussion on experiential content poses the risk of excluding the documentation of certain processes and actions which require an explicit representation of knowledge. A "double articulation" of an artefact and text can, however, present a holistic understanding of the issue being studied (Marley, 2015:2,116,325). As such, PLR can apprehend, preserve, and communicate "the epistemological content embedded and embodied in practice" as Haseman (2007:148,156) notes, through an artefact and textual exegesis.

Considering the discussion regarding the textual output of PLR, the research report should articulate the creative process in a way that is thorough and accessible for other academics to further interrogate, build upon and continue the discourse (Candy & Edmonds, 2018:64). Such expression and articulation of knowledge from PLR can enrich the understanding of both the researcher of the artistic work and fellow practitioners-researchers on the subject in the academic community (Borgdorff, 2011:54,55,57,58). The production and dissemination of design knowledge must therefore be presented in a shareable format (Candy, 2006; Swann, 2002:51). In light of this, the present research project is concerned with the production of two kinds of interrelated outputs and knowledge systems, namely a creative output in the form of a prototype, and documenting knowledge in the form of a research report.

According to Green (2007), the practitioner-researcher needs to exercise academic rigour during the investigative process and production of creative outputs to prove the confirmability, credibility, and transferability of the study. This means that the application of a laborious methodology in PLR is necessary, given that it should entail critical and reflective practice. Marshall (2010:79,80) adds that the problem statement is investigated through a methodological structure that is observational, analytical, and encourages reflection. This structure contains a systematic set of methods, skills, and tools to capture and analyse the practitioner's research activities for the production of a transparent record and process documentation, adding credibility to the creative process (Van Zyl, 2010:123). Thus, the research process is also subject to scrutiny by the self-same practitioner-researcher who generates it, resulting in heightened self-awareness, self-analysis, and observation of one's work to establish the reliability of the research outputs (Gray & Malins, 2004:38).

Schön's (1983) theory of reflective practice subsequently guides the reflection process of this study as part of the chosen methodological framework. The practitioner knows-in-action, reflects-in-action, and reflects-on-action when researching in the field and designing a solution (Scrivener, 2000). Continuous reflection on how theory and practice inform each other enhances a practitioner's proficiency and critical involvement in the creative production process (Scrivener & Chapman, 2004; Van Zyl, 2010:121). By revisiting the body of creative work through iterative cycles of critical reflection, the practitioner can arrive at a desirable and viable prototype in line with the research objectives. This study, being a PLR project, focuses on the creative exploration of practice, driven by the theoretical bases of emic perspective, thick description, human-centred design, and action research (cf. Mäkelä *et al*., 2011:6; Sullivan, 2009:49,50), as discussed below.

1.4 Theoretical framework

The primary body of theory that underlines and drives this PLR project is action research. Other theoretical frameworks, such as medical anthropology and human-centred design, serve as contextual lenses and respectively informed the researcher's fieldwork approach and inspired the data collection and analysis methods for field research and design practice.

1.4.1 Contextual lens: medical anthropology and human-centred design

Medical anthropology is the study of how people experience and interpret health, diseases and treatment (Shield & Borkan, 2008:360; Singer & Baer, 2012:3; Hudelson, 2004:345). A medical approach to anthropology originated from ethnographic research (Broom *et al*., 2013:16). Central to medical anthropological research and practice, is the field research that is conducted to contextualise and find commonalities in people's values and beliefs (Manderson, 1998:1021). According to Krumeich *et al.* (2001:121), fieldwork may potentially reveal the socio-cultural, economic, political, and historical factors that shape the understanding of human health. In medical anthropology, these factors are studied through three theoretical perspectives: critical medical anthropology, medical ecology and meaning-centred medical anthropology (see Image 1.3).[13] Subsequently, the way in which the different approaches and concepts of medical anthropology shape an understanding of healthcare

13 Medical anthropology is a subfield of anthropology and draws upon cultural, biological, linguistic, and social anthropology (Society for Medical Anthropology, 2017). Critical medical anthropology emphasises the importance of political and economic factors in shaping health (Grønseth, 2006). Medical ecology entails where people live and how a community adapts to its given environment to form its health beliefs (Singer & Baer, 2012:37). Meaning-centred medical anthropology prioritises the symbolic construction of the world in the analysis of health-related behaviour (Singer & Baer, 2012:38).

was made intelligible in order to derive appropriate theoretical postulations towards the establishment of the contextual lens (see Image 1.3).

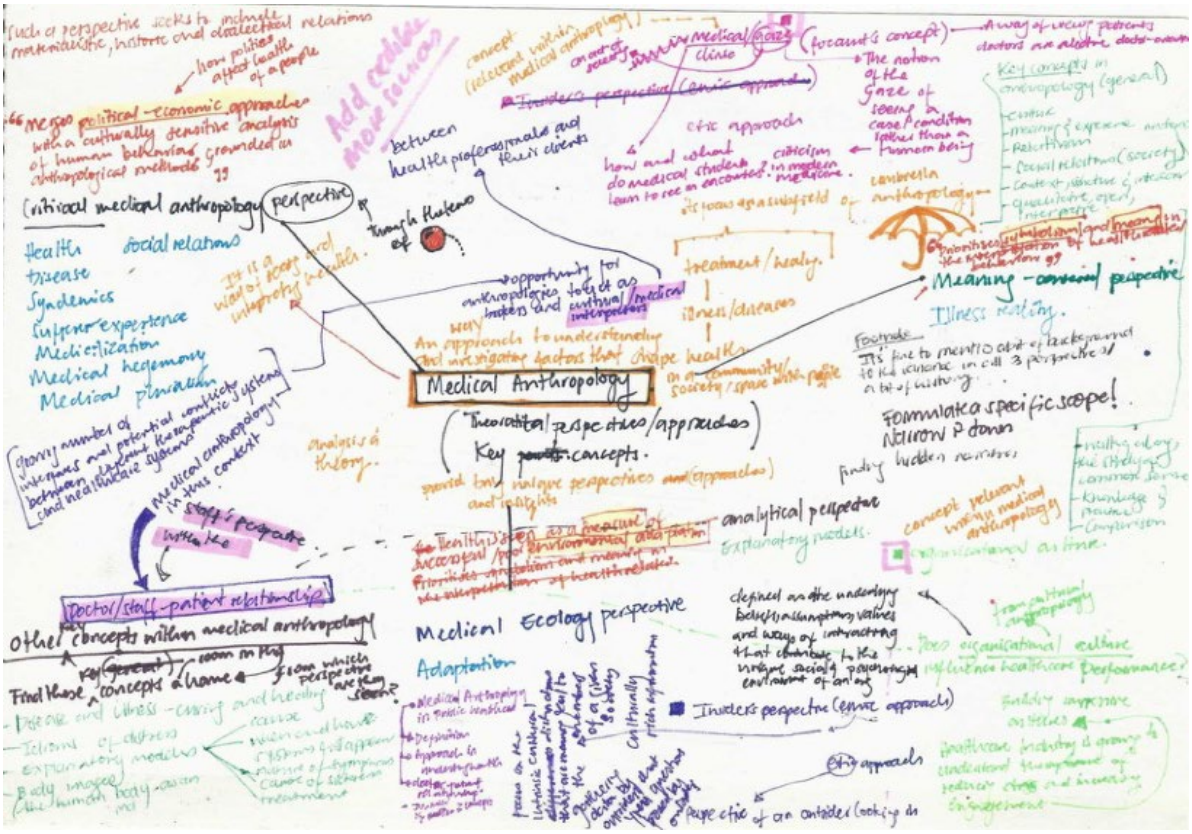

Image 1.3: Exploring medical anthropological theoretical perspectives and related concepts, and their relevance to the study. An excerpt from the researcher's reflective journal. Process image by and in possession of the researcher (Manyame, 2018).

During the research exploration, the concepts of the medical gaze, thick description and emic approach stood out as possible ideas and lenses through which Promosa Clinic can be viewed. Medical anthropology becomes a starting point that can provide contextualisation on community health (cf. Kaulagekar-Nagarkar, 2012:171,172). Such an explicatory approach opens up the possibility for clinics to provide accessible, preventive and rehabilitative care suited to a community's needs (Sigdel, 2012:29).

Some aspects of medical anthropology are rooted in the poststructuralist Michel Foucault's (1926-1984) social theory of the clinic (Carroll, 2013:40). Foucault (1973:3,5,8,31), in *The Birth of the Clinic: An Archaeology of Medical Perception* (originally published in French in 1963), questioned the exercise of power and knowledge within the discourse of the human body, health and disease. Although his research is mainly built around studies of the clinic during

the medical practice of the eighteenth century, his work is still relevant as it offers a possible lens for exploring a community health centre staff's perspective and experience of delivering healthcare to their patients. The clinic, according to Foucault (1973:52,54,55,96,196), becomes an examining apparatus – a discursive space that links a sick patient with his or her doctor through a medical perception. He (Hancock, 2018:443) calls this *the medical gaze.*

> Foucault develops the concept of 'the medical gaze', describing how doctors modify the patient's story, fitting it into a biomedical paradigm, filtering out non-biomedical material. A 'gaze' is an act of selecting what we consider to be the relevant elements of the total data stream available to our senses. Doctors tend to select out the biomedical bits of the patients' problems and ignore the rest because it suits us best that way. (Misselbrook, 2013)

Misselbrook (2013:312) describes how Foucault especially criticises the medical practice for not viewing the patient holistically. The medical gaze, in Foucaultian terms, gives physicians the power to determine the causes of illness according to their medical knowledge and not based on humaneness (Foucault, 1973:30,111,170,195). However, in contemporary medical practice, the doctor's gaze considers the patient's history in addition to the physical exam, observation and consultation, and this course of questioning leads to the identification of the patient's problem (Lange & Lu, 2014). The patient's illness narrative is taken into account and the doctor's perception and application of knowledge is only one of the determining factors in interpreting the cause of an illness (Bristowe & Harris, 2014:552,553). Notwithstanding, Foucault's theory and insights on the medical gaze can be used as a litmus test or possible perspective to understand how medical consultations are practiced today.

Another term of particular interest during the preliminary research for this study was anthropologist Clifford Geertz's (1926-2006) method of describing ethnographic findings (see Geertz, 1973). His fieldwork analysis method can be useful in interpreting contextual complexities that contribute to the observed social action or behaviour. Geertz (1973:6) calls this the "thick description", a term borrowed from philosopher Gilbert Ryle's (1900-1976) work of describing one's behaviour and the factors that contribute to it in an expository fashion. Such a comprehensive description of an observation could uncover the surrounding context and meaning beyond the surface. A thick description provides detailed "vignettes" explaining situations and the significant cultural meanings underpinning an observation (Drew, 2020). Ponterotto (2006:542) adds that the researcher has a task of thickly explaining and interpreting an observation in a manner that is accessible to the research community.

Gomm and Hammersley (2011) argue that qualitative research should produce and reflect the rich and complex social life in contrast to a thin description which reduces ethnographic accounts to a simplified version. Furthermore, Lincoln and Guba (1985) describe a thick description as a way of achieving external validity and transferability of results in other contexts. It is important to explore ways of making the description of a contextual problem "thick" (Sergi & Hallin, 2011:204). Therefore, this qualitative research technique is effective in exploring and describing the medical staff's perception of health and in determining the wealth of meanings that they associate with a maternal health problem. The same concept can be applied in the analysis of people's understanding of treatment and medication (McSharry *et al*., 2015:6,7). The increased contextual and cultural sensitivity merges the researcher's human-centred analysis with the medical staff's knowledge and experience into a dialogue of identifying intervention points for disease prevention and health promotion in a healthcare facility (cf. Krumeich *et al*., 2001:126).

Writing thick descriptions is also accompanied by looking through an emic lens. The term "emic" was coined by linguist Kenneth Pike (1912-2000) and was adopted in research as a way of seeing (see Pike, 1967). In this study, the emic approach in healthcare facilities looks at the medical staff's perspective and perceptions of the observed problem (cf. Harris, 1976). An insider's perspective attempts to put aside the researcher's bias and helps to obtain meaningful knowledge on how social groups organise and understand themselves (Morris *et al*., 1999:782; Lu, 2012:109; Sabbagh & Golden, 2007:373). The researcher can provide a subjective account with detailed insights (Malinowski, 1922:2; Hoare *et al*., 2012:721).

Gitte Wind (2008:79), a medical scholar, challenges the notion of how an ethnographic study with an emic view can be applied in a medical setting. Wind (2008:79,80,82) explored the possibilities and limitations faced by the researcher who assumes the role of an insider or doctor in their field research, and suggests the need to refine the ethnographic research method, "participant observation" to "negotiated interactive observation", to describe the true character of an ethnographer's fieldwork in a hospital. The researcher is not bound to "see" or operate as health professionals do, but can negotiate and navigate his/her way through a medical space as an inquirer, experimenter, and collector of data (Wind, 2008:85). Notwithstanding, the researcher as an insider does not compromise the data collected, which is used to represent the medical staff's perspectives (cf. Long *et al*., 2008:76). A better way, proposed by Wind (2008), is to understand the research participants' outlook by observing and interacting with the unfolding medical story in a negotiated manner (Long *et al*., 2008:75,

76; Wind, 2008:84,85). In summary, for the purposes of this study, medical anthropology comes down to providing and using methods, strategies, and ways that best investigate and serve the staff's communication needs.

The philosophies of both medical anthropology and human-centred design (HCD) focus on how people experience and understand their environment, and offer tools for interpretation. Human-centred design, with its origins in the fields of ergonomics[14] and computer science, prioritises the values and concerns of project stakeholders in the design process (Bazzano *et al*., 2017:2; Akama, 2008:18). One of the HCD approaches which this study incorporates, is to approach people from an ethnographic, contextual and empathic angle (cf. Steen *et al*., 2007). The aim is to harmonise the designer's creative aspirations with the insider's perspective by conducting research collaboratively with subjects at the research site (Kuijer & De Jong, 2011:2). In this collaborative effort, the principal investigator needs to conduct the research ethically, to protect the rights, confidentiality and anonymity of the research participants (IDEO, 2015). The HCD methodology thus enables designers to jointly comprehend, together with participants, the issue at hand and to develop a desirable, sustainable and viable solution that makes use of local resources (Fisher & Johansen, 2020:2; Steen, 2012:72; IDEO, 2011:7; Giacomin, 2014:610).

The foundation of HCD is a well-defined problem, as it guides the formulation of field research questions and the design process (IDEO, 2011:34). There is a sustained engagement with the problem by continuous learning, making, testing, and iterating through three phases of the HCD methodology – inspiration, ideation, and implementation (IDEO, 2015:11,21). In the HCD process, one proceeds from concrete observations about people ('hear' or 'inspiration' phase), to abstract thinking ('create' or 'ideation' phase), and then back to the concrete with tangible solutions ('deliver' or 'implementation' phase) (IDEO, 2011:8,9). In this sense, HCD thinking is interwoven with a PLR approach in the way it uses practice as an integral part of investigating a problem and the potential design outcome through a selection of methods.

The research methods used in HCD are, among others, ethnography, co-design, and participatory action research. In participatory action research, participants become co-creators of the product or service (Carstens, 2015:33; IDEO, 2015:109). A participatory approach collectively captures and advocates the ideas, values, and circumstantial knowledge of all

14 Ergonomics is the study of how the working environment can be made safe and efficient for humans to work in (Scheer & Mital, 1997:36).

stakeholders in the design process (Taffe, 2015:55; Taffe, 2017:390; Akama, 2008:166). In addition, Taffe (2015:41,47) argues that co-designing solutions allow participants to assume the designer's role. This means that the designer may have to abstain from fully utilising his/her expertise, knowledge, and intuition to yield feasible and well-crafted outcomes (Taffe, 2017:394,397). Considering the complexities discussed by Taffe (2015:56), the designer and participants should ideally foster a relationship where the designer's competence is not undermined. Therefore, in this study, the participants' contributions are consultative and fulfil a guiding role for the designer on how to best conceptualise a visual communication solution.

Although medical anthropology does not theoretically drive this project, it did provide a good introduction on how to approach and navigate the clinical space. Specifically, the emic approach and thick description concepts provided a lens through which the theme could be framed, and the clinic's problems could be ascertained. On the other hand, action research became the primary theory and structure through which the research was conducted.

1.4.2 Primary theory: action research

The idea of action research is generally attributed to the psychologist Kurt Lewin (1890-1947). Lewin (1935:43) devised a different method of research by incorporating the participants' inputs, and the practitioner's effectiveness and professional development to engineer social change.

> Mr Baldau presents in a very clear way the challenge of the person who is trying to improve group relations… He is quite in doubt about the effectiveness of the techniques used for the betterment of intergroup relations, without being able to offer suggestions for techniques which have been proved to be effective. He asks, therefore, for action-research, for research which will help the practitioner… It is a type of action-research, a comparative research on the conditions and effects of various forms of social action, and research leading to social action. (Lewin, 1946:34, 35)

The above excerpt from Lewin's writings on *Action research and minority problems* proposes an action research model to investigate a social group's concerns and improve intergroup relations of American communities through an intervention (cf. Bargal, 2008). Lewin (1946:43) describes action research as both a method and strategy in which the investigator can intervene and actively participate in the process of practice and research to evaluate the usefulness of his/her techniques, bringing about change to human relations or group dynamics. Adelman (1993:9) highlights the characteristics of Lewin's method on using action

research with vulnerable groups with challenges. The method is centred on encouraging spiralling steps of active participation, reflective thinking, discussion, fact-finding, group decision-making, and drafting an action plan. Lewin's action research work focused on the function of a social group making collective decisions towards overcoming the problem. However, action research methods can also be applied by an individual to advocate the democratic values of a social group (Noffke, 1997). Somekh (1995:339,340) supports this statement by pointing out that the action researcher can take full control of the research process, and make methodological considerations based on good judgment and contextual knowledge.

A key characteristic of action research is to advance social action (Koshy *et al*., 2010). Kemmis (1993) emphasises the close connection between action research and social action – it is symbolic of the aspiration towards social change in the manner that it unremittingly tries to understand and improve situations for the better. This improvement is also in a sense the hopeful achievement of both HCD and medical anthropology. To support this notion, Pettit (2010:820) states that action research can represent the multiple subjectivities of diverse stakeholders and produce context-specific and novel understandings to bring value to social practices, groups and movements. The value of action research hence lies not only in its effectiveness as a research method but also in the way it can address and advocate for the complexities of human interactions and situations in an investigation.

In this study, action research is a systematic inquiry into new ideas, data and techniques through planned action in order to generate communicable knowledge and visual solutions (cf. Archer, 1995:11,13). Within an action research method, the practitioner can iteratively plan, act, observe, and reflect on the actions taken to improve his/her practice, specifically in the context of the design cycles (Tripp, 1995:11; Zuber-Skerritt, 1991). In the reflection of each field and design cycle, the insights gained from the preceding cycle can amend the plan and feed into the next cycle (Cilliers, 1999:130). On that note, Roberts and Dick (2003) highlight the flexibility of the action research process that gives room for imprecision, discovery, and progression for new questions, methods and answers. In this spiralling process, it is good practice for the action researcher to revisit the research objectives and the theoretical and ethical basis of the study to avoid bias (Archer, 1995:11,12). This research model is designed to help practitioners develop their expertise, competence, knowledge and orientation towards their practice in a way that is relevant to the audience they are studying.

Zuber-Skerritt and Perry (2002:171,172) also point out that it is an appropriate theoretical methodology for solving real-life problems, to benefit the practitioner in improving practice, and to advance an academic body of knowledge. According to Carr and Kemmis (1986), action research has developed over time with various forms of action inquiry, which are characterised by a problem-solving approach – indicating how situational, adaptive and responsive the model is to the practitioners' needs. However, all variants of action research models follow the same basic principles of being systematic, investigative, reflective, critical and iterative (Tripp, 2005).

The diverse theoretical and practical underpinnings of action research, as above-mentioned, support the efforts of this study. The goal is to define the staff's concerns at Promosa Clinic and identify an appropriate graphic design intervention. It is a relevant model of inquiry within PLR because it depends methodologically on practice and cycles of critical reflection (cf. Griffiths, 2011:169; Haseman, 2007:152). In the context of design research, action research is both a structure and a model that can articulate the intuitive design process and make explicit the steps a designer takes to reach the final result (Swann, 2002:52). In this study, action research cycles are conducted with a set of design-oriented research methods and tools during the researcher's consultation sessions with medical staff in the four phases of the design process – discover, define, design, and decode (as demonstrated in Image 1.9). This PLR project's action research approach entails a reflective practice of reflecting in and on the action, and thoughtful action, which is not automatic but requires careful thought in the application (cf. Tripp, 1995:5,9). A practitioner can research according to the envisioned production plan, taking full ownership of the collection, and use of research data from participants' input (cf. Clark, 2014:6).

The abovementioned theoretical aspects, woven together with the contextual background and introduced research approach, provide a supporting framework within which the study can take place. The theory discussed in this sub-section also inspired the method for conducting the study, as discussed below.

1.5 Methodological framework

1.5.1 Design thinking models consulted

This study uses a Design Thinking model which is inspired by the IDEO[15] *Human-Centred Design (HCD) Process* (2011) of tackling social problems with creativity and empathy (see Image 1.4) (IDEO, 2020a). IDEO practitioners use an HCD toolkit to integrate the needs and preferences of the client in all stages of the design process with the possibility of creating a desirable outcome in response to the problem (IDEO, 2020b). However, for this study, IDEO's HCD model was removed from an HCD participatory action research context, and it was embedded in an action research framework.

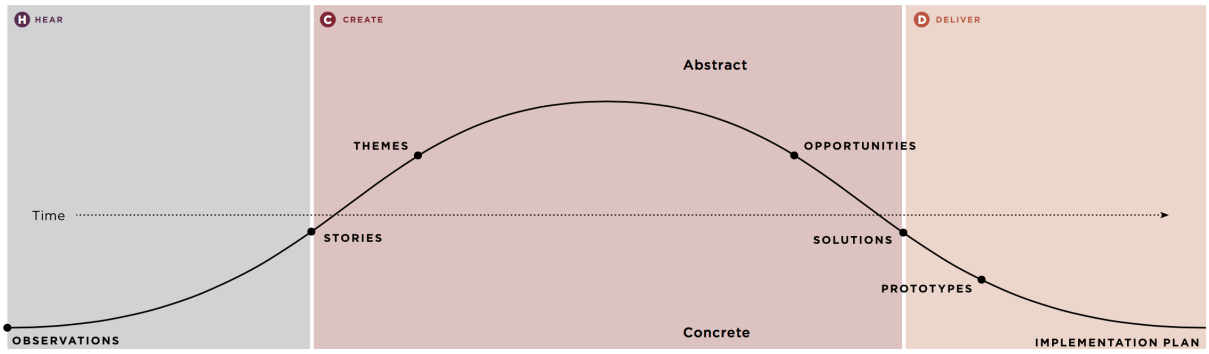

Image 1.4: The HCD process (IDEO, 2011:8,9; IDEO, 2015:11). Model by IDEO.

The IDEO model uses participatory and co-design approaches. The contentious aspect, and the criticism behind the human-centred design theory is that, participants can assume the role of a designer, thus compromising the designer's expertise and knowledge in the process (cf. Taffe, 2015; Steen, 2012:79). In order to make it more effective, the HCD model was adjusted for this project to give the designer-researcher more flexibility and control. The staff was integrated in the design process on a consultative basis thus providing more autonomy to direct the process in light of fulfilling the project objectives towards the best design outcomes. With that understanding in mind, the adapted design thinking model was technically and ethically more appropriate for the context of the staff. The adaptability of the IDEO HCD toolkit, along with medical anthropological-inspired methods, was ideal for the fieldwork, research, and design practice of this study.

15 IDEO is a design consulting firm with a non-profit organisation division that pioneered the HCD process and techniques with the intention of creating solutions in the form of services, products and modes of interaction alongside organisations committed to improving the well-being of those living in under-resourced communities (IDEO, 2011:189).

The methodology of this study also drew inspiration from other similar design thinking process models, such as the Design Council's *Double Diamond* (2020), Hasso Plattner Institute of Design at Stanford University's *Design Thinking Process* (2010), and Interaction Design Foundation's *Design Thinking Process* (2010). The Design Council introduced the *Double Diamond* model (now known as the *Framework for Innovation*) in 2004 to explore a problem widely and narrowly through divergent and convergent stages of thinking across four parts: Discover, Define, Develop and Deliver (Design Council, 2020) (see Image 1.5). This framework uses a set of design methods and principles geared toward engagement and leadership (Lipiec, 2019). The model has been widely used to structure and explain design projects because of its ability to create, engage and innovate in problematic spaces (Hambeukers, 2019).

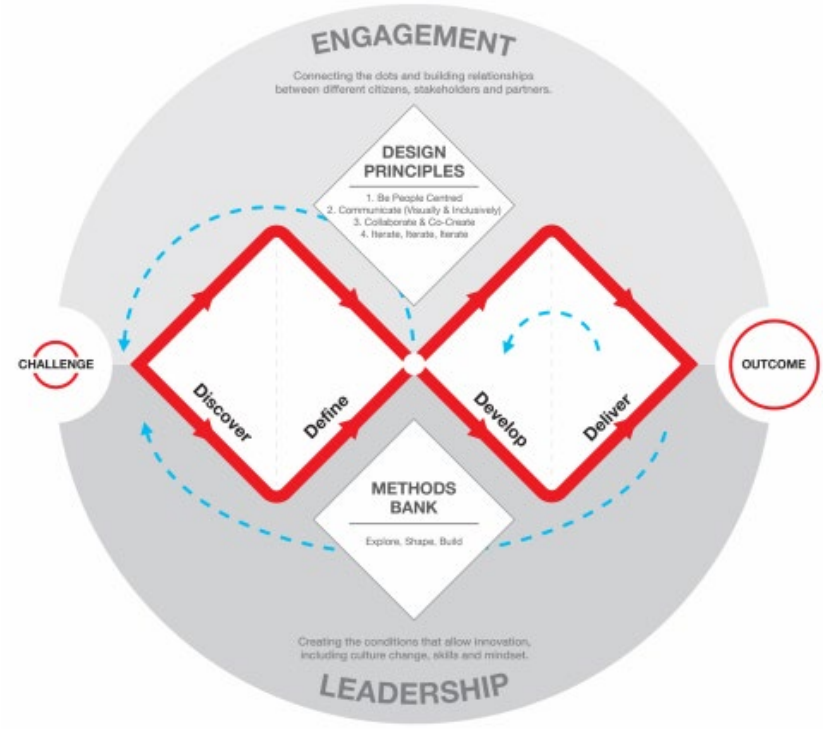

Image 1.5: Double Diamond model by Design Council (Design Council, 2020). Model by Design Council.

The *Design Thinking Process* model, proposed by the Hasso Plattner Institute of Design at Stanford University in 2005, was also beneficial to this study's understanding of the design process. This systematic model consists of five stages: Empathise, Define, Ideate, Prototype and Test (see Image 1.6). Specific research activities, tools and guidelines are assigned to each stage in order to facilitate the design process (Hasso Plattner Institute of Design, 2010). The model is simple to understand and easy to apply. As such, practitioners of the model

could report on obtaining transformative solutions that are informed by people on the ground instead of using a top-down approach (Berk, 2016:17). The Interaction Design Foundation's *Design Thinking Process* (2010) is a variation of the Hasso Plattner Institute of Design model, which seeks to reframe ill-defined problems in human-centric ways and eventually address it through design and hands-on prototype testing (see Image 1.7) (Dam & Siang, 2020a). This process takes into account how the designer pivots between stages in a non-linear fashion until a desirable outcome is achieved (Baylé, 2018).

Image 1.6: Hasso Plattner Institute of Design at Stanford University Design Thinking Process (Hasso Plattner Institute of Design, 2010). Model by Hasso Plattner Institute of Design.

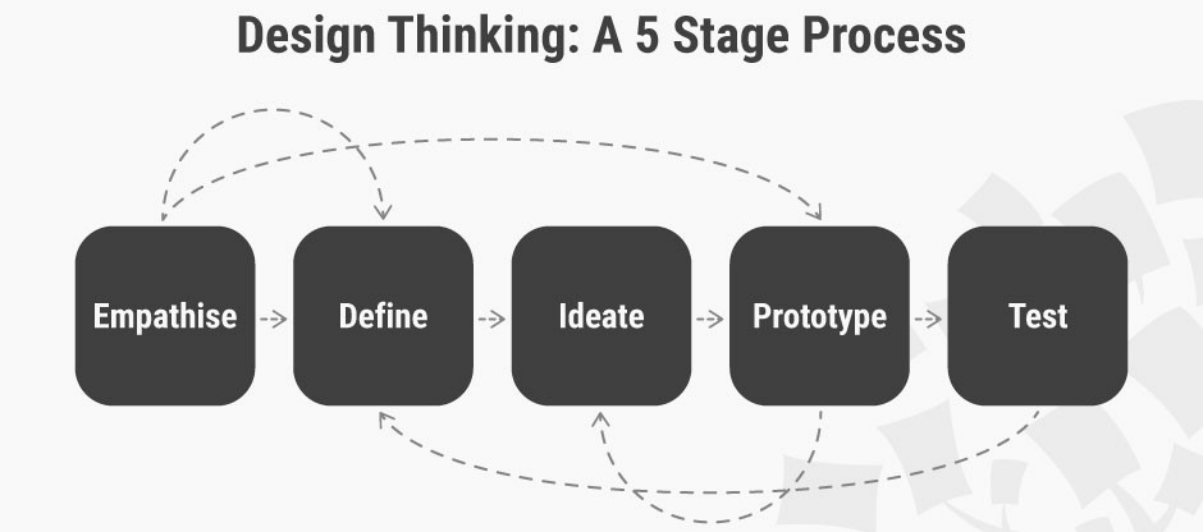

Image 1.7: Interaction Design Foundation Design Thinking Process (Interaction Design Foundation, 2010). Model by Interaction Design Foundation.

All the models presented above, share a similarity of promoting design thinking processes as the best methodology and framework for addressing real-world problems and needs through non-linear, reflective, and iterative methods. The perceptive, practical, and human-centred principles and approaches to Design Thinking which these models propagate as a way of understanding people, problems, and contexts, were inspiring. For that reason, these models motivated the sculpting of the model within which this study's design research is conducted.

1.5.2 The design thinking model used in this study

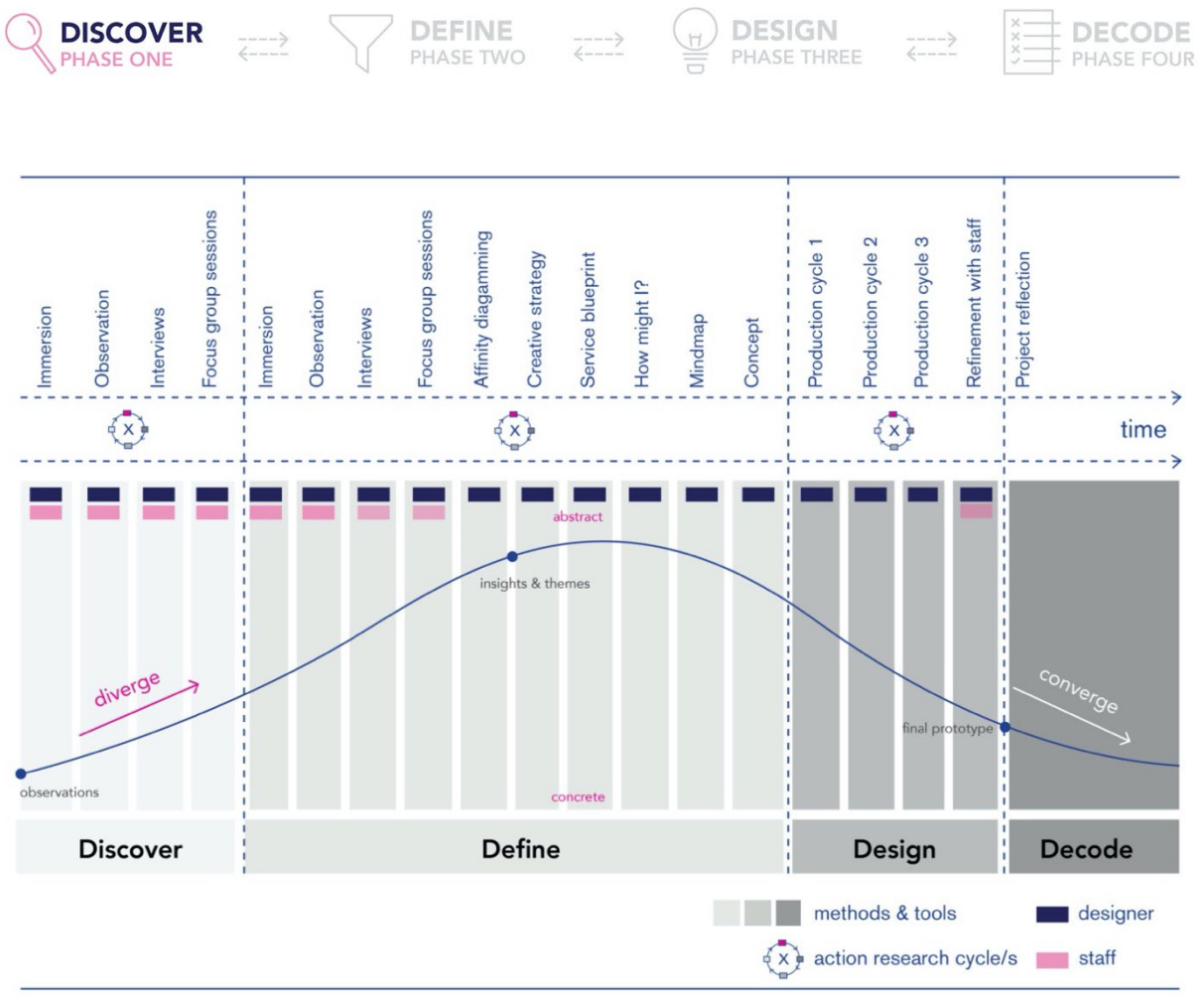

Image 1.8: An overview of the research methods used in this study's adapted Design Thinking model (inspired by IDEO, 2011:8,9; IDEO, 2015:11; Design Council, 2020; Hasso Plattner Institute of Design, 2010; Interaction Design Foundation, 2010). Schematic diagram by and in possession of the researcher (Manyame, 2019).

This study considered IDEO's *Human-Centred Design (HCD) Process*, Design Council's *Double Diamond*, Hasso Plattner Institute of Design at Stanford University's *Design Thinking Process,* and Interaction Design Foundation's *Design Thinking Process*. An adapted Design Thinking model was then constructed specifically for this project's design research so as to be more specifically applicable in, relevant to, the unique context of this study. The new proposed model has four phases – Discover, Define, Design and Decode – to suit the needs of this project's context (see Image 1.8). The designer-researcher can select research methods and tools from an existing HCD toolkit and field guide which are suitable for the collection and analysis of data in Promosa Clinic. The designer-researcher pivots between the four phases as necessitated by the design process. In the Discovery phase, the researcher ascertains the context and formulates a problem statement within a supporting research framework, based on preliminary research findings. In the Define phase, the researcher observes and interacts

with the medical staff in the clinic through action research cycles to collect data.[16] Thereafter, the research data are analysed and synthesised before insights are distilled and stated as a visual communication problem.[17] In the Design phase, the design problem anchors the production, and the researcher uses design knowledge and techniques to guide the making of graphic design applications in line with the communication goal. In this phase, through action research, the prototype undergoes several iterations based on the designer's expertise and the staff's response to the usability, functionality, and viability of the design. The prototype that is produced from the process is a preliminary version that can be developed further in the future. Finally, the Decode phase reflects on the design process, the results of the creative production, and the study as a whole.

The schematic (see Image 1.8) outlines the four phases of the study, the selected research methods and tools that were used for data collection, as well as the strategic and conceptual processes for developing visual communication materials. This project uses design-oriented research methods, and tools to collect and analyse data, which are rooted in the qualitative research epistemology (cf. IDEO, 2011:32,33). The orientation and use of these methods are driven by the theoretical framework of the study. The intent of implementing this model was to build empathy and obtain honest and open responses from participants. Data were also verified in the use of more than one tool. The designer-researcher selected the research methods and tools suitable for the collection of data as the study progressed, taking into account the medical staff's input and perspective at all times.

16 The researcher designs a tool to use within a research method, acts with the tool and observes how participants respond to the tool while capturing data (Tripp, 1995). Then the researcher reflects on the tool's effectiveness through the analysis of data for the purpose of amending the tool for the next action research cycle (Tripp, 1995).

17 All the cycles and steps of the field research and production process, and the data collected thereof, are captured in the form of field notes, recordings and photographs. As part of documenting the process in an accessible, formal and ethical manner, the interview and discussion recordings are transcribed while protecting the participants' identities.

An action research approach is integrated into the model. Each phase comprises a reflective and iterative cycle to enable the designer-researcher to improve the use of research methods and tools in Phase Two: Define, and conduct effective creative production cycles in Phase Three: Design. Each method follows four steps in the action research cycle (see Image 1.9). In the Define phase, the researcher designs an action plan on how to collect data within a research method, acts by designing and applying an appropriate data collection tool, and observes the participant's response to the tool (see Tripp, 2005). Finally, the researcher reflects on the effectiveness of the method through the analysis of data for the purpose of amending or creating a tool for the next action research cycle.

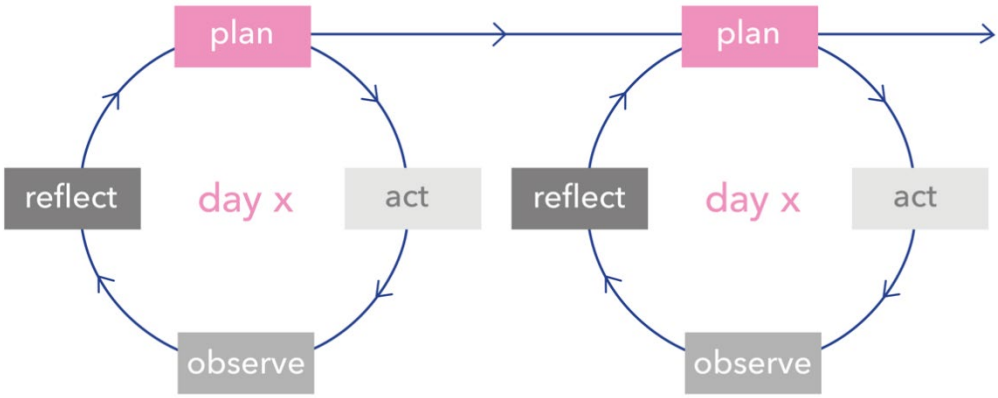

Image 1.9: An example of an action research cycle comprising four steps: planning, acting, observing and reflecting on the actions the researcher takes by applying data collection tools during the investigation of a problem. Schematic diagram by and in possession of the researcher (Manyame, 2020; cf. Tripp, 2005).

In the design process, the designer-researcher adopts two perspectives: that of the staff, to understand their communication problem in context; and that of a designer, to apply the appropriate methods, knowledge, and skills to address the communication need (see Image 1.10). The collaborative and consultative role of the staff across all design phases is where every interaction and consultation in the field is an opportunity to learn about the contextual situation surrounding their needs. The final creative solution of this collaboration should be a feasible and viable prototype which satisfies the communication goal and research project objectives.

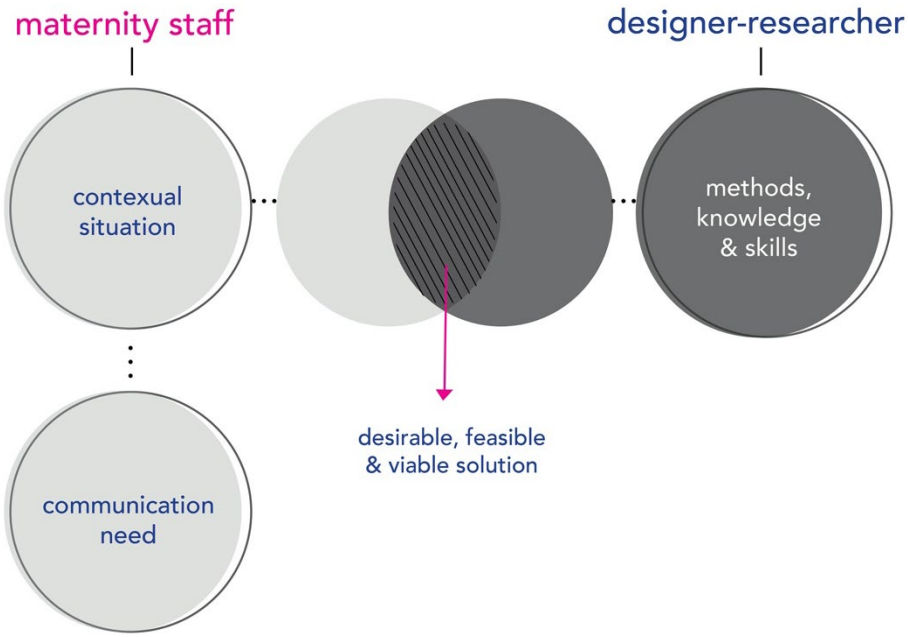

Image 1.10: Visualisation of the roles that the staff and designer-researcher play in the collaborative effort in the four phases. Schematic diagram by and in possession of the researcher (Manyame, 2020).

1.5.3 Strategies to ensure trustworthiness in design research

Exercising academic rigour is integral to this project's design research process which entails being thorough, critical, reflective and accurate in the processes of data collection, analysis, and interpretation (Van Zyl, 2010:118). To ensure that the creative process and outputs of this study are transferable, credible, transparent and dependable, this study employed and applied the following rigorous strategies: prolonged engagement with participants; member checking; audit trail; methodological triangulation; and recording and transcribing of interviews. A prolonged engagement refers to a researcher that is present at the research site to build rapport and familiarity with the participants (Shenton, 2004:65). Lincoln and Guba (1985) further advocate this technique as a way of understanding and learning about the participants in order to acquire their direct input on a problem being investigated. This technique was applied by employing the selected primary research methods of immersion and observation.

In this research space of potential subjectivity, the designer-researcher needs to occupy a critical and intentionally reflexive stance to maintain an unbiased opinion in the data gathering process (Probst, 2015:43). Reflexivity is the examination of one's own subjectivity in the research process and outcomes (Palaganas *et al*., 2017:427). The researcher exercises awareness of his/her own views, reasoning, pre-conceived ideas of and reactions to the field experiences (Mills *et al*., 2010; Attia & Edge, 2017:36). According to Qin (2016), a researcher

recognises his/her positionality when observing and documenting participants' lived experiences from an insider's perspective. Writing a journal entry is one of the ways researchers can maintain objectivity and provide transparency and clarity on their personal experiences that were a part of the data collection and analysis process (Janesick, 2015). In this study, the designer records and reflects on one's observations and subjective reactions in the field to differentiate the personal view and prioritise the participant's perspective. In support of that stance, Dodgson (2019:220) states that the reflexivity of describing the intersecting relationship between the researcher and participant not only increases the trustworthiness of the findings, but it also deepens the researcher's understanding of the study.

An audit trail is a transparent description of the research steps, decisions, and choices taken from the start of the design research project right up to the production of the final outputs (Korstjens & Moser, 2018:121; Nowell *et al*., 2017:3). This method is applied in the form of a research report and process books that capture and detail the processes and creative production in a system of structured notes, photographs, and sketches (cf. Van Zyl, 2010:123). Interviews and focus group sessions were conducted, recorded, and transcribed to capture verbal accounts of the staff that could be referred to in order to improve the accuracy of reporting, and make credible the reflective process which holds the designer accountable. The fieldwork process was also captured and documented in the form of reflective journals and field notebooks. It was also established that the findings of the research study accurately portray participants' responses and needs, as well as the designer's approach to resolving them by designing a prototype for participant testing.

The application of various methods was also a form of methodological triangulation. Triangulation involves using more than one research method to generate a comprehensive view that can fully explain the complexity of the staff's tasks and experiences (cf. Bekhet & Zauszniewski, 2012:40; cf. Cohen & Manion, 1986). Triangulating was enacted as a strategy to draw insights from multiple inputs and cross-examine results. This method established validity concerning the researcher's search for commonalities and patterns of human behaviour, and the findings on the staff's communication problems (cf. O'Donoghue & Punch, 2003; cf. Altrichter *et al*., 1996).

During the early stages of this design project's field research, the method of member checking applied. Member checking or respondent validation is a research technique where participants

can check for accuracy of the data to see if the information collected resonate with their experiences and reflect their voice (Pitney, 2004:26,27,28). The staff had the opportunity to read, verify or make adjustments to ensure what was abstracted through the data and analysis process was faithful to what they had said (cf. Birt *et al*., 2016:1804). Transcripts of focus group sessions, interviews and the interpreted data were returned to the available staff at the clinic and verification of their inputs were recorded and transcribed.

The above-mentioned validity checks are evidenced in this project's sources of data that includes field notebooks, transcripts and process work. This strategy ensured that the design research practice is trustworthy and rigorous in its approach and outcomes.

1.6 Conclusion

Phase One offered a glimpse into the preliminary research and contextualisation of the project *Design for maternal health: collaborating with medical staff to facilitate community-centred and continuous maternity care*. This phase acted as an exploratory stage, aimed at equipping and empowering the designer-researcher to go into the field with a set of ideas and possible theories and methods to identify communication problem areas. A design opportunity was identified within the knowledge of the prevalence of adolescent pregnancies and the potential health risks, thus ascertaining the theme of the study, designing for maternal health at Promosa Clinic. This phase contextualised Promosa Clinic by engaging with the experience of the medical staff and their concern with bettering their ANC service experience with pregnant adolescents. Within the context of the maternity staff's working environment, a problem statement was framed as pertaining to the need for convenient and appropriate visual communication materials to better their ANC service delivery to pregnant adolescents. Practice-led research, along with a design thinking-oriented methodological model and an action research-driven theoretical framework, was identified as an appropriate research approach to investigate the problem statement. In the next phase the reader is offered an inside look at the maternity staff's context and specific communication needs and a creative concept that was formulated in response.

PHASE TWO: DEFINE

Learning about the conditions that underlie and define a problem is the first step to solving it. (Bowers, 2011:xvi)

2.1 Navigating Phase Two

The next phase of the design project's research process is called ***define***. After contextualising the project in Phase One, Phase Two discusses how field research data were collected, analysed and synthesised to determine the communication needs of the Promosa Community Health Centre (CHC) medical staff. The goal of this phase is to frame discernible communication needs as a visual communication challenge through ethical, empathic and relevant methods, tools and techniques. Firstly, this phase introduces the research participants that were selected to participate in the data collection process. Secondly, the fieldwork approach is discussed, and the research methods and tools implemented for data collection are presented. Thirdly, the data collection results are deliberated and distilled into insights and themes from which the visual communication problem is defined. Thereafter, the visual communication challenge, communication goal and project objectives are determined. Lastly, a creative strategy is developed towards a conceptualisation process where the final concept is articulated. The discussion of Phase Two is illustrated and supported by supplementary process work and images. This phase concludes with a summary of Phase Two, guiding the reader into the next phase.

2.2 Selecting research participants

Permission was granted by the management of Promosa Clinic for the fieldwork of the study to take place within the maternity unit. A gatekeeper was assigned to grant access to the unit, and a list of medical staff members, their job responsibilities and operational hours was provided for the selection of participants. The list comprised professional nurses, a doctor, midwives and mentor mothers who are stationed in the unit. The participants of this project were selected on the grounds of their job responsibilities, availability, and willingness to voluntarily participate in the project's chosen methods. Nine participants were selected and gave consent after being thoroughly informed about all the aspects of the research project. The participants were four professional nurses (one of the nurses also had a dual role as

midwife), one doctor and four mentor mothers. Members of the participation group had between three to nineteen years of work experience from the time this study commenced. The participatory group was a representative subset of the population of the medical staff who work within community health centres in South Africa. The selected staff agreed to participate in the methods discussed in the following subsection.

2.3 Fieldwork approach: selecting and applying primary methods

The selected methods used in this study's design thinking model were inspired by IDEO's *Field Guide to Human-Centred Design (HCD) Kit*, *HCD Toolkit* and medical anthropological-inspired ethnographic methods. IDEO (2020a) designed and launched the HCD toolkit and a field guide on how a practitioner-researcher can apply human-centred design thinking and methods in fieldwork as a creative approach to addressing community-related problems. Similarly, ethnographic research methods stemming from the disciplines of anthropology or social sciences are increasingly being integrated into the practice of design (Gray & Malins, 2004:117; Nova, 2014:13,36). The methods are re-contextualised and adapted to solve wicked problems[18] in a design context (Dorland, 2017:233). Design-oriented methods according to Barnes (2012:7,8), therefore, allow for an exploratory and open-ended investigation. The methods create a pathway to data insights and provide empathy-building opportunities with research participants, notwithstanding their limitation in offering an in-depth analysis as a traditional anthropological inquiry would do (Gregory, 2018:211). The purpose of these methods in a design context is to collect field data that can inform the production of a suitable design outcome within a project timeframe (Dijk, 2010:1; Rodgers & Anusas, 2008). The designer-researcher is therefore equipped with a set of design-oriented methods adapted from ethnographic and HCD approaches.

This study's design-oriented methods are applied from an emic perspective to facilitate the process of collecting and documenting a thick description of the staff's inputs and context in the absence of patients. The methods are carried out within an action research framework to guide and manage the gathering of data in a social setting (see Image 2.1). The purpose of using the selected methods is to connect with staff in their workplace, understand their

18 A wicked problem is by nature an ill-defined and multifaceted challenge that may possibly have multiple solutions due to its occurrence in a socially complex context (Buchanan, 1992:16; Thienen, 2014:98).

perceptions of maternal health and identify their communication needs in terms of maternity services at the clinic.

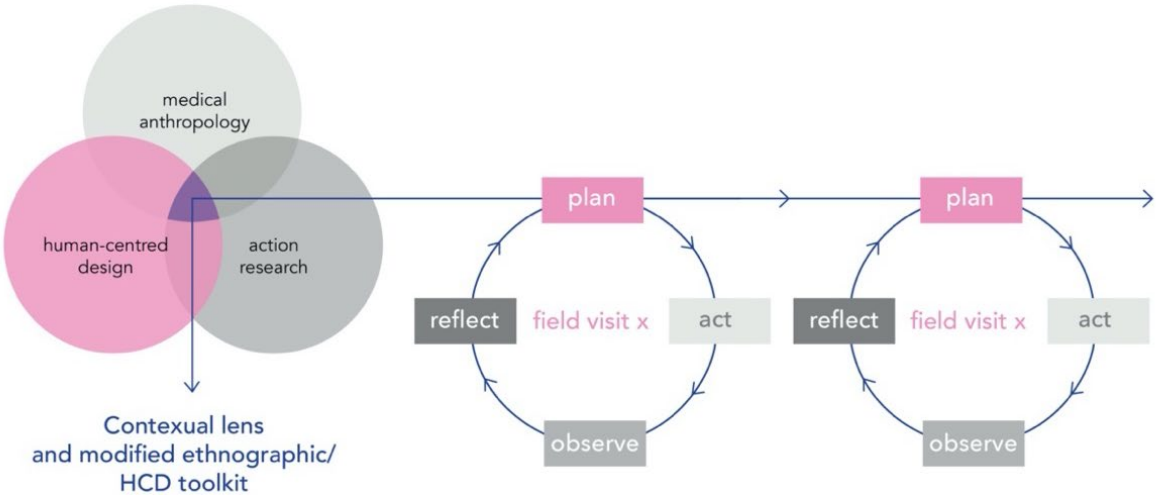

Image 2.1: An action research cycle model with methods inspired by medical anthropology and human-centred design theories used on field visits. Schematic diagram by and in possession of the researcher (Manyame, 2020; also see Tripp, 2005).

An action research cycle with a sequence of four steps was applied on each field visit over a period of fifteen days. The cycle (see Image 2.1) entails planning a tool, methodically acting with the tool while reflecting-in-action, and observing how the staff respond as a result. The last step includes reflecting on the results to gain insights on the staff's communication needs, and to plan for the next cycle (Marshall, 2010:81; Tripp, 1995). On each field visit, the tools were applied simultaneously and not necessarily in chronological order, as necessitated by a non-linear and open-ended data collection process. According to Payne and Payne (2004), data gathering "in a social setting tries to reflect the naturally occurring order of events and subjective meanings of those being studied." The use of a method, application of a tool and the data collected, reflected the unfolding of the staff's actions and activities in the clinic in real time. Feinberg *et al*. (2013:218) emphasises that useful primary data are collected by means of a perceptive and subjective approach. The engagement as well as the integration of staff in the data collection process of this study was centred on actively building empathy and creating conditions in which the staff could reveal what mattered most to them. For research reporting purposes, the tools are discussed separately in this phase to highlight their effectiveness based on the results and insights they generated.

The problem statement is at the centre of an action research cycle (cf. Marshall, 2010:82). The goal was to gather relevant data and insights on the staff's communication needs in

maternity services. As a starting point to fieldwork, and as a way of getting acquainted with the staff, the following primary methods, namely immersion and observation, were applied at Promosa Clinic.

2.3.1 Immersion method

The immersion method used in this study is adapted from design ethnography and IDEO's HCD method of In-context Immersion. IDEO (2011:46) describes In-context Immersion as a method in which a designer can spend time with participants in their context and get an in-depth look at their circumstances. This immersive approach allows a designer to interact with and listen to the participants perspectives of carrying out their duties in a workplace (IDEO, 2015:52). The method gives a designer intimate access to the field in order to collect relevant and ethically sound primary data that may be useful for the design process (cf. Webster & Rice, 2018:524). IDEO (2011:46,47) advocates In-context Immersion as a field research technique where one can gain empathy for participants, and new insights into their natural setting. The contextual knowledge of the participants' needs and their workspace can lead to a better understanding of the space which the potential design solution will occupy.

Campbell and Brand (2014:1332,1334) highlight the versatility of the In-context Immersion method and how its borrowed concept has been adopted and termed in various ways by practitioners, including design ethnography. Martin and Hanington (2012:60) describe design ethnography as a means of getting a holistic view of the participants by collecting enough data from "time-sampled observations" to meet project-based goals, instead of immersing oneself for long periods as an anthropologist or ethnographer would. The abovementioned viewpoints on In-context Immersion were considered and inspired the design of this study's immersion method.

Time with the staff was spent exclusively in the consultation rooms of the maternity unit such as the antenatal care (ANC) high-risk clinic (also called sonar room), the maternity ward, the postnatal care (PNC) room, and the maternal, child and women's health (MCWH) room (see Image 2.2). On other field visits, the maternity staff would occupy other rooms outside the maternity unit such as the kitchen, chronic room and acute or minor ailment room.

Image 2.2: Immersion took place within the PNC room, maternity ward, MCWH room and ANC high-risk clinic of the maternity unit of Promosa Clinic in Potchefstroom, 2019. Photographs by and in possession of the researcher (Manyame, 2019).

The participants were accompanied by the researcher in the absence of patients as they carried out their duties and socialised with one another. A sense of rapport and trust was built with staff over time. An element of empathy is embedded in the immersion method, and therefore it was possible to identify with the staff's experiences and point of view (Gasparini, 2015). An insider's perspective allows "an empathic understanding of the motivations, priorities and rationality of those studied" (Green & Thorogood, 2004:136). The staff were observed from an emic perspective while they were working, which entailed writing what was seen from their point of view (see DMHB Field notebook 2, 2019). IDEO (2011:47) points out that when a designer is immersed in a participant's context, he/she is able to see from the participant's perspective, thus informing the intuition and decision-making process when designing a possible outcome. The immersion method was used concurrently with the observation method, as described below.

2.3.2 Observation method

Observation as a method is defined as the act of noticing and actively acquiring data of participants in their natural environment (Marshall & Rossman, 1989). Observation positions the researcher in proximity to the participants to take note of what they say and do in their context. Two observation methods were used in this study, namely Negotiated Interactive Observation and Fly-On-The-Wall observation (FOTW). A medical anthropologist, Gitte Wind (2008), proposed a modified version of participant observation suitable for a medical context called the Negotiated Interactive Observation method. Negotiated Interactive Observation allows the researcher to retain his/her role as a 'researcher' without assuming the role of a 'participant'. This implies taking part in the same activities as the people being studied, and therefore fully capturing the data as an inquirer (Wind, 2008; Karadaghi & Willot, 2015:3). While collecting observational data the researcher negotiates his/her way through the site by interacting with the participants to obtain access and permission to observe them, with consent, working in medical rooms (Wind, 2008). The FOTW observation method allows the researcher to observe participants without interrupting by asking questions during a natural occurrence of the participants' behaviours and activities (see Petticrew *et al*., 2007:209; Martin & Hanington, 2012:90). FOTW observation ensures that the researcher has little to no influence on the participant and data collected (see Goodwin *et al*., 2017:3).

The primary role of an observer is to look, listen, take photographs and make notes of what is being observed. The staff were observed, both interactively and without interruption, in their workspace. An interactive negotiation took place to occupy the same consultation rooms as the staff and observe as they worked in the absence of patients. The focus of the observation was to take note of the staff's interactions amongst themselves and their use of medical objects in their work environment as they carried out healthcare duties. With the FOTW observation method, data were gathered unobtrusively by looking at and listening to what the staff were saying and doing.

Key observations were made in the following rooms: the ANC high-risk clinic, occupied by a doctor; the maternity ward, occupied by a mentor mother; MCWH room, with a nurse and mentor mother; and the PNC room used by nurses (see DMHB Field notebook 2, 2019). The staff made mention of, and were using, medical documentation such as the maternity case record (MCR) and basic antenatal care (BANC) checklists. It was noted that there were graphic leaflets intended for hand-out on their tables which illustrated general medical

information, such as cough remedies (see DMHB Field notebook 2, 2019). It was also observed that the doctor, midwives, mentor mothers and nurses interacted with one another in different maternity rooms (see Image 2.3). The doctor and midwife would discuss their tasks and obtain information from each other. Observations were made of nurses leaving the maternity unit to attend to healthcare duties in the chronic room and acute or minor ailment room because of the shortage of staff or an emergency in other units (DMHB Field notebook 2, 2019).

Image 2.3: Nurses, midwife, doctor and mentor mother working in the ANC, PNC and MCWH rooms of Promosa Clinic. Photographs by and in possession of the researcher (Manyame, 2019).

2.3.2.1 Tool one: interviews

Interviews: description, theoretical underpinning and motivation

An interview is an opportunity for a designer to speak directly to participants and learn about their work, behaviour, opinions and needs (IDEO, 2015:39). Lupton (2011:26) contends that interviewing participants face-to-face in their context allows the researcher to capture tone, expression and body language as additional insight to their responses. In this study, the interviews took the form of semi-structured interviews, contextual inquiry and conversational

interviews. A semi-structured interview is described as an in-depth exploratory discussion with open-ended questions, with room for any possible answer from the respondent (Magaldi & Berler, 2018:1,2). However, the interviewer must maintain objectivity and refrain from asking leading questions that can prompt the respondent to answer in a biased way (Allen, 2017). A semi-structured interview is often used in healthcare-related research because it provides a researcher with a two-way communication platform to inquire in detail about a participant's viewpoints (Keller & Conradin, 2020). In contrast, a contextual inquiry is an interview method where a researcher can ask questions while observing the participants performing tasks in their work environment (Wixon *et al*., 1990:332; Raven & Flanders, 1996). The goal is to obtain clarity and an understanding of the context, frustrations, behaviours and concerns as the activity occurs. A conversational interview differs from the standardised method of interviewing due to its flexibility in application (Lavrakas, 2008). An interviewer can ask a set of unscripted questions during a conversation to get more understanding of what is being observed (Jamshed, 2014:87). These interview tools were selected to purposely inquire about individual staff members' specific job responsibilities and communication needs. An interview would enable a one-to-one discussion where staff could discuss their points of view during a sit-down or while an observation was taking place in the maternity unit (cf. Breen, 2006:466).

Interviews: application

A total of four interviews were conducted with staff members: a semi-structured interview with a nurse (also midwife); a conversational interview with a nurse; a conversational interview with the adolescent and youth-friendly services (AYFS) responsible staff member; and a contextual inquiry and semi-structured interview with a doctor. The semi-structured interviews were recorded and transcribed. The contextual inquiry and conversational interviews were conducted and documented in field notebooks while the staff carried out their duties. All interview questions were formulated based on the problem statement. A sample of questions asked includes:

- What makes you passionate about serving in the maternity section of the clinic?
- What factors contribute to high-risk pregnancies?
- How do you render your maternal healthcare services to pregnant women and mothers of new-borns?
- What kind of communication difficulties do you face when providing antenatal and postnatal care to pregnant women and mothers with new-borns?

Interviews: results

The interview results indicated that the staff were experiencing a rise in adolescent pregnancies which were referred to the doctor for check-up in the ANC high-risk clinic on Thursdays (DMHP01 Interview 1, 2019; DMHP02-1 Interview 2, 2019; DMHP02-2 Interview 3, 2019). The participants shared that the leading factors that predispose their patients to a high-risk pregnancy were substance abuse, pre-existing illnesses such as diabetes and hypertension, hereditary conditions, unsafe lifestyle choices, poor socio-economic status, and involvement in gang violence (DMHP02-1 Interview 2, 2019). They described how they conducted the BANC approach using checklists as screening tools, which included checking the patient's vital signs, determining their alcohol use, assisting with transport plans, and connecting them to messaging platforms such as MomConnect[19] (DMHP02-2 Interview 3, 2019; DMHP01 Interview 1, 2019). As part of the staff monitoring their patient's pregnancy, they handed out loose sheets of paper for patients to use at home to monitor foetal movements and identify danger signs such as severe bleeding (DMHP02-2 Interview 3, 2019; DMHP01 Interview 1, 2019). The participants also emphasised the importance of encouraging their patients to test for HIV/AIDS as early as possible during ANC. The nurses especially reiterated how important it was for them to educate their patients on how not to take risks at home but to visit the clinic and receive professional medical advice (DMHP01 Interview 1, 2019; DMHP03 Interview 4, 2019). They described how some pregnant women at home take so-called medicinal herbs to induce labour based on their beliefs and family background (DMHP01 Interview 1, 2019). However, these remedies are discouraged by staff because of possible dangerous effects on the mother and foetus. They were also concerned that some patients delayed their transport arrangements and are then forced to give birth at home, which increases the risk of neonatal cold injury syndrome.

The staff relayed how they communicate with patients primarily by making use of hand gestures, body movement and verbal communication to demonstrate and educate patients on antenatal and postnatal care (DMHP01 Interview 1, 2019). The staff explained that they seriously lack visual communication materials, and that their patients do not generally take the time to read notices, flyers or posters; they mostly just want to see the health professional and leave (DMHP02-1 Interview 2, 2019; DMHP01 Interview 1, 2019; DMHP03 Interview 4, 2019). They highlighted that the clinic often gets busy and short-staffed, and that they have little time

19 MomConnect is a cell phone messaging programme launched by the South African Department of Health to support and connect pregnant women and mothers with infants with maternal health messages and access to healthcare services (Praekelt, 2020; Department of Health, 2020).

to educate their patients on health issues (DMHP02-1 Interview 2, 2019; see DMHB Field notebook 2, 2019). The staff also expressed their frustrations of how time consuming it is to document patient information in medical records while their patients waited in consultation (DMHP02-1 Interview 2, 2019).

The staff highlighted AYFS as a service platform that offers advice, in a youth-friendly manner, to adolescents regarding family planning methods, mental health services, sexual health education and contraception (DMHP03 Interview 4, 2019). However, the AYFS was not in full operation. The staff pointed out that their adolescent patients required more support from the clinic in the form of support groups and confidential health talks. The nurses also used a WhatsApp platform to support their patients and some staff members reported being perceived as a "friend" rather than a health professional. However, other staff members shared that their adolescent patients struggled to open up during consultations about sensitive health topics that might put their pregnancy at risk. According to staff, some patients are either reserved, despondent, or find it difficult to express how they feel (DMHP02-1 Interview 2, 2019; DMHP03 Interview 4, 2019). Specifically, the staff pointed out substance abuse, HIV/AIDS, poor diet and unsafe sexual practices as sensitive health topics that their patients struggled to discuss. In such an instance, the staff detected that the patient was in need of psychological services and referred them to the counselling room of the clinic for additional support. Towards the end of their consultation, the staff said that they advised their patients on the importance of eating healthy and avoiding the use of drugs, tobacco and alcohol. Overall, the staff's desire was to encourage their patients to make better lifestyle choices, adhere to chronic medication, and honour follow-up appointments (DMHP01 Interview 1, 2019; DMHP02-1 Interview 2, 2019).

2.3.2.2 Tool two: focus group sessions

Focus group: description, theoretical underpinning and motivation

A focus group session is a tool where a group of participants voice their opinions, hopes and concerns on a particular set of issues (Mack *et al*., 2005:51; Redmond & Curtis, 2009:57). Focus groups are regarded in healthcare research as a qualitative means of exploring various perspectives that participants have on a problem (Tausch & Menold, 2016:1). The focus group session of this study involved the researcher facilitating the interactions and discussions between participants in a group setting. Eight staff members in Promosa Clinic's maternity unit

were initially selected to participate in all the sessions. Six participants attended the first session and four participants attended the second. Four participants withdrew from the sessions owing to their busy work schedules. Such unforeseen and uncertain circumstances were adapted to by revising the action research plan with more appropriate tools to get the most applicable data from available participants. Two focus group sessions were conducted and were guided by the researcher using the following techniques: KJ; deck of cards; Persona; and a group discussion, to be discussed below.

Focus group: application

In the first half of the first focus group session the KJ technique was applied and in the second half the deck of cards technique was used. The KJ technique is a team-work exercise developed by ethnologist Jiro Kawakita (1920-2009) (Scupin, 1997). The technique helps a group of participants to state and organise a complex range of ideas or information to reach unanimity on an issue (Martin & Hanington, 2012:104). The purpose of the KJ technique was to ascertain the prevalent problems the staff were encountering in order to narrow the scope of the problem. The staff were requested to write down their concerns and aspirations on blank sticky notes in silence, within the context of the maternity unit (see Image 2.4). Theme words were provided such as communication, Promosa Clinic's building, maternal patients and day-to-day services, to trigger their thoughts, memories or experiences concerning those themes. The aim was to give everyone an equal opportunity to express their points of view.

Image 2.4: The maternity staff write their needs and aspirations concerning the maternity unit on sticky notes during a focus group session. Photographs by and in possession of the researcher (Manyame, 2019).

The notes were posted on a sheet of paper on the wall which served as an external presentation of the group's thoughts (see Image 2.4). The next step of this technique required them to organise their concerns and hopes according to urgency. The staff responded by stating that their concerns were interconnected, and each problem warranted the same level of attention. When facilitating focus group sessions, the researcher must be aware of the group dynamics and level of comfort in accordance with Grønkjær *et al.* (2011:24). Other opportunities might arise to elicit more information on the topic in question in the next focus group technique.

The second half of the first session was conducted with the deck of cards technique. This technique is a variation of the IDEO's human-centred design Card Sort tool that can spark conversation about what matters most to people (IDEO, 2011:57). It can be applied in different ways, depending on a project's research objectives. Each staff member was asked to express what problem they considered to be most relevant and reflective of their concern. An array of maternity-related terms and photographs of the Promosa Clinic's unit were laid out on the table for each participant to choose a word or photograph that represented an important issue

to them (see Image 2.5). This technique was an opportunity to identify terminology that was likely to be misunderstood either because the term was vague, multiple meanings were associated with it, or they used it differently within the clinic's context. The participants shared their concern after pointing to their card of choice (see Image 2.5).

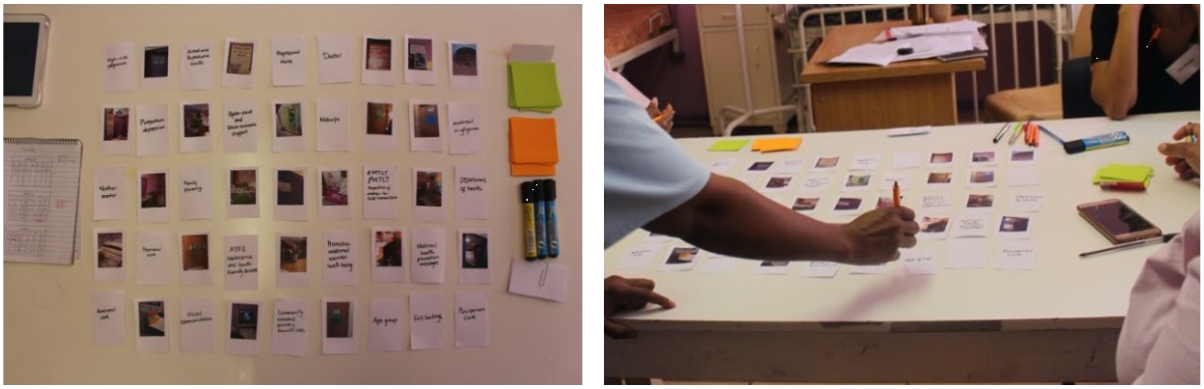

Image 2.5: The deck of cards technique in action as a staff member singles out concerns in a focus group session. Photographs by and in possession of the researcher (Manyame, 2019).

During the second focus group session the Persona technique and a group discussion were applied. This session was a build up from the results of the first session. The goal was to find out more about the staff's needs when delivering maternity services to pregnant adolescents. The Persona technique stems from the field of human-computer interaction and is used by creating a fictitious character based on information about real people (Brenner *et al*., 2016:14,15; Gudjonsdottir, 2010:14). It highlights specific features and characteristics of a group being studied, which have an influence on the design process and usefulness of its outputs (Harley, 2015). The Persona technique was not used in the traditional sense of constructing personas from data analysis, but instead, personas were created based on the staff's direct inputs in the session (cf. Pérez-Montoro & Codina, 2017; cf. Nielsen & Hansen, 2014:1672). The staff were requested to describe the nature and character of their health professional role. While using the Persona technique, it organically progressed into a group discussion (see Image 2.6). A focus group discussion is a qualitative research method where a selected group of people discuss a given topic in-depth with the guidance of a researcher (Eeuwijk & Angehrn, 2017). The participants then discussed communication issues concerning their interactions as a team as they provided maternity services to adolescent patients.

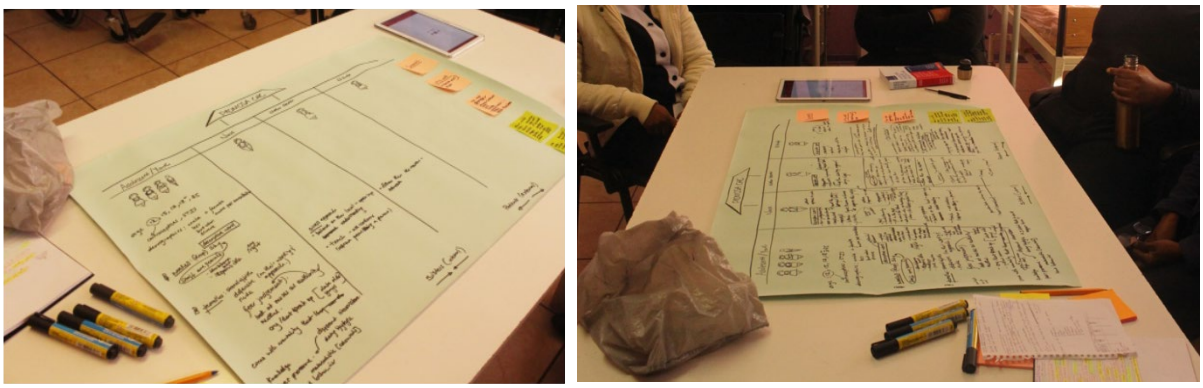

Image 2.6: The participants discuss their maternity service delivery experiences while the researcher constructs personas on a sheet of paper using the staff's inputs. Photographs by and in possession of the researcher (Manyame, 2019).

Focus group: results

During the first focus group session (see Image 2.7) the sticky notes highlighted the staff's most pressing concerns and desires: the high adolescent pregnancy rate; education of maternal health risks; youth not attending the AYFS gathering and family planning; the desire for Promosa Clinic to be a safe haven for teenagers; the desire to improve their service delivery towards young mothers; and the desire for their ANC mothers to give birth to healthy babies (DMHC01 Focus group session 1, 2019). They also raised concerns that were beyond the scope of the project such as the need for more professional nurses because of the shortage of staff at the clinic.

Image 2.7: Results derived after the first focus group session including the use of the KJ and deck of cards techniques. A sheet of paper on the wall indicates the staff's concerns and needs in the maternity unit. Photograph by and in possession of the researcher (Manyame, 2019).

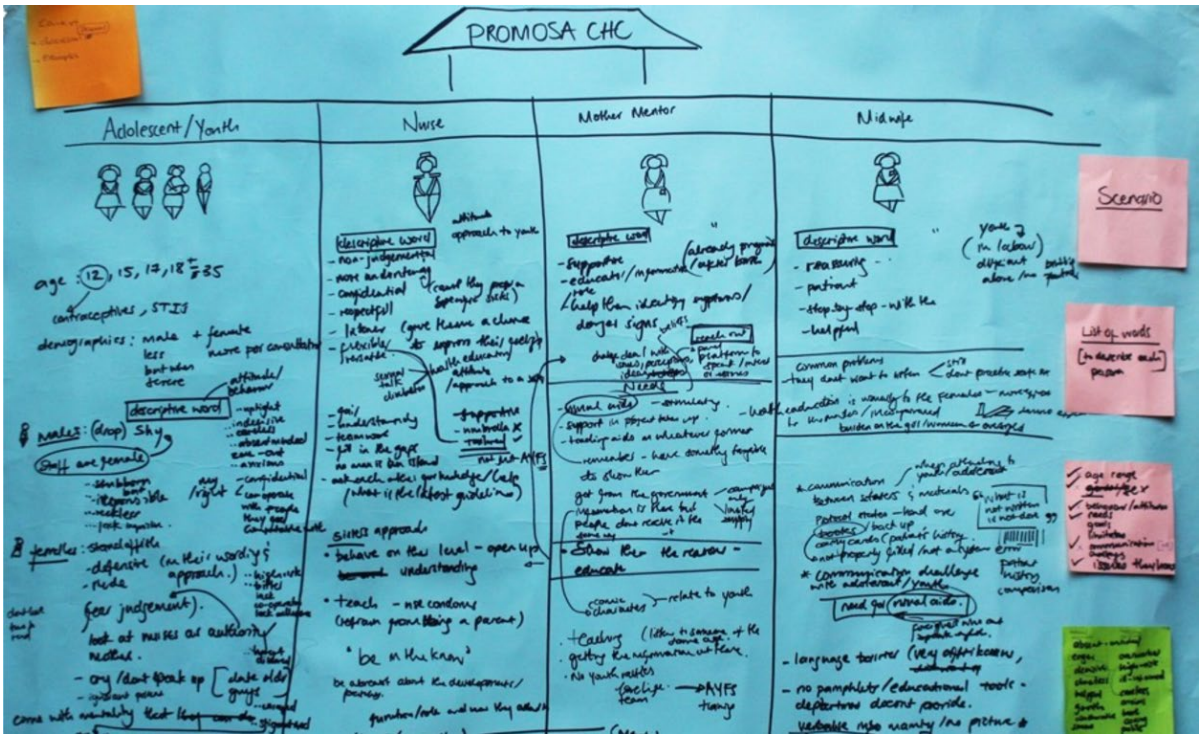

Image 2.8: Results of the Persona technique from the second focus group session detailing the staff's role and concerns within maternity services. Photograph by and in possession of the researcher (Manyame, 2019).

In the second focus group session, the staff described their job and how they provided maternity services to adolescent patients. Four personas – nurse, mentor mother, midwife and adolescent patient – were identified and discussed as part of the staff's maternity service delivery concerns (see Image 2.8). The staff expressed the communication challenges and frustrations they experienced amongst themselves as medical staff and with their patients in their service delivery (DMHC02 Focus group session 2, 2019). The results showed how staff lacked visual aids that were appealing to younger patients and that could improve their antenatal care discussions. The staff also highlighted how their patients had difficulty expressing themselves while interacting with them for the first time as well as during regular consultations. Taking into consideration the ensuing results, the researcher translated them into purposeful and insightful realisations, as discussed below.

2.4 Distillation of insights and themes

The last step of the action research cycle was to reflect on the results generated by the application of the tools. The purpose of this sub-section is to extract, distil and synthesise key insights and themes from the staff's specific communication needs towards formulating a visual communication challenge.

The results were reflected upon collectively and key insights were gained from the staff's inputs on their contextual situation and communication needs in relation to the problem statement (see Image 2.9). The problem statement of this design project is concerned with investigating what the staff's communication needs were in the maternity unit.

Image 2.9: A wall of research-backed insights drawn from the staff's context and communication needs. Photograph by and in possession of the researcher (Manyame, 2019).

A prominent insight from both the interview and focus group sessions was how the staff desired to improve their service delivery towards at-risk adolescent patients and provide more focused antenatal care communication. The vivid descriptions that the staff used while describing their service experience reflected their passion, concern and empathy. Results from the interview and focus group sessions revealed how important the BANC approach was

in the maternity unit. The staff anonymously indicated how younger patients experienced complicated pregnancies as a result of other health conditions and often consulted with the doctor in the ANC high-risk clinic. The staff detailed how pregnant adolescents were at risk of adverse birth outcomes and agreed that the BANC approach was a means to ensure that their patients received ANC timeously.

The interviews provided an inside look into the high-risk conditions that surround the staff's patients such as socio-economic concerns, medicinal beliefs, risk of suffering a placenta abruption, neonatal cold injury syndrome and lack of antenatal care and information at home. The Department of Health's (2015a:27,132) BANC approach guidelines highlight the importance of responding to such alarming signs that the patient might display, therefore the staff stated that they responded to observed signs or problems reported by the patient by taking notes and immediately referring them to a counsellor and possibly for further assessment at a hospital. This also displayed that health professionals were community-centred and observant of high-risk patients in their service delivery approach.

The staff communicated how they needed more effective means of communication and ways to ensure confidentiality during services. The completion of a healthcare task depended on how effective communication was between the staff and patient. The BANC approach emphasises that health professionals should ensure communication, privacy and confidentiality during examination and counselling at each ANC visit (Ngxongo, 2018). However, the staff have little to no visual materials that they can use to empathically show the patient what they are referring to or to help the patient indicate with ease what they were struggling with such as sensitive information and pain. Therefore, the staff relied more on verbal communication and demonstrations. Another key insight came from the way the staff described how they had to work in-between units because of the shortage of nurses. This compromised their time and subsequently the need to provide patients with maternal health education during consultations. To ensure that their patients received the best antenatal care, the staff also relied on each other's expertise and guidelines to know how to address a specific patient's case. This illuminated how interconnected the staff's job responsibilities in the ANC and PNC services were. Therefore, the staff's workflow and communication style were captured and kept in mind to facilitate the distillation and understanding of the visual communication problem.

Overall, the focus group session techniques confirmed the similar communication needs that other staff members shared in interviews. The triangulated data pointed to the staff's maternity service delivery concerns which centred on their adolescent patients. This revealed how the staff needed the means to form a connection and to maintain rapport with their young patients in order to provide better care. The next step in the distillation process was to extract themes from the staff's communication needs by using the affinity diagram tool in order to coherently organise specific factors.

Affinity diagramming is a process that a designer-researcher can use to externalise field information by spreading out, sorting and clustering motivated insights according to likeness (Martin & Hanington, 2012:13,14). The designer-researcher can step back from the body of data and translated insights and make connections, see relationships, notice patterns and find emerging themes (Dam & Siang, 2020b). Affinity diagramming allows one to see the bigger picture and, at the same time, notice the finer details embedded in the interpreted data. As an application of this tool, the insights on sticky notes derived from the last step of the action research cycle were pasted on a wall. Connections were made between insights and were clustered into groups. Themes started to surface and highlighted the subject matters that pervaded the grouped insights (see Image 2.10). Relationships were intuitively built between the thematic groups identified (see Curedale, 2016). The most prevalent themes that came up were: shortage of staff; high adolescent pregnancy rate; the management of high-risk pregnancies; certain communication challenges with adolescent patients; the staff's BANC approach providing more or better health education; and maternal and neonatal health concerns (see Image 2.10).

Image 2.10: Insights grouped according to commonalities and the resultant themes generated by affinity diagramming. Photograph by and in possession of the researcher (Manyame, 2019).

The affinity diagram specifically highlighted communication challenges with adolescents as a prominent theme. The staff communication aspiration was that they needed a safe, confidential and empathic space during ANC consultations for their adolescent patients. The staff were concerned about how sensitive health risks affected their patients' maternal health and therefore they needed better means of communication. This particular communication struggle created a barrier between staff and patients and further complicated the empathic care patients are supposed to receive. The affinity diagram also highlighted the staff's need for helpful visual aids that can facilitate difficult conversations, provide more education on

maternal health risks, save time and communicate empathy to enhance the level of care for their pregnant adolescents.

2.5 Synthesising the visual communication challenge

Identifying the insights and themes in accordance with the staff's communication needs further assisted in highlighting important aspects that needed to be included in the development of a visual communication problem. This section discusses how the visual communication challenge was synthesised and developed into a project brief detailing the visual communication problem, communication goal, project objectives strategy and creative concept of this design project.

2.5.1 Defining the visual communication problem

A visual communication problem is a clear description of the unmet communication need which is the space between the participant's current state and the desired condition (cf. Stevens, 2019). The key insights and themes of the staff's communication needs were translated into a central visual communication problem. This project's visual communication problem is defined as follows:

> The medical staff of Promosa Clinic are concerned about the difficult and time-consuming task of discussing sensitive health topics and associated health risks with pregnant adolescent patients during ANC consultations. This, in turn, complicates the dissemination of healthcare information, as well as reduces the probability of patients returning for regular consultations. There is a lack of visual-verbal support in order to provide a confidential, reliable and time-effective discussion space between a health professional and patient.

2.5.2 Defining the communication goal

The communication goal of this design project, which aimed to address the visual communication problem, is articulated as follows:

> This project aims to provide Promosa Clinic's maternity staff with time-saving, confidential, useful, youth-friendly and interactive communication tools to use with their

pregnant adolescent patients to help promote continuous and effective antenatal care within the community.

2.5.3 Defining the project objectives

The communication goal is contextualised by developing specific project objectives. These objectives were formulated based on the insights and themes of the staff's communication needs highlighted in the insight distillation process. The project objectives are stated as follows:

a. The content of visual materials on ANC health topics and risks should be easily understood, community-centred and context-specific.
b. The tone of voice and writing style of the content should reflect empathy, facilitate communication and enhance confidentiality.
c. The visual materials should consist of tools useable by both the health professional and patient to promote connection.
d. Visually engaging graphic materials should appeal to pregnant adolescent patients to promote engagement.
e. ANC content should be illustrated in a demonstrative and expressive manner to promote understanding.
f. Familiar and identifiable visual materials relevant to the staff's context should be used as guidelines to develop visual material in an appropriate visual language.
g. Visual materials should assist staff with identifying, educating and responding to health risks during consultations.
h. Visual materials should be durable for multiple use and be utilised interactively with a patient.
i. Visual materials should be time-saving, sharable, easy to read and available to all staff for use during ANC consultations and across workstations.

2.6 Developing a creative strategy

Developing a creative strategy entails determining a creative approach on how to respond to the visual communication problem, goal and objectives (Davis, 2016). The proposal of design action includes exploring and assessing the validity of the project objectives and conveying a workable and viable creative strategy. This, in turn, should facilitate the generation of potential

ideas and the articulation of a final concept. The following service design tool was employed to explore and validate the project objectives and develop a creative proposal in preparation for the conceptualisation process.

2.6.1 Service blueprint

The idea of a service blueprint was first introduced by Lynn Shostack (1984:134) as a technique to explore the issues inherent to creating a seamless service process that reliably delivers. The service blueprint was adopted as a service design tool to explain how a service works by pinpointing how people, processes and components interact with one another from the service provider's point of view (cf. Gilson, 2020; Bitner *et al*., 2008:69,70). Ambrose and Aono-Billson (2011:67) highlight that, in order to validate communication objectives, the designer should look into the context and environment in which the design solution will exist and function. The blueprint created for this project (see Image 2.11) visually maps out the process and flow of the ANC service as detailed by staff inputs. It includes the organisation of care, the roles of medical staff, touchpoints of when the staff might interact with patients and the medical materials they use. The blueprint details strategic moments when the staff might engage and benefit from the design solution from the beginning to the end of the service, therefore visualising an improved staff service experience with the proposed objectives (cf. Interaction Design Foundation, 2020; cf. Kostopoulos *et al*., 2012:580). By understanding the original service in detail using a service blueprint, the designer can see how a creative plan can be implemented and the project objectives integrated into the existing service.

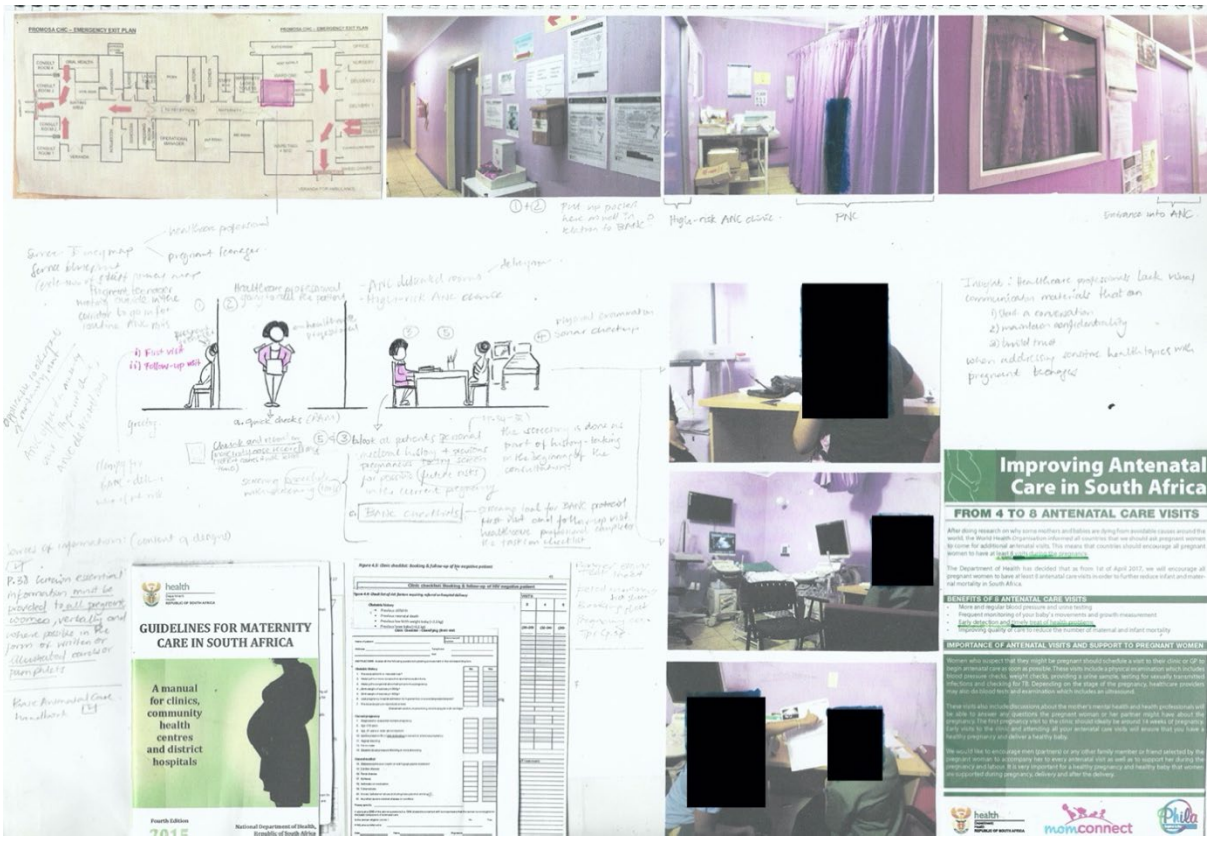

Image 2.11: Determining the validity of project objectives with a service blueprint on the staff's ANC service provision. Blueprint by and in possession of the researcher (Manyame, 2019).

The service blueprint indicated that a set of graphic design materials that are empathy-driven, confidential and educational can be integrated into the ANC discussions and consultations as part of the BANC approach. When a health professional sits down with an adolescent patient in the consultation room, the staff can potentially benefit from using visually engaging materials with community-centred ANC content applicable to the patient's context as a means of discussing sensitive health topics and risks. The visual material's functionality and feasibility, such as the interactivity of handheld material, can enable the health professional and patient to show and tell regarding antenatal care-related concepts and issues during a consultation. The time-saving aspect of using such material is also vital. As the health professional listens to the patient, it would be convenient for them to have note-taking materials at hand. The blueprint displayed the dual possibility of portable materials, some that can remain at the clinic, and other materials that can be taken home by the patient, as an extension of the ANC consultation with the staff.

The creative strategy is stated as follows:

> The strategy is to unobtrusively integrate an array of functional, visual materials into the existing BANC service provision of the clinic, thereby creating sensitive, seamless, and multifunctional communication opportunities between health professionals and their patients.

2.7 Conceptualisation process

After exploring and validating the project objectives through a workable strategy within the staff's context, the next step was to ideate and communicate the most viable ideas to solidify a creative concept. The following ideation techniques, namely the how might I? technique and the Mindmapping technique were utilised to explore keywords from the creative strategy that could trigger potential ideas and eventually articulate a final concept.

2.7.1 How might I?

The how might I? technique was adapted from IDEO's *Field Guide to Human-Centred Design Kit's* 'How Might We' ideation method. IDEO's How Might We method provides a designer with an explorative space to think innovatively and divergently about the possible directions in which the design problem can be solved (Siemon *et al*., 2018:97). The themes and insights deducted from the project are reframed as How Might We questions to scope design possibilities (cf. IDEO, 2015:75,85,86,87). The goal is to create trigger questions motivated by research insights that might provoke an array of generative and actionable ideas (Stickdorn *et al*., 2018:109; Stanford D. School, 2020; Crawford, 2018). With regard to this study, the creative strategy keywords such as BANC approach, sensitivity, care, empathy and discussion were explored. Those keywords were accompanied by reflection on the insights and themes to determine a design-related idea that could address the staff's concerns (see Image 2.12).

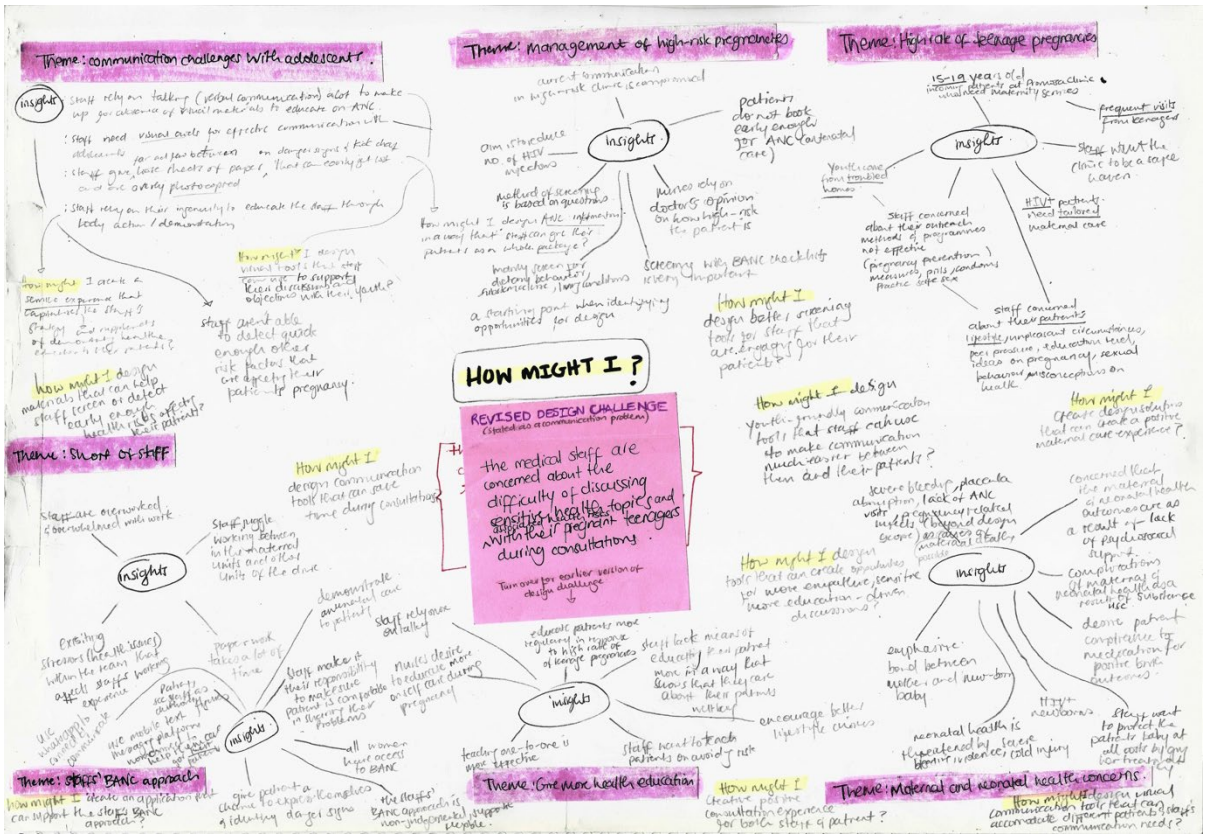

Image 2.12: Exploring potential design possibilities through how might I? ideation technique. Process image by and in possession of the researcher (Manyame, 2019).

Applying the how might I? technique resulted in several design opportunities that could be considered, such as designing youth-friendly tools that can make communication easier and confidential; developing visual tools that can save time; designing visual tools that can create opportunities for more empathic, educational and friendly discussions; and creating improved service delivery experiences for both health professional and patient. Examples of designed tools were a square, sealed container like a ballot box that can be used by patients to slot in their sensitive, written concerns privately. A health professional could then access the box and address the concerns confidentially. Secondly, youth-friendly maternal health tips in the form of hand-out cards were considered. Lastly, an empathically written booklet describing the most pressing questions and answers could be designed to provide timely, youth-centred information in topics related to ANC and associated risks.

2.7.2 Mindmapping technique

Apart from the how might I? technique, the Mindmapping technique was also employed. A mind map is commonly used for generating alternative and solution-oriented ways of looking at an issue by writing and building up a mesh of thoughts, ideas, strategies and opinions related to the problem (Mandal, 2014:336; Dam & Siang, 2019). The technique originated from Alex Osborn's (1888-1966) (1953) initial concept of applied imagination. The assumption is that a number of ideas that are written with no judgment or criticism can generate options where the most promising and viable idea can be selected (Ritter & Mostert, 2018:264; Stickdorn *et al*., 2018:113,114). This technique entails writing down the main subject in the middle of the page, and mapping words related to the subject, expanding the map with nodes of sub-topics branching out with relevant details (Crowe & Sheppard, 2012:1494). In this study, the creative strategy served as inspiration and reference for the variety of words that were written (see Image 2.13). The Mindmapping process resulted in a web of thoughts that highlighted potential ideas (cf. Ambrose & Aono-Billson, 2011:48). Some of the most promising ideas came forth after a process of selection.

The ideas that were in response to the staff's need for better means of communication during ANC service delivery were: "handle with care", emphasising the fragility of the pregnant adolescent's antenatal period; "in safe hands", articulating the staff's' desire to protect the patient from risk; "youth maternal aid kit", providing all essential education for emergencies, "maternal companion", which is a health professional's informed booklet always by the patient's side; and "take care before birth", which is a step-by-step journey on how to optimise a patient's antenatal care experience with a health professional until the arrival of the new-born.

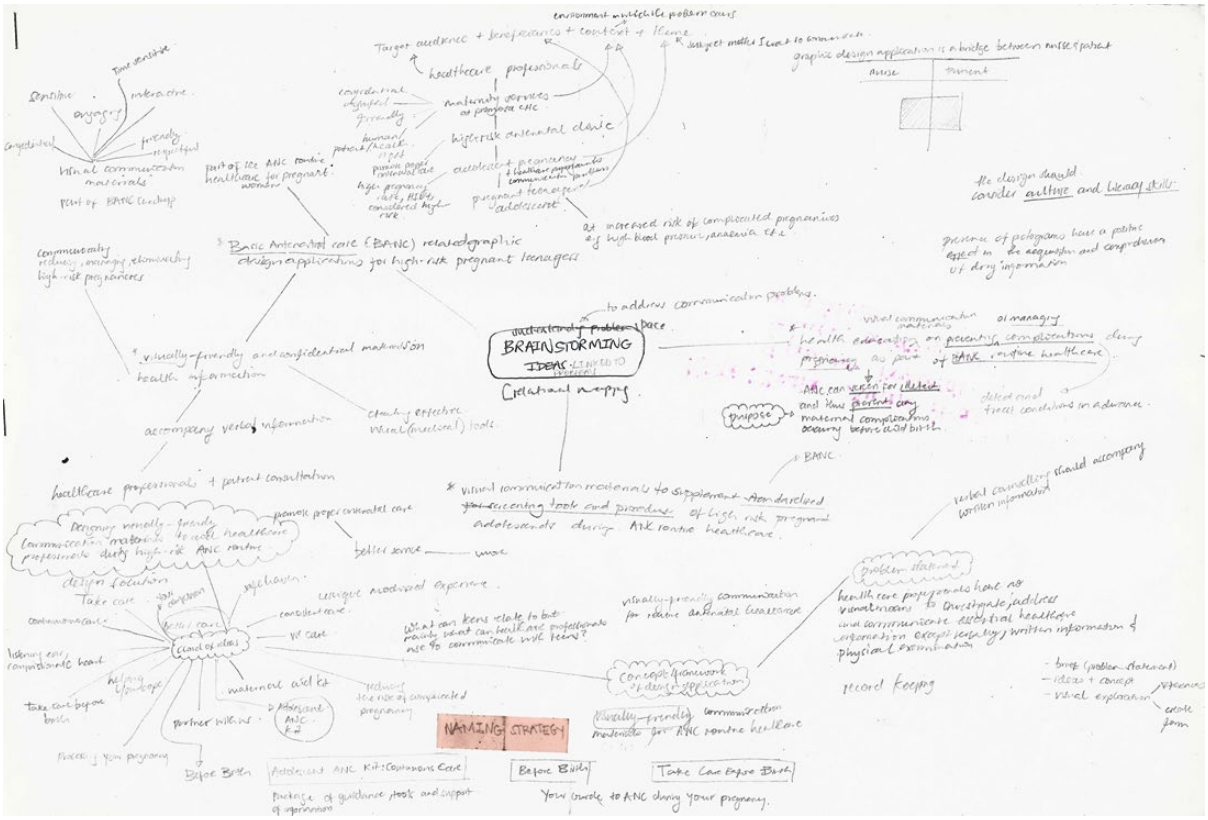

Image 2.13: The process of editing and selecting potential ideas using the Mindmapping technique. Mind map by and in possession of the researcher (Manyame, 2019).

2.7.3 Final concept

The ideation process resulted in a selection of ideas in accordance with the communication goal to select the most applicable and appropriate idea that might possibly be the answer to the visual communication problem. The creative concept had to have the potential for empathy, confidentiality, interactivity and most importantly, identification and education of sensitive health topics, as the creative strategy highlights. Thought processes eventually converged to one suitable concept title: – “in safe hands”. The “in safe hands” concept encapsulates the idea of staff creating a safe space for sensitive discussions and the promotion of more focused antenatal care communication. “In safe hands” carries the meaning of being cared for or dealt with by an empathetic and skilled health professional during pregnancy. The goal of the staff is to protect the expecting adolescent mother and her unborn baby from harmful behaviour and health risks through early detection, education and treatment in ANC consultations. The narrative is that the unborn baby is in the safe hands of the mother, and in turn, the expecting mother finds herself in the safe hands of the staff during their

antenatal care period. “In safe hands” is the thinking behind and final concept of the design solution.

2.8 Conclusion

This phase was dedicated to determining the scope of the staff’s communication needs in the maternity unit and, as a result, synthesise a visual communication problem that this design project could address. A set of methods and tools were used in action research-oriented cycles to integrate the staff as research participants in the design research process. At the end of the fieldwork, the researcher was presented with multiple communication needs from which key insights and realisations in relation to the problem statement were extracted. The staff revealed that they were concerned about the antenatal care service delivery that they provided to adolescent patients and needed better means of communication during consultations. As a result of the staff’s inputs, a visual communication problem was defined. Central to the problem statement and the communication goal was how the project aimed to facilitate staff with community-centred and continuous maternity care by using youth-friendly visual materials. The project objectives were validated, potential ideas were explored and a final concept was developed in line with the creative strategy. The final concept was encapsulated as “*in safe hands”,* which emphasises the empathic, confidential and safe space that can potentially be created by the envisioned visual production during ANC consultations. The next step was to execute the concept through a creative production process in Phase Three.

PHASE THREE: DESIGN

Designers receive a "brief" or "specifications" of a product (or service)…Design follows cycles of mutual adjustment between specifications and solutions until a final "solution" is reached. (Hatchuel & Weil, 2009:182,183)

3.1 Navigating Phase Three

The third phase of the research process of this design report is called ***design***. This phase encapsulates how the final concept from Phase Two was executed through the use of creative production design cycles. The goal was to achieve the most viable visual communication solution to the problem in the form of a final designed prototype. Firstly, the envisioned production is articulated, a creative production cycle is defined, and this project's action research-oriented design cycle model is presented and motivated. Secondly, three design cycles are discussed, detailing the experience and processes of designing and executing the developing prototype in service of achieving the project's communication goal and project objectives. Thereafter, the prototype is tested with the staff in order to refine the design solution towards a final design prototype. Lastly, the creative production process concludes with a reflection of all design cycles, and as a result, the refinements that were considered and implemented to complete the final prototype to be presented in Phase Four. The design process is illustrated by process work and supplementary images. The phase culminates with a pre-final prototype and a summary of key points that lead to the last phase.

3.2 Envisioned solution

The staff's specific communication needs, and contextual situation were encapsulated as an overarching visual communication problem in Phase Two. The idea of *in safe hands* was conceptualised as a probable envisioned product answering to the visual communication challenge. The staff face the difficulty of discussing sensitive health topics and health risks with pregnant adolescent patients during antenatal care (ANC) consultations. The *in safe hands* concept was imagined as a solution that can provide staff with an empathic, confidential and safe space to discuss and educate pregnant adolescents on sensitive health concerns. The envisioned solution encompasses graphic design materials that are empathy-driven, time-saving, hand-held, interactive, educational, visually engaging and youth-friendly. The staff will have in their hands a product that can make them feel assured in quickly identifying at-risk

situations, which in turn makes the expecting adolescent mother feel safe and taken care of in the hands of the staff. The design solution should provide a level of comfort and security when emotional, physical and socio-economic well-being is discussed with a patient. The envisioned product will therefore communicate and promote continuous and community-centred adolescent maternity care for better maternal health outcomes. The aim was to bring to life the concept of *in safe hands,* as discussed hereafter.

3.3 Planning to design

The next step is to create the envisioned product within an action research framework. Marshall (cf. 2010:79,80,81) posits that action research is an appropriate framework for the process of planning, creating, reflecting, responding to and analysing an emerging solution to a visual communication challenge. The cycle enables a designer-researcher to exercise critical, reflective, self-evaluative, and reflexive skills while interweaving theory and practice in the act of designing a prototype (cf. Zuber-Skerritt, 1982). A design-oriented action research cycle was constructed to fulfil this project's objectives.

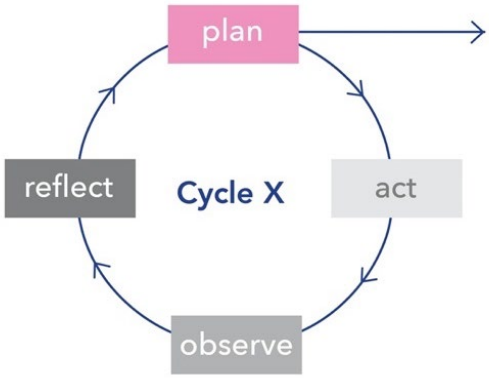

Image 3.1: The design-oriented action research cycle illustrating four steps on how to conduct the creative production process of the design prototype. Schematic diagram by and in possession of the researcher (Manyame, 2020; cf. Tripp, 1995).

As illustrated in Image 3.1, within a design cycle there is a sequence of four steps; *plan, act*, *observe* and *reflect*. The *plan* step entails devising a creative production plan that is informed by field research insights, inspirational graphic materials and secondary sources of information. The *act* step involves scamping, sketching and making detailed annotations on paper while referencing the plan. Thereafter, the designer makes and assembles printed materials according to plan, using suitable media, drawing equipment and design software. The act of designing and making also includes reflecting-in-action and deliberating on an

appropriate response in the process. The *observe* step entails looking at the results of the creative process. The last step, *reflect*, is an analysis of the results, where insights are drawn and recommendations are made which influence the planning of the next cycle. The design cycles followed for this study's creative production are discussed below.

3.4 Design cycles for *in safe hands*

The creative production process of this study consists of three design cycles that were implemented successively (see Image 3.2). Each cycle contained a set of three project objectives that had to be met in line with the envisioned solution of the *in safe hands* concept. The first design cycle focused on determining the form and content, followed by the second design cycle which looked at developing the design language, and the last cycle which entailed exploring the functionality and feasibility of the design solution in the form of a prototype.

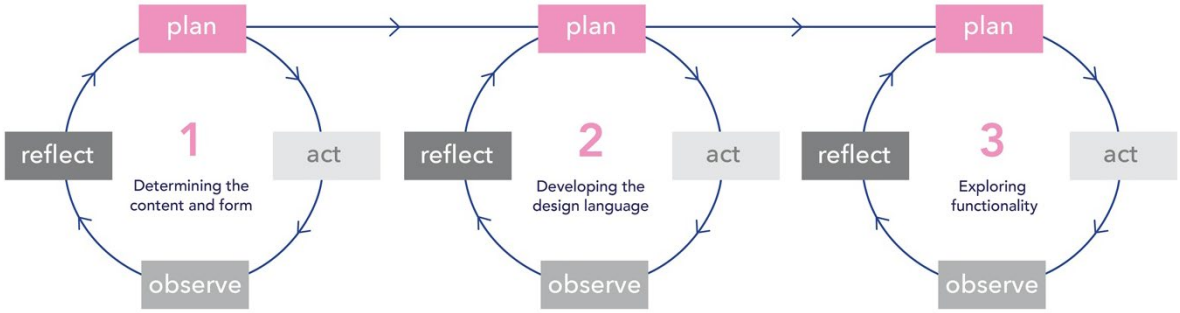

Image 3.2: Three design cycles of the creative production process. Schematic diagram by and in possession of the researcher (Manyame, 2020).

3.4.1 Design cycle one: determining content and form

According to Landa (1998:26), to think creatively, a designer needs to identify and explore the interdependent relationship between content (the subject matter) and form (the appearance), in order to create the visual communication message. This cycle discusses how ANC information was sourced and collated on sensitive health topics and risks in order to adapt and create content for the design solution, and secondly, how an appropriate form was explored in fulfilment of the project objectives.

The aim of implementing this design cycle was to fulfil the following project objectives:

a. The content of visual materials on ANC health topics and risks should be easily understood, community-centred and context-specific.
b. The tone of voice and writing style of the content should reflect empathy, facilitate communication and enhance confidentiality.
c. The visual materials should consist of tools useable by both the health professional and patient to promote connection.

Step one: plan

In order to plan the definition, purpose and content for the design solution, categories were made according to certain aspects which stood out when defining the communication goal: emotional well-being; determining pain; and identifying risks. Within these categories, certain formats came to mind as to what would be viable in the form of designed visual communication pieces for medical staff to use easily, confidentially and in service of caring for their patients. A set of specific communication tools were starting to develop under these overarching features – instructional materials, interactive discussion materials, record-keeping materials, and educational materials, which could eventually be enclosed in some kind of packaging. Questions such as, “How are you feeling today?”, “Where do you feel the pain?” and “Which situation or condition do you identify with?” assisted in informing the categories and envisioned possible materials (see Image 3.3). These questions were mainly informed by the staff’s inputs and referrals to the South African Department of Health’s Mother, Child Health and Nutrition booklet (2014), Guidelines for maternity care in South Africa manual (2015a) and the National Adolescent and Youth Health Policy (2017a).

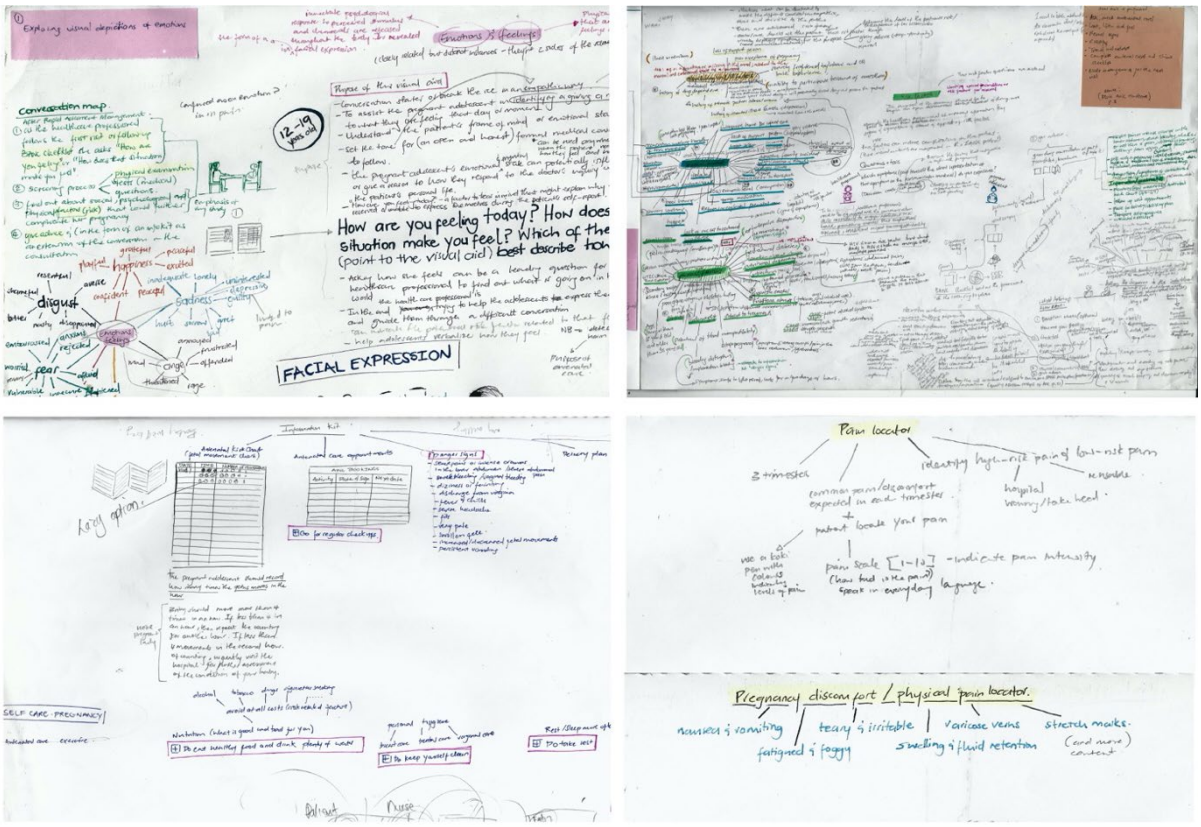

Image 3.3: Preliminary planning for content creation of the interactive discussion materials, instructional materials, record-keeping materials, and educational materials. See Addendum A (images 1a-6a) for more process work. Process images by and in possession of the researcher (Manyame, 2019).

The purpose of each type of visual material was defined and planned by using questions such as the ones mentioned above, as well as possible answers to an array of sensitive health risk topics. The questions and answers would reflect the social, socio-economic, psychological, physical and psychosocial dynamics and influences that can impact an adolescent patient's pregnancy experience. Three different interactive discussion tools were then conceptualised to assist medical staff in determining a patient's emotional state, locating a patient's physical pain, and determining potential risks which might surface during the patient's pregnancy (see Image 3.3). Two supplementary tools were also imagined and defined as record-keeping and instructional materials for staff on how to use these materials during a consultation (see Image 3.3). One additional tool was also added to serve as a patient's educational self-care material to take home, including guidelines and resources on pregnancy, as well as important contact numbers (see Image 3.3). The tools were preliminarily named *emotions tool, pain tool, risk tool,* staff's *instruction manual*, *record-keeping sheets* and patient's *self-help information pack*. When these materials are used and stored together they form a functional set of tools, and

the idea of a useful visual communication kit, which staff could use at any point to approach their patients, presented itself.

Image 3.4: Social design project outcomes that inspired this project's form. From Top Left: Mindnosis Kit, Better Beginnings Pregnancy Purse question cards tool and Cookery Kit. Images by Sarah López-Ibáñez, WHO and Magdalena Sabatowska (López-Ibáñez, 2020; Salgado *et al*., 2017:70; Sabatowska, 2020).

The specifications of the communication kit's format were planned and motivated. Inspired by insights gained from a visual inquiry of existing communication aids from medical and social graphic design projects, scamping of the *in safe hands* kit began in the subsequent step. Several sources of inspiration were found (see Image 3.4). A multidisciplinary designer, Sarah López-Ibáñez (2020) designed the *Mindnosis Kit* with a set of mental health self-assessment tools that an individual can use to assess his/her emotional distress. This kit's application of form inspired the creative production of this study, underscoring visual functionality such as readability, simplicity and accessibility. Another design project that was consulted is the service concept *Better Beginnings* of the Better Outcomes of Labour Difficulty (BOLD), initiated by the World Health Organisation (WHO) to increase Nigerian and Ugandan communities' access to maternal healthcare facilities (see Oladapo *et al*., 2015). The Better Beginnings *Pregnancy Purse* question cards inspired the aspect of organising the text and illustration of the *risk tool* on the front and back part of a card. The Cookery Kit was created

by Magdalena Sabatowska (2020) to help elderly women socialise, and it inspired both the element of creating interactive and digestible forms of content and the selection of a box-like packaging.

After carefully considering existing visual communication outcomes as usable inspiration, preliminary formats for the conceptualised set of materials were explored. The tools in the set were envisioned as being handheld and interactive in their form. The *emotions tool* could take on an octagon shape, sectioned for certain emotions, and the supplementary *emotions tool* could be a mini-poster which the health professional could refer to on a table or wall. The *pain tool* could be a hand-held flip chart to allow navigation between information on different trimesters during pregnancy. The *risk tool* could take the form of cards to categorise information and facilitate the selection of the most applicable card. The *record-keeping sheet* could be a convenient fill-in paper for making notes. Both the staff's *instruction manual* and patient's *self-help information pack* could be in the form of a booklet to dedicate sufficient space to essential ANC subject matter and communication guidelines. The preliminary planning of a visual style, layouts and compositions for the set of tools was done by gathering reference materials for inspiration. Illustration styles and colour choices of brand illustration systems such as Facebook (see Giller, 2020) and Oscar Health (see Alejo, 2017) were collated as reference materials from which to draw inspiration (see Image 3.5).

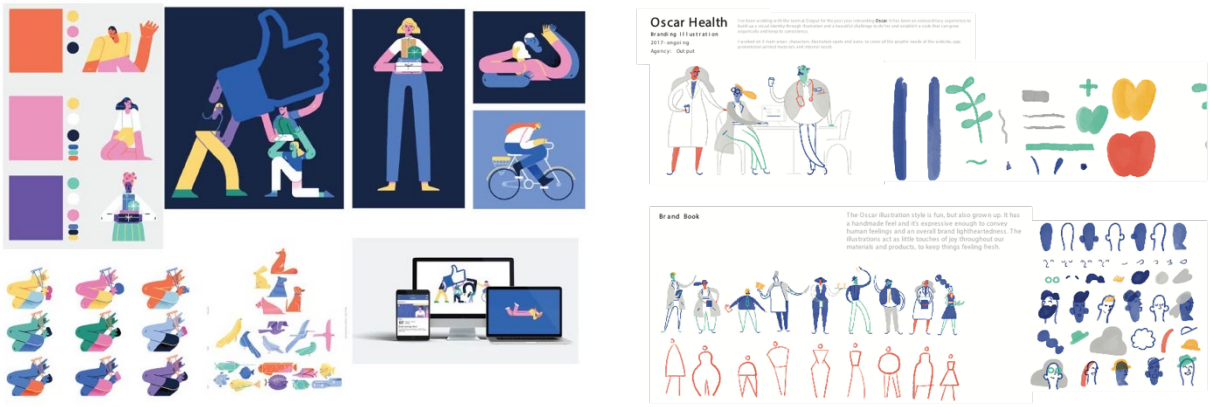

Image 3.5: Examples of visual styles that influenced the visual appearance of the form and content. Images by Amelia Giller and Laura Alejo (Giller, 2020; Alejo, 2017).

Step two: act

After the conceptualisation, content creation, and format selection process of the communication kit, the next step was to create the visual form (see Image 3.6). Ambrose and Aono-Billson (2011:67) emphasise that visualising abstract ideas can be determined through a process of sketching while drawing inspiration from existing visual materials. Sketches of emotions, pain, discomfort and external risk factors associated with pregnancy were visually conveyed by starting with illustrations of certain facial expressions and body language. The layout of the communication kit's text and illustration on the form was also explored.

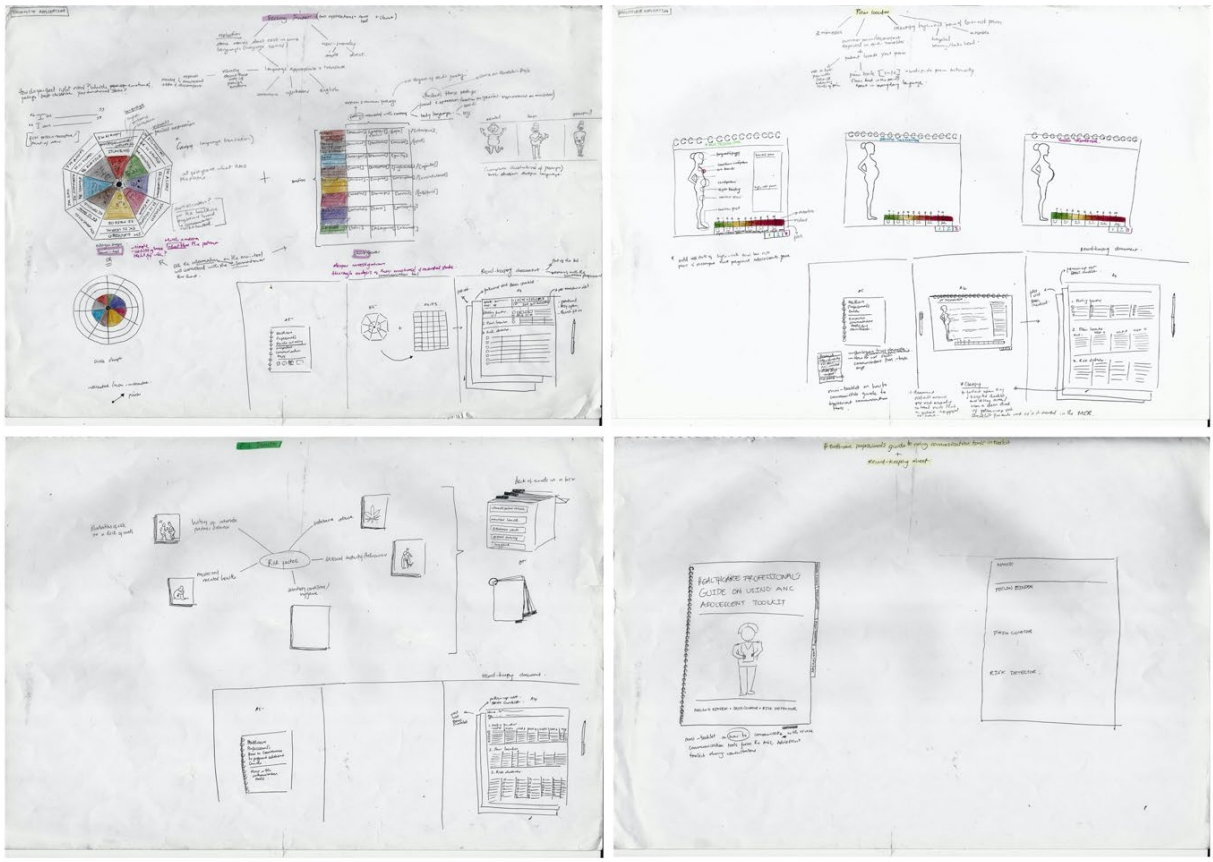

Image 3.6: Sketches and scamps of the content, form, layout and application of the *emotions tool*, *pain tool*, *risk tool*, staff's *instruction manual*, patient's *self-help information pack* and *record-keeping sheet*. See Addendum A (images 7a-21a) for more process work. Process images by and in possession of the researcher (Manyame, 2019).

The drawing activity resulted in the creation of two characters – a pregnant adolescent and a health professional (see Image 3.7). These characters were drawn to explore how the ANC content can be visualised and placed on the suggested formats of the kit in order to make the content easy to read. Certain areas of copy were also translated into two more languages, Setswana and Afrikaans, both which are used within the staff's context at the clinic. In

preparation for translating the sketches into a digital format, the following design guidelines were applied: use of clean lines, bold text that is easy to read, primary shapes, simplified shapes, and ethnically non-specific colours. The intent was to create characters with exaggerated body forms to express body language and emotion (cf. Lauer & Pentak, 2012:159).

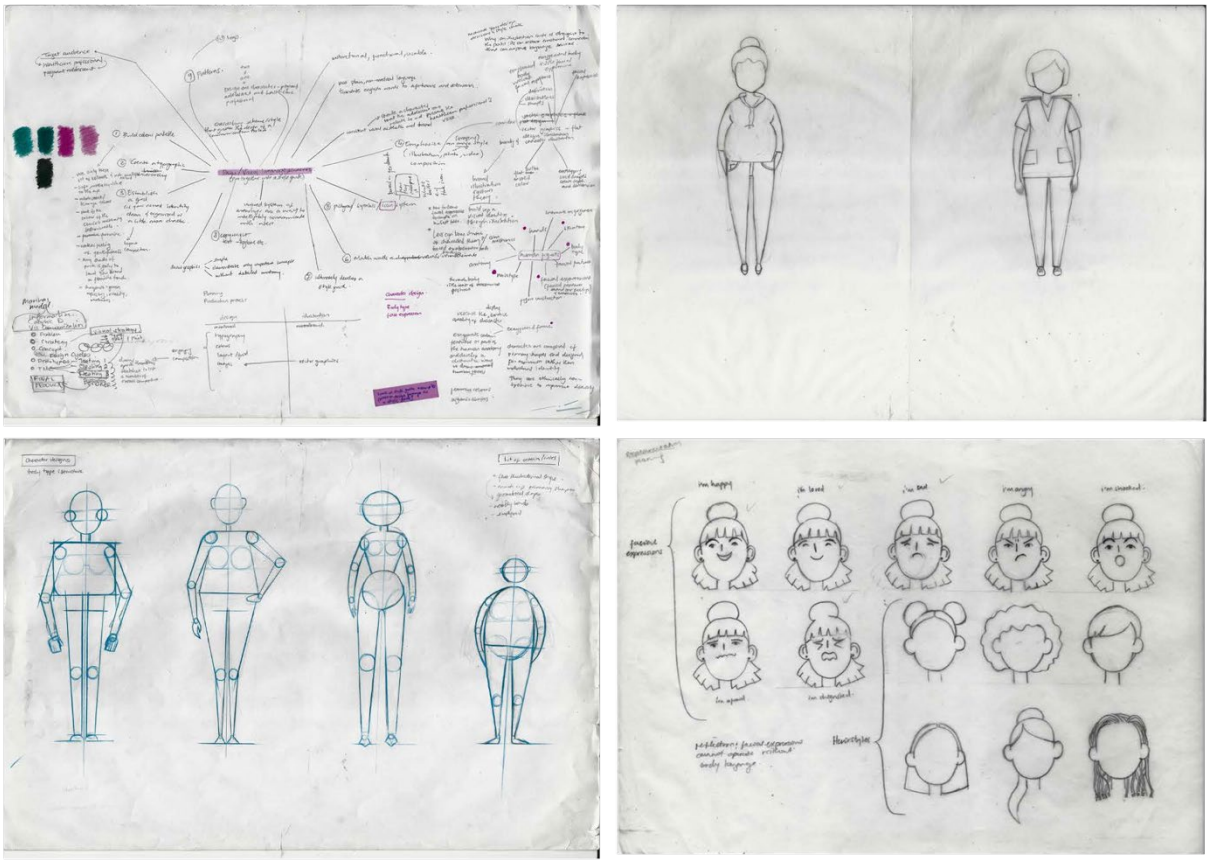

Image 3.7: Character drawing and selecting suitable design elements to give the communication kit a visual form. See Addendum A (images 22a-26a) for more process work. Process images by and in possession of the researcher (Manyame, 2019).

To digitise the preliminary designs, the Adobe Illustrator software was used. While reflecting during the act of designing, variations of character illustrations with different bone structures, facial features and colour application were explored (see Image 3.8). Visual design elements such as colour, type, and shape were applied using principles of hierarchy and contrast to create simplified graphics without detailed anatomy. References were made to visual style inspirational material that had previously been collected. A style guide sheet was compiled which detailed the colour palette, typefaces, and illustration style. This was followed by the designing of the form, placement of the text and application of the visual style on all the communication tools.

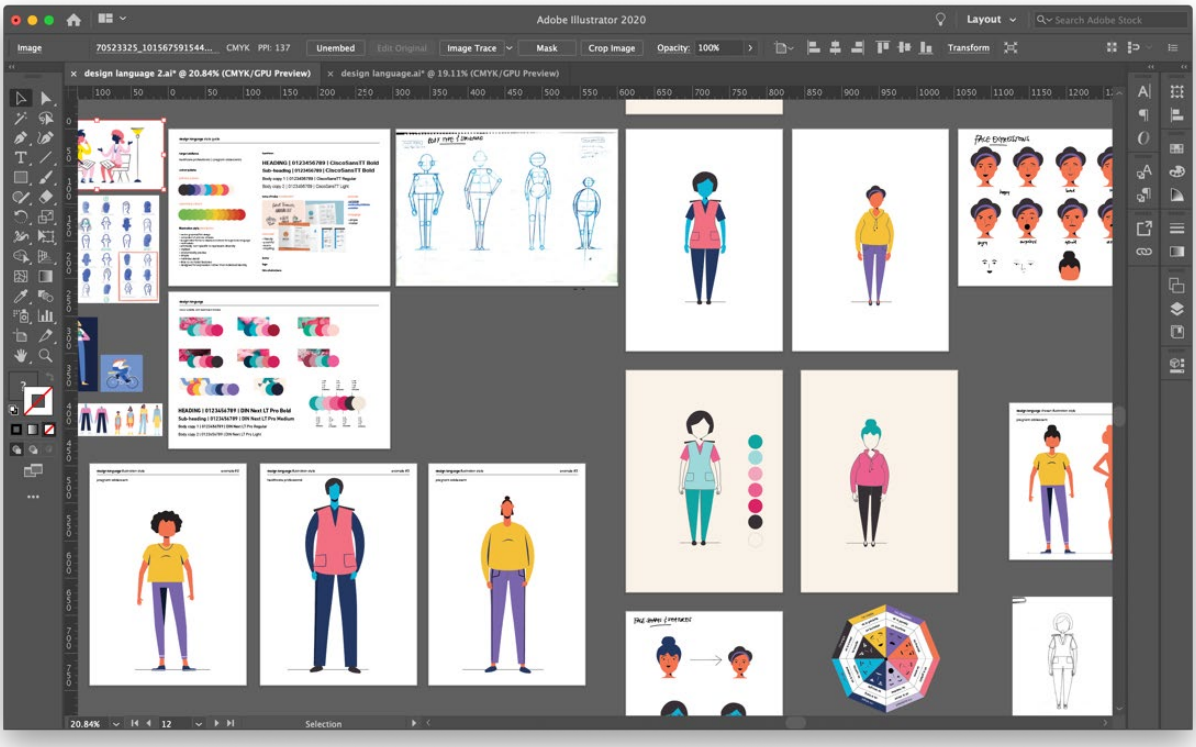

Image 3.8: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. See Addendum A (images 27a-35a) for more process work. Screenshot by and in possession of the researcher (Manyame, 2019).

Step three: observe

After designing digitally, printouts were made and assembled as high-fidelity prototypes[20] (see Images 3.9 and 3.10). A set of seven tools were produced: *emotions tool*, supplementary *emotions tool, pain tool, risk tool,* staff's *instruction manual, record-keeping sheet* and patient's *self-help information pack* (see Image 3.10). The purpose of producing a high-fidelity prototype was to reflect on the effectiveness of the message being visually conveyed through selected content and a three-dimensional form (cf. IDEO, 2015:119).

20 High-fidelity prototypes are early samples with low level detail and some of the necessary design components built to test the concept's functionality and interactivity (Esposito, 2018; Ponomarev, 2019).

Image 3.9: The first prototype at the end of the first design cycle. Photograph by and in possession of the researcher (Manyame, 2019).

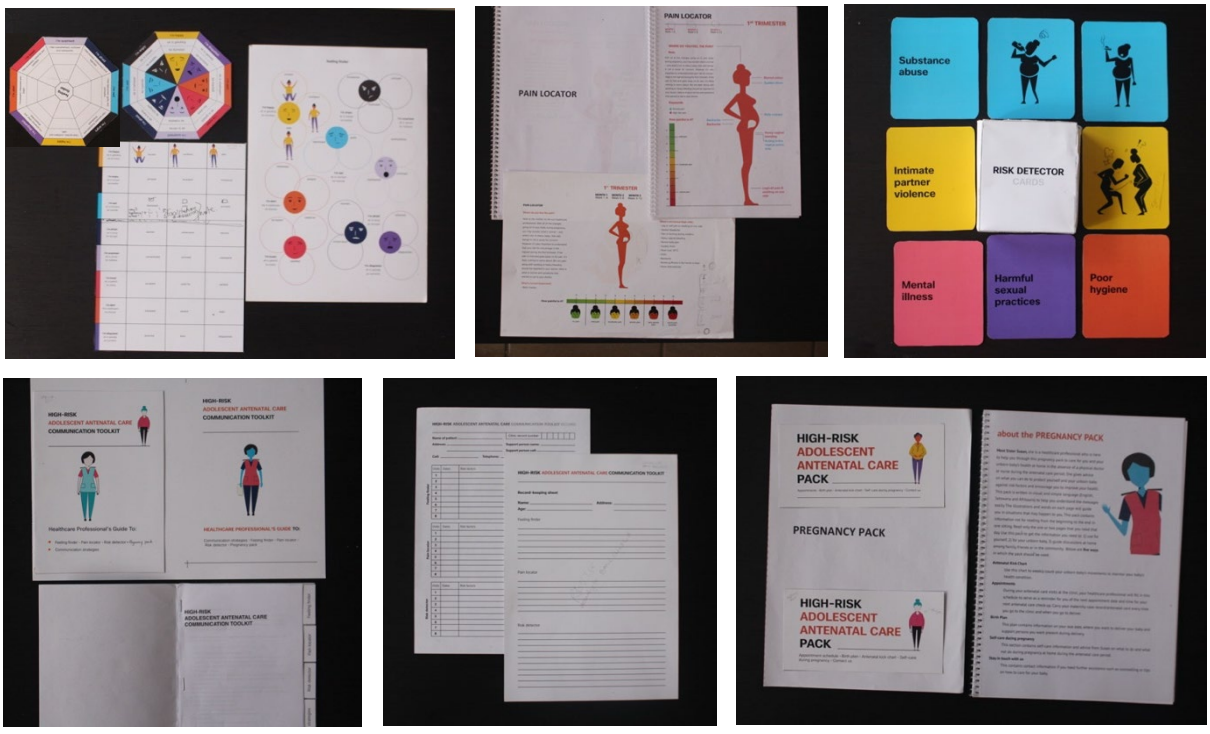

Image 3.10: Communication tools laid out for reflection at the end of the first cycle. From Top Left: *emotions tool* (back and front), supplementary *emotions tool, pain tool, risk tool*, staff's *instruction manual, record-keeping* sheet and patient's *self-help information pack*. Photographs by and in possession of the researcher (Manyame, 2019).

Step four: reflect

The effectiveness of the design decisions and resultant prototypes of this design cycle were assessed according to the project objectives. The goal of this cycle was to determine the necessary content in the correct tone of voice and the design formats it would be conveyed on. The ANC content embedded in the visual tools reflected the conditions and circumstances that could affect the maternal health of pregnant adolescents who utilise Promosa Clinic's services. The communication tools are handheld and can be used by staff in the relevant ANC consultation rooms. As an extension of the ANC check-up, the patient can take the *self-help information pack* home for continued care. The empathic, yet confidential and sensitive, tone of voice used by staff members can be heard through the written and spoken word of the communication kit. Upon reflection, the visual representation of the health professional in the communication kit was not necessary, but could rather be expressed implicitly through the visuals and writing style.

The interactive form of the tools was reflected upon and possible adjustments were suggested. The octagon shape of the *emotions tool* was difficult to pivot when held, and the layout of text and illustration was uncomfortable to read. The *emotions tool* should take the form of a circle for better rotation. The supplementary *emotions tool* had little space to fit needed content on feelings. A booklet instead of a mini-poster can be considered. A booklet would allow staff to navigate through content easily and make notes on alarming symptoms identified during the investigation of psychological risk factors. More information on recognisable feelings associated with emotions could be added on the supplementary *emotions tool*. The *pain tool* should be read at horizontal orientation instead of vertically. The risk cards were too large thus smaller sized cards are preferable. The staff's *instruction manual* and patient's *self-help information pack* could consist of booklets with a smaller format.

Exploring a preliminary visual style indicated the need for a cycle dedicated to determining an appropriate design language for Promosa Clinic context. The current visual style was not taking into account Promosa Clinic's diverse population of staff and patients with different sets of circumstances, language and perceptions. The illustrations had little to do with the clinic's context. The next step in the production process was to develop an appropriate graphic design language, as discussed in Cycle Two.

3.4.2 Design cycle two: developing a design language

A design language consists of a selection of visual elements applied with design principles in order to visually express and translate a concept into a well-informed message relevant to a target audience (Lauer & Pentak, 2012; Poulin, 2012:10,11). Following up on the insights on the visual language from the first cycle, this production cycle discusses the visual inquiry that took place into Promosa Clinic's visual communication environment, as well as existing social and healthcare graphic materials. It also details how the illustration style, design elements such as icons and symbols, and the branding for the kit were explored. The cycle ends with how the design language was iteratively sampled and tested.

The development of the kit's design language aimed to fulfil the following project objectives:

d. Familiar and identifiable visual materials relevant to the staff's context should be used as guidelines to develop visual material in an appropriate visual language.
e. Visually engaging graphic materials should appeal to pregnant adolescent patients to promote engagement.
f. ANC content should be illustrated in a demonstrative and expressive manner to promote understanding.

Step one: plan

A visual inquiry of the maternity unit of Promosa Clinic was conducted to analyse the visual materials that the staff use to disseminate youth-related maternal health messages. The aim of the inquiry was to inform the thinking and decision-making process of selecting a suitable colour palette, typefaces and illustration style based on the staff's unique visual context (cf. Lupton, 2011:38). According to Butler-Kisber (2010:125), visual imagery is socially constructed and is reflective of the communication culture and the knowledges and practices that they were created in. Following this insight, the medical and visual materials of Promosa Clinic were analysed as visual text to gain insight on the signs, colours and imagery that the staff understood and used in their services (see Image 3.11).

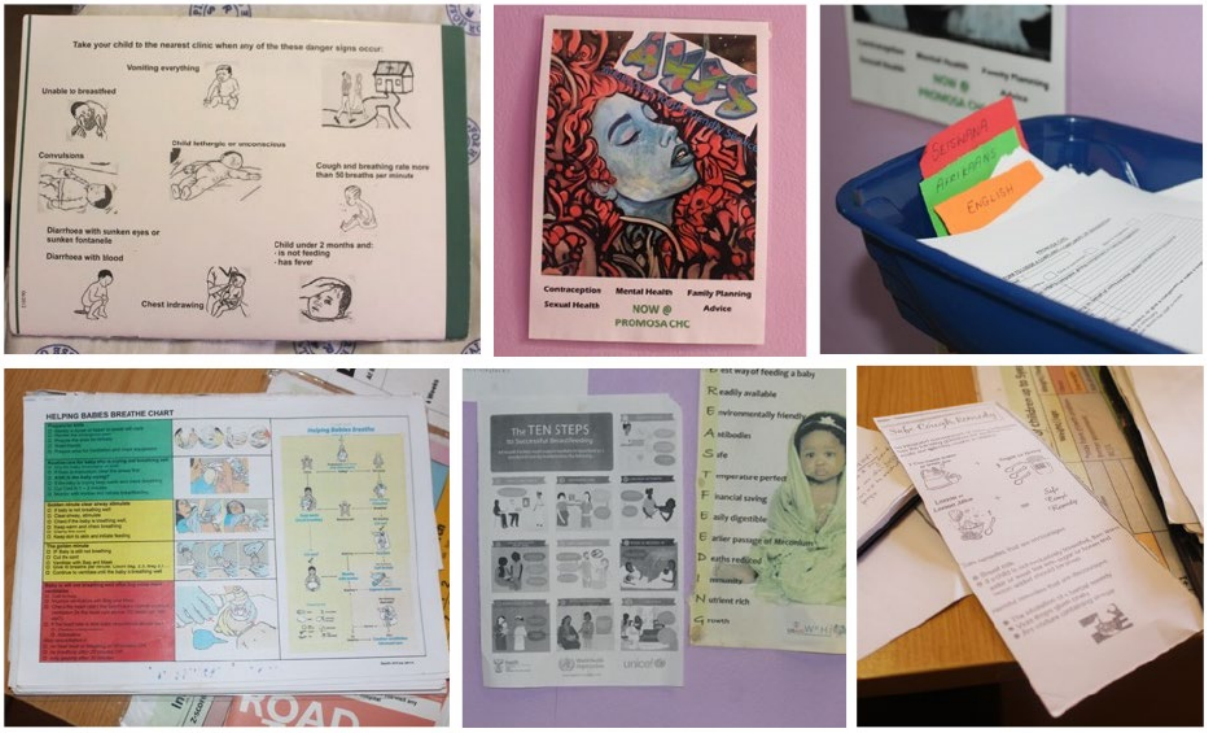

Image 3.11: The Road to Health Boys booklet with illustrations to educate and monitor the patients maternal and neonatal health. Other graphic materials include the AYFS poster on the clinic's youth-friendly healthcare service offerings, Ten Steps to Successful Breastfeeding sheet from health organisation information sources, and the Safe Cough Remedy leaflet. Photographs by and in possession of the researcher (Manyame, 2019).

The results indicated that the clinic's maternity unit had assorted visual materials made up of photocopies, photographs and extracts from health organisations, governmental publications and other unidentifiable sources on maternal health. The staff mainly made use of visual media such as posters, leaflets, pamphlets, books and display signs. The materials relied on dense text and images to communicate maternal health content. There were repetitive graphic elements such as the use of black and white and some colour illustrations. An overall or consistent brand identity or design language was not present in the space, nor on the available graphic materials.

Another inquiry was made into the design language of existing visual materials on the healthcare landscape. A variety of artefacts such as the Healthy Baby Toolkit by Frog Design and Birth Kit by Ayzh Organisation were selected and analysed (Frog Design, 2020; IDEO, 2020c). Both toolkits were designed to support the maternal and neonatal health of pregnant women by providing timely physical and visual resources for ANC and childbirth in communities with under-resourced clinics (see Image 3.12). It was discovered that elements such as the naming strategy, icons, colour palette, logo, patterns and text were useful for referral and inspiration for the prototype development. The importance of designing a context-

specific visual language, with the audience and context in mind, stood out as central to communicating the message successfully to that particular audience. In addition to investigating existing materials, relevant illustration styles, forms, patterns, colour, and typefaces were collected and consulted, in order to project a potential style or visual direction for the kit.

Image 3.12: Images of healthcare graphic design applications that were investigated. From Top Left: Healthy Baby Toolkit and Ayzh's Birth Kit. Images by Frog Design and IDEO (Frog Design, 2020; IDEO, 2020c).

A visual strategy was planned to build a design vocabulary that could effectively communicate the staff's ANC message meaningfully to young expecting mothers. The visual strategy entailed making design decisions based on Promosa Clinic's context. The design language would include a carefully considered illustration style, naming strategy, brand story and logo, and supporting illustrations and icons that would determine the visual appearance, identity and meaning of the communication kit (cf. Miles, 2019).

Step two: act

As part of the visual strategy, the intent was to create visually engaging and expressive graphics through the methods of design and illustration. The goal was to firstly develop and apply an illustration style to a visual character that could form a part of the visual language. According to Albers (2004), visual imagery structures formats and displays complex information in a simplified mode that is readable and understandable for the audience. Male and Arnold (2019:2) highlight that illustration is a "contextualised visual communication" that depends on the setting and audience that the visual form will inform. This suggests that the benefit of the creative application of character illustrations in service provision materials dispenses information and education. Therefore, it was important to base the illustrations and visual style on Promosa Clinic's visual context, taking inspiration from the visual inquiry. This

character would be the staff's first point of contact and connection with the young patient. The illustrations are intended to visually represent the staff's empathic approachability and relatability to adolescent patients when discussing sensitive topics during ANC consultations.

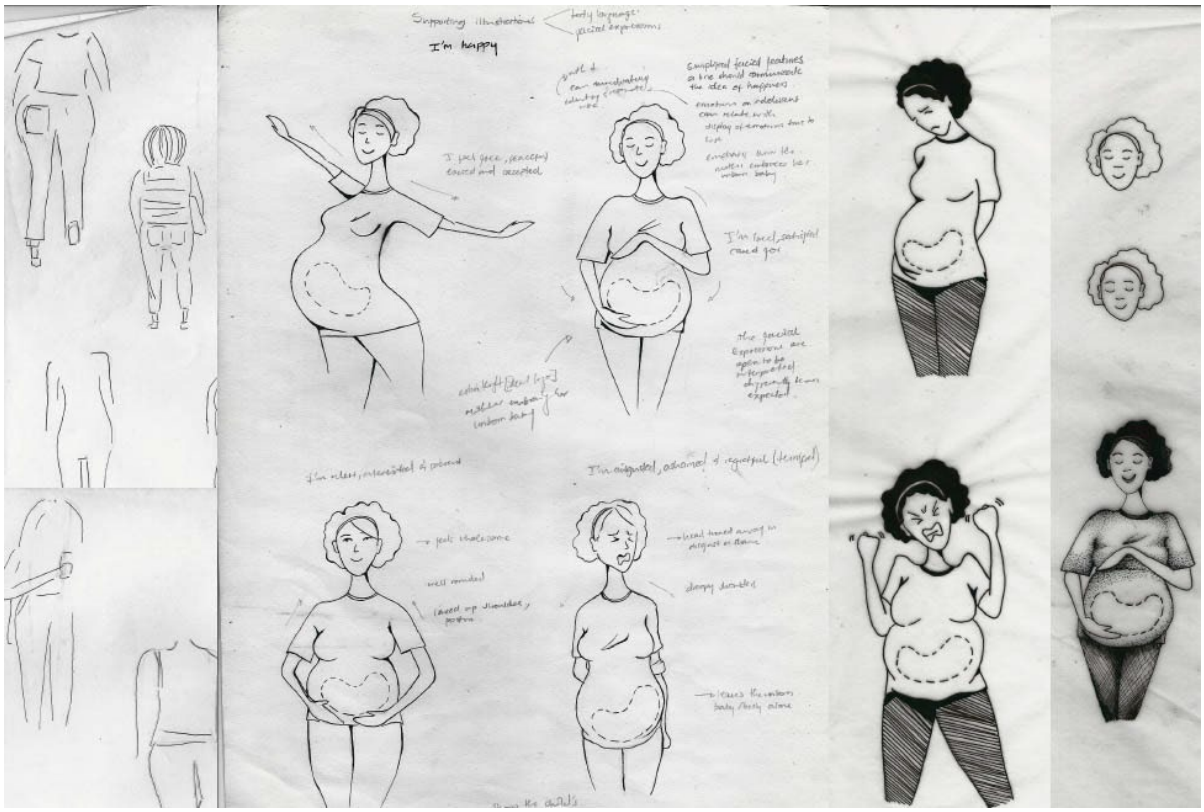

Image 3.13: Exploring illustration styles and experimental drawings of the female body to represent a pregnant adolescent's gestures and facial expressions using pen and ink and mark-making techniques. See Addendum A (images 36a-40a) for more process work. Illustrations by and in possession of the researcher (Manyame, 2020).

The act of designing shifted from illustrating digitally to drawing freehand on paper the new character that would represent a pregnant adolescent female (see Image 3.13). Drawings were first completed to capture the gestures and form of a female figure (see Image 3.13). This was a fundamental exercise that based the character on a more literal representation of a human figure. The character was drawn expressing eight different emotions through body language and facial expression with few facial and hand details. This illustrative approach of using a fine liner pen on paper provided more breadth, space, depth and freedom to explore line variation, volume and shape. In favour of this approach, Glaser (2008) states that drawing is a way of visual thinking on paper. The intention was to combine the analogue technique of drawing with digital refinement at the end.

The use of tonalities and texture in the illustration style was also explored. It took into account the possibility of the staff's contextual need for black and white materials as seen from the presence of photocopied materials in the maternity unit. Experimental drawings were made with pen and ink techniques to translate colour into black and white, using texture and tonal shading to create depth, volume, value, form and tone. Texture is an artistic element that refers to the surface quality of objects, and when applied it creates "graphic interest" (Lauer & Pentak, 2012:186). The designer has the ability to convert pen smears, stains and marks on a surface into "implied textures and representations" (Lauer & Pentak, 2012:192). The character illustration was converted to a series of lines and dots which resulted in different textures expressing the character's form (see Image 3.13). The techniques of stippling, cross-hatching and shading were used to create a variety of diagonal lines, wavy thick strokes and shadows to bring definition to the character's body, clothes and hair.

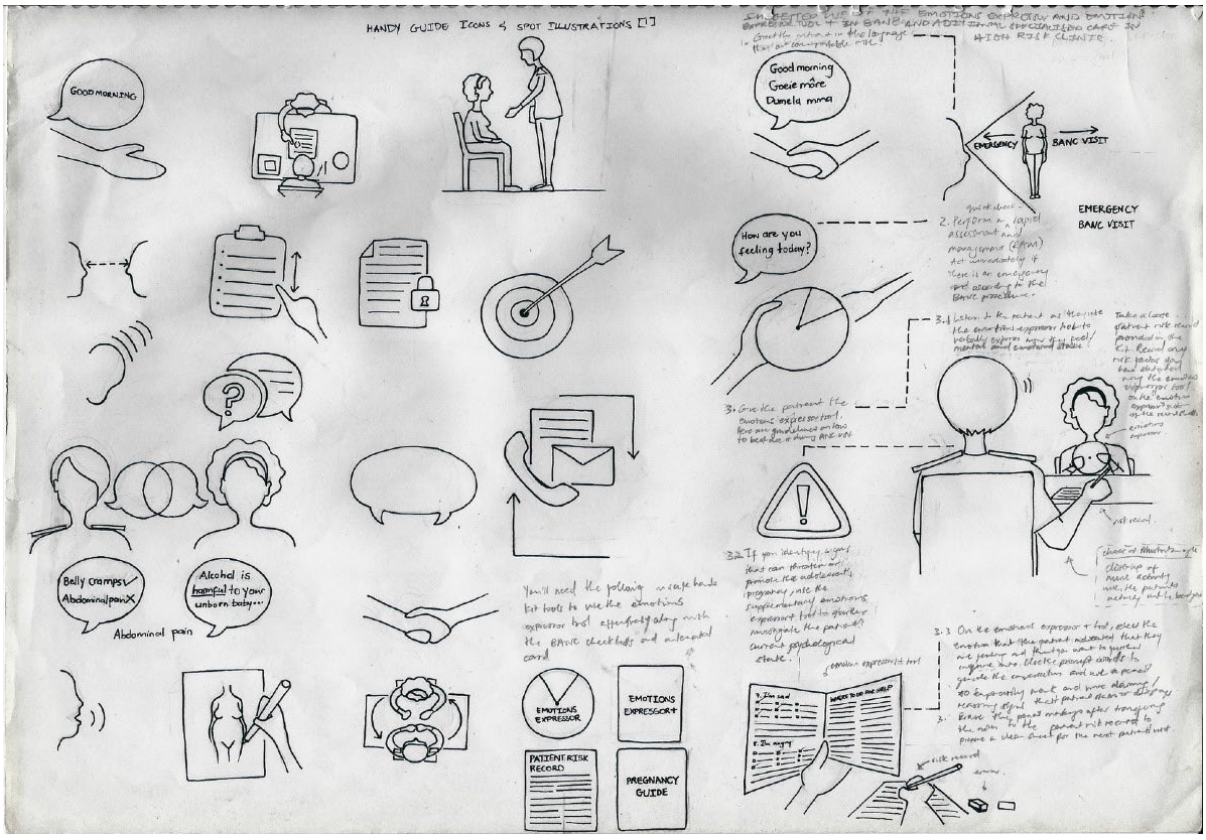

Image 3.14: Supporting illustrations and icons on ANC text for communication tools. See Addendum A (images 41a-52a) for more process work. Illustrations by and in possession of the researcher (Manyame, 2020).

After working on the character, supporting illustrations and icons that visualise ANC content simply were designed. These supporting elements would form an integral part of the visual

language, content layout, and organisation of information within the kit (see Image 3.14). A set of icons was designed with a consideration of Roland Barthes' semiotic theory. Semiotics refers to the formation and meaning of signs such as an icon, symbol or index, and the processes by which people generate meaning from visual representation (cf. Curtin, 2009:51). A designer applies semiotic principles in design by producing meaningful forms of communication elements based on a study of existing categories of signs and their meanings in a specific context (Lupton, 2011:88). This framework of understanding of how signs communicate was useful in reviewing Promosa Clinic's visual environment, and it was a reminder of how an icon can signify different ideas, especially to a diverse population such as that found in Promosa Clinic (cf. Vihma, 2014:197,198,205).

This project made use of that theory by designing a set of universal icons that staff could quickly read and navigate to make sense of the content. An icon is a type of sign that uses shape, colour and other elements to create recognisable connections between an image and an idea i.e., the drawing of a human figure resembles a person (Shen *et al*., 2018:2,3; Lupton, 2011:89). The icons and illustrations were reduced to their minimal form to express essential characteristics and ideas. The act of drawing illustrations and icons was accompanied by writing and editing the explanatory text in a concise manner. This was to ensure that both icon and text complemented each another in communicating the same information to provide verbal-visual-textual support through the content.

After completing the illustrations and icons, the communication kit's brand identity, including the logo and its variations, was created (see Image 3.15). A mind map exploring potential names for the kit using trigger words related to safety, maternal and neonatal health were written down. Having settled on the name, *in safe hands*, sketches and notes were made to convey the brand story of the kit. Initially, the health professional and the adolescent patient were the only characters in focus in the crafting of the brand narrative. However, as more words associated with risk and maternal well-being were discovered, a third character in the story was identified, that of the unborn baby. The story conveyed the staff's desire for their ANC patients to give birth to healthy babies, as identified in the contextual situation and specific communication needs in Phase Two.

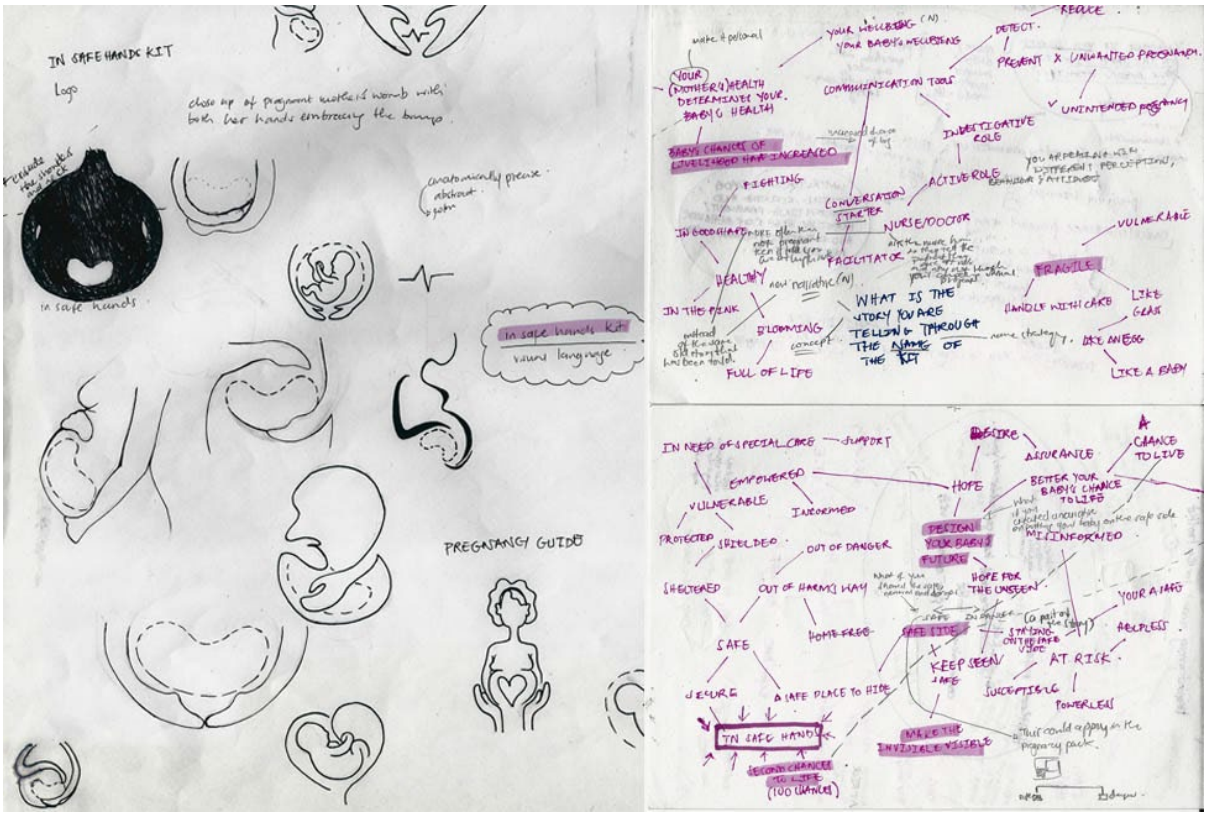

Image 3.15: Exploring through a Mindmapping technique the communication kit's preliminary brand identity, names, slogans, and sketching and developing logo possibilities. See Addendum A (images 53a-56a) for more process work. Process images by and in possession of the researcher (Manyame, 2020).

The names of the communication tools were also refined during a Mindmapping exercise, resulting in more descriptive names such as *in danger* (*risk tool*). The selected names conveyed the staff's concerns for their patients' safety from health risks and followed suit with the preposition "in" of the *in safe hands* name, which refers to when the patient is "in" danger, the baby is "in" danger as well. The rest of the communication tools' names are *in motion* (*emotions tool*), *in motion +* (supplementary *emotions tool*), *in pain* (*pain tool*), *instructions* (staff's *instruction manual*), *risk record* (*record-keeping sheet*) and *carebook* (patient's *self-help information pack*). Overall, *in safe hands* as the kit's name, identity and story, communicates the idea of medical professionals protecting an expecting adolescent mother and her unborn baby from danger and keeping them safe from risk. In turn, it also communicates that the medical professionals are equipped with a set of tools which can assist in safely and accurately determining a patient's risk profile. The narrative was summarised in the chosen slogan "Your safety is your baby's security."

The logo was visualised based on the meaning and story of the chosen communication kit's name. Brand identity theory states that a logotype is a key component of visual communication effectiveness that can influence the target audience's preference and perception of the product (Mindrut *et al*., 2013:398). Henderson and Cote (1998:14,15) highlight the importance of setting guidelines for the logo creation process in order to increase a brand's communicative value. Therefore, the criteria for the logo design were simplicity, memorability, and recognisability to carry meaning relevant to the staff and their patients. With this in mind, key features of the logo were sketched, visually representing the figurative and literal meaning of *in safe hands* by drawing the expecting mother's hands holding and embracing her unborn baby (see Image 3.15). The baby was represented by an abstract foetal shape, serving as a reminder and indicating that the unseen, unborn baby is equally affected by the mother's state of health (see Image 3.15). The logomark would be supported with a suitable typographic rendering of the "in safe hands" logotype. As a result, the logo was formed out of distinct parts, functioning separately as well as in tandem, maintaining its core message. This logo would allow for easy interpretation and brand identification, especially for a start-up communication kit in a new context of a healthcare space. The logo is a visual pathway for the communication kit to communicate the staff's message and story to the pregnant adolescent patients in a heartbeat (cf. Kohli *et al*., 2002:59).

As part of building the design language vocabulary, the colours violet, yellow and shades of pink were selected as the brand's colour palette, representing the recurring colours in the maternity unit, and with colour theory in mind. These colours are associated with sensitivity, youthfulness, tenderness and nurturing (cf. Zammitto, 2005:4,5; cf. Wright & Rainwater, 1962:89). The use of those colours would allow the communication tools to complement the environment of Promosa clinic in which it needs to function. A careful selection of sans serif typefaces such as Avenir, Sofia Pro Soft and Sofia Pro was made, harmonising with the character's bold look and rounded edges. Sans serif typefaces increase legibility, readability and visibility of the text and its supporting image. Both serif and sans serif typefaces accentuate the ends of the strokes of the letters and help the reader to read faster (Arditi & Cho, 2005:2927). The weights of the typefaces were also varied to create hierarchy from headings down to body copy.

Step three: observe

Subsequently, all hand-drawn work was digitised and observed. The initial hand-drawn logo was redrawn in Adobe Illustrator with variations, after which the final logo design was selected (see Image 3.16). Thereafter, the essential elements of the design language were put together, from the choice of colours and typefaces to the logo and illustration style choices, into a style guide sheet. The proposed design language was experimented with by applying it to the *emotions tool* in order to analyse the effectiveness of the visual features. Aspects of the design language, were then iteratively refined, in order to progress towards a preferred design language.

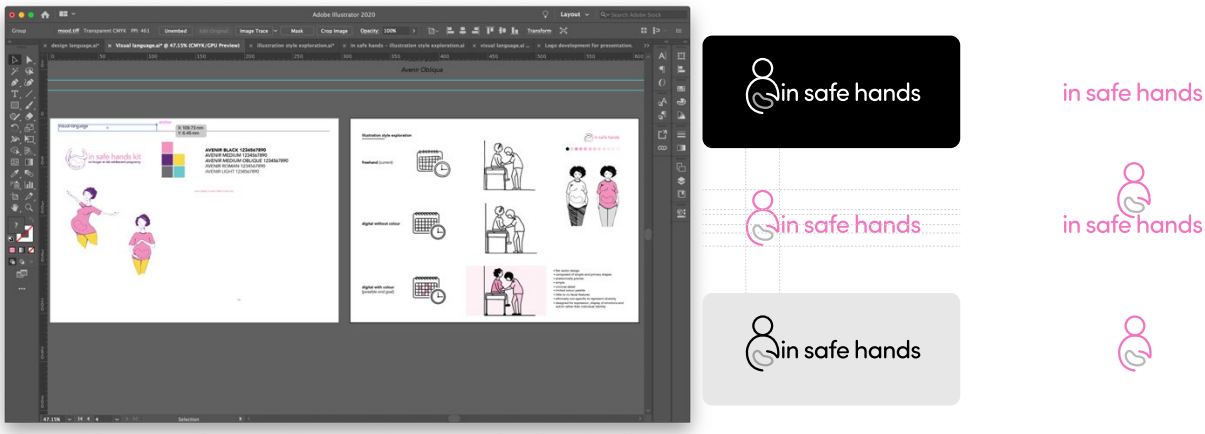

Image 3.16: Digital refinement of logo design, selection of colours and illustration style exploration in Adobe illustrator towards a design language. See Addendum A (images 57a-62a) for more process work. Process images by and in possession of the researcher (Manyame, 2020).

After completing the digital design process, the prototypes of the *emotions tool* were printed and assembled to assess the effectiveness of the proposed design language, and to ascertain if the projected objectives had been met. The prototypes' visual appearance on printed materials was analysed, specifically the quality and visibility of the colours, text, illustration, logo and lines. The third application of the design language on the *emotions tool* was a potential visual direction, suggesting the visual direction to be taken for the rest of the communication tools (see Image 3.17).

Image 3.17: Design language effectiveness tested on three prototypes of the *emotions tool*. Photographs by and in possession of the researcher (Manyame, 2020).

Step four: reflect

Research on existing health-related design projects provided insights and knowledge on principles that were important to consider when designing and illustrating visual materials that can appeal to an audience in a specific context. The visual inquiry of the clinic was integral to inspiring and informing the choices and decisions of the design language elements that were selected and designed to give visual expression to the *in safe hands* brand name, story, typographic choices, illustration style, character illustration and supporting illustrative icons. After analysing the progress, it was reflected upon that the character illustrations would be expressive and visually appealing for a young patient, and that supporting illustrative icons demonstrated ANC information in an educational and understandable manner. The design language manifested a sense of engagement and empathy through text, tone, colour and expressive illustrations. The communication kit's story was crafted with the skilful use of design and written language in order to make the brand more recognisable, familiar and memorable for the staff and its use in their service provision. The plan for the next production cycle was to explore the communication kit's feasibility, functionality and adjustments of form, with the proposed design language applied to the rest of the communication tools.

3.4.3 Design cycle three: exploring functionality

Functionality is the design of a product's physical form and tactility that makes it simple to use and understand (Johnson & Gibson, 2014:113,114; Han *et al*., 2019:259). The product's characteristics, constraints and symbolic meaning are determined to make it more suitable for

the user's comfortability and efficiency (Townsend *et al*., 2011:376). Adhering to the reflections from the second cycle, and partly to those from the first cycle, planning for the third cycle included exploring how the kit's physical form could be made more optimal with regard to functionality. This would include aspects such as materials, longevity, ergonomics, physical constraints and user interactivity. This last production cycle set out to determine the size, shape, layout, function, purpose and interactivity of the communication tools and packaging, and to apply the design language to the rest of the set of tools.

The exploration of the communication kit's functionality in this design cycle aimed to achieve the following project objectives:

g. Visual materials should assist staff with identifying, educating and responding to health risks during consultations.
h. Visual materials should be durable for multiple use and be utilised interactively with a patient.
i. Visual materials should be time-saving, shareable, easy to read and available to all staff for use during ANC consultations and across workstations.

Step one: plan

The usefulness of a design product is mainly contingent on constraints: limitations on time, materials, financial costs, availability, and usability (Neuhart & Neuhart, 1989; Barnett, 2007; Bradley, 2015). In this cycle, the goal was to explore how the communication kit can be designed in a more convenient, pragmatic, time-saving, quick to read and easy-to-use manner, given the staff's constraints, such as the printing capacity, table space and sitting arrangements with patients. In addition, the aim was to enhance the prototype's interactivity, simplicity and intuitiveness. Ultimately, the feasibility, form and functionality of the communication tools would be determined by assessing the physical aspects of the product – size and shape. Firstly, the plan was to use scrap paper to explore suitable dimensions. Then (secondly) to consider form, content and layout when determining the tools' interactivity, usability and two-fold functional purpose in terms of identification and education of health risks. Lastly, the design language will be applied to the adjusted form of the communication kit.

Step two: act

Scrap paper was used to physically explore, imagine and determine the most suitable dimensions of a particular communication tool. Low-fidelity wireframes and skeletal formats were constructed to define key features such as the measurements, structure and shape (see Image 3.18). Ergonomic factors such as height, size, durability, and orientation of consultation spaces with desks and chairs, were considered. The benefit of applying ergonomic principles to this part of the design process was a way of taking the users' "limitations and capabilities" into account and optimising the design for ease of use (cf. Davies & Bingham, 2013:46; cf. Rouse, 2007). Most of the communication tools were resized to optimal handheld formats, making the communication tools more portable and convenient to handle. The shapes of the communication tools varied from a circular wheel, to rectangular booklets, flipcharts and cards, either in portrait or horizontal orientation to structure the information. While reflecting-in-action, the communication tools were designed and printed out to assess their portability and to adjust the size accordingly by hand (see Images 3.18 and 3.19). With this approach it was possible to visualise and determine the size and shape specifications of the communication kit with the staff in mind.

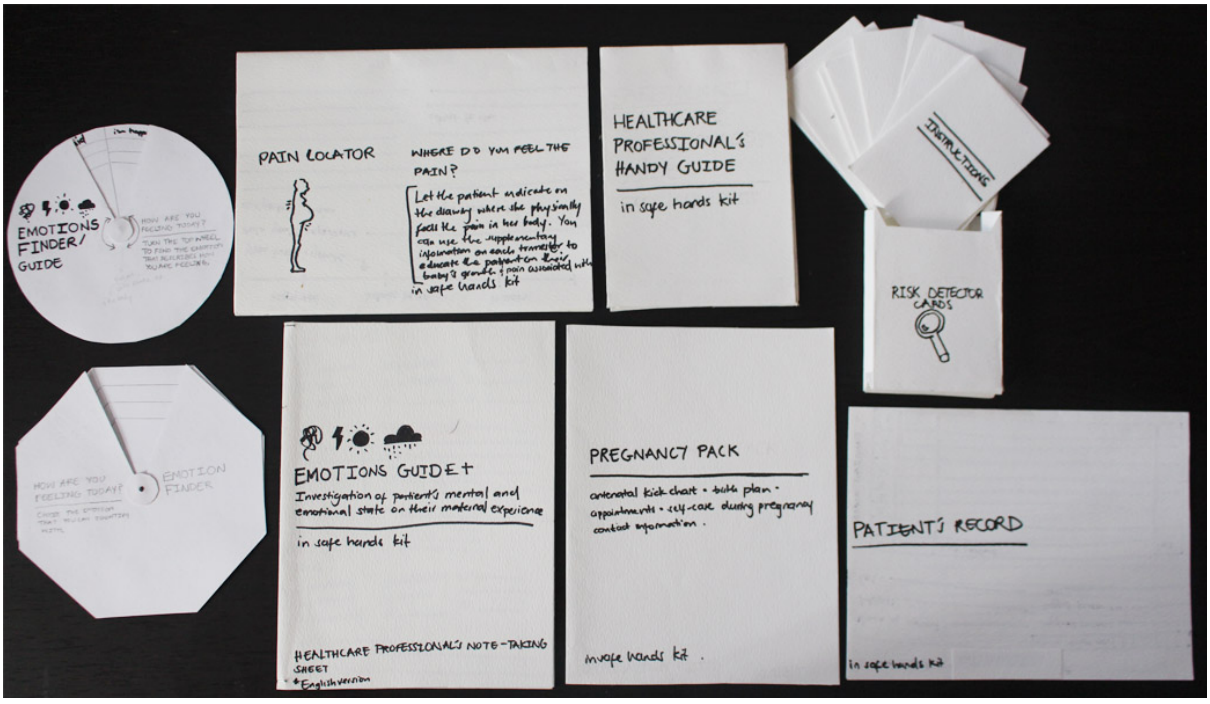

Image 3.18: Low-fidelity handmade samples of tools to determine dimensions, and printed materials with suggested new sizes and shapes. Photographs by and in possession of the researcher (Manyame, 2020).

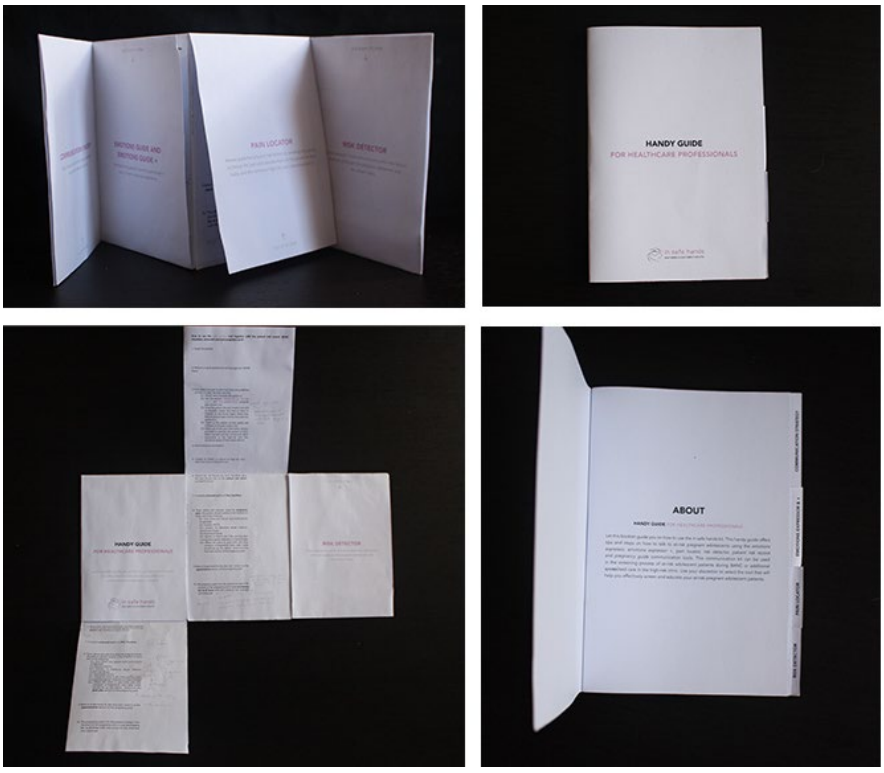

Image 3.19: An exploration of the *instructions* booklet interactivity in a flip-open and stapled booklet form. Photographs by and in possession of the researcher (Manyame, 2020).

Layout options for each tool were determined for the placement of illustration and text within the specified shape and measurements (see Image 3.20). Layout is an important principle of organising text and image on a page to establish a path through the design that reveals the hierarchy of information and simplifies text-visual comprehension (Cullen, 2005:55). The organisation of text and design elements within the communication tools had to facilitate the two-fold function of identifying and educating. This would be incorporated by arranging content on each page according to the specific purpose, design and communication criteria which a particular tool had to meet. This included empathy-driven design, visually engaging design, interactive design, serviceable design, and educational design, all within the context of building trust between the patient and health professional, as well as saving time with efficient communication. Adobe InDesign software was used to organise the text and illustration into a visual composition and apply the design language to each communication tool.

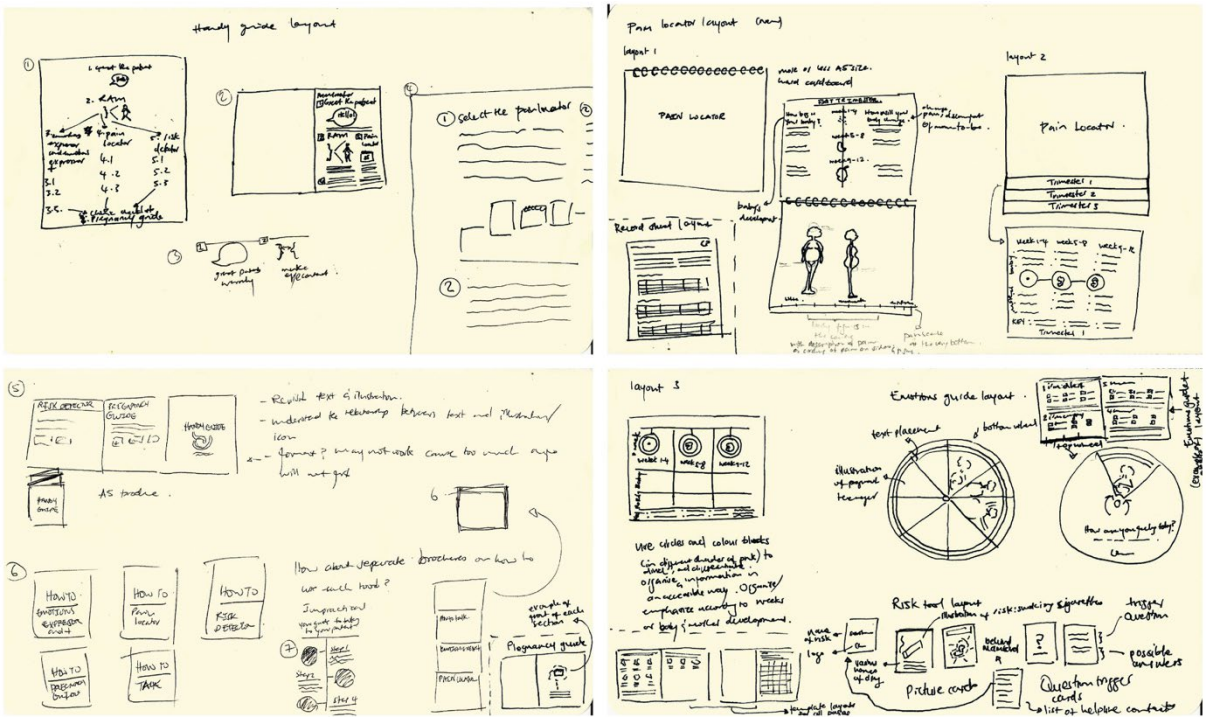

Image 3.20: Low-fidelity sketches of the layout and composition of text and illustration of communication tools to integrate identification and education of health risks function. Sketches by and in possession of the researcher (Manyame, 2020).

In terms of durability, rounded corners were added to reduce wear on corners and reduce sharp edges when handling, as well as to aesthetically compliment rounded typefaces. Lamination was considered to protect the paper from dirt and stains. This would be useful when temporary, wipe-friendly marks had to be made on the tools during a consultation.

Regarding the efficient use of time, the flipchart and booklets were divided into main sections with tabs, instead of inserting only a table of contents (see Image 3.21). These considerations would amplify ease of use, durability and optimal navigation of visual and textual information.

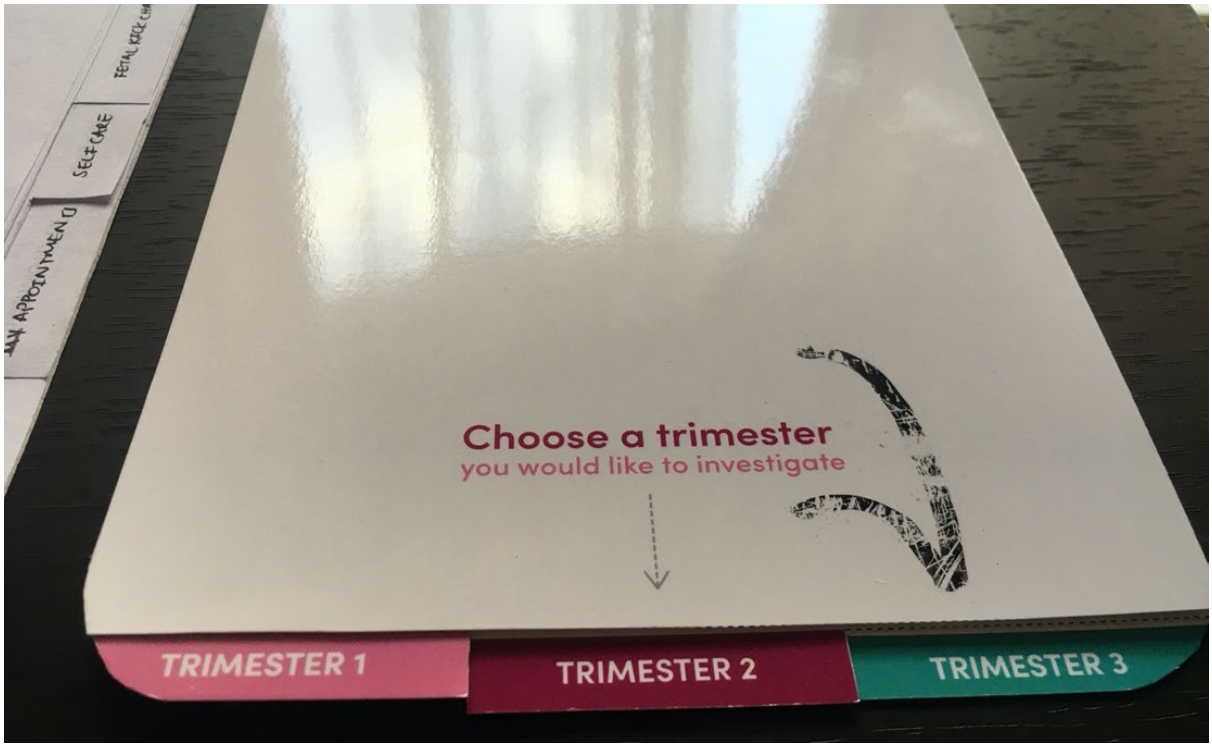

Image 3.21: Printed *in pain* flipchart with rounded corners, lamination and tabs. Photograph by and in possession of the researcher (Manyame, 2020).

The size and design of the packaging was determined by the size of the communication tools. A compartmentalised box was considered a viable option that could organise and store the tools, and could also be kept on the staff's desk or shared between staff (see Image 3.22).

Image 3.22: Possible packaging for the communication kit. Process images by and in possession of the researcher (Manyame, 2020).

Step three: observe

The designs were completed and printed as prototypes for review (see Image 3.23). The following communication tools were produced; *in motion* wheel, *in motion +* booklet, *in pain* flipchart, *in danger* cards, *record-keeping sheet* and *carebook.*

Image 3.23: A set of prototypes of communication tools. Photograph by and in possession of the researcher (Manyame, 2020).

The purpose and function of each tool and packaging was described as follows:

1. The ***instructions*** booklet is the staff's manual on how to use the communication tools.
2. The ***record-keeping sheet*** is a note-taking page for recording risk factors identified.
3. The ***in motion*** wheel consists of a set of two rotating wheels parted into eight emotions for identifying the patient's emotional states.
4. The ***in motion +*** booklet is for an in-depth investigation into the patient's emotional well-being for further referral.

5. The ***in pain*** flipchart is for the identification and education on the patient's pregnancy-related pain and discomfort.
6. The ***in danger*** cards are used for detecting external risk factors.
7. The ***carebook*** is the patient's personalised task-driven and educational guide on ANC at home.
8. The ***helpline*** section contains information on specialists that the staff can refer their patient to for further assessment.
9. The ***packaging*** folder is used to organise and store the tools efficiently.

Step four: reflect

When completing the third cycle, design decisions that were made regarding form, content, visual language and functionality were assessed. The size and formats of the kit were made to be more ergonomic, and the purpose of each tool was more definite. The design elements, illustration and ANC content were organised into layouts that can facilitate easier reading, identification, education and discussion of health risks. The design language made use of simplicity and white space. It was decided that the kit would be reusable and remain in the clinic, and that each patient would receive a personalised *carebook* to take home and bring along to their medical visits. The packaging was reconsidered to save space on a desk. The *instructions* manual contained quick to read guidelines for using the tools with patients. All the tools would be envisioned as being easily shared across their maternity service workstations for all relevant staff at any given point, focusing on flexibility and time constraints. Durability of the kit was considered by adding material features such as rounded corners, tabs and laminated surfaces. The analysis of the prototype resulting from the third design cycle suggested that it would be possible to test the preliminary kit with the staff at Promosa Clinic and use their feedback as valuable insights towards finalising the end product, as discussed below.

3.5 Refinement towards a final prototype

One of the essential elements of human-centred design thinking within the action research framework is to get participants' feedback to revaluate certain design decisions until the solution is fully executed for the specific context in which it should function (cf. IDEO, 2015:126). The aim of this testing procedure toward concluding the creative production process was to refine the prototype based on the staff's feedback; as well as to resolve design

issues present in the communication tools by reviewing and applying design elements and using materials in service of the project objectives stated earlier.

In the presentation of the communication kit during the testing sessions, the visual communication problem was reiterated, and a selection of prototypes completed during the creative production cycles were shown to staff as possible solutions. The goal was to test the concept and functionality of the communication kit as a response to the identified visual communication problem by letting staff voice their responses as they interacted with the designs (cf. IDEO, 2015:119). The content, layout, visual appearance, functionality, and user experience were highlighted as main areas for testing. Testing for functionality, usability and experience would shed light on missing features or functions of the communication kit, observing the extent to which the prototype is useful in achieving service delivery goals, and ultimately assessing the interactive experience the prototype would provide (cf. McNamara & Kirakwoski, 2006:27,28).

The staff were observed as they interacted with the tools to determine whether there were any features that might hinder them from using the kit properly (see Image 3.24). They were indeed able to use the tools and they reported identifying with the ANC content and how it could be useful to their practice (see Image 3.24). They also described additional information they would like to have added, such as a foetal movement chart and warning signs in pregnancy. At the end of the feedback sessions with various staff members, key insights from the staff's feedback were collated to acquire their collective view of the communication kit in order to make final adjustments, and they concurred that the concept and prototypes were working well for them and would be useful during their service delivery (see DMHP04 Feedback session 1, 2019; see DMHP05 Feedback session 2, 2020; see DMHP06 Feedback session 3, 2020; see DMHP07 Feedback session 4, 2020).

Image 3.24: Staff test and feedback session on the communication kit. Photographs by and in possession of the researcher (Manyame, 2019; Manyame, 2020).

The analysis of the staff's comments revealed that the *in motion* wheel and the *in motion +* booklet were valuable in assisting them ascertain how their patients were feeling. One of the mentor mothers reiterated how some of their patients displayed shyness and reservation during consultations. They saw the tool as an opportunity to make the patient feel more comfortable to speak. They also considered how the visual elements of the expressive character on the tool could possibly bridge the language gap between them and patients who speak another language. One of the staff members commented on how the text and illustrations in the *in pain* flipchart and *in danger* cards were easy to read and understand. They valued the fact that the tools could be used at their discretion and whenever the need arises. They imagined a scenario whereby they could show and ask their patients to point out their thoughts or feelings using the tool. They pointed out how the *in pain* flipchart may be the least necessary since the patients can point out their pain physically without need for assistance, although other staff members appreciated the possibility of pointing out pain on the tool itself. The staff members appreciated how the *in danger* cards could help communicate difficult topics directly, such as intimate partner violence and abuse. From their perspective, abstracting sensitive issues too much, either through text or image, would discourage patients to speak directly, or cause them to be evasive, which would result in them

obtaining too little information in order to assess risks. It was also observed that one of the participants struggled to use the flip version of the staff's *instructions* manual and opted for the sectioned booklet instead, which they could easily open and close (see Image 3.19).

The individual staff members voiced their differing viewpoints about the necessity for the *record-keeping sheet*. One opinion was that, since they could inscribe notes on the maternity case record (MCR), such a tool would not be needed, but others saw the value in documenting risks separately. It was worth noting how the staff emphasised the need to educate their patients on danger signs and ANC exercises, for which they often demonstrated with their bodies to make information memorable in the absence of visual materials. Thus, they were satisfied that this section was included in the patient's *carebook* to take home. Initially, the toolkit was designed for the ANC high-risk clinic only, but the healthcare professionals expressed the desire to use the kit during health talks outside of ANC services with their patients. One of the nurses repeatedly said that they had insufficient health education talks about pregnancy, and that the kit would stand in for this purpose as well.

According to staff, the kit would help them be more empathic, and cultivate a safe environment for their pregnant adolescent patients. One of the staff members preferred the kit in English because of its inclusivity, and where necessary they would translate the information to the patient. The staff also requested a change in some of the wording on the *in motion +* wheel to convey a friendly tone which would put the patient at ease. The brand name, logo and slogan were approved by staff. During the testing, the staff provided supplementary loose ANC materials in order to check the content for accurate information. These materials included paper sheets on warning signs in pregnancy, normal pregnancy problems, and birth preparation tasks which they wanted to be illustrated and included in the patient's *carebook*. The test also demonstrated that it was best to make contact information for specialists (which was initially at the back of some tools) as a separate sheet which the staff could refer to quickly to help their patient. A note-taking notepad called the *riskpad* instead of loose sheets was proposed, to make it easier and manageable for the staff to write, tear off and insert A5 notes in the patient's medical file.

Apart from the participants' feedback, additional reflective comments were documented from a designer's point of view. Firstly, the manner in which the health professionals handled and spoke about the communication kit revealed that it was a new learning experience for them. The main insight was that staff loved the visually engaging content for ANC discussions with

pregnant adolescents, and valued how it prioritised their patients' need for maternal health education on ANC and health risks. Secondly, another invaluable insight was that the staff repeated important matters and concerns which were divulged in Phase Two, which was a good indication that the communication kit was indeed addressing their visual communication needs.

Image 3.25: A visual audit and plan on how to refine the final prototype with additional elements and principles. See Addendum A (images 63a-69a) for more process work. Photograph by and in possession of the researcher (Manyame, 2019; Manyame, 2020).

The staff's feedback was more focused on the user experience of the tools than on the stylistic treatment of image and text. After completing a visual audit of the overall design of the kit, issues had to be resolved with the designer's knowledge and acquired skills, while keeping the focus on the staff's needs (see Image 3.25). A visual and technical audit considered the interrelated issues affecting the creation of a more successful prototype such as materials use, development of an appropriate design language and the final form (cf. Noble & Bestley, 2005:20,21). Design concerns, such as small text, and monotonous organisation and treatment of information, needed to be resolved according to appropriate readability principles. Unique dimensions and materials for the production of the kit were also investigated further, considering ergonomics and cost. Missing ANC components needed to be included, visual composition of text and image had to be refined using a grid system, and visual cues needed to be inserted to differentiate between low and high-risk factors (cf. Lupton, 2011:120). Furthermore, each tool would have its own colour to help staff tell them apart, and visual hierarchy within the tools needed refined organisation. Visual devices extracted from the logo

would be created to complement design features. In terms of hierarchy, colour would be used to emphasise important aspects, to create rhythm, and portray softness and comfort. Layout would be edited to improve legibility, appropriate use of typefaces, create balance, and align elements to enable the user to read the content in a logical and coherent manner. Illustrations were inspired by existing materials provided by staff, and icons needed to be refined in terms of vector consistency to achieve a crisp and clean look. The possibility of a more portable, flat packaging needed to be explored; such as a file folder which staff could easily handle and store tools in.

3.6 Conclusion

Phase Three explored how the concept of *in safe hands* could be translated into a product in the form of a designed prototype. A creative production process consisting of three design cycles, framed with an action research model, facilitated the execution of the concept. The production process was guided by project objectives in order to achieve the overarching communication goal. The design cycles entailed planning, acting, observing and reflecting on the designer-researcher's actions, and testing the prototypes in order to assess the advantageous aspects of each cycle and the results it produced. The last step of each cycle fed into the first step of the next iterative cycle until the project objectives were satisfactorily met. Where necessary, refinements and amendments to the plan were made in order to meet the evolving project needs and effect better changes on the envisioned product. The goal of promoting continuous and community-centred ANC discussions to achieve better maternal health outcomes at Promosa Clinic was satisfied with the developing prototype. The design decisions and choices were influenced and motivated by reflections on and inquiry into the staff's visual context within the clinic, as well as a selection of existing external and internal healthcare-related materials. As a result, the form, content, visual language, feasibility and functionality of the envisioned solution was determined and finalised. The concept of *in safe hands* came alive as a kit including eight communication tools that are empathy-driven, visually engaging, community-centred, confidential, educational, interactive and demonstrative. These tools fulfil the function of identifying and educating on sensitive health topics and risks during ANC consultations. The communication kit was tested and approved by Promosa Clinic maternity staff, and their feedback provided insights on how to make final improvements of the kit. In Phase Four the final prototype of the *in safe hands* kit is presented by describing and reflecting on the outcomes that were produced, as well as on the design research process of this study as a whole.

PHASE FOUR: DECODE

…the designer reviews a project outcome or evaluates the success of an experiment, by testing its effectiveness against a predetermined set of criteria. (Noble & Bestley, 2005:68)

4.1 Navigating Phase Four

The final phase of this design research process is called ***decode***. This phase presents the reader with a reflection on the design outcome and the project's design research and production processes. The aim of this phase is threefold: i) to present and evaluate the final prototype of the kit; ii) to provide a critical reflection on the design thinking process as a whole; and iii) to offer a conclusive summary of the outcomes of the study. Digital mock-up images of the refined prototype are presented with an analysis of its communication effectiveness regarding visual appearance, form and function. Then the final prototype is evaluated against the criteria of the project brief set in Phase Two, preceding the creative production process in Phase Three. Thereafter, theoretical and methodological underpinnings, as well as design techniques and processes that have been used to implement research and design decisions during Phases One to Three are assessed in terms of success and usability, and reflected upon. Finally, this research project concludes with a manifestation of the resolution of the problem statement, and recommendations for further research.

4.2 Presentation and evaluation of the *in safe hands* kit

4.2.1 Presenting the *in safe hands* kit final prototype

Image 4.1: The final prototype of the *in safe hands* kit communication tools and packaging with a range of serviceable features tailored for sensitive and time-effective discussions between a health professional and adolescent patient during an ANC consultation. Digital mock-up by and in possession of the researcher (Manyame, 2020).

At the end of the refinement stage of the creative production process in Phase Three, the final prototype of *in safe hands* kit was completed. The *in safe hands* kit was iteratively designed and refined, in line with the problem statement of this project (see Addendum A: images 70a-84a for more process work). The goal was to produce a set of visual and intuitive hands-on tools adapted to the medical staff's antenatal care (ANC) communication needs and context at Promosa Clinic (see Image 4.1). The *in safe hands* kit was completed with eight communication tools that can be used interactively by the health professional and patient. Firstly, the *instructions* booklet was refined with empathy-driven and context-specific content to guide the health professional on how to talk to an adolescent patient, and appropriately use the following tools: *in motion* wheel*, in motion +* booklet*, in pain* flipchart*, in danger* cards*, riskpad, helpline* card and *carebook*. The *in motion* wheel and *in motion +* booklet were refined with complementary colours and the continuity of the pregnant adolescent illustration across both formats. This synchronises the *in motion* wheel's enabling feature of helping the health professional identify the patient's mental and emotional state and the *in motion +* booklet's ability to facilitate a continued examination of the potential risks to the patient's pregnancy. The *record-keeping sheet* was finalised as a *riskpad* to allow for timeous and quick writing of risk-based notes in a time-critical ANC appointment where identifying and responding to risks is a high priority for the health professional.

The *in pain* flipchart was refined as a two-tier visual information set intended to provide the health professional with assistance on identifying his/her patient's physical discomfort and pain. At the same time the health professional has at hand information divided per trimester on how to classify warning signs and educate where necessary about how the developing baby contributes to the expecting mother's physical discomfort. The *in danger* cards were refined with six categories of illustrated risk-related scenarios that can facilitate a health professional with determining concerning factors that might put the patient's and unborn foetus's health in danger. The *carebook* was not only concluded as the patient's take-home booklet but also as a tool the health professional can use during consultation to educate, remind or illustrate on an ANC health topic. The booklet was finalised as an all-inclusive ANC guide integrated with the health professional's recommended tasks, guidelines, reminders and educational information that the patient can consult at home. The *helpline* section was concluded as a separate sheet of important contact information called the *helpline* card. The card's refined form aids the health professional with responding to high-risk signs and situations immediately. Lastly, the *in safe hands* kit packaging was refined as a file folder which is a safe and spacious casing that the health professional can use to store and organise

the above-mentioned communication tools efficiently. The distinct visual appearance, form and functionality of the communication tools and how they fulfil the project brief of this study are discussed below.

4.2.2 Evaluating the *in safe hands* kit final prototype

The visual communication challenge for this design project was formulated as a project brief which included i) identifying a visual communication problem; ii) defining a visual communication goal; iii) putting in place attainable project objectives; iv) defining a suitable creative strategy; and v) developing a visible and encapsulating concept for the envisioned production (refer to Phase 2.4). This section reflects on the design language, content, form and functionality of the communication tools in light of their effectiveness, and lastly, as a communication set against the backdrop of the project objectives that had to be met, according to the brief.

Focus: design language of communication tools

The visual language of the *in safe hands* kit was developed using a defined set of elements and principles, motivated and carefully considered in the creative production process (see Image 4.2). The first critical component of the design language is the brand identity of the communication kit. The logomark is crafted to embody the concept “in safe hands” with abstract shapes and elements depicting an expectant adolescent mother embracing her unborn baby in a minimal graphic. This logomark also represents the new mother being in the skilful hands of the clinic’s staff. The logo is supported by the slogan, “your safety is your baby’s security”, which encapsulates the staff’s ANC goal – to identify and educate adolescent patients on maternal health topics and associated risks, and protect them from danger. The logo is extended into a set of supporting iconographic elements that are incorporated into the design of the communication tools’ names, layout and illustrations. The purpose is to establish a consistent visual style and to create visual continuity across all tools.

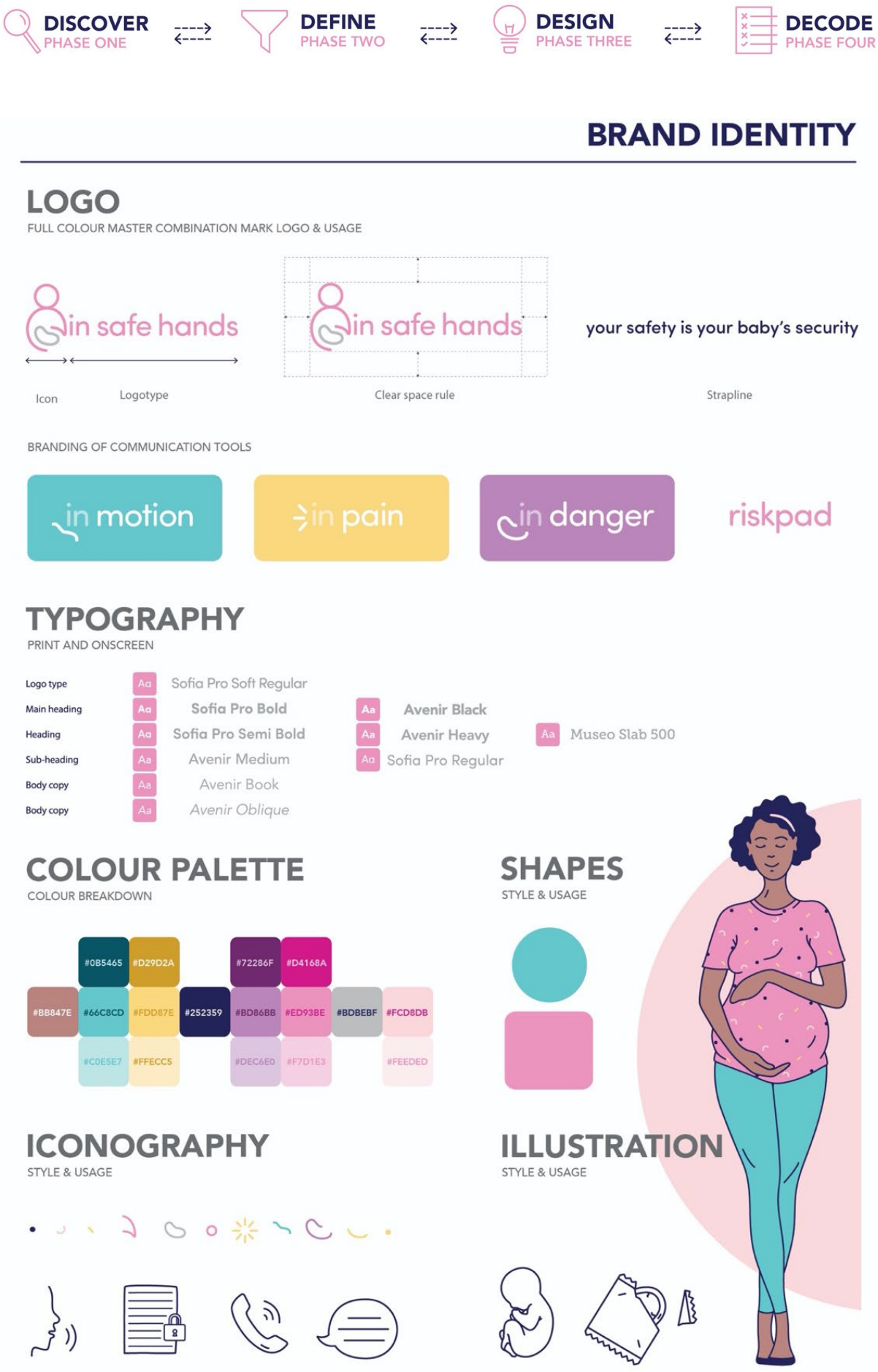

Image 4.2: The brand identity and style guide sheet of the *in safe hands* kit. Digital design by and in possession of the researcher (Manyame, 2020).

Typefaces are selected in support of the visual language, Sofia Pro Soft, Sofia Pro and Avenir, to complement the graphic elements and communicate a sense of caregiving. The characteristics of the typefaces include rounded letterforms and serifs which reflect the kit's visual tone. Varied weights for typefaces are employed to create hierarchy in the text, from headings to body copy, in order to display importance and succession of information. The illustration style consists of vector linework and flat colours inspired by existing graphic materials within the medical staff's workspace. This satisfied the needs of the staff for an organic representation of the pregnant adolescent and the display of inanimate objects, such as tables and books, in the visual communication pieces.

The application of text, logo, iconography and illustration is facilitated by a colour palette consisting of dark blue, purplish pink, turquoise green, and brown. Each communication tool and name is colour-coded with a primary colour and a tint to help the health professional tell the communication tools apart and easily choose one to use. A tint of each primary colour is used to differentiate high-risk factors from low-risk content, for the health professional to effortlessly work between both sets of information and identify certain levels of risk. Blocks within rounded corners to frame text and circles to emphasise icons are created to support the composition and organisation of content in the communication tools. Principles such as rhythm, unity, balance and a column-based grid system were applied to arrange and structure the design elements into a specific composition and layout.

Focus: form, functionality and content of the communication tools

The communication tools are designed with a set of features fulfilling particular functions. The overall function of the communication kit's form is to be time-saving, educational and youth-friendly, so as to provide verbal-visual support that fosters a confidential and empathic discussion space between a health professional and their patient. The health professional can discuss in absolute safety delicate health topics and risks such as substance abuse, unhealthy intimate partner relationships, poor diet and nutrition, poor hygiene, unsafe sexual behaviour, physical pain and psychological health risks. The tools can be used in any order, depending on the risk evaluation needs of a particular ANC consultation. For the purpose of this discussion, the communication tools are presented in an ideal sequence that could achieve communication effectiveness, seamlessness and flow within the BANC approach or general ANC during a medical consultation.

The in safe hands kit: tool one – instructions booklet

Image 4.3: The front and back cover, and inside pages of the *instructions* booklet to guide the health professional on how to use the *in safe hands* kit. Digital mock-ups by and in possession of the researcher (Manyame, 2020).

The first tool is the *instructions* booklet (see Image 4.3). The content of the booklet is written in an empathic tone which is illustrated by one of the questions: “Would you like to talk to your patient with more empathy?” This introduces the health professional to the communication kit’s purpose and usage. Tabs for each tool’s section are incorporated to allow the staff member to locate a page quickly and with ease. The booklet’s layouts provide images and icons, demonstrating the key functions and user instructions of each of the eight tools. The corners of the booklet are rounded, and the front and back cover are laminated to increase the tool’s durability. The *instructions* booklet embodies the communication guidelines applicable to an adolescent patient and staff relationship during an ANC discussion.

The in safe hands kit: tool two and three – in motion wheel and in motion + booklet

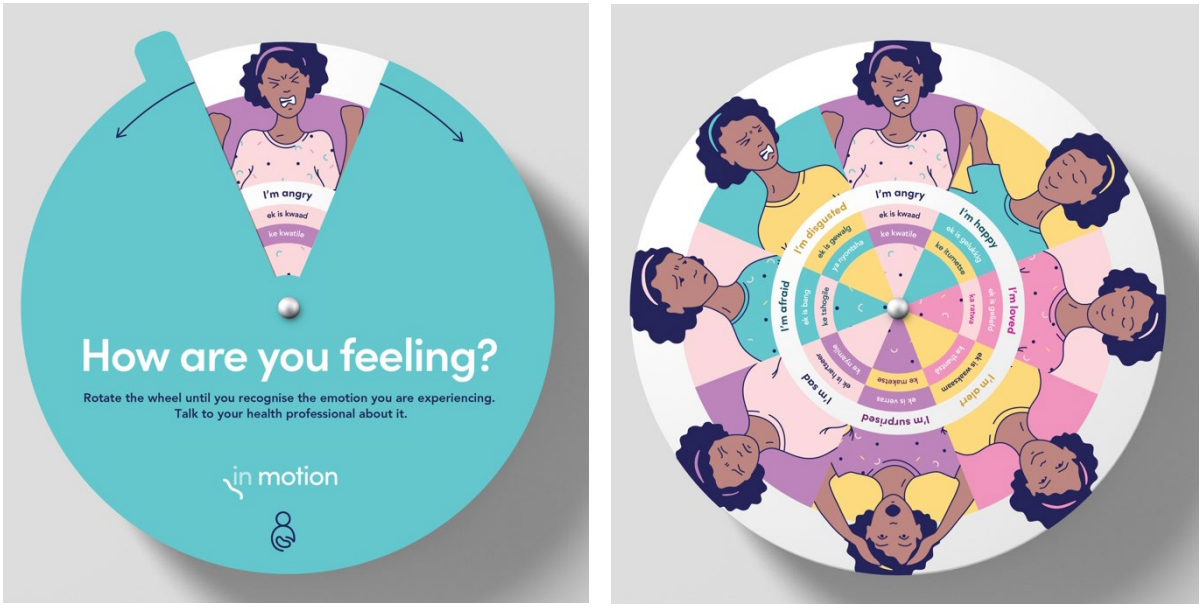

Image 4.4: The *in motion* wheel of the *in safe hands* kit with illustrations of the pregnant adolescent expressing eight emotions. Digital mock-ups by and in possession of the researcher (Manyame, 2020).

After the health professional is acquainted with instructions on how to use any of the selected tools, the interactive *in motion* wheel and *in motion +* booklet is an ideal conversation starter (see Images 4.4 and 4.5). The health professional may use this tool to assess the patient’s well-being and current state of mind during a single ANC check-up, or over the patient’s entire antenatal period. The *in motion* wheel takes the shape of an uncomplicated circular shape, yielding to the patient’s hands when rotating it in any direction with the little handle, until they

find an emotion they can identify with. The expressive female character displays a variety of emotions, in order for the patient to search for and recognise an emotion without difficulty.

When a patient speaks about, indicates or displays her emotions about particular aspects of her situation or well-being, the medical professional can inquire into the patient's level of risk by consulting the *in motion +* booklet (see Image 4.5). Possible questions to determine symptoms and signs are listed in the relevant section in order to create a comfortable and confidential environment for discussion. The contents, layout and illustrations promote ease of identification and provide steps that can be taken regarding fast referral of a patient to a specialist for further assessment by using the *helpline* card. As the health professional identifies alarming signs, notes can be made swiftly on a sheet in the *riskpad* provided.

Image 4.5: The front and back cover, and inside pages of the *in motion +* booklet to guide discussions on the patient's emotional well-being. Digital mock-ups by and in possession of the researcher (Manyame, 2020).

The in safe hands kit: tool four – in pain flipchart

When the need arises for the patient to communicate her physical pain and discomfort, the health professional can make use of the *in pain* flipchart to put the patient at ease in the process of verbalising and indicating physical pain (see Image 4.6). The health professional selects the relevant trimester and facilitates the discussion. The function of the *in pain* flipchart is to assist the patient in locating where the pain occurs, as well as to indicate the level of discomfort on the pain scale. The patient may use the flipchart to reveal her own pain location on the graphic of the female figure, either by indicating with a black marker on the chart or by pointing to the affected area. This reassures them should they experience shyness when talking about their own bodies.

While the patient indicates types of pain and the severity thereof, the health professional assesses the level of risk, as well as converses with the patient in an informal yet educational fashion, about the development of the foetus and how it can contribute to specific types of aches and tenderness. The information is neatly organised and placed in coloured columns, and also displays the sizes and attributes of a healthy foetus. Should the health professional deem the kind of pain the patient is suffering to be indicative of a high-risk factor, he/she can immediately refer the patient to the doctor or high-risk ward for further examination using the *helpline* card.

Image 4.6: The educational and interactive female figure sections to identify and educate on pain and discomfort on the *in pain* flipchart of the *in safe hands* kit. Digital mock-ups by and in possession of the researcher (Manyame, 2020).

***The in safe hands kit: tool five – in danger* cards**

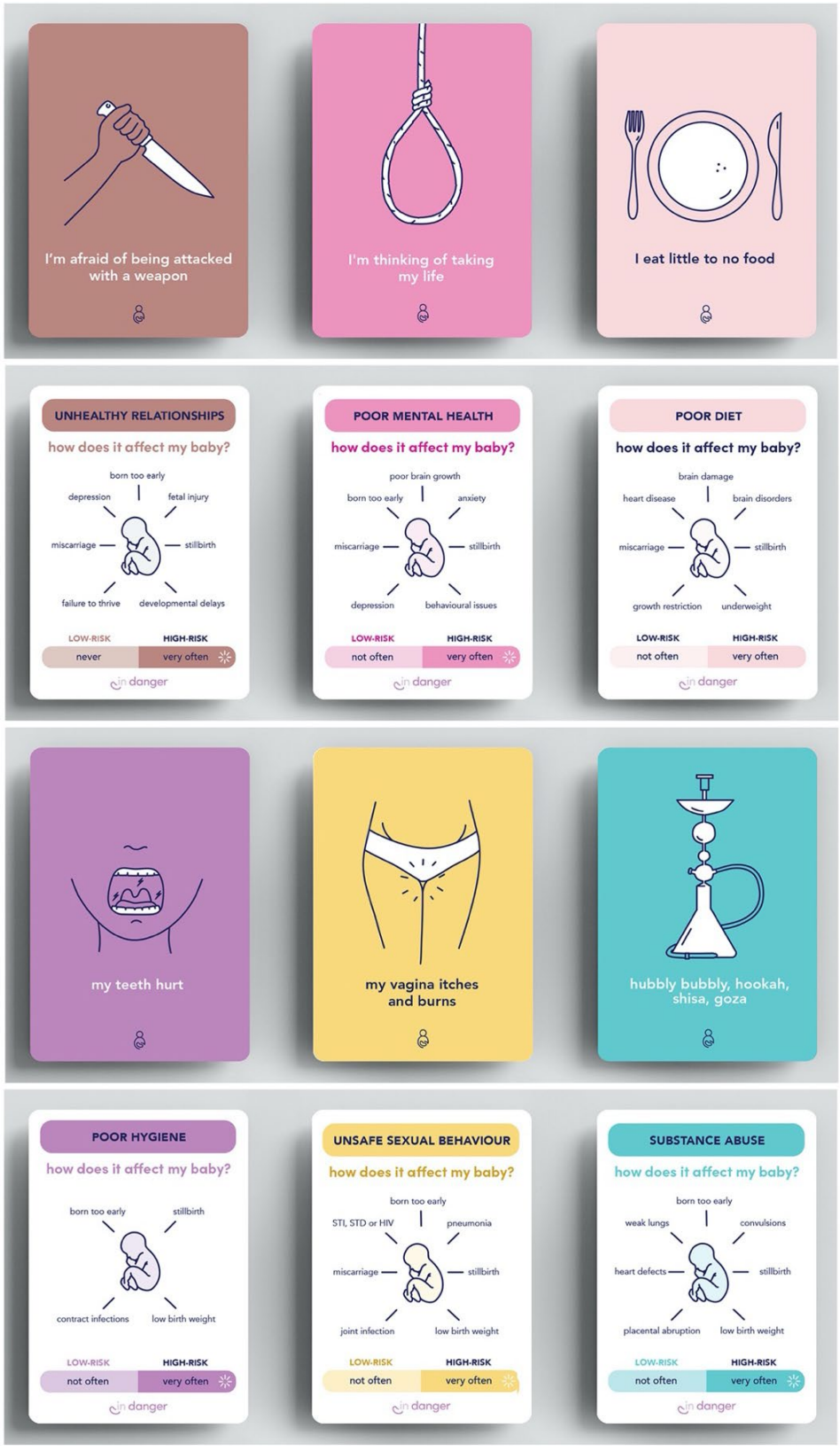

Image 4.7: Six sets of *in danger* cards of the *in safe hands* kit. Digital mock-ups by and in possession of the researcher (Manyame, 2020).

The health professional may also determine if a patient is suffering from socio-economic, physical, psychological, health, and psychosocial risk factors which may affect the pregnancy, for which they can use the set of *in danger* cards (see Image 4.7). A health professional can either lay the cards out on a table or surface, and let the patient investigate them, or ask the patient to point out what card she identifies with or which one resonates with her. The cards are categorised in different types of risks and colour-coded for medical staff to differentiate them easily and for patients to select them intuitively. Each of the six sets contains a range of three to nine cards. The categories include poor mental health; unsafe sexual behaviour; poor diet; unhealthy relationships; poor hygiene; and substance abuse. The health risk factors are illustrated in a simple, graphic style and supported by descriptive text in different languages or colloquial terms (such as varying names for substances) which might be used in the context of an ANC consultation. The visual information is divided to cater to risk information which the patient needs to see first, and secondary information that clarifies the effects on the baby. The staff can use both: the *riskpad* to record alarming signs, and the *helpline* card to find appropriate help for their patient.

The in safe hands kit: tool six and seven – riskpad and helpline card

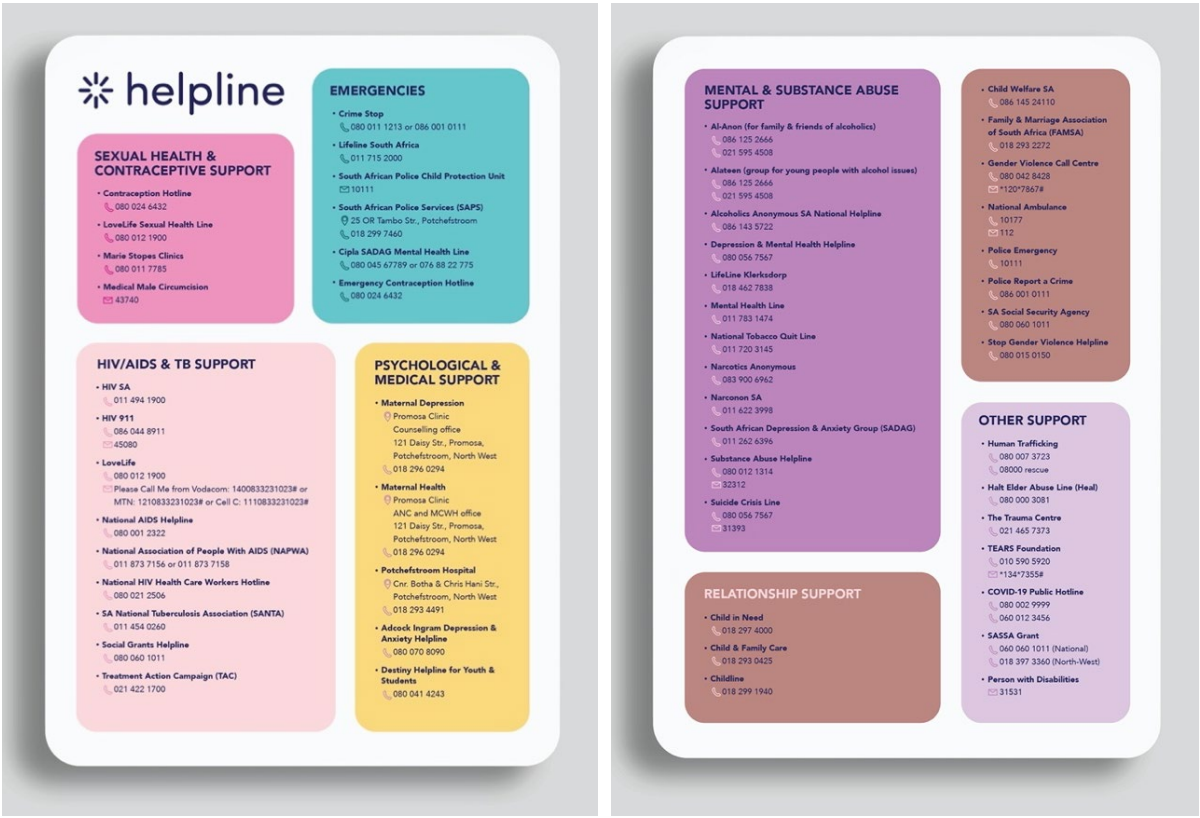

Image 4.8: The *riskpad* and *helpline* card of the *in safe hands* kit. Digital mock-ups by and in possession of the researcher (Manyame, 2020).

The portable size of the *helpline* card and *riskpad* enables the health professional to use them in conjunction with other communication tools to record risks and refer the patient to a specialist or support respectively, using the contact information provided. The *riskpad* can facilitate a quicker process of documenting the patient's personal details, information given or health risks displayed during consultation. The health professional can easily tear off the *riskpad* sheet and insert it into the patient's file after use. The contact information on the *helpline* card is divided into seven categories of colour-coded blocks. These blocks are visual cues and identifiers of where to find a specialist's information without delay for the patient's benefit.

The in safe hands kit: tool eight – carebook

Image 4.9: The front and back cover, and introductory page of the *carebook* of the *in safe hands* kit. Digital mock-ups by and in possession of the researcher (Manyame, 2020).

During the ANC consultation, the health professional can refer to the relevant pages of the *carebook* to personalise the patient's ANC experience and provide additional support (see Image 4.9). The health professional can use the illustrations in the 'My Birth Plan' and 'Self-Care' sections to demonstrate how the patient can apply ANC health information on eating healthy, avoiding recreational drugs, exercising, preparing for birth, relieving discomfort, HIV testing, and identifying labour signs and danger signs at home. With the *carebook*, the health professional also provides the patient with an easy-to-use 'Fetal Kick Chart' to monitor the unborn baby's condition. The health professional can also make use of 'My Check-ups' section to write down the patient's next appointment to encourage patient compliance and attendance of consultations. At the end of the consultation the patient can take home the customised booklet, furnished with all the ANC information she needs to know and implement during the course of the antenatal period of the pregnancy until the baby is born.

The in safe hands kit packaging

Image 4.10: The folder packaging of the *in safe hands* kit. Digital mock-up by and in possession of the researcher (Manyame, 2020).

All the communication tools can be stored by the health professional in a folder packaging (see Image 4.10). The inside of the packaging is furnished with slots for the tools to assist the health professional in choosing and classifying with ease and intuitiveness the tool that they would like to use or put away. The packaging's flat form saves space when placed along with

other documents on the table during use. The health professional can lay the communication kit flat on the table or position it upright on a bookshelf for storage. The packaging is also suitable for transporting and sharing the communication tools between the health professionals' workstations.

Focus: overall reflection on the in safe hands kit with regards to the project objectives and communication goal

The visual language, form and function of the communication tools facilitate engagement and empathy through appropriate use of text, tone, colour and expressive illustrations. The design language also caters for the staff's younger pregnant patients. The rounded corners, soft appearance of colours, harmonious shapes and expressive illustration style contributes to the idea of encouraging pregnant adolescents to take the utmost care of themselves for the sake of their unborn babies, with the guidance of health professionals, thus visualising the concept of "in safe hands". The form and portability of the communication tools is visually engaging and allows for interactivity by enabling the health professional to illustrate what is meant by any ANC concept. The content is written in a medical professional's empathic voice – the manner in which the staff would like their care to be perceived by their patients. The ANC subject matter is presented in a visual composition which is undemanding, effortless to understand and easy to follow. The communication tools are community-centred in that the content and visuals reflect the prevalent maternal health concerns that pregnant adolescent patients face in the Promosa community, from the staff's perspective. The patient, using the communication tool, can point out how they feel emotionally and physically, as well as the potential socio-economic, psychological and physically harmful risks they may be exposed to outside of the clinic. There are multiple ways, during the creation of a safe and confidential discussion space, in which the patients may illuminate and unveil uncomfortable topics adequately, where risks need to be identified and treated for the sake of their health.

The functional design elements of the communication tools save time by helping the health professional to find, apply and refer to the information quickly during consultations. Each discussion tool is accompanied by a risk level identifier that can alert the staff to respond appropriately. All the communication tools can be used together or singularly to identify, educate and respond to high-risk situations and the associated effects on the patient and her unborn baby. Specifically, these communication tools highlight the effectiveness and success of the *in safe hands* kit in answering the project objectives. The prototype includes the *riskpad*

and *helpline* card for staff to conveniently write important notes and refer to a readily available sheet of specialists' contact information to save time. The kit can be shared across different ANC workstations as it comes with navigable and favourable guidelines in the *instructions* booklet. The communication tools' utilitarian design and visual appearance bridges the communication gap identified by medical staff, by helping the health professional to empathically, effectively and timeously address maternal health risk factors while prioritising the patient's comfort and confidentiality during a consultation. The *carebook* which a patient takes home, is very valuable to ensure that a patient is equipped with significant and crucial information in self-care and preparedness. This underscores the continuous maternal care service which the medical staff of Promosa Clinic desire for their patients. In reflection, the *in safe hands* prototype communication kit addresses each objective with the intention of answering the visual communication problem and meeting the goal to facilitate continuous and community-centred maternal health.

4.3 Reflection on the theoretical and methodological underpinnings of the design process

After reflecting on how the final prototype satisfies the project brief's requirements, this section reflects on the theoretical and methodological aspects of the design process that drove the field research and creative production of the *in safe hands* kit.

4.3.1 Insights on the theoretical and practical approach

This study theoretically adapted concepts and practical methods from the fields of medical anthropology, action research and human-centred design (HCD). This includes the emic view, thick description, negotiated interactive observation, design-oriented action research cycles and HCD ideation techniques. The application of these concepts provided a contextual lens of inquiry into the medical staff's working environment and communication concerns from which the problem statement was identified in Phase One. The research problem was to investigate how graphic design practice can address the staff's communication needs to facilitate maternity care and promote better maternal health outcomes. The pragmatic and subjective approach of the theoretical framework enabled the framing and understanding of the problem within the theme of adolescent pregnancies and the context of the staff's ANC service delivery. It provided constructive insights into the circumstances surrounding the staff's visual communication needs. Subsequently the theoretical approach inspired, initiated and

established a primary fieldwork approach, synthesis process and ideation techniques in Phase Two, and a method of conducting a design production in Phase Three.

Particularly, the practical approach facilitated an open-ended collaboration with staff in which the problem statement was constantly reviewed through action research cycles until the staff's context and their specific communication needs in maternity services, especially concerning pregnant adolescent patients, were identified. This resulted in an insightful definition of the visual communication problem, communication goal and project objectives which were contextually synthesised into a visual communication challenge in preparation for the creative production process in Phase Three (cf. Nova, 2014:4; cf. Gwilt & Williams, 2011:89,90). According to Barnes (2012), a designer's practical engagement with social science-related ethnographic approaches is a means to collect relevant data and consequently analyse, synthesise and distil insights in a design process. In accordance with that view, Bowers (cf. 2020:12) contends that synthesising information in a divergent (Phase One: Discover) and convergent (Phase Two: Define) manner is critical to the success and setting of the direction of an iterative design process. Arguably, the design process can be "chaotic". However, in this study, an action research model managed the exploratory and divergent aspects of the design process towards defining a problem in Phase Two and resolving the project's brief with a designed solution in Phase Three (cf. Kim & Ryu, 2014:516).

4.3.2 Research methods and design techniques

Braha and Reich (2003:185) posit that a design process starts with an abstract approach of applying theories and ends with a tangible product with the facilitation of carefully selected methods and tools. The adaptation of existing methods and tools attained focused data for the design process (Rodgers & Anusas, 2008). The selected methods and tools – immersion, observation, interviews, focus group sessions – were used as necessitated by reflection and the need to gather and access relevant data with the use of action research cycles. The action research cycle's reflection step was modified with Schön's theory (1983) of reflective practice – reflect-in-action and reflect-on-action. Therefore, it was possible to make connections between theory (knowing) and practice (doing) during field research and the design production (cf. Satariyan & Reynolds, 2016). The research methods were applied intuitively, critically and tacitly while knowing-in-action and reflecting-in-action to explore and determine the staff's communication concerns (cf. Lucena & Popaduik, 2018:25,33). To keep the staff at the centre of this design project, the research methods were applied from an emic perspective to

document the data from the staff's point of view. The human-centred elements embedded in the methods of investigation enabled empathy for staff and a level of objectivity was maintained through reflexivity and a reflexive practice (cf. Dong *et al.*, 2018; cf. Gasparini, 2015).

The contextual inquiry and semi-structured interviews provided more valuable results on the staff's needs during the data gathering stage. Two focus group sessions were conducted with a set of four techniques – KJ, Persona, deck of cards and a group discussion. The collated data from the sessions led to a detailed understanding of the staff's needs. However, the KJ technique was least effective in determining the staff's main concern as a team but the deck of cards technique was applied and voiced the pressing concerns that each staff member had. Upon reflection, the KJ technique is not appropriate in sorting and classifying problems but it is more applicable in brainstorming and prioritising group ideas for ideation purposes (cf. Scupin, 1997:233).

All the methods and tools were triangulated by assessing and comparing the data to confirm and validate the insights produced by each method, therefore illuminating the problem. The data pointed to the staff's main concern of the increasing rate of teenage pregnancies at Promosa Clinic and their need for better communication methods and strategies in ANC service delivery. The insight distillation process demonstrated how complementary and useful the research methods were in generating data on both the communication needs and contextual situation of the staff. It provided the designer-researcher, in anthropological terms, a thick description or context of the staff's communication problems in the form of recordings, filed notebooks, annotated entries, sketches, and photographs representative of the staff's inputs at the clinic. An effective tool that contributed to analysing field data, ultimately leading to the success of defining the visual communication problem, was the affinity diagram. Affinity diagramming enabled the organisation, extraction and crystallisation of key themes and insights into a specific design challenge (cf. Holtzblatt & Beyer, 2015:24,25).

The ideation techniques, how might I? and Mindmapping, were the most suitable and strategic methods of generating ideas and, eventually, developing the concept of "in safe hands" that could potentially enhance the staff's service experience. This concept was successfully addressed through action research-driven design cycles. The envisioned product could be iteratively developed and refined until the communication goal was met. The critical aspect of the design cycles was the *reflect* step which was in service of making adjustments in the *plan*

step in order to design a more suitable prototype that could meet the staff's need. The changes made with every iteration of the *in the safe hands* kit in each design cycle led to the making of a functional final outcome.

4.3.3 Implementation of the adapted design thinking model within a PLR research approach

This design project takes on the position that PLR is an interdisciplinary research approach that can accommodate different branches of theory and methods suitable for the designer's practice context (Stewart, 2006). For this study, the PLR approach was formulated based on the above-mentioned concepts within action research, medical anthropology and HCD. This study's PLR method incorporated a pragmatic and exploratory approach to the field and design production process through the dual role of a designer-researcher. The designer-researcher's role entailed gathering data and distilling field insights useful for designing (Rodgers & Anusas, 2008). The structure of this study's adapted design thinking model within PLR facilitated the field research, design practice and production processes in this project. The model was a suitable PLR approach for investigating how graphic design practice can design for maternal health in a community health centre context (cf. Haseman, 2007:149).

The HCD approach by IDEO (2011), which partly inspired this design thinking model, is industry-based (cf. Gregory, 2018:211). It empowers research participants to make most design decisions and it is structured to produce solutions within a short timeframe to meet project goals (Yee, 2007). However, this study's adapted design thinking model within an action research framework allowed the designer to make most of the decisions reflectively in the interests of the participants, and it provided a new understanding on reflective practice in the context of healthcare (cf. Ellmers *et al*., 2009). This approach reveals how a prolonged and critical engagement with graphic design theory and practice in an academic setting can yield insights and probable solutions that can meet health professionals' communication needs.

In PLR, the design solution is supported by a trail of process documentation and an examination of the design practice and creative production process in the form of this report (see Lotz, 2014:xv,xvi). The process work, as illustrated in the research report through photographs, notes, sketches and preliminary prototypes, served as an explanation of the final prototype to demonstrate critical reflection and application of the selected theoretical and

methodological processes (cf. Schwab, 2010:60). A designer can therefore produce suitable artefacts for an intended audience evinced by process work through well-considered theoretical approaches and methodological practices of action research, medical anthropology and HCD in a PLR project (Farber & Mäkelä, 2010:5; cf. Yee, 2007).

4.4 Answering the problem statement

The problem statement of this study was to investigate how graphic design practice can address the medical staff's communication needs to facilitate community-centred and continuous maternity care. In reflection of the abovementioned viewpoints on the effectiveness of the methodological and theoretical underpinnings of this design process, the problem statement is resolved by this study's research outcomes. This entails a final prototype of the *in safe hands* kit supported by process work, and a critical reflection on the process and design outcome in the form of this research report. The "in safe hands" concept embodied as a communication kit was iteratively designed as the most desirable and viable solution to the staff's visual communication problem and, consequently, the problem statement. The final prototype equips a health professional with the necessary time-saving and context-specific communication tools to foster empathic, youth-friendly and safe spaces of discussion, identification and education on health risks with an adolescent patient in ANC service delivery.

Adolescent pregnancies hold many concerns for not only the pregnant adolescent and their unborn baby but also the skilled health professional managing their care (James *et al*., 2012:1). The *in safe hands* kit is a valuable visual resource and a relevant communication material that can assist ANC health professionals with pregnant adolescent patients in a community health centre (DMHP04 Feedback session 1, 2019; DMHP05 Feedback session 2, 2020; DMHP06 Feedback session 3, 2020). This proposed solution can be considered in light of the South African DoH's commitment to preserve adolescent pregnancies from unfavourable birth outcomes (Worku & Woldesenbet, 2016:135). The final prototype is responsive to Promosa Clinic's maternity staff's communication needs as well as the DoH's BANC approach to detect, manage and treat at-risk pregnancies (cf. Department of Health, 2015a). Literature studies on adolescent maternal health also highlight that ANC services that are designed to be adolescent-friendly are easily accessible, foster privacy and provide better support for pregnant adolescents (cf. Daley *et al*., 2019). Ease of access encourages frequent follow-ups and patient attendance to ANC consultations (Erasmus *et al*., 2020:474). Primarily youth-friendly approaches, strategies and resources enable health professionals to provide

timeous, consistent and continued ANC health education, guidance and screening (Dickson-Tetteh *et al*., 2001:160).

According to a study on adolescent health screening and counselling by Ham and Allen (2012:1110), adolescents are responsive to care that is personalised, tailored and sensitive to their healthcare needs. Furthermore, the healthcare professional's interpersonal communication skills play a vital role in "early identification of problems, provision of psychological support, effective illness management and health education" (Kim & White, 2018:198). The *in safe hands* kit's content, form, visual appearance and functionality prioritise the Promosa Clinic's medical staff's communication need to discuss sensitive health risks and their desire to keep their adolescent patients safe from danger. The *in safe hands* kit therefore facilitates and supports the medical staff's and DoH's efforts to provide proper care in order to detect, prevent and treat pregnancy risks for the best possible birth outcome.

4.5 Further research

Following the evaluation of this study's design process and outcome, this section acknowledges the limitations of the study and offers recommendations for further design research. The following aspects of the design and production processes and output that were beyond the scope of this study can be considered:

4.5.1 Beyond Promosa Clinic

The focus of this study was to design a context-sensitive design solution for medical staff at Promosa Clinic. This study proposes that the *in safe hands* kit can be tested in other community health centre settings in South Africa where facilitation of difficult ANC health topics between adolescent patients and health professionals is needed (see Department of Health, 2015a). Experimenting with the *in safe hands* kit in a different context includes observing how medical professionals and adolescent patients respond to the communication kit; thereafter it can be customised and adapted to suit that context in keeping with the "in safe hands" brand identity.[21] After the viability, feasibility and usability of the *in safe hands* kit has been tested, this study suggests that the communication kit can be fully translated into other local languages such as Setswana, Afrikaans and isiXhosa, depending on the context in which

21 This study was limited to collaborating with and designing for medical staff's maternity service needs. However, to test with vulnerable persons such as patients, which was out of the scope of this study, will require ethical clearance and their informed consent.

it will be used. This suggestion builds on a particular finding in the project that health professionals might also benefit and use with ease a visual material that is written in a local language spoken in that environment, other than English (DMHP04 Feedback session 1, 2019; DMHP05 Feedback session 2, 2020). The locally translated communication kit can increase the user's access and understanding of ANC health information.

4.5.2 Other design applications

Another research suggestion is to explore the possibility of developing a mobile application design of the *in safe hands* kit to complement the tactile version of the communication kit. Mobile devices and software applications are rapidly being integrated into clinical practice and healthcare settings to improve the efficiency and accuracy of information and communication between providers and patients (Vearrier, 2018:28). A mobile application is a software program that is designed to operate on a mobile device and facilitate the use of a concept with a digital interface and a set of functions (Siuhi & Mwakalonge, 2006; Baktha, 2017:15). This entails employing user experience and user interface theory to design and integrate the *in safe hands* kit content, functionality, and design language on a software platform (cf. Choi & Tulu, 2017). A mobile software version can allow quick access and permanence of some of the *in safe hands* kit's communication tools such as the *carebook*. It can also potentially make ANC health information more attainable, easy to use and portable for patients, and convenient for dissemination by health professionals. It can allow the user to perform more health tasks seamlessly and conveniently, subsequently increasing patient or staff satisfaction and efficiency (Ventola*,* 2014:356). However, as a context-specific application, it is only suitable for an audience that has immediate access to smartphones, tablets or other mobile devices that have readily available mobile data or access to wireless network technology (WIFI). This suggestion was inspired by the Promosa Clinic's staff's response to how the *in safe hands* kit makes ANC information accessible through printed material as well as how they staff make use of MomConnect mobile messaging services (DMHP07 Feedback session 4, 2019; DMHB Field notebook 2, 2019; Barron *et al*., 2018). It was further inspired by a visual inquiry of digital and mobile applications such as mHealth (mobile health). mHealth leverages mobile technology to support a wider audience of medical professionals, deliver high-quality healthcare education, increase access to medical helplines and provide medication reminders to patients (see Marcolino *et al*., 2018; Leavy, 2019).

4.5.3 Exploring *in safe hands* kit as a standardised risk screening toolkit

According to an analysis of screening tools in healthcare literature, the prototype of *in safe hands* kit resembles in visual form and function, the BANC screening tools at Promosa Clinic (cf. Jull, 2002:68). It is worth noting that a number of clinical methods, such as urine screens, blood tests and questionnaires have been developed as screening tools to detect potential health risks in patients. Medical studies on the use of word-based screening tools such as questionnaires have proved to be more effective because of how quick, brief and informative they are when assessing early-stage substance use before the medical examination of the patient (Morse *et al*., 1997:2,4). In addition, the field data showed how the staff made use of text-driven screening tools such as the BANC checklists in ANC consultations (DMHB Field notebook 2, 2019). It is important to note that the *in safe hands* kit content discusses various sensitive health topics that are also addressed in the BANC checklists, which health professionals ask during a patient personal history-taking task. The difference between the existing clinical means of screening and the *in safe hands* kit is that, the communication kit is graphics-driven to suit the Promosa Clinic's staff's need for visually engaging, demonstrative and user-friendly visual materials. The communication kit can be potentially used to screen patients as a standardised risk screening toolkit during routine screening in ANC or BANC. Most importantly, it can provide a window of opportunity where health professionals can detect and intervene on danger signs at an early stage of the adolescent's pregnancy. However, for the purposes of fulfilling the communication goal of this design project, the final prototype of *in safe hands* kit was concluded as a communication kit that can be developed further in the future.

4.6 Concluding remarks

This phase concludes this design project by decoding the meaning, significance and effectiveness of the design process and the resultant design outcome. This study set out to investigate how graphic design practice can address the medical staff's communication needs at Promosa Clinic with emphasis on the maternity unit and the rise in adolescent pregnancies in need of better care. A set of graphic design theories and methods were selected to craft a contextualised Design Thinking model as a practice-led research approach suitable for exploring the medical staff's ANC context and concerns. The designer collaborated with staff by obtaining their direct inputs and feedback to initiate, drive and validate an iterative design process and its outcomes. As a result, the final prototype of *in safe hands* kit was produced,

presented and analysed in light of the project brief. In conjunction, the design process that encapsulated the design research and practice was evaluated to determine its usability in resolving the staff's communication need for youth-friendly communication tools and, ultimately, the problem statement of how design practice can be utilised as a tool to determine appropriate visual materials for a healthcare setting. In reflection, this study highlighted and advocated for the medical staff's need for more visual materials to facilitate their care for pregnant adolescent patients during ANC consultations as evinced by the concept, content and functionality of the *in safe hands* kit. In the end, the *in safe hands* kit with the slogan "your safety is your baby's security", was the graphic designer's response to the Promosa Clinic's maternity staff need for visual communication tools that can facilitate enhanced, time-saving, durable, interactive and visually engaging ANC communication and care. Therefore, the *in safe hands* kit satisfied the communication goal of promoting continuous and community-centred antenatal care for pregnant adolescents to achieve better maternal health outcomes at Promosa Clinic.

GLOSSARY

Adolescent describes a young person between the ages of 10 and 24. The term adolescent is used interchangeably with teenager in this study.

Antenatal care is the routine health control of a presumed healthy pregnant woman without symptoms, in order to diagnose diseases or complicating obstetric conditions, and to provide information about lifestyle, pregnancy and delivery. It is a means to identify high-risk pregnancies and educate women so that they might experience a healthier delivery and outcome. Skilled healthcare professionals provide the care to pregnant women and adolescent girls in order to ensure the best health conditions for both mother and baby during pregnancy.

Birth defect is a structural abnormality present at birth, irrespective of whether the defect is caused by a genetic factor or by prenatal events that are not genetic.

High-risk pregnancy is a pregnancy with risk factors that threaten the health or life of the mother or her foetus.

Maternity care refers to the health services provided to women, babies, and families during pregnancy, labour and birth.

Maternal health is the well-being of a woman during pregnancy, childbirth and the postpartum period.

Maternal mortality is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

Maternal morbidity is an overarching term that refers to any physical or mental illness or disability directly related to pregnancy and/or childbirth. These are not necessarily life-threatening but can have a significant impact on the quality of life.

Neonatal mortality is the death of a live-born baby within the first 28 days of life. Neonatal mortality rate is defined as the number of infant deaths within the first 28 days of life per 1000 live births.

Neonatal morbidity is the risk of death during the newborn period – the first 28 days of life. The major causes of neonatal morbidity, prematurity and birth defects generally occur in pregnancies free of antecedent complications.

Optimal well-being is an active process through which people become aware of, and make choices toward, a healthier and more successful existence.

Risk factors refer to existing health conditions, the mother's age, lifestyle, and health issues that can endanger both mother and baby.

Risk screen is a tool designed for use by healthcare professionals to determine whether the patient is "at risk" and the level of urgency required for intervention.

Routine healthcare is a preventive service that includes screenings, check-ups, and patient counselling to prevent illnesses, disease or other health problems.

Screening tools are questionnaires or checklists designed to be administered face-to-face from provider to patient. They are not designed to diagnose for example, a substance abuse problem, but are intended to determine if a patient may be at risk for alcohol or drug problems and would benefit from a more comprehensive evaluation by a specialist.

Staff refers to health professionals or practitioners such as nurses, doctors, mentor mothers and midwives operating in the maternity unit of a clinic or community health centre.

Teenager is a young person aged between 13 and 19 years old.

Youth-friendly is a term that connotes user friendliness (acceptable or appealing) to young people between the ages of 10 and 24. The term is used to describe elements of healthcare that are accessible to and comfortable for preteens, adolescents, and young adults.

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ADDENDUM A: PROCESS WORK

DATABASE LIST FOR MA GRAPHIC DESIGN RESEARCH PROJECT				
NAME + DATA SOURCE	**YEAR**	**DATA FORMAT**	**DETAILS**	**LOCATION**
DMHA Field notebook 1	2019	Field notes	Observation notes of medical staff members	Promosa Clinic
DMHB Field notebook 2	2019	Field notes	Observation notes of medical staff members	Promosa Clinic
DMHC01 Focus group session 1	2019	Transcript	Focus group with Mentor Mothers and Nurses (P01-P09)	Promosa Clinic
DMHC02 Focus group session 2	2019	Transcript	Focus group with Mentor Mothers and Nurses (P01-P09)	Promosa Clinic
DMHP01 Interview 1	2019	Transcript	Interview with Nurse/Midwife (P01)	Promosa Clinic
DMHP02-1 Interview 2	2019	Transcript	Interview with Doctor (P02)	Promosa Clinic
DMHP02-2 Interview 3	2019	Transcript	Interview with Doctor (P02)	Promosa Clinic
DMHP03 Interview 4	2019	Transcript	Interview with Nurse (P03)	Promosa Clinic
DMHP04 Feedback session 1	2019	Transcript	Feedback session with Mentor Mother (P04)	Promosa Clinic
DMHP05 Feedback session 2	2020	Transcript	Feedback session with Mentor Mother (P05)	Promosa Clinic
DMHP06 Feedback session 3	2020	Transcript	Feedback session with Nurse (P06)	Promosa Clinic
DMHP07 Feedback session 4	2020	Transcript	Feedback session with Mentor Mother (P07)	Promosa Clinic

Table 1a: List of data sources that were processed and consulted for this design project. Process work by researcher.

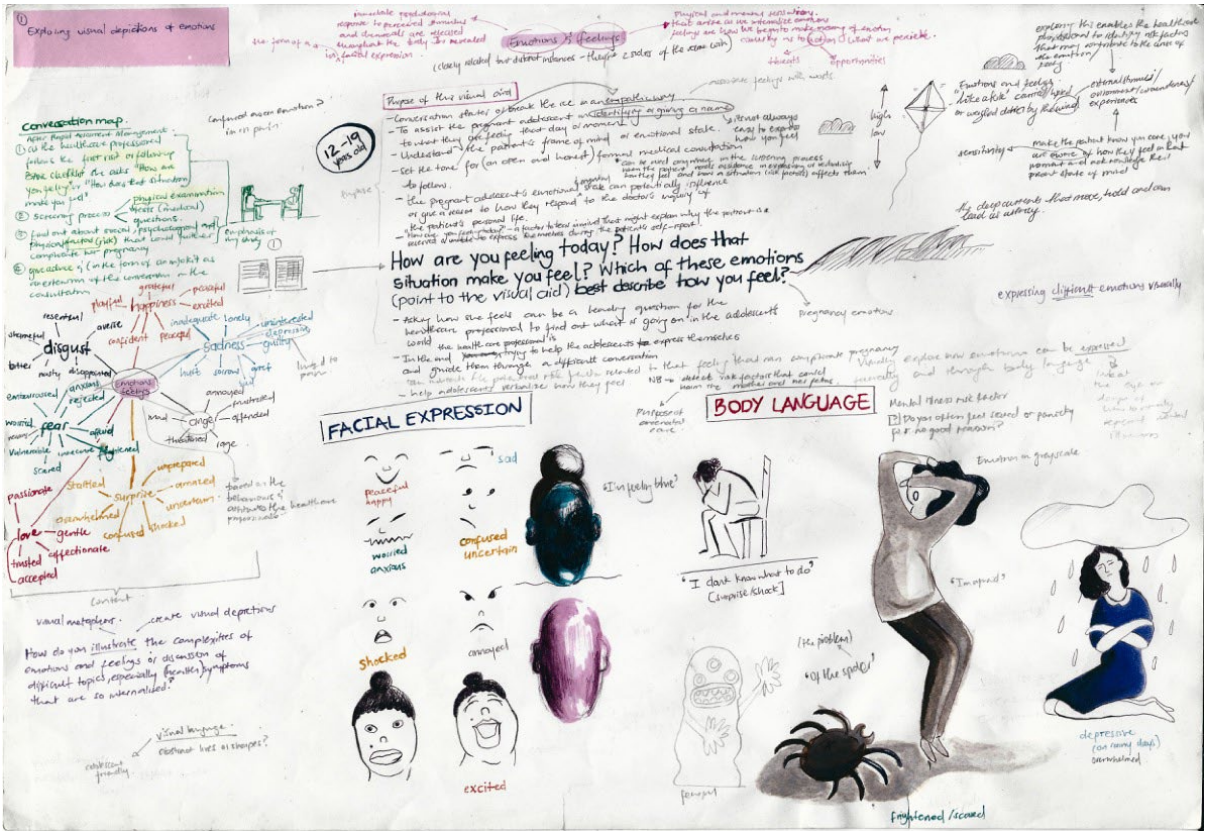


Image 1a: Preliminary planning for content creation of the interactive discussion materials. Process work by researcher.

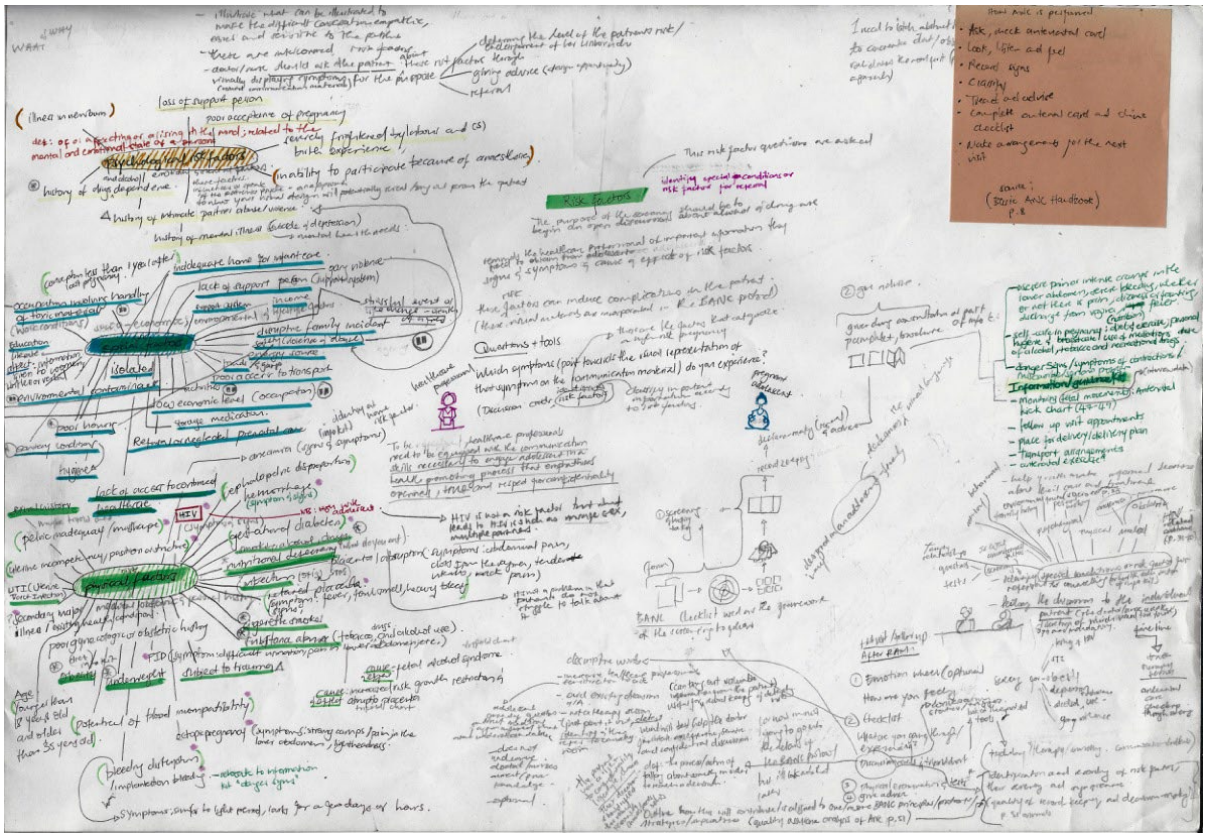


Image 2a: Preliminary planning for content creation of the interactive discussion materials. Process work by researcher.

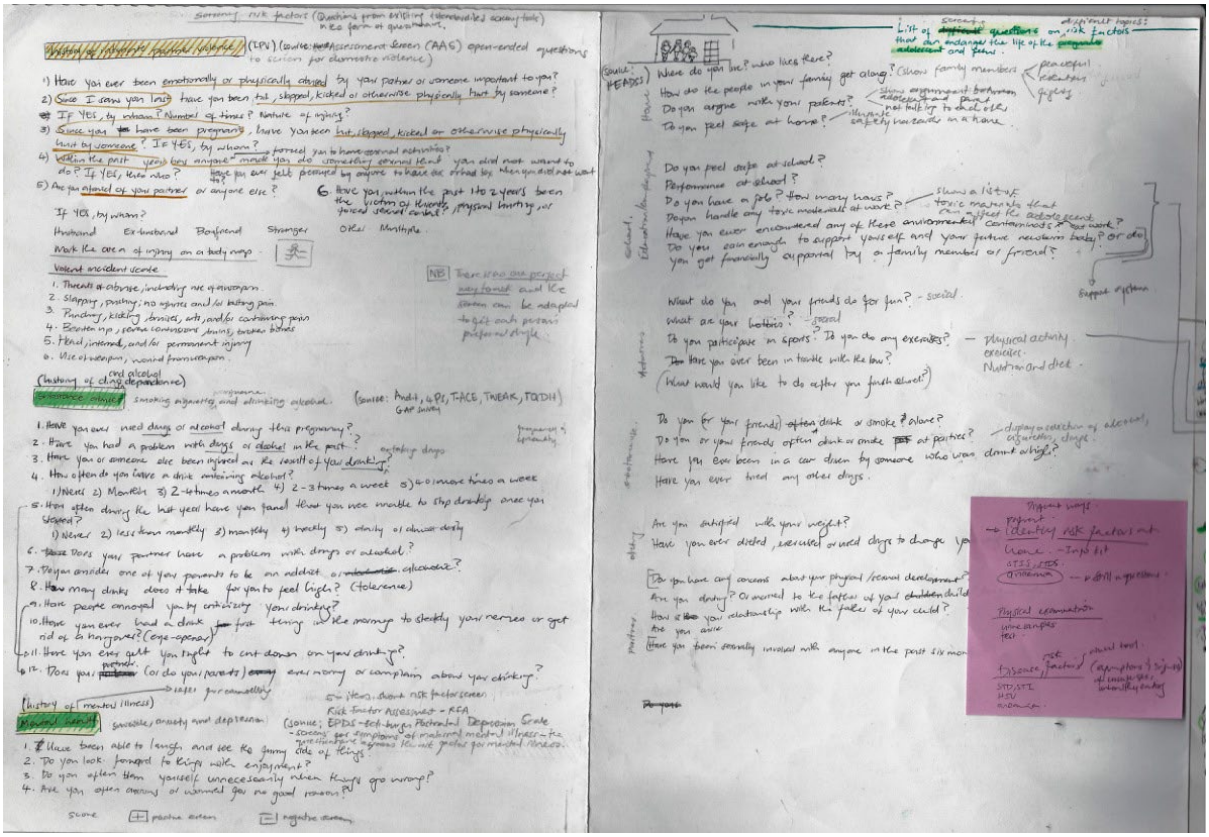


Image 3a: Preliminary planning for content creation of the interactive discussion materials. Process work by researcher.

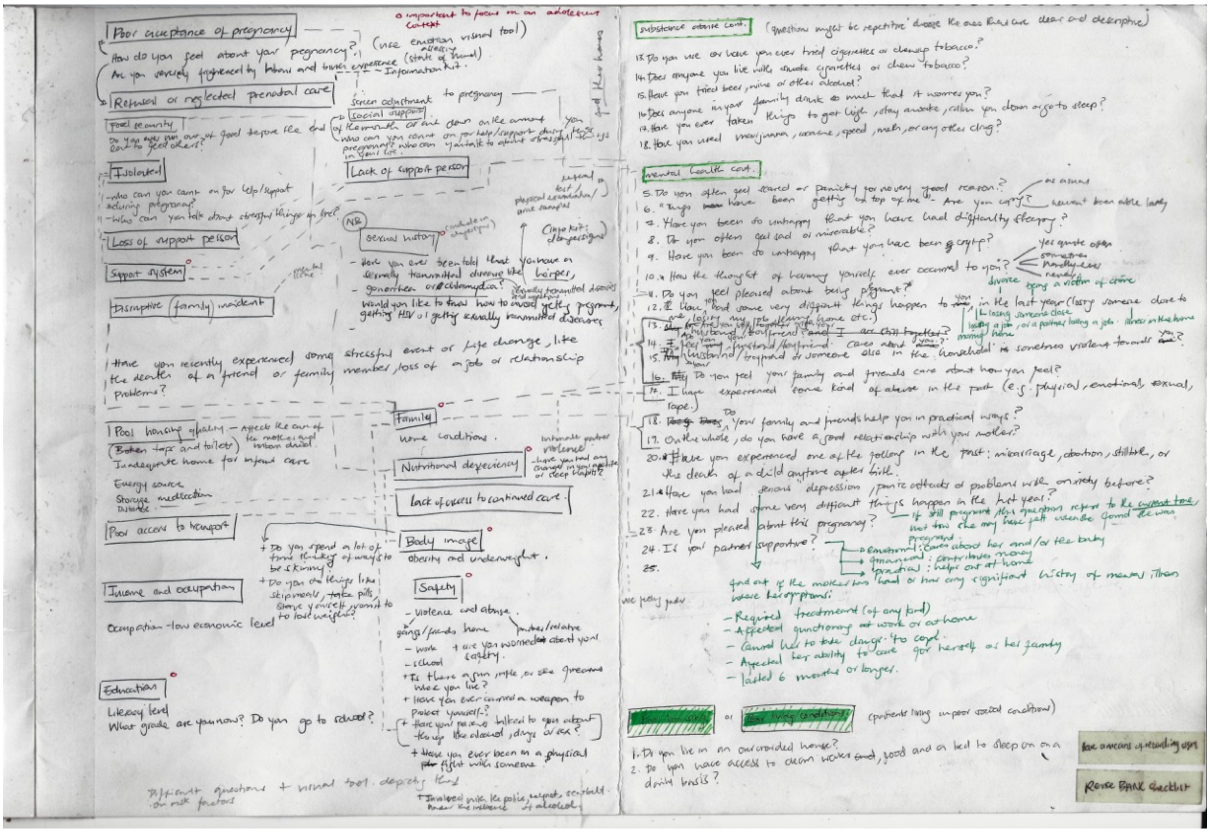


Image 4a: Preliminary planning for content creation of the interactive discussion materials. Process work by researcher.

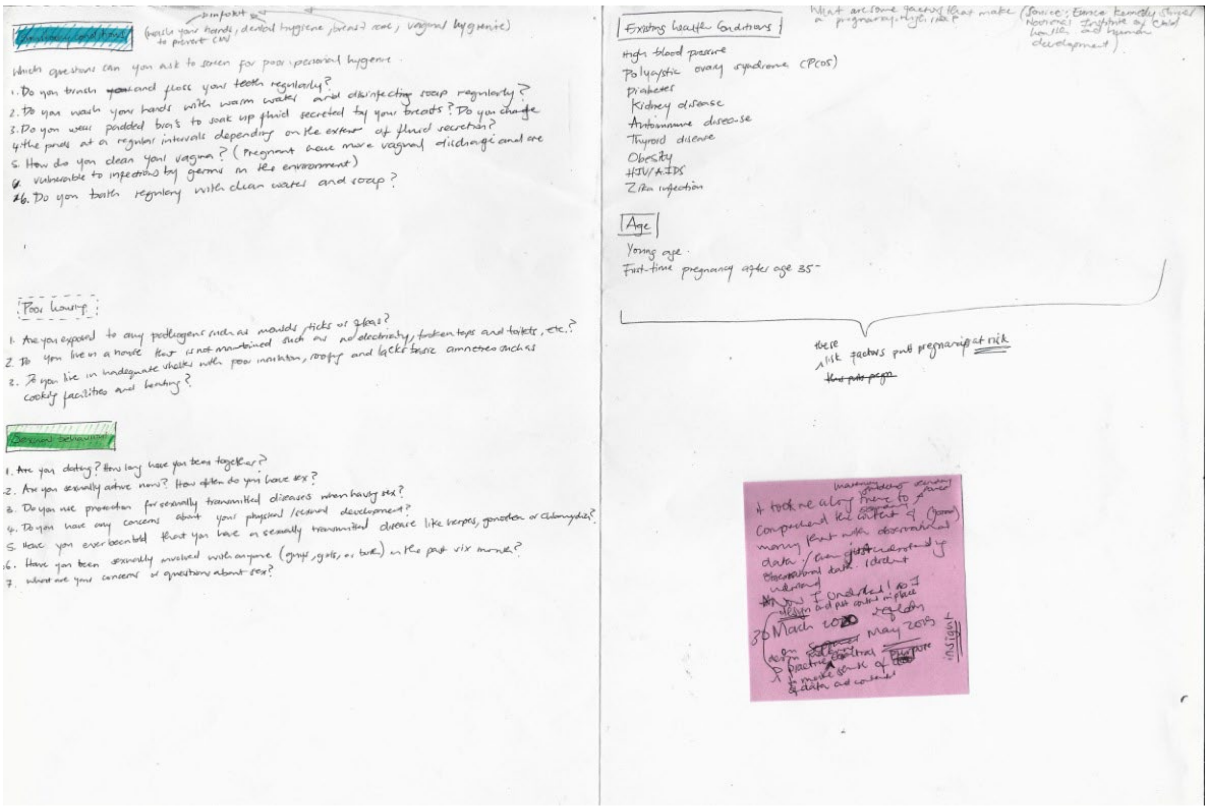


Image 5a: Preliminary planning for content creation of the interactive discussion materials. Process work by researcher.

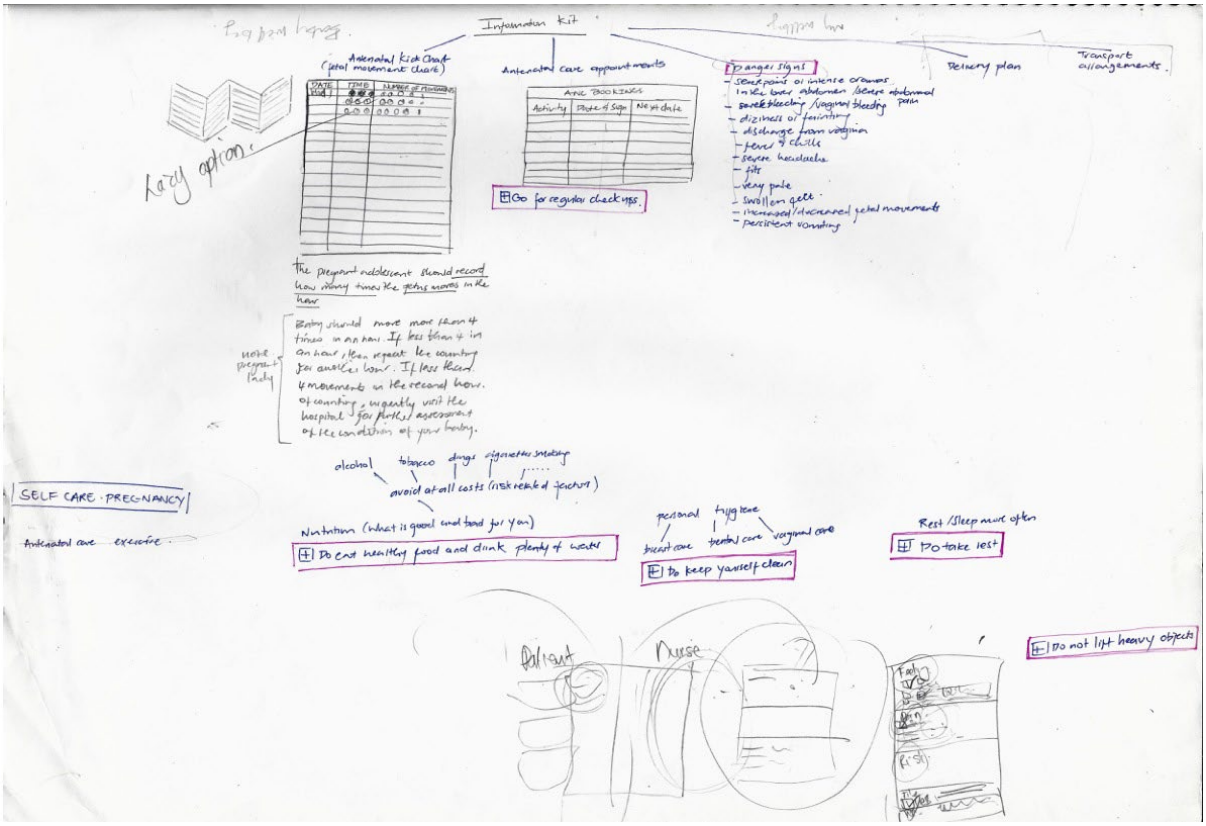


Image 6a: Preliminary planning for content creation of the educational materials. Process work by researcher.

Image 7a: Sketches and scamps of the content, form, layout and application of the *emotions tool*. Process work by researcher.

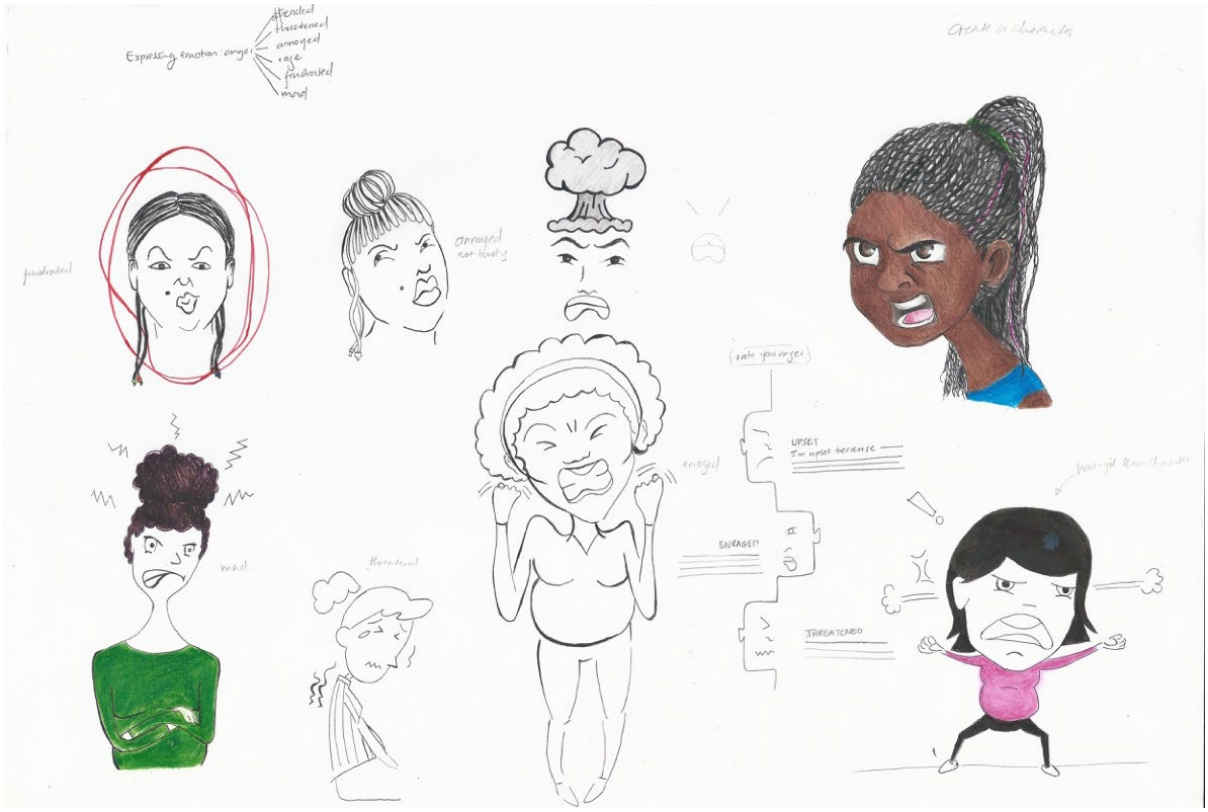


Image 8a: Sketches and scamps of the content, form, layout and application of the *emotions tool*. Process work by researcher.

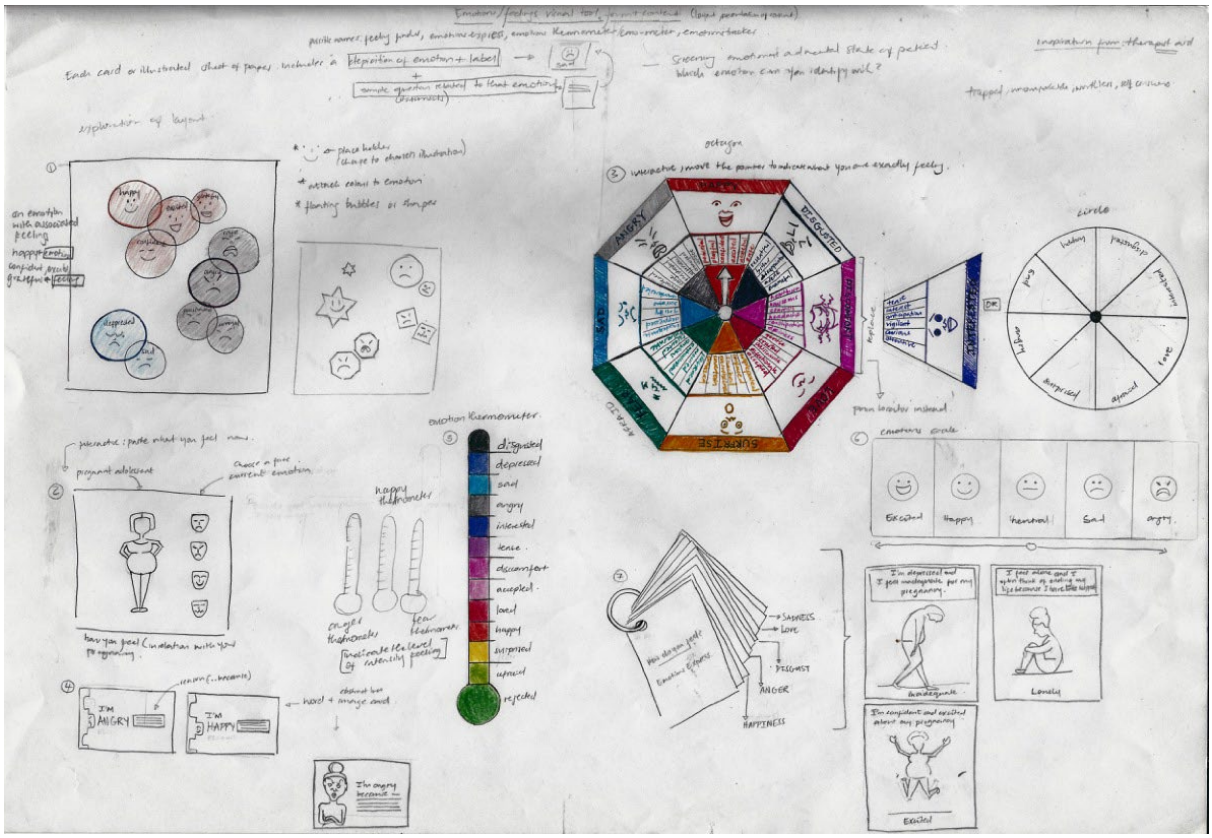


Image 9a: Sketches and scamps of the content, form, layout and application of the *emotions tool*. Process work by researcher.

Image 10a: Sketches and scamps of the content, form, layout and application of the *emotions tool*. Process work by researcher.

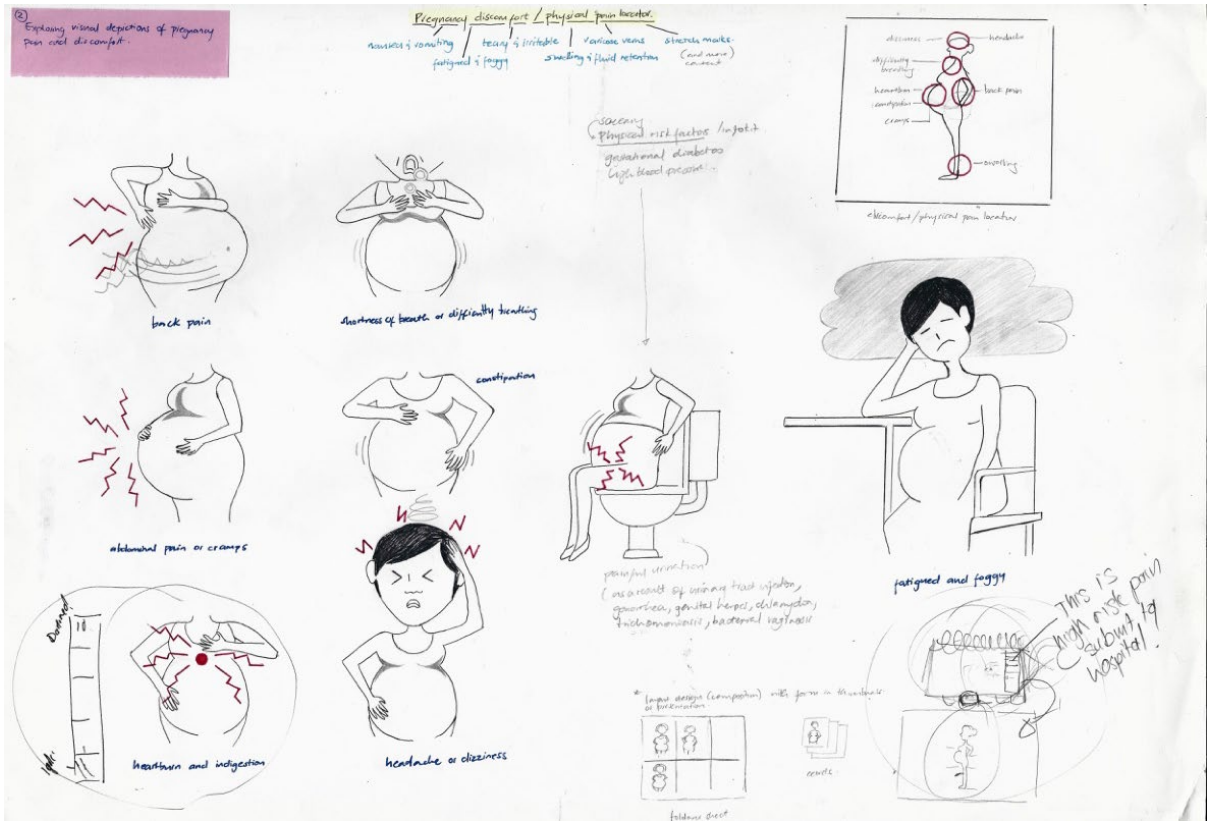
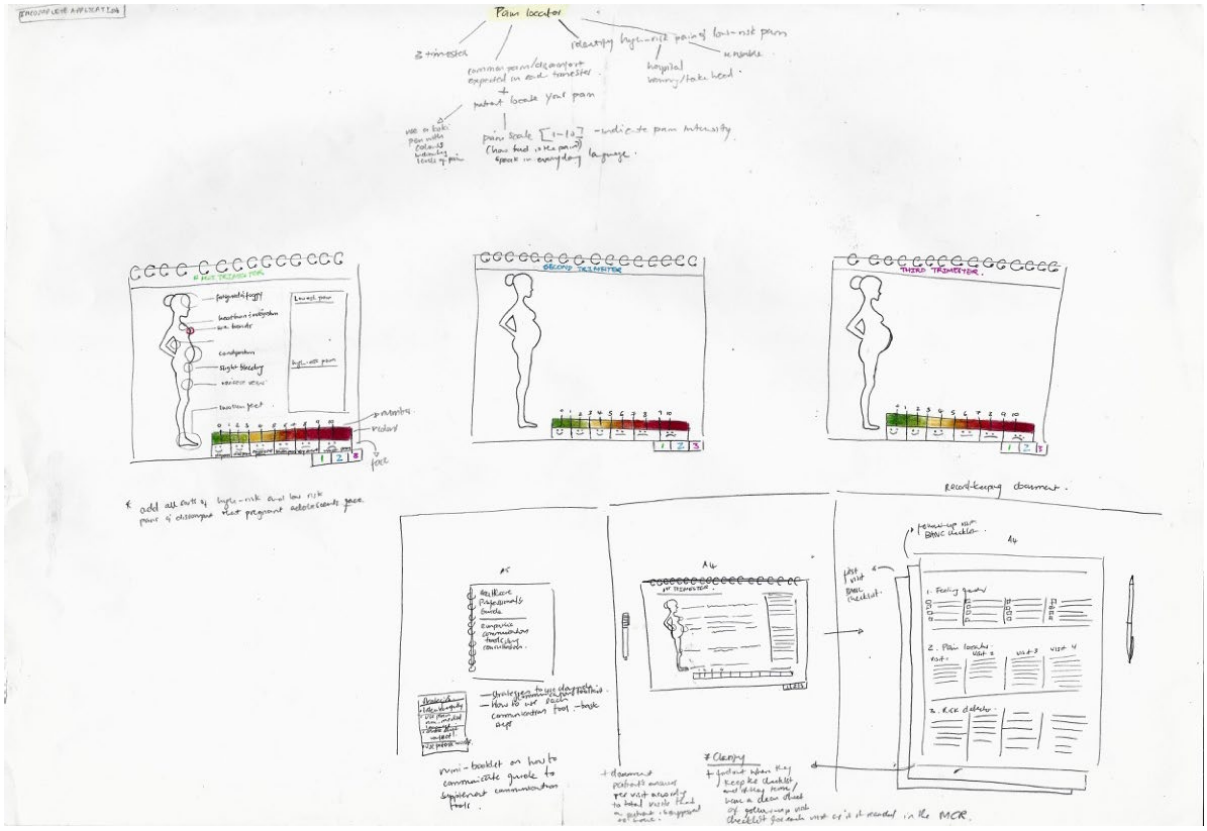


Image 11a: Sketches and scamps of the content, form, layout and application of the *pain tool*. Process work by researcher.



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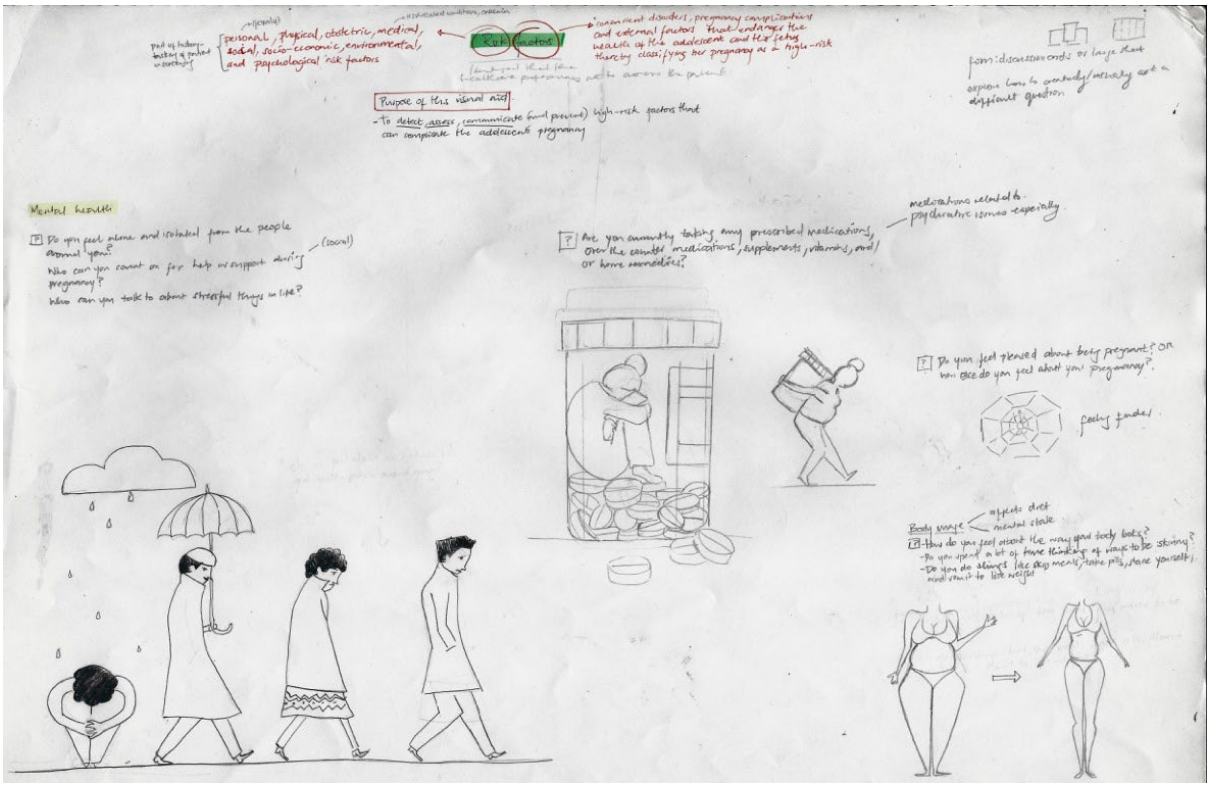

Image 13a: Sketches and scamps of the content, form, layout and application of the *risk tool*. Process work by researcher.

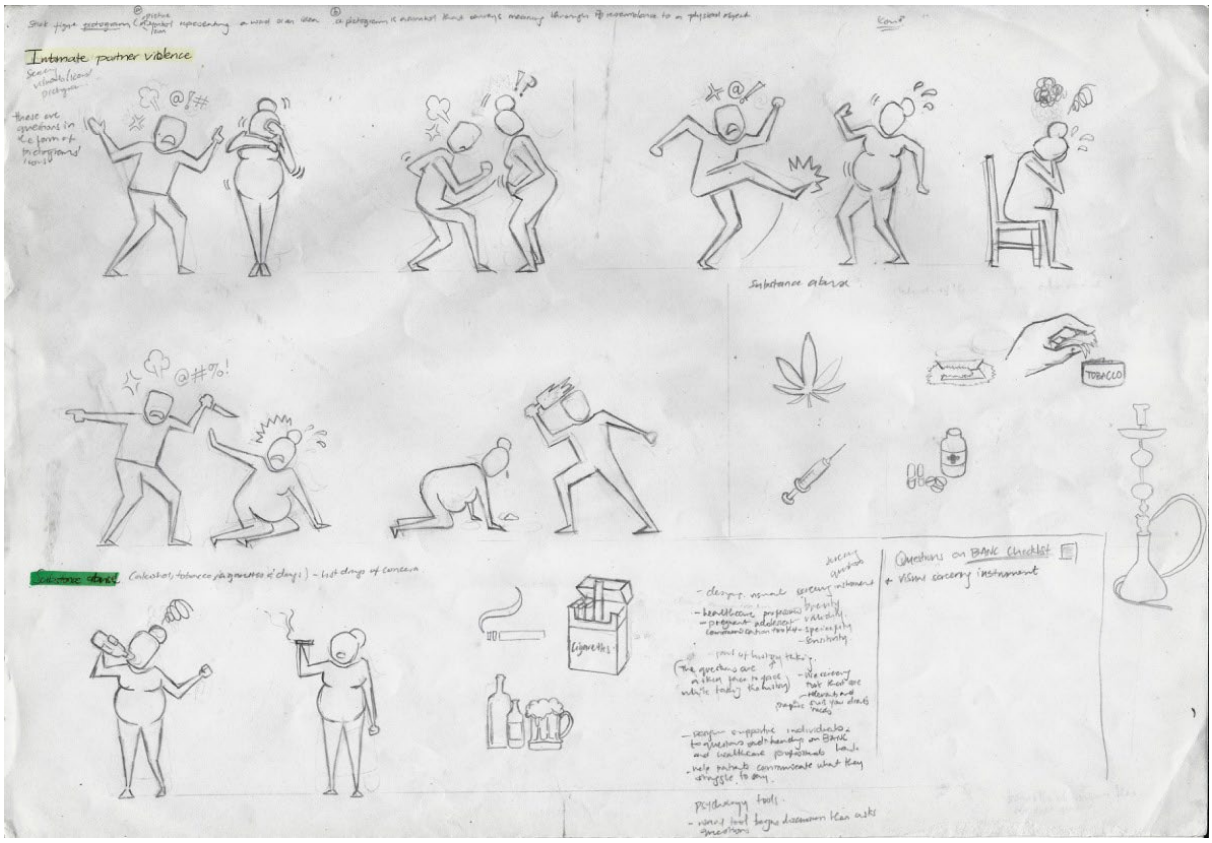

Image 14a: Sketches and scamps of the content, form, layout and application of the *risk tool*. Process work by researcher.

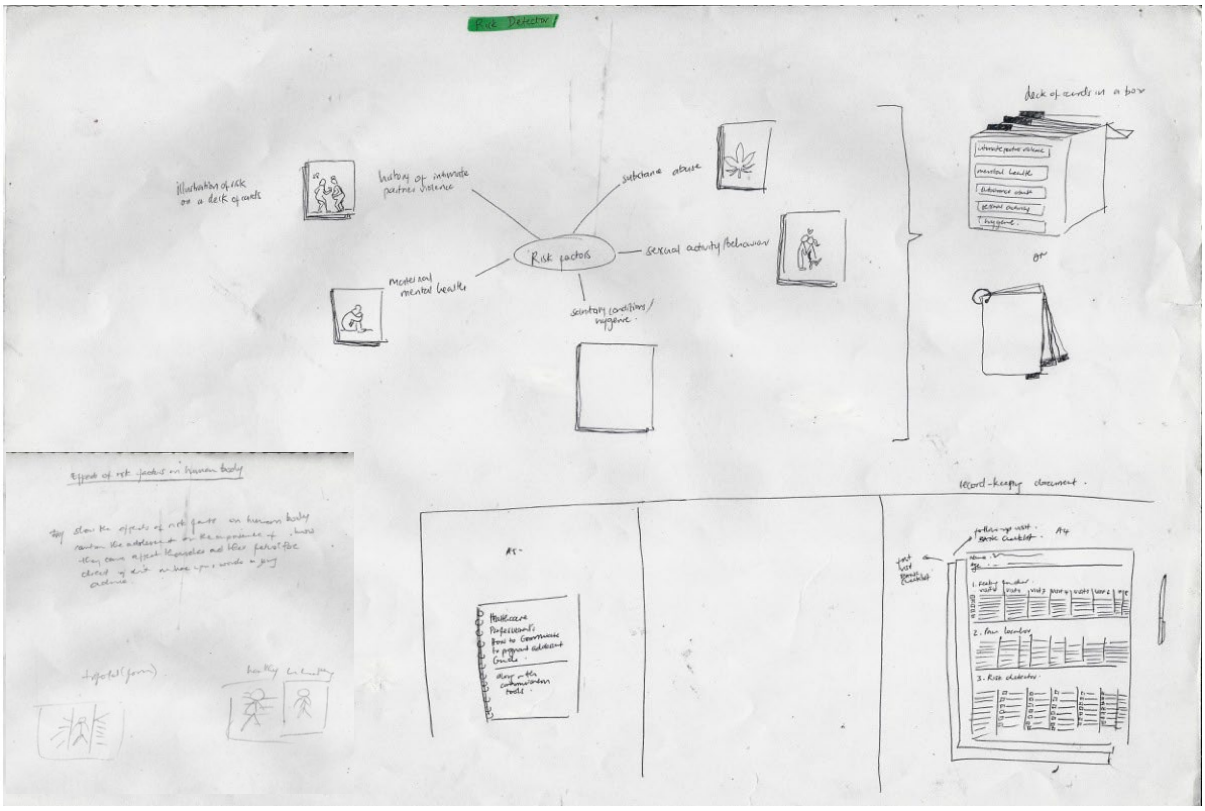

Image 15a: Sketches and scamps of the content, form, layout and application of the *risk tool*. Process work by researcher.

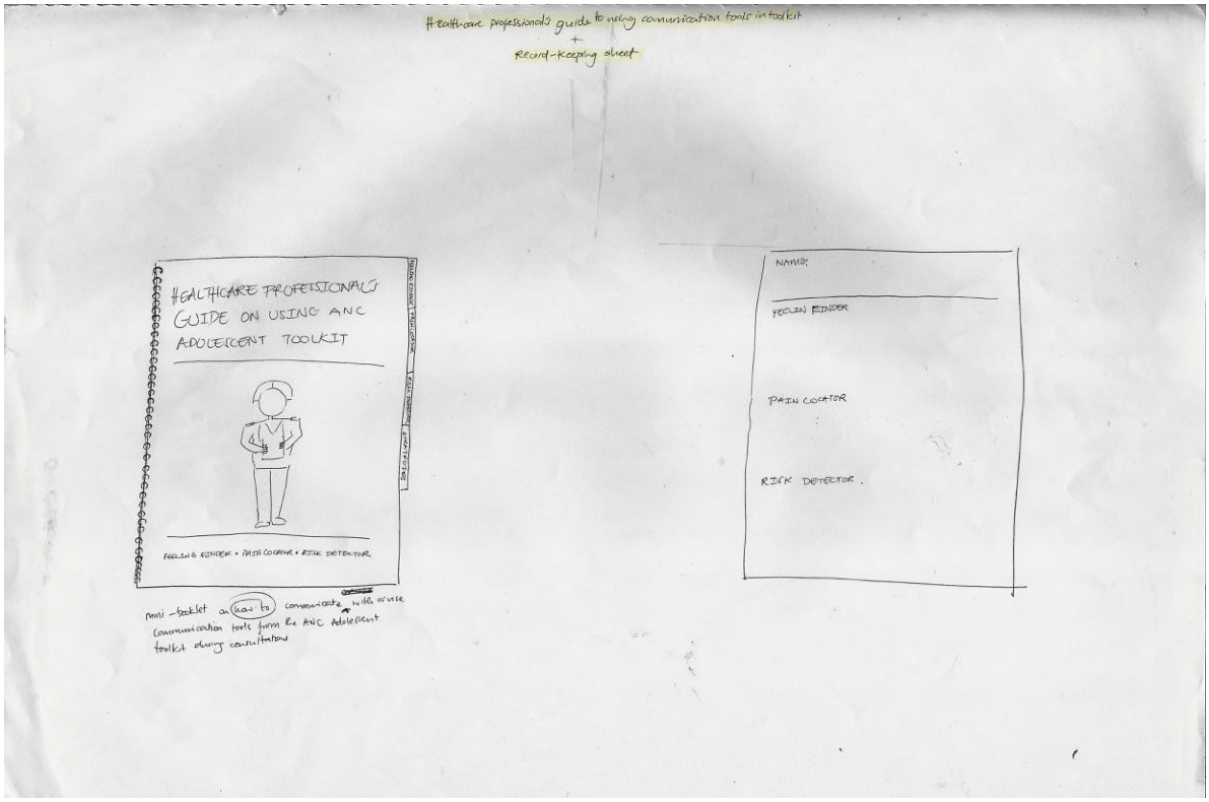

Image 16a: Sketches and scamps of the content, form, layout and application of the staff's *instruction manual* and *record-keeping sheet*. Process work by researcher.

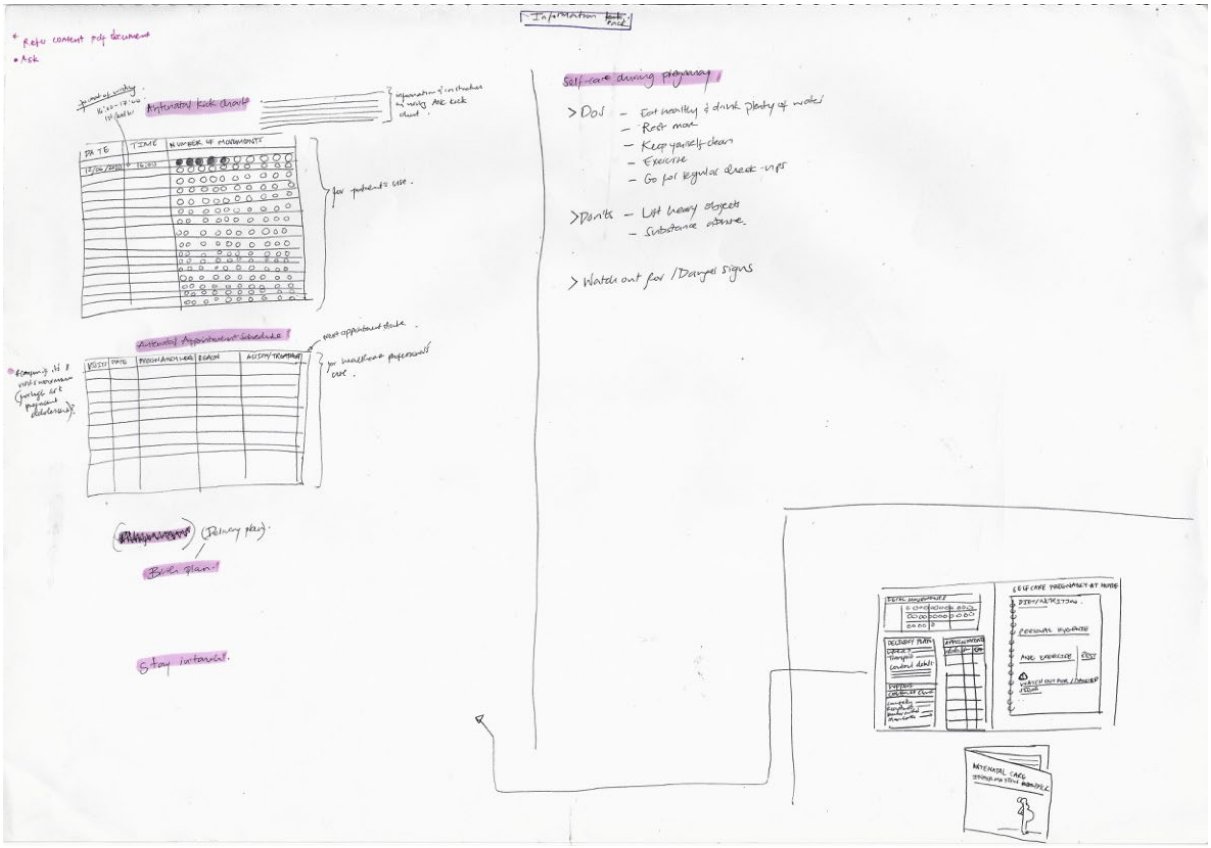

Image 17a: Sketches and scamps of the content, form, layout and application of the patient's *self-help information pack*. Process work by researcher.

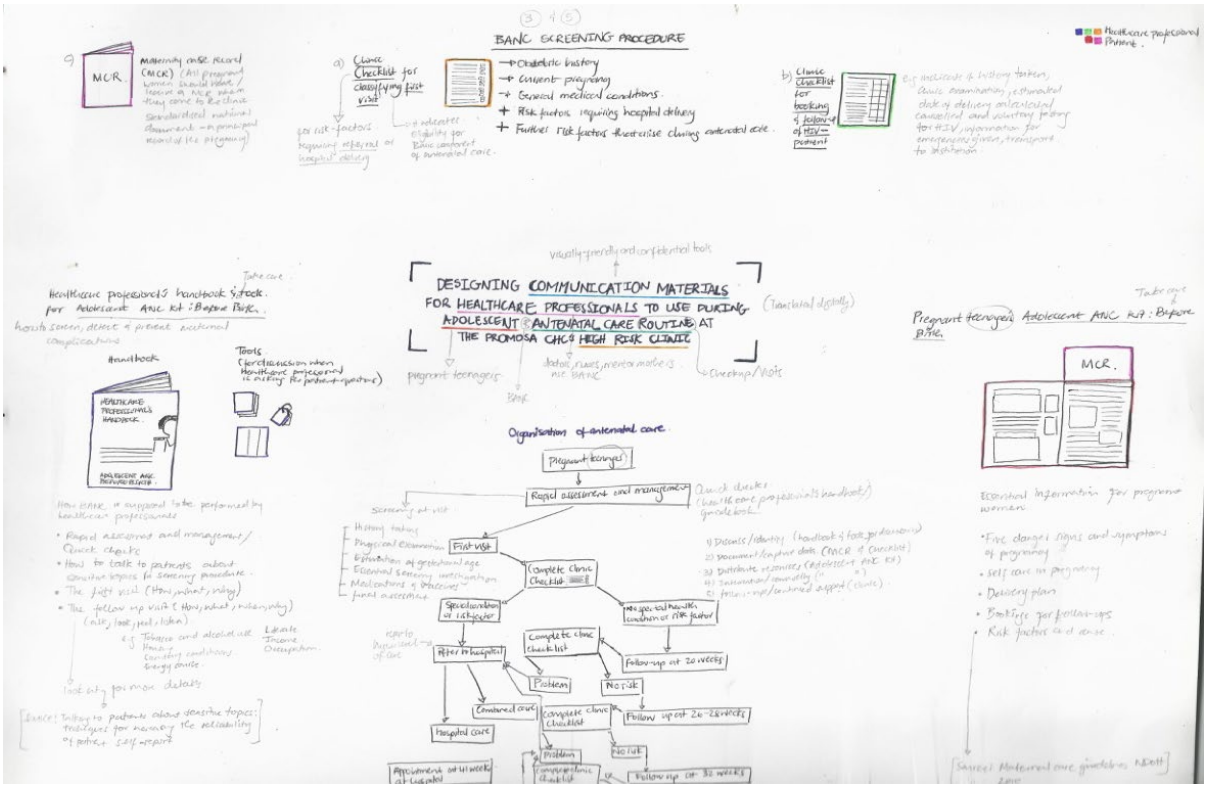

Image 18a: Sketches and scamps of the content, form, layout and application of the *emotions tool*, *pain tool*, *risk tool*, staff's *instruction manual*, patient's *self-help information pack* and *record-keeping sheet*. Process work by researcher.

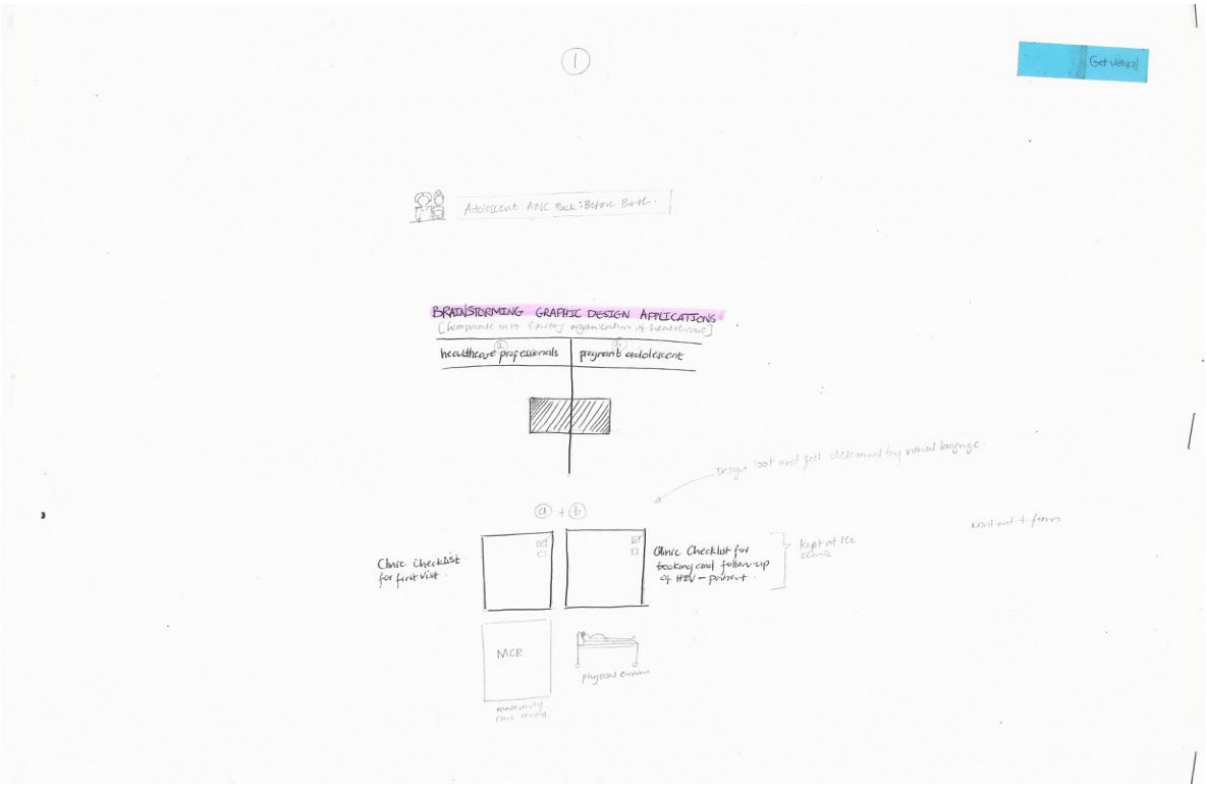

Image 19a: Sketches and scamps of the content, form, layout and application of the *emotions tool*, *pain tool*, *risk tool*, staff's *instruction manual*, patient's *self-help information pack* and *record-keeping sheet*. Process work by researcher.

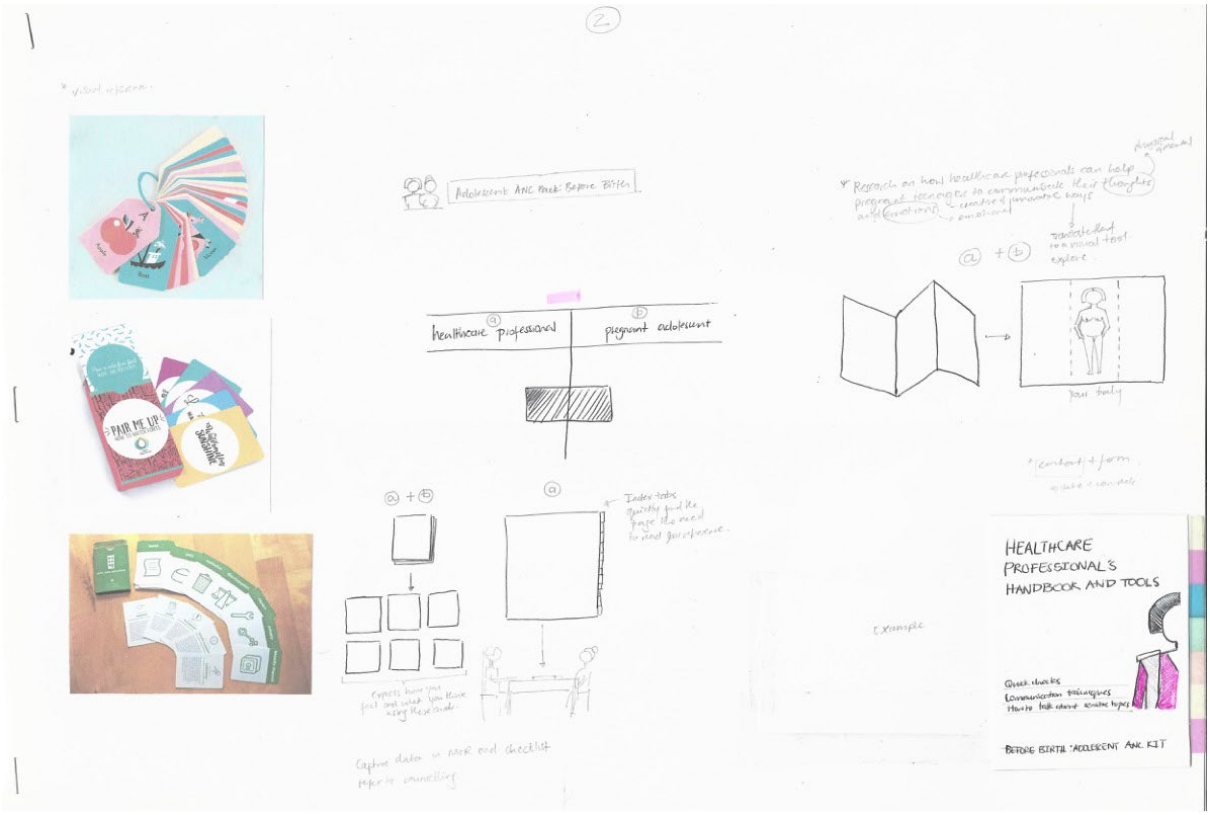

Image 20a: Sketches and scamps of the content, form, layout and application of the *emotions tool*, *pain tool*, *risk tool*, staff's *instruction manual*, patient's *self-help information pack* and *record-keeping sheet*. Process work by researcher.

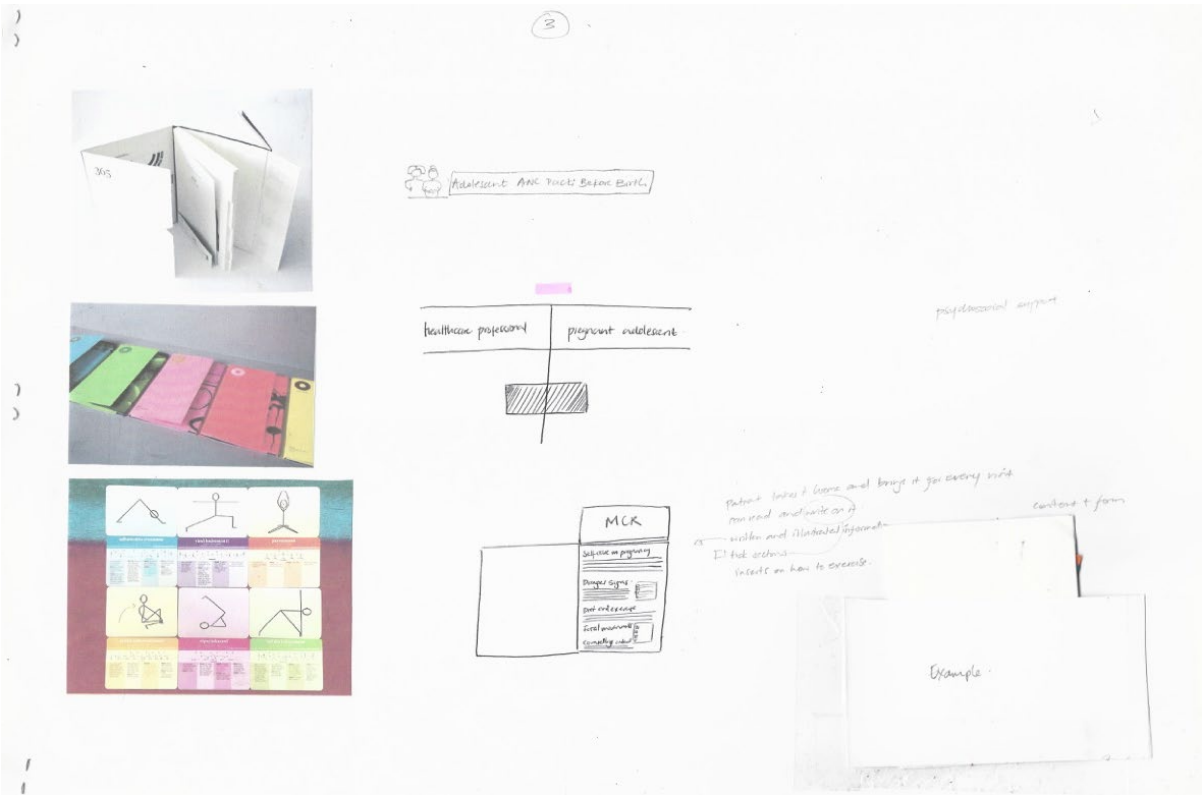

Image 21a: Sketches and scamps of the content, form, layout and application of the *emotions tool*, *pain tool*, *risk tool*, staff's *instruction manual*, patient's *self-help information pack* and *record-keeping sheet*. Process work by researcher.

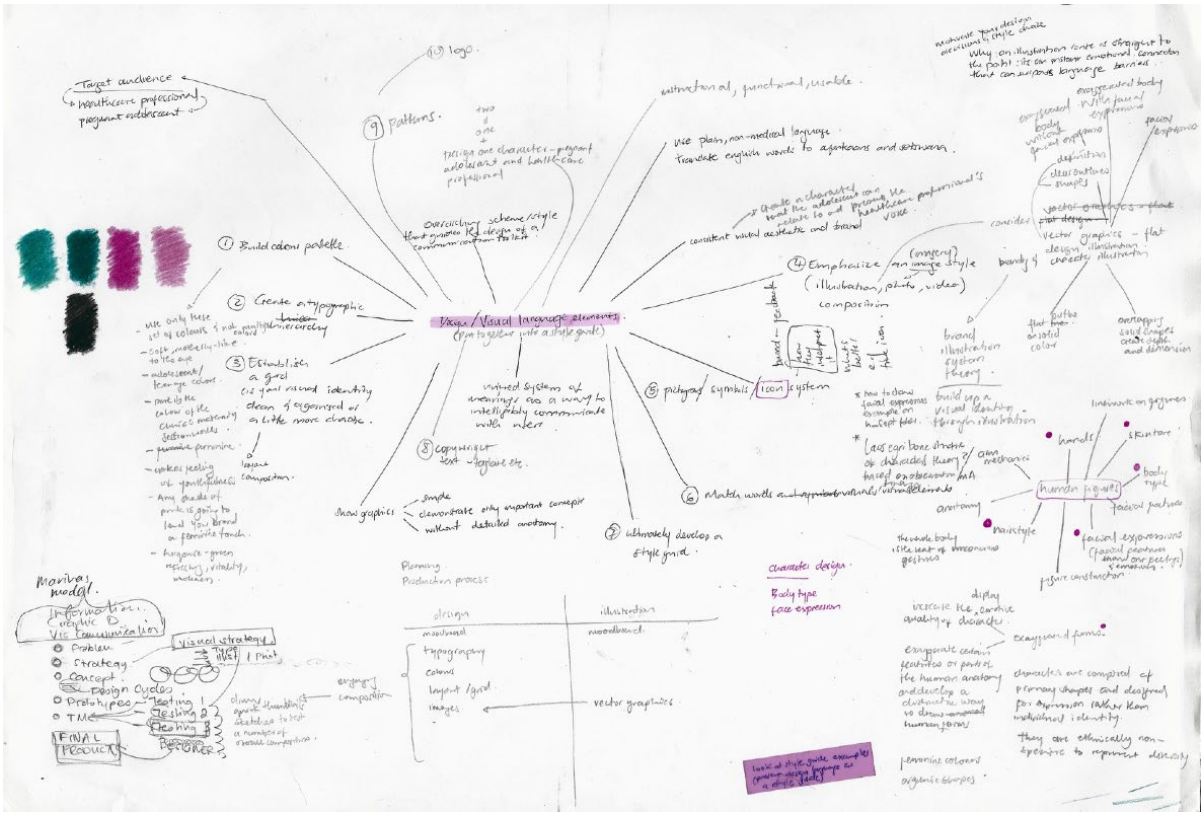

Image 22a: Selecting suitable design elements to give the communication kit a visual form. Process work by researcher.

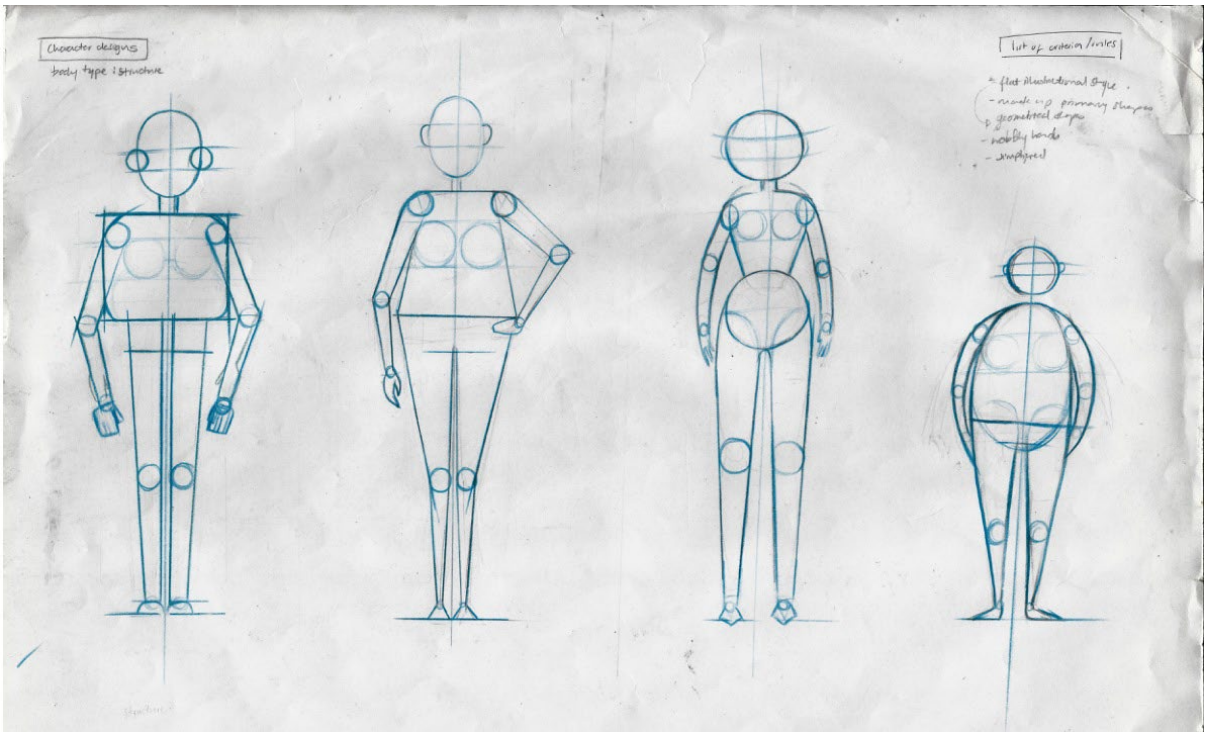

Image 23a: Character drawing and selecting suitable design elements to give the communication kit a visual form. Process work by researcher.

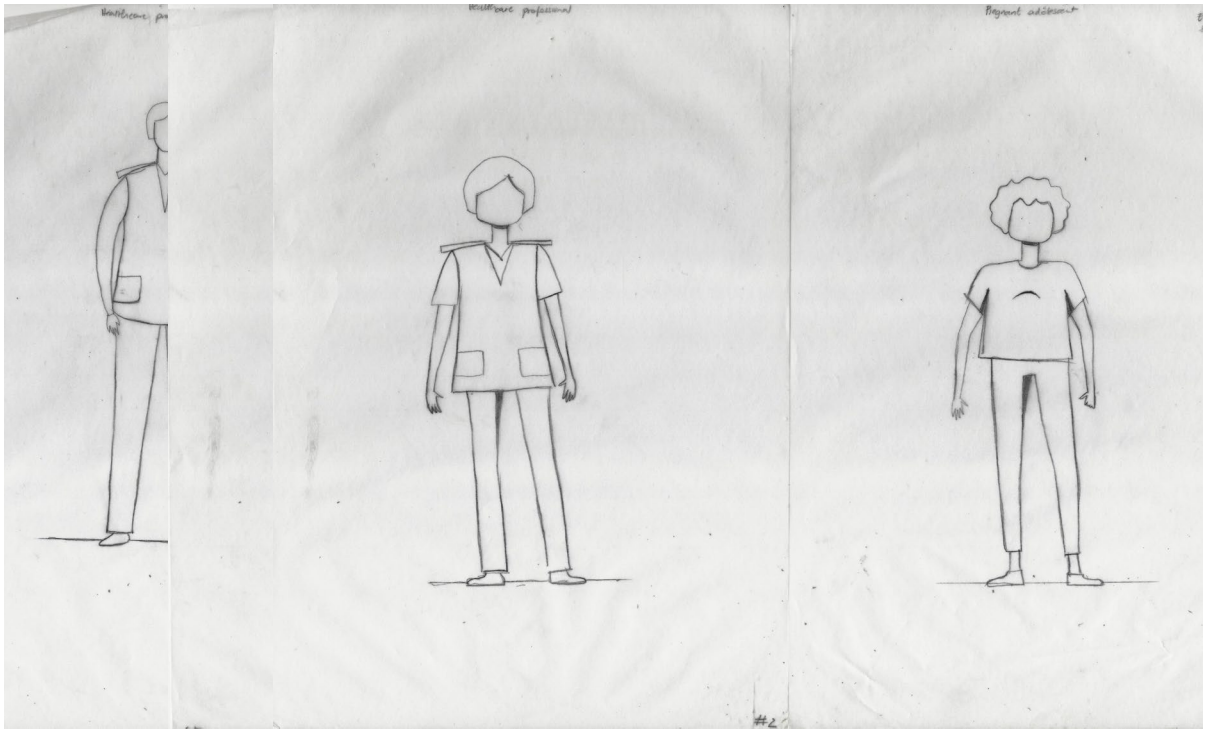

Image 24a: Character drawing and selecting suitable design elements to give the communication kit a visual form. Process work by researcher.

Image 25a: Character drawing and selecting suitable design elements to give the communication kit a visual form. Process work by researcher.

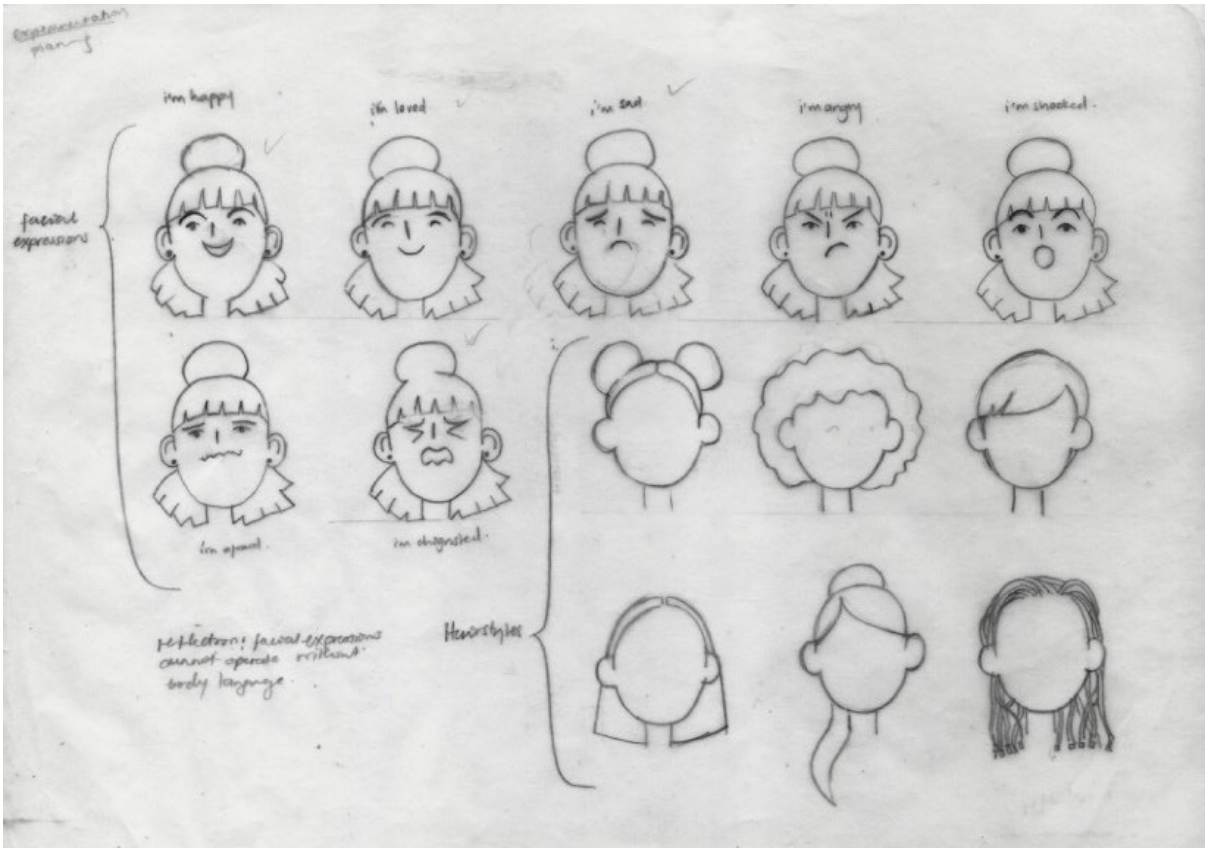

Image 26a: Character drawing and selecting suitable design elements to give the communication kit a visual form. Process work by researcher.

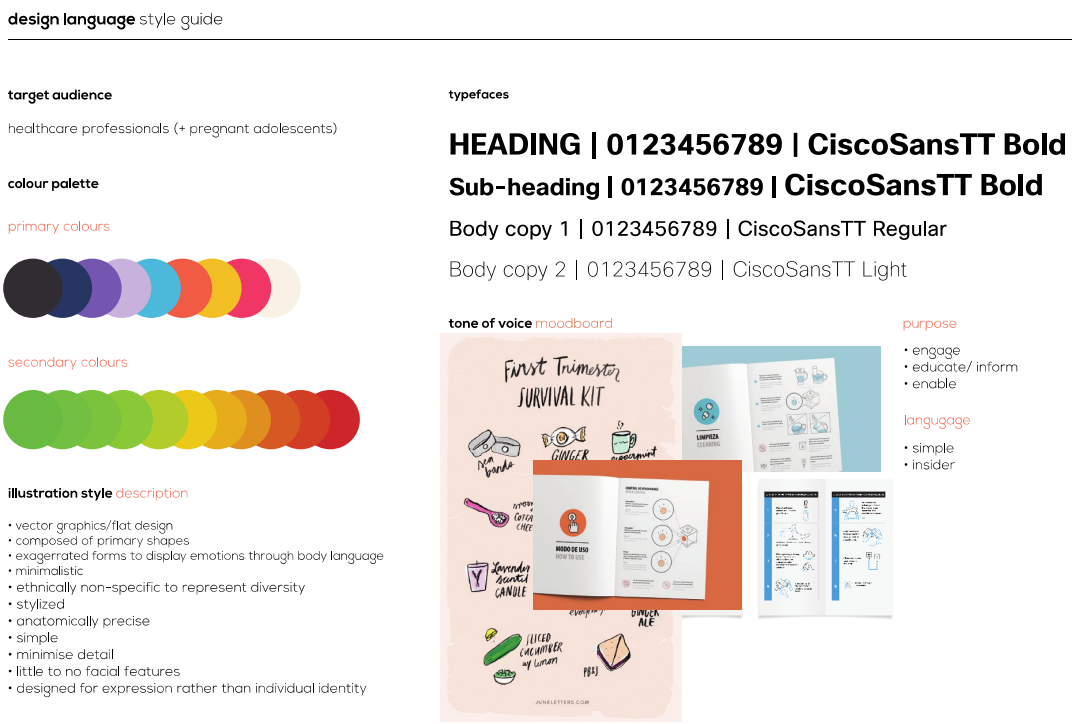

Image 27a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

Image 28a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

Image 29a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

Image 30a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

Image 31a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

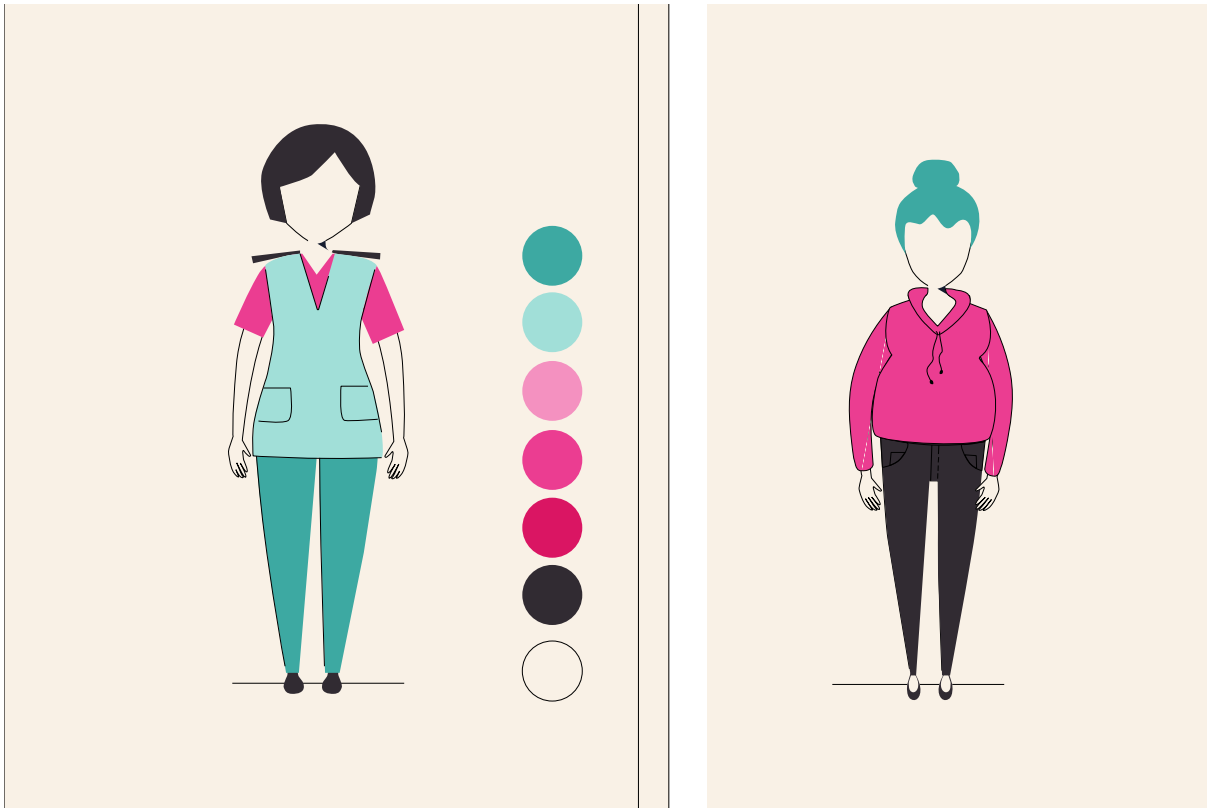

Image 32a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

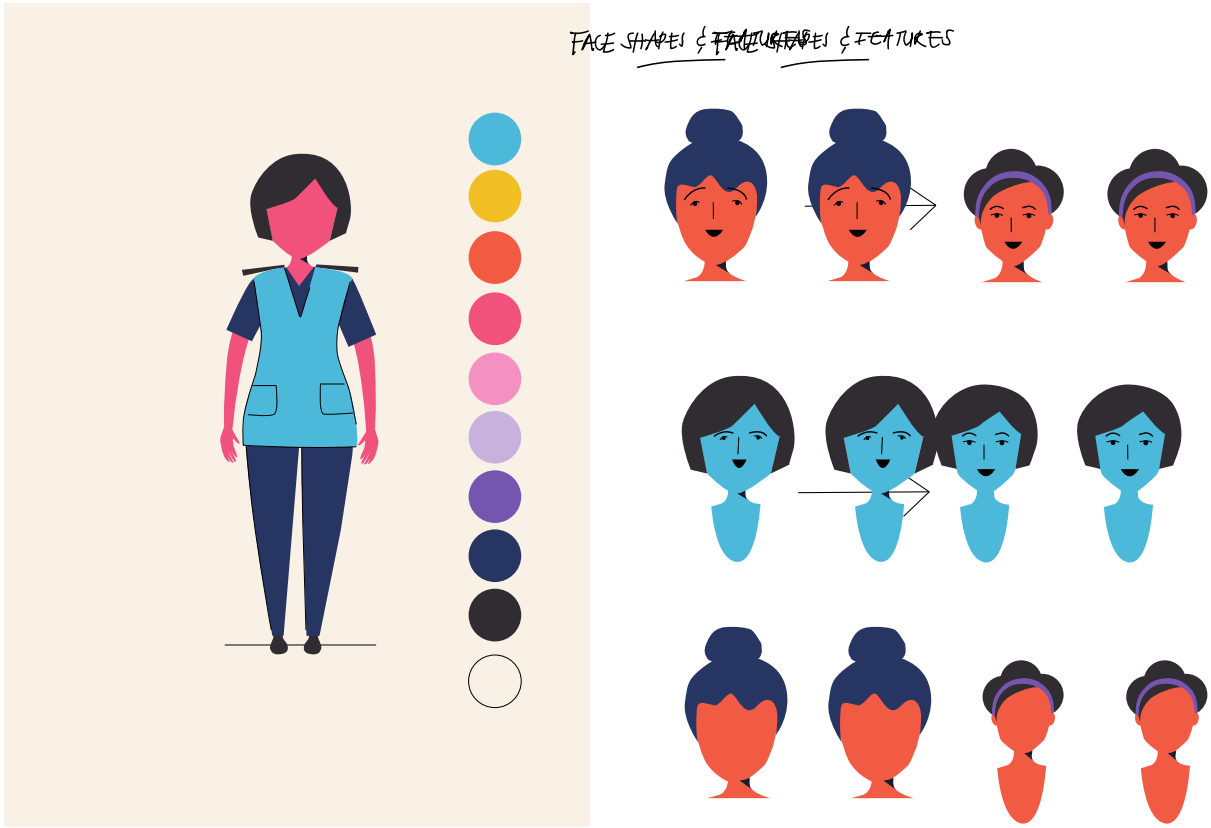

Image 33a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

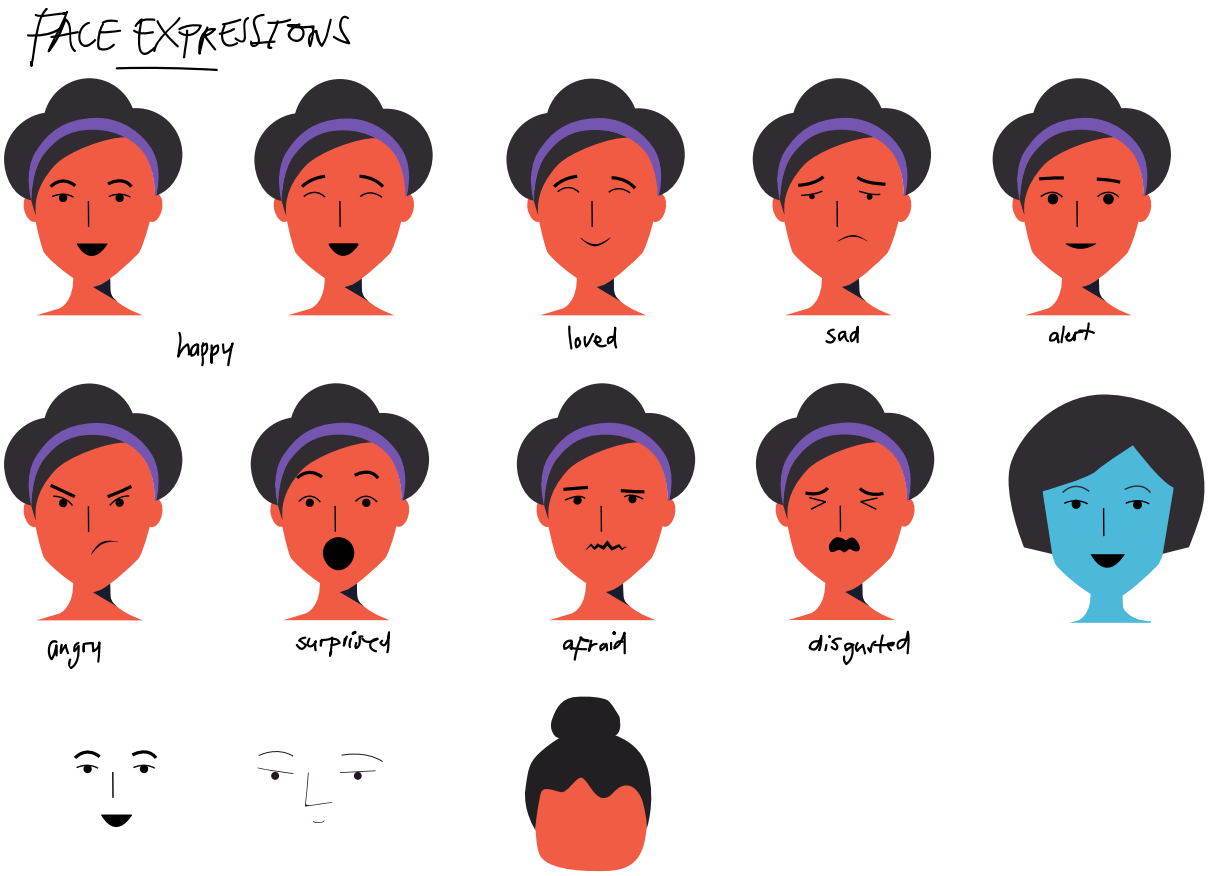

Image 34a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

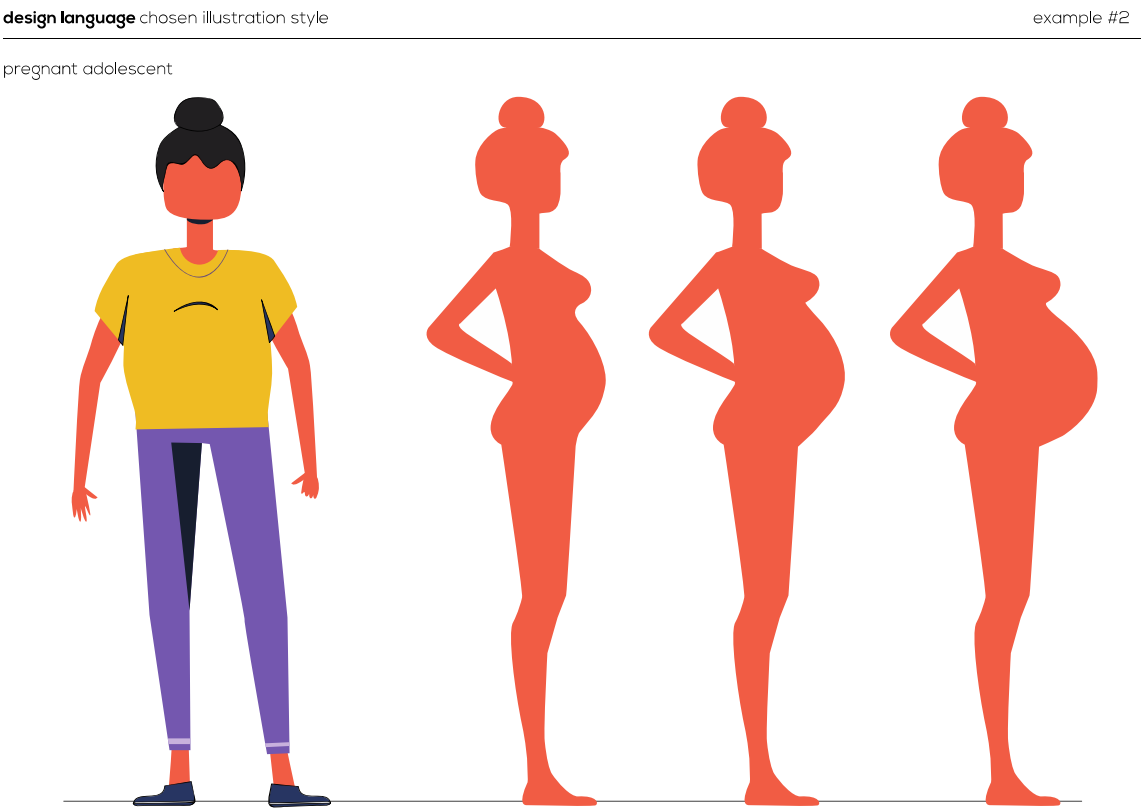

Image 35a: Exploring how ANC written content can be supported with the use of selected design elements and digital illustration. Process work by researcher.

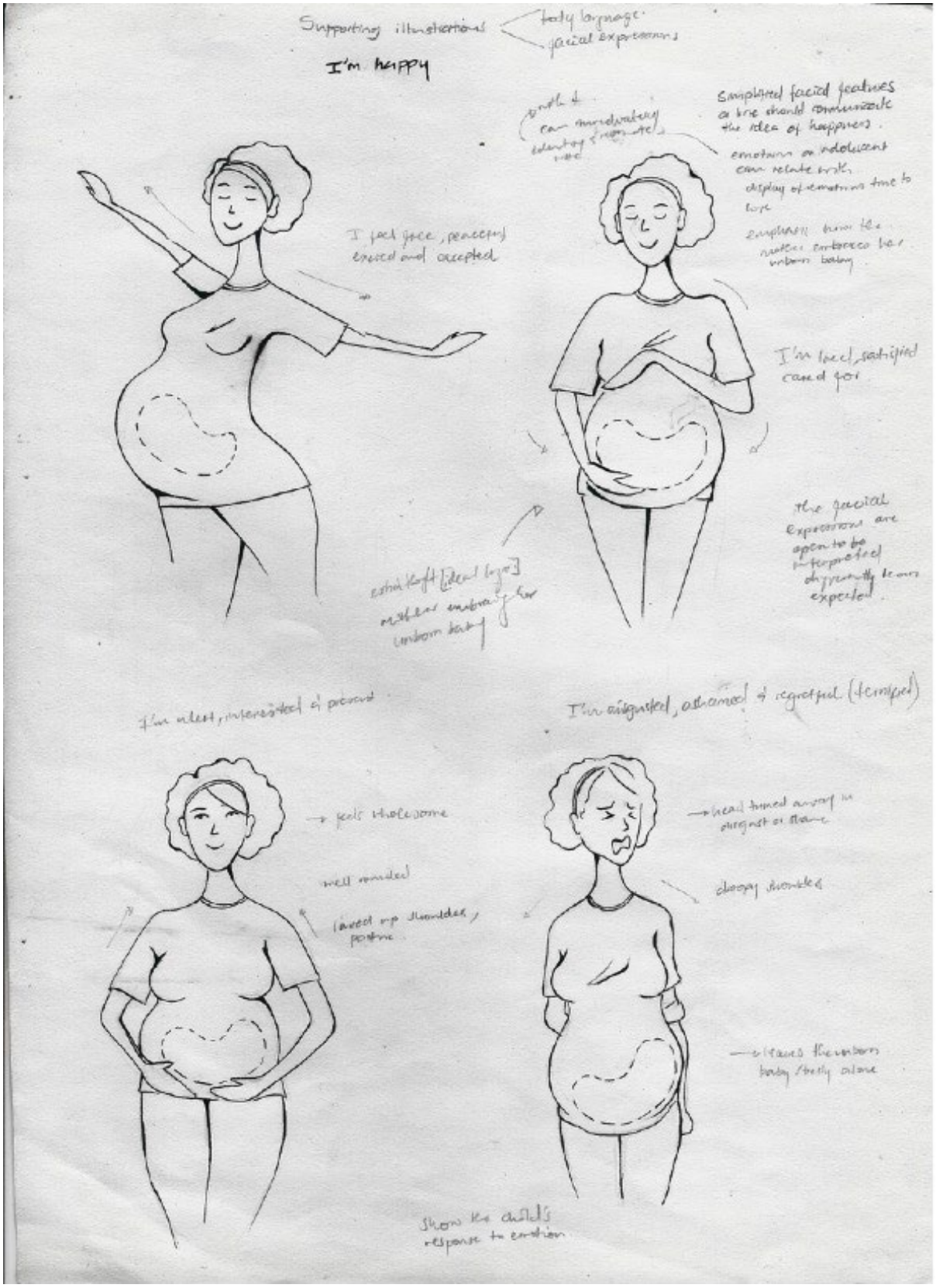

Image 36a: Exploring illustration styles and experimental drawings of the female body to represent a pregnant adolescent's gestures and facial expressions using pen and ink and mark-making techniques. Process work by researcher.

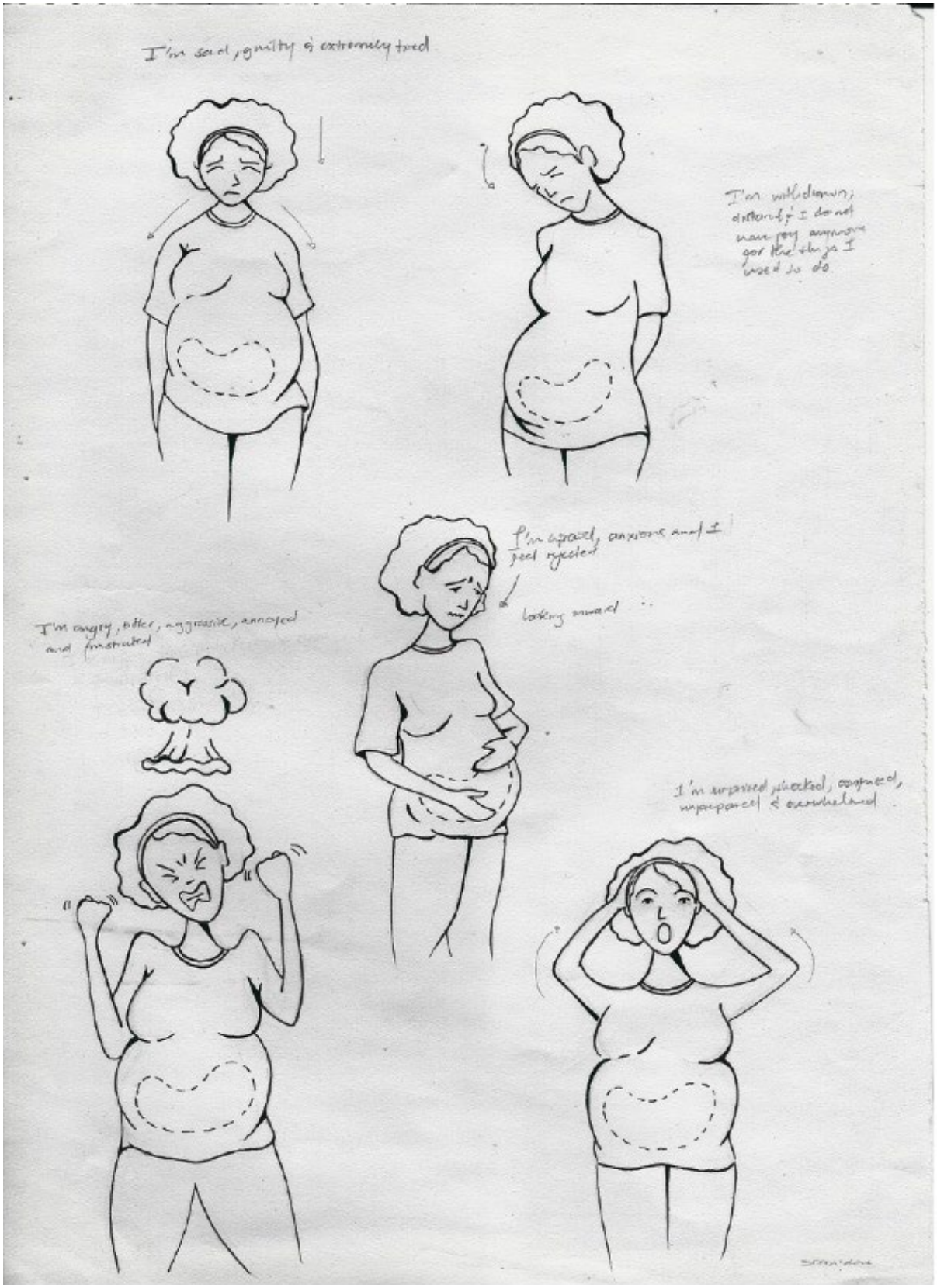

Image 37a: Exploring illustration styles and experimental drawings of the female body to represent a pregnant adolescent's gestures and facial expressions using pen and ink and mark-making techniques. Process work by researcher.

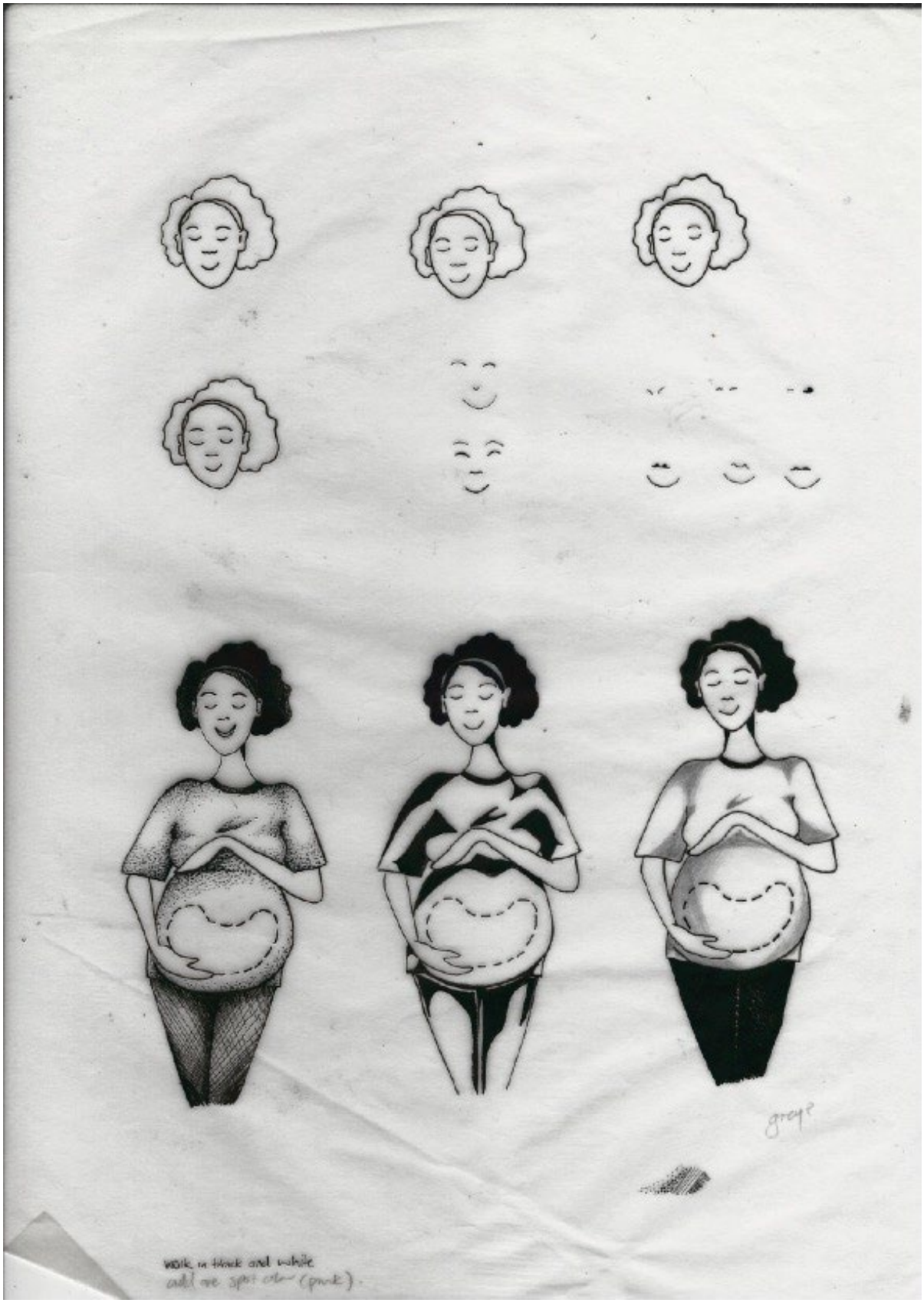

Image 38a: Exploring illustration styles and experimental drawings of the female body to represent a pregnant adolescent's gestures and facial expressions using pen and ink and mark-making techniques. Process work by researcher.

Image 39a: Exploring illustration styles and experimental drawings of the female body to represent a pregnant adolescent's gestures and facial expressions using pen and ink and mark-making techniques. Process work by researcher.

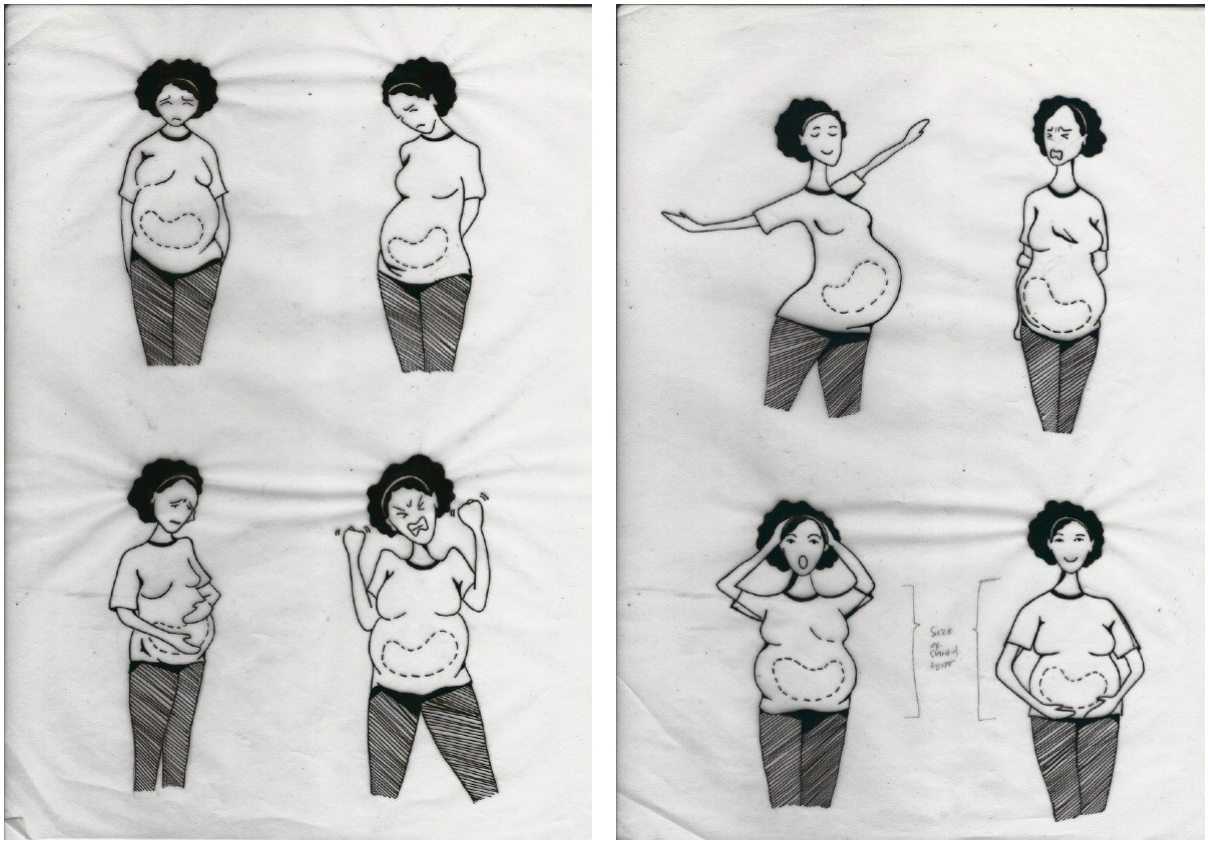

Image 40a: Exploring illustration styles and experimental drawings of the female body to represent a pregnant adolescent's gestures and facial expressions using pen and ink and mark-making techniques. Process work by researcher.

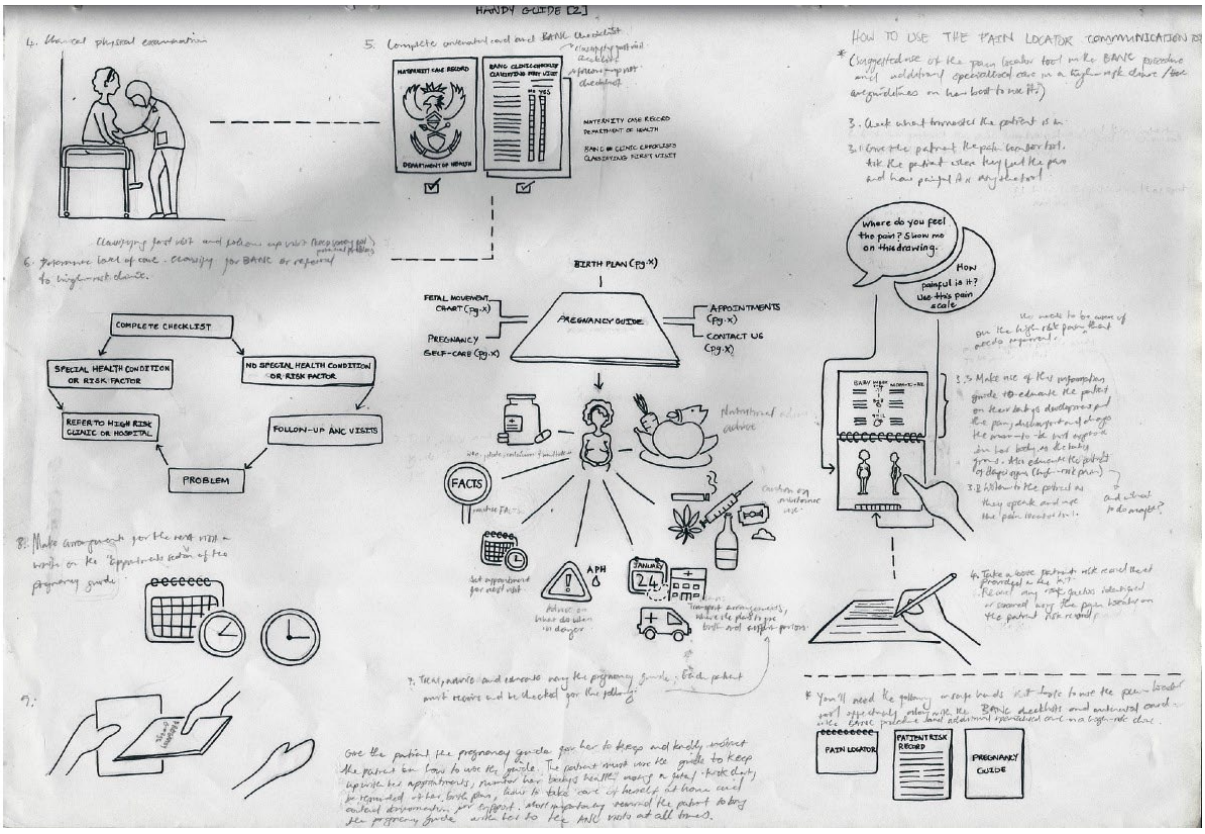

Image 41a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

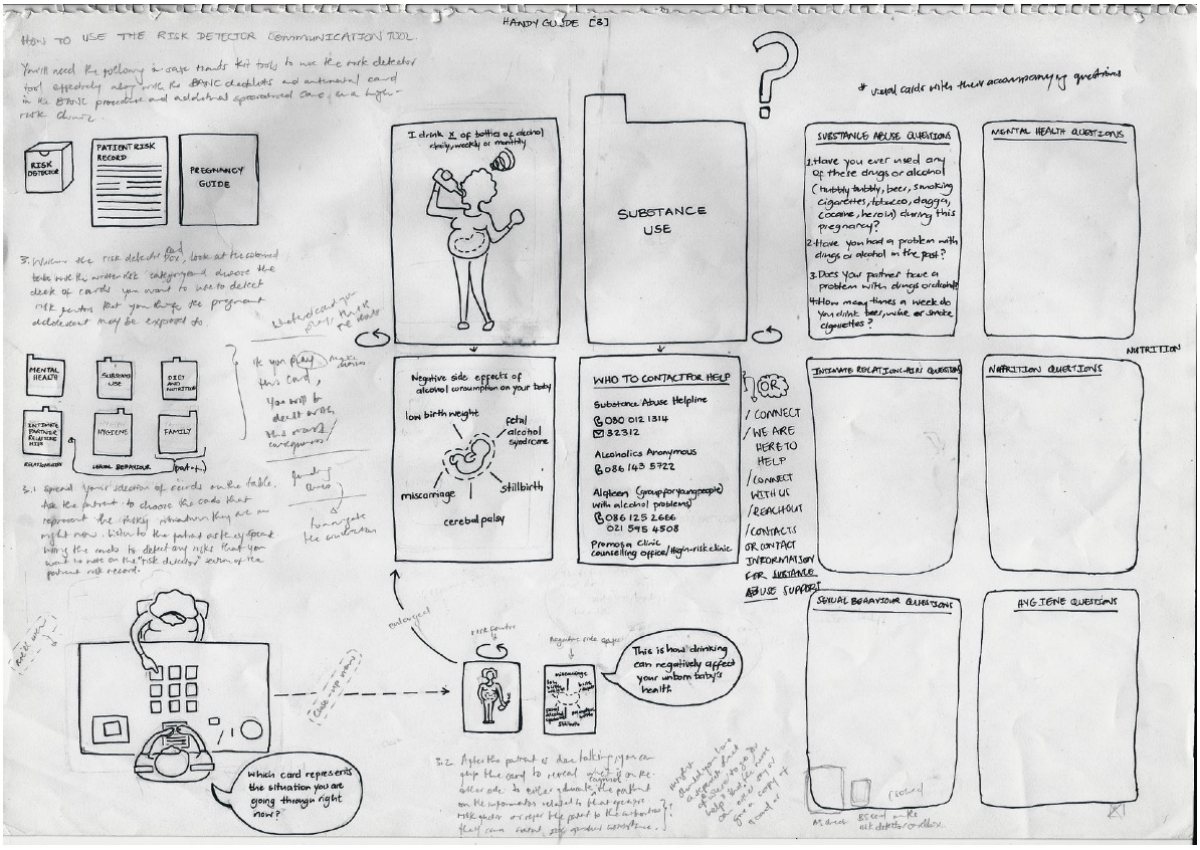

Image 42a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

Image 43a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

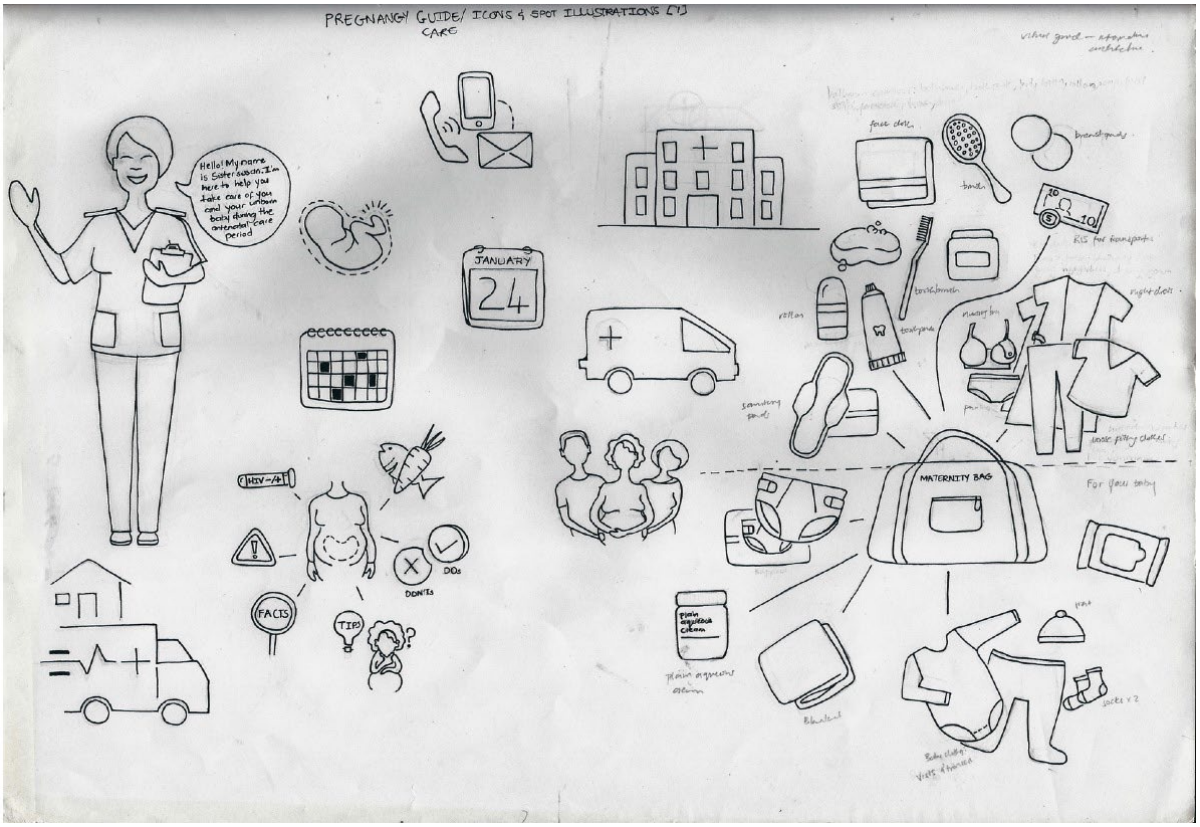

Image 44a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

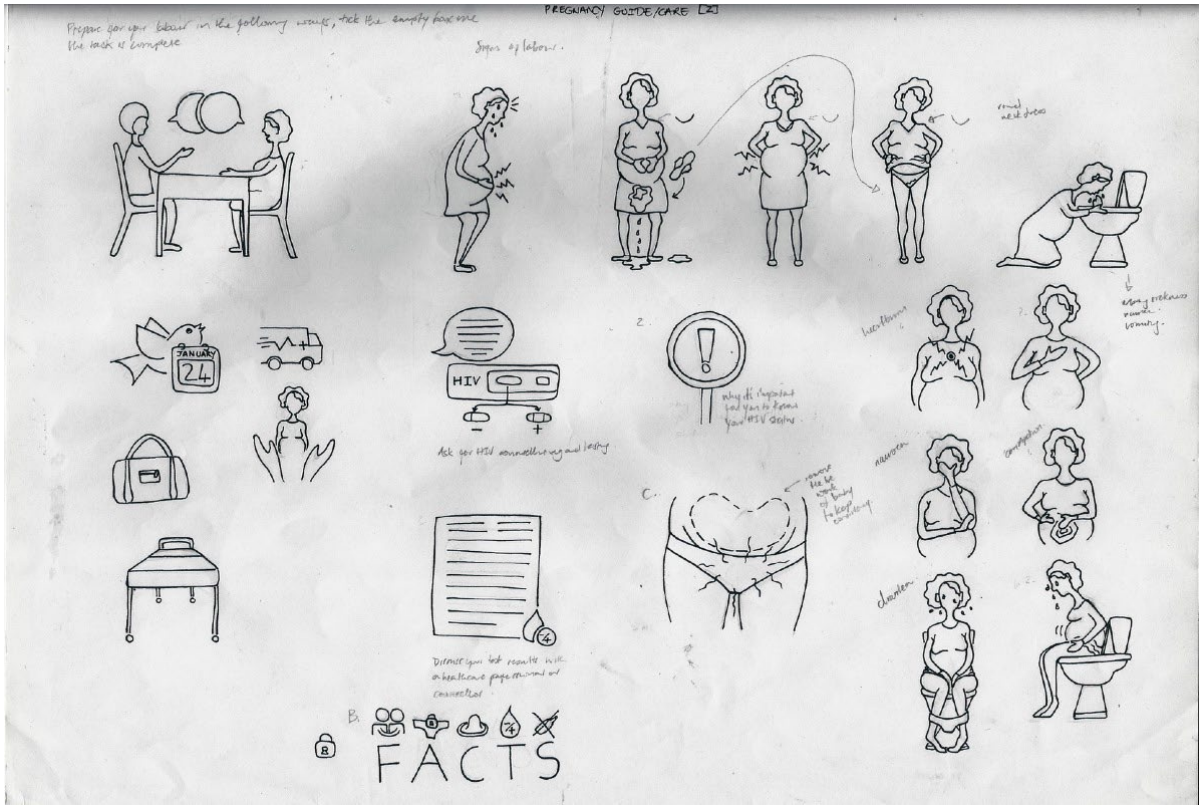

Image 45a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

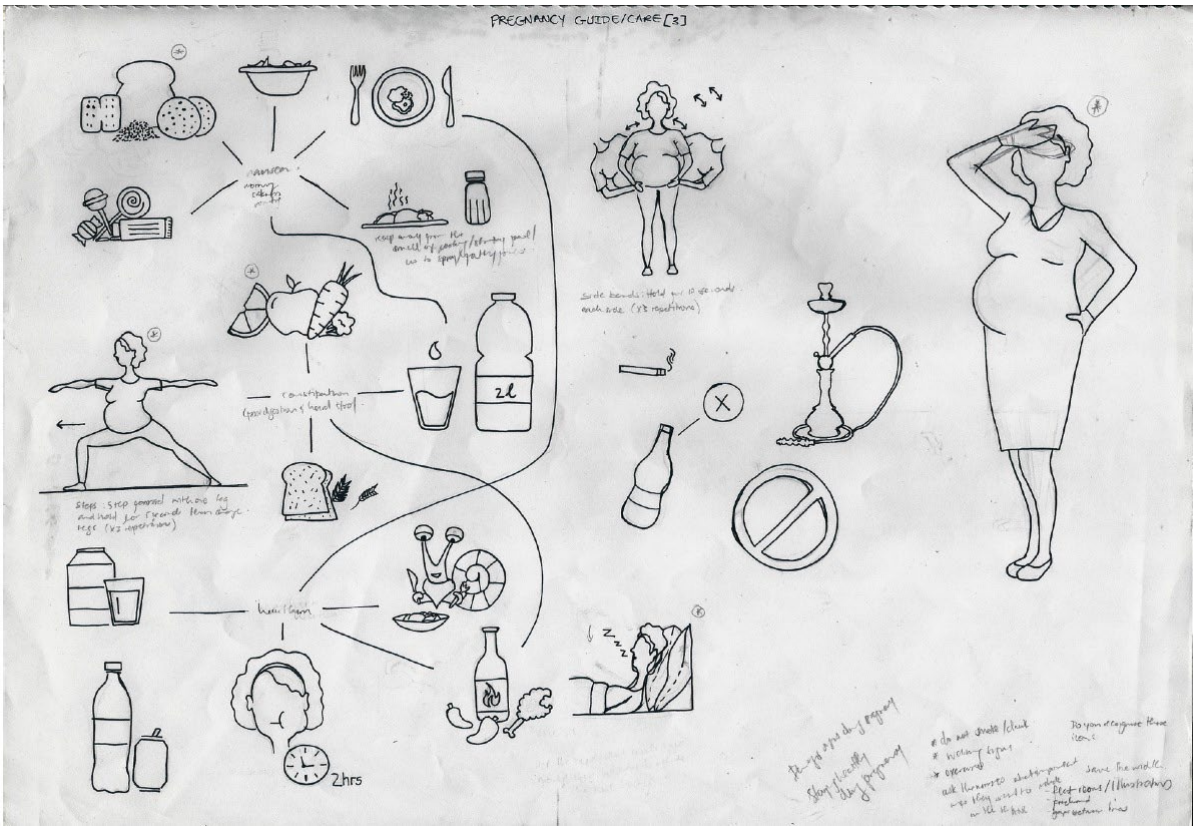

Image 46a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

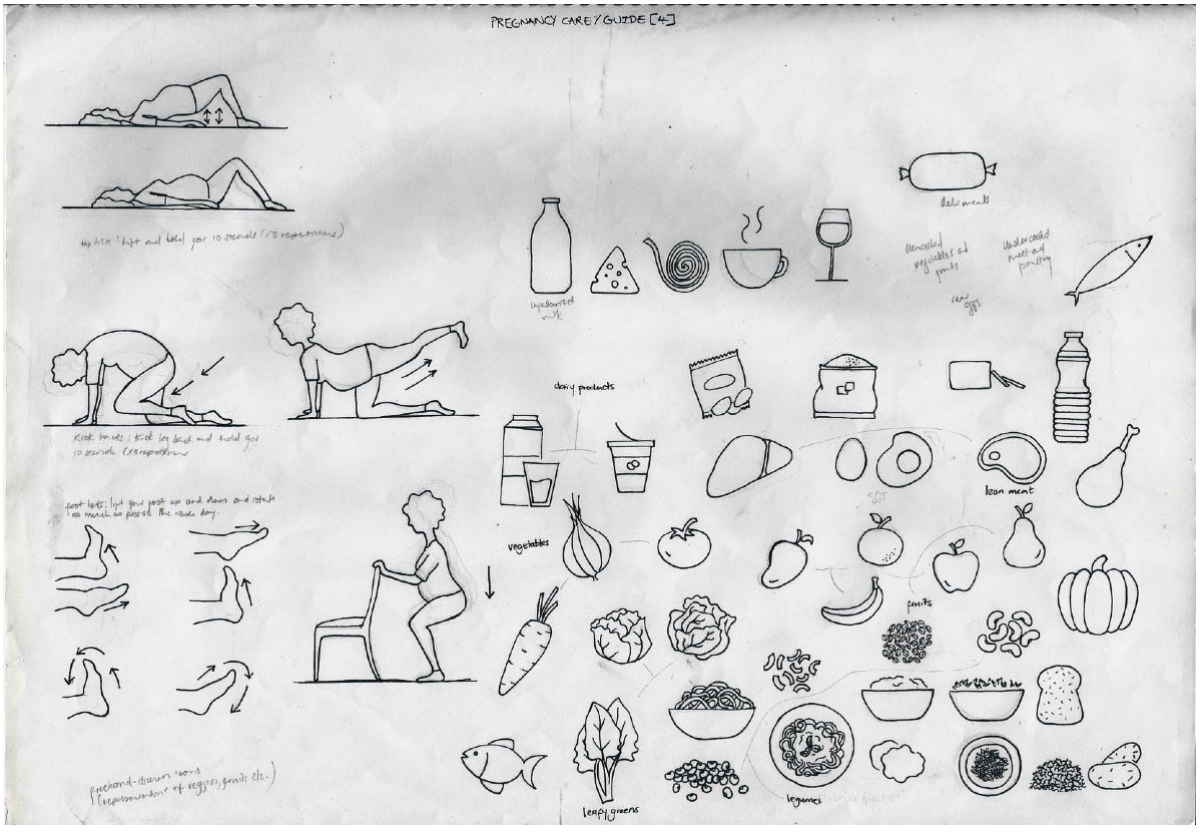

Image 47a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

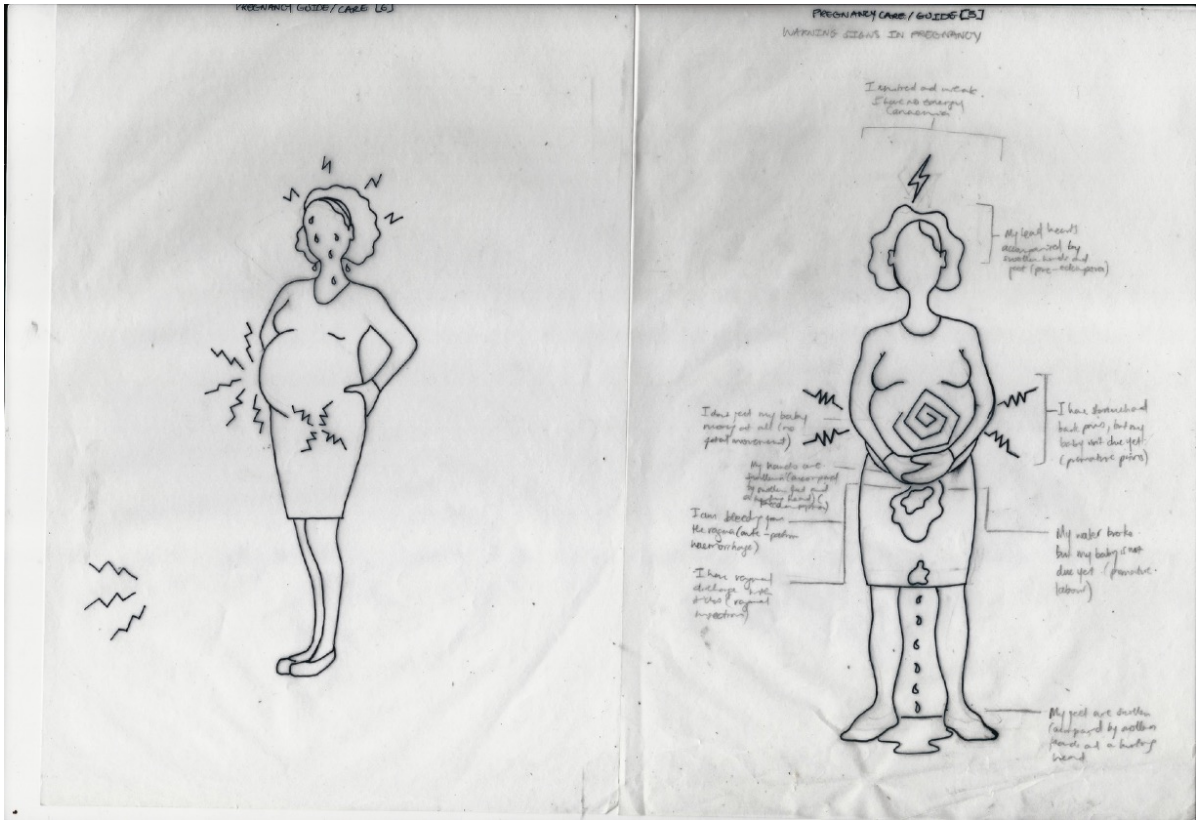

Image 48a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

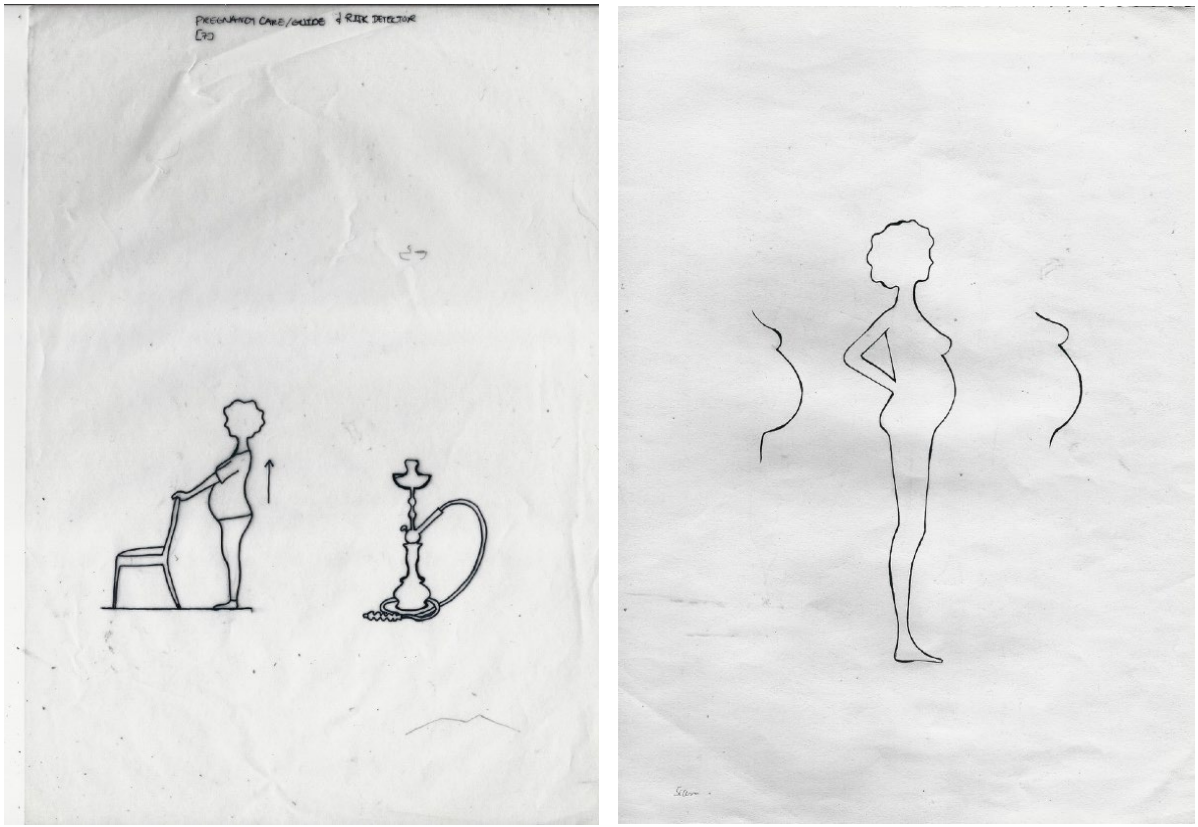

Image 49a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

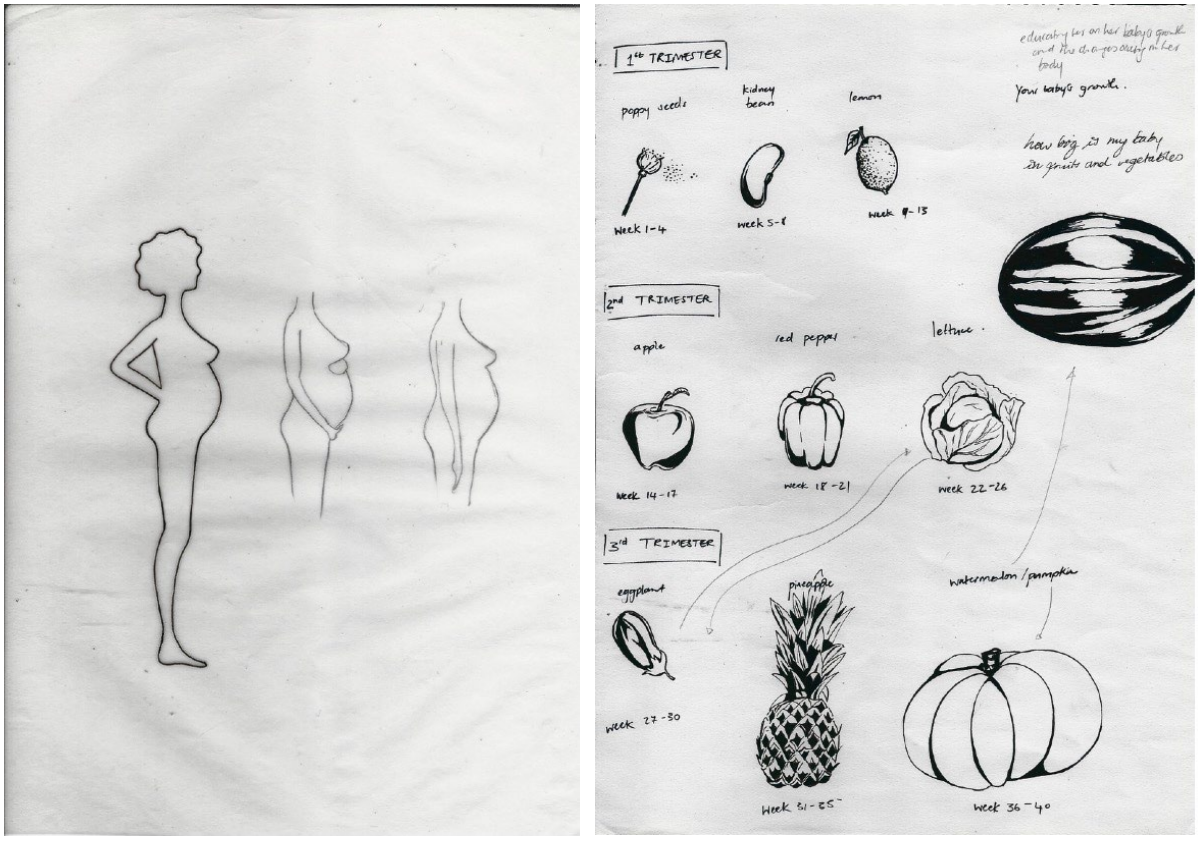

Image 50a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

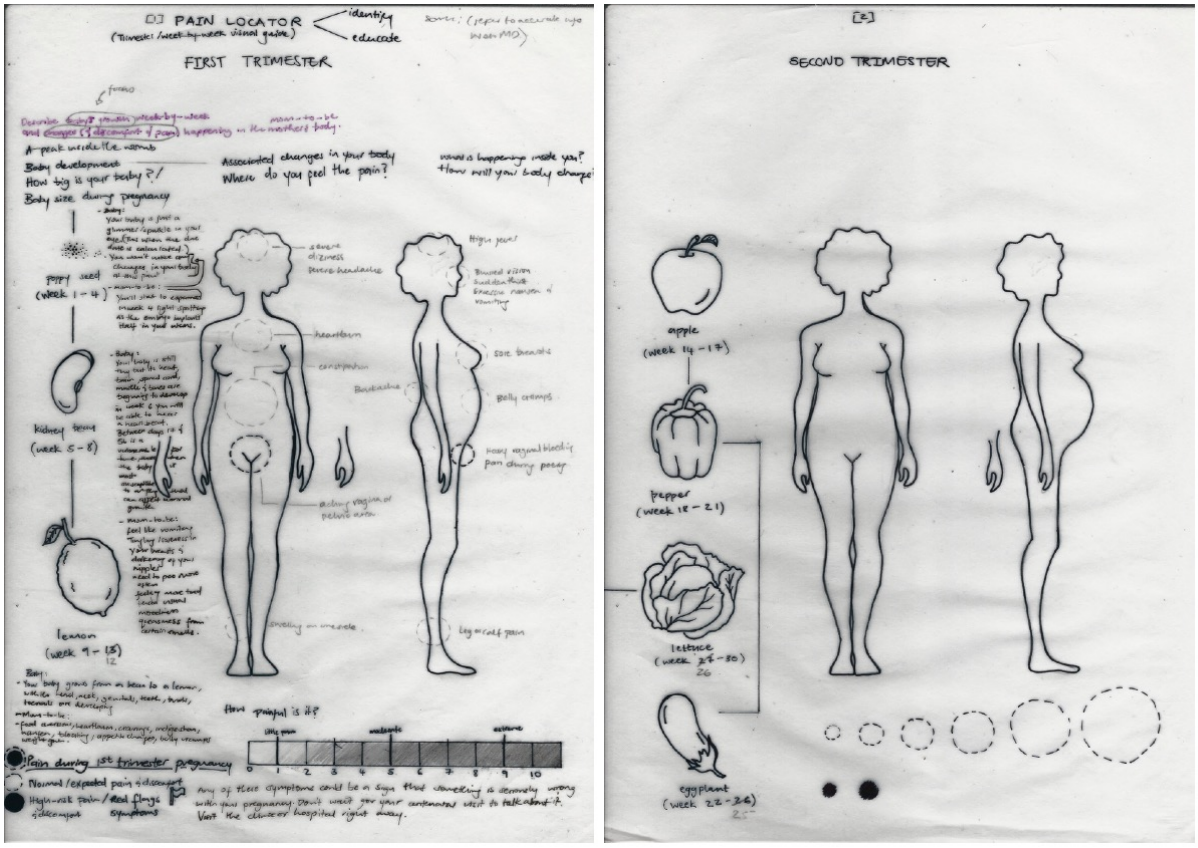

Image 51a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

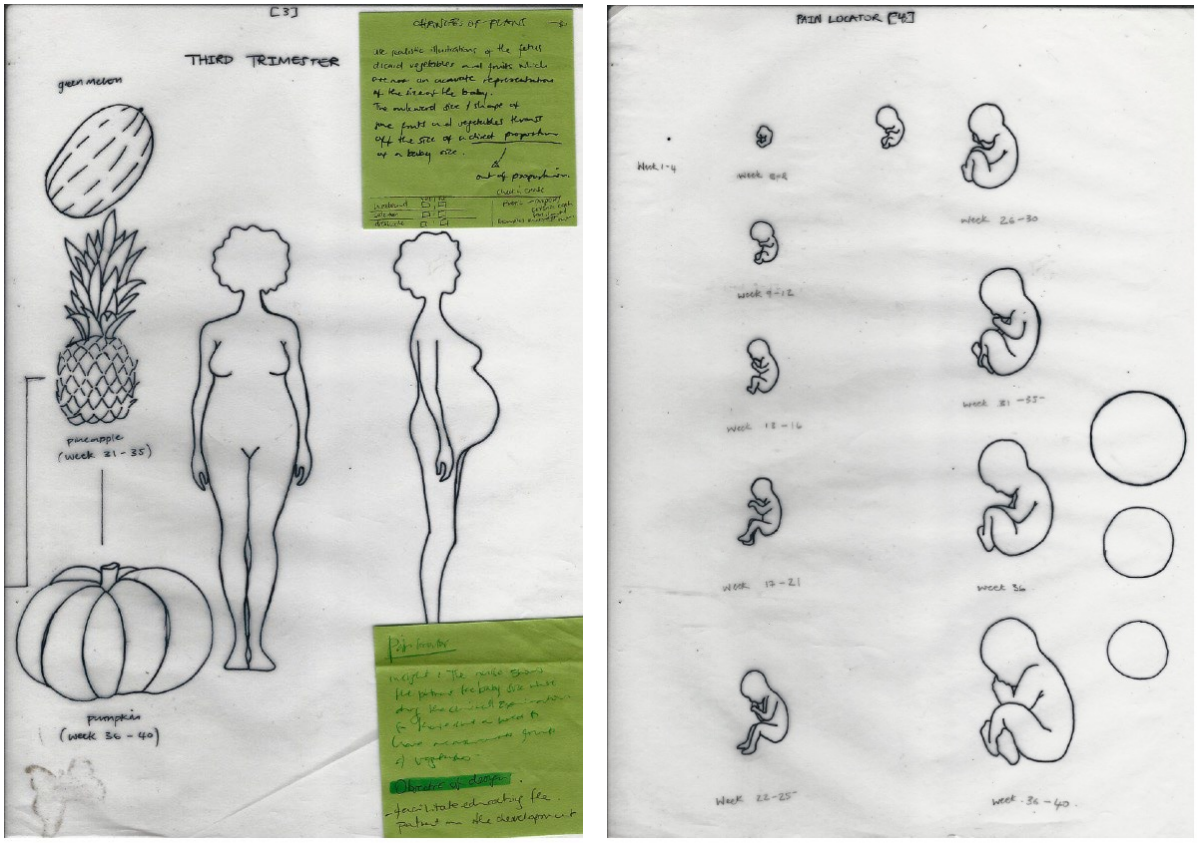

Image 52a: Supporting illustrations and icons on ANC text for communication tools. Process work by researcher.

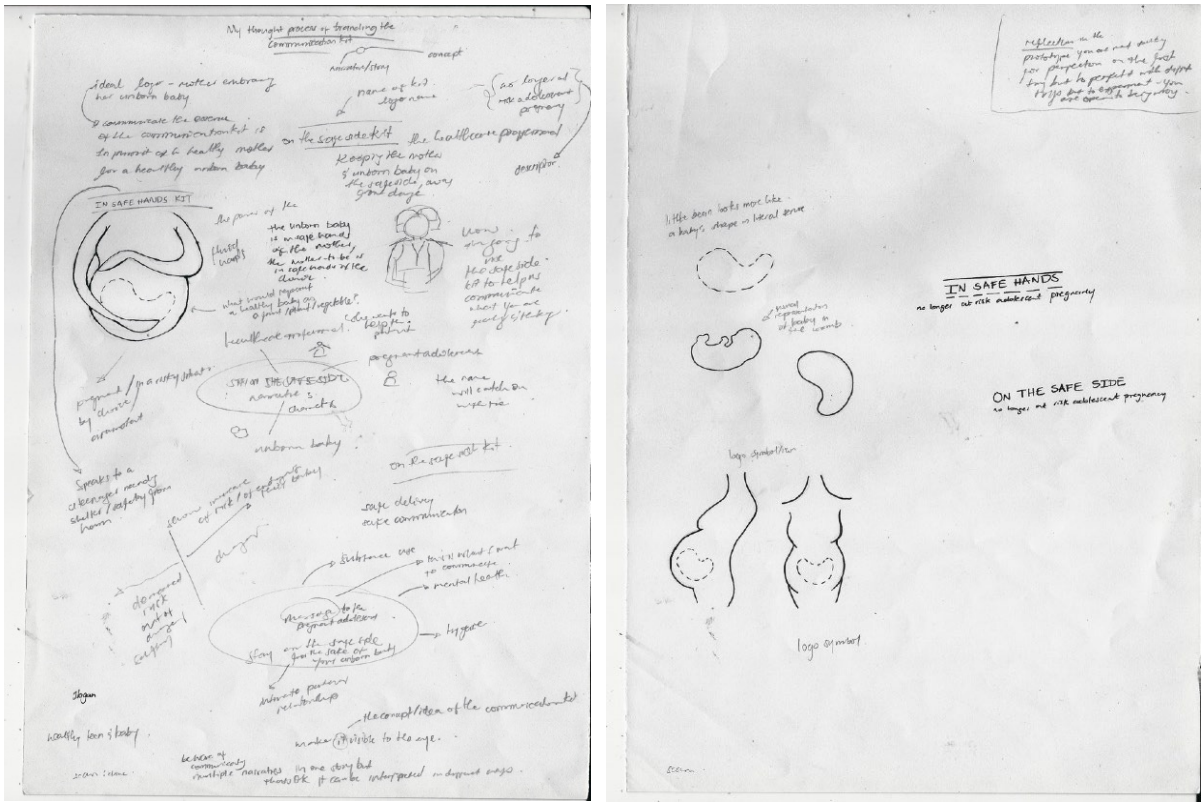

Image 53a: Exploring through a Mindmapping technique the communication kit's preliminary brand identity, names, slogans, and sketching and developing logo possibilities. Process work by researcher.

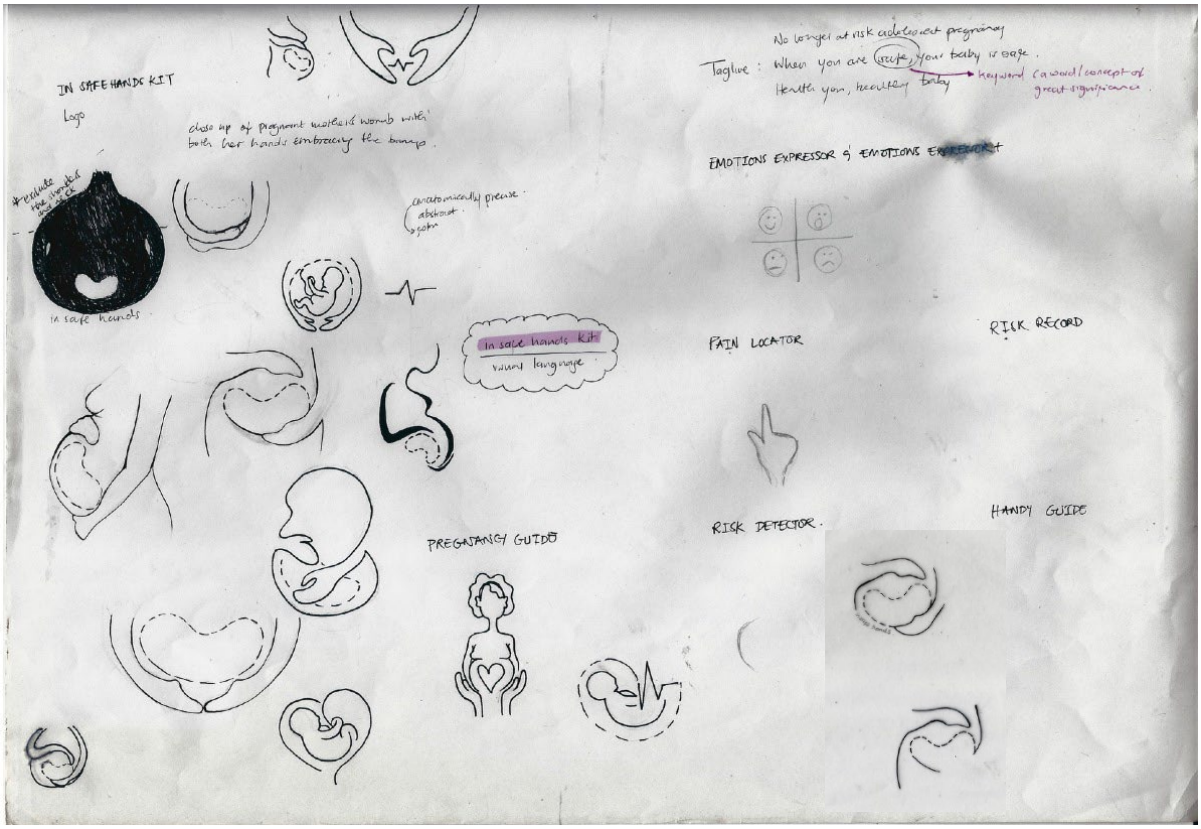

Image 54a: Exploring through a Mindmapping technique the communication kit's preliminary brand identity, names, slogans, and sketching and developing logo possibilities. Process work by researcher.

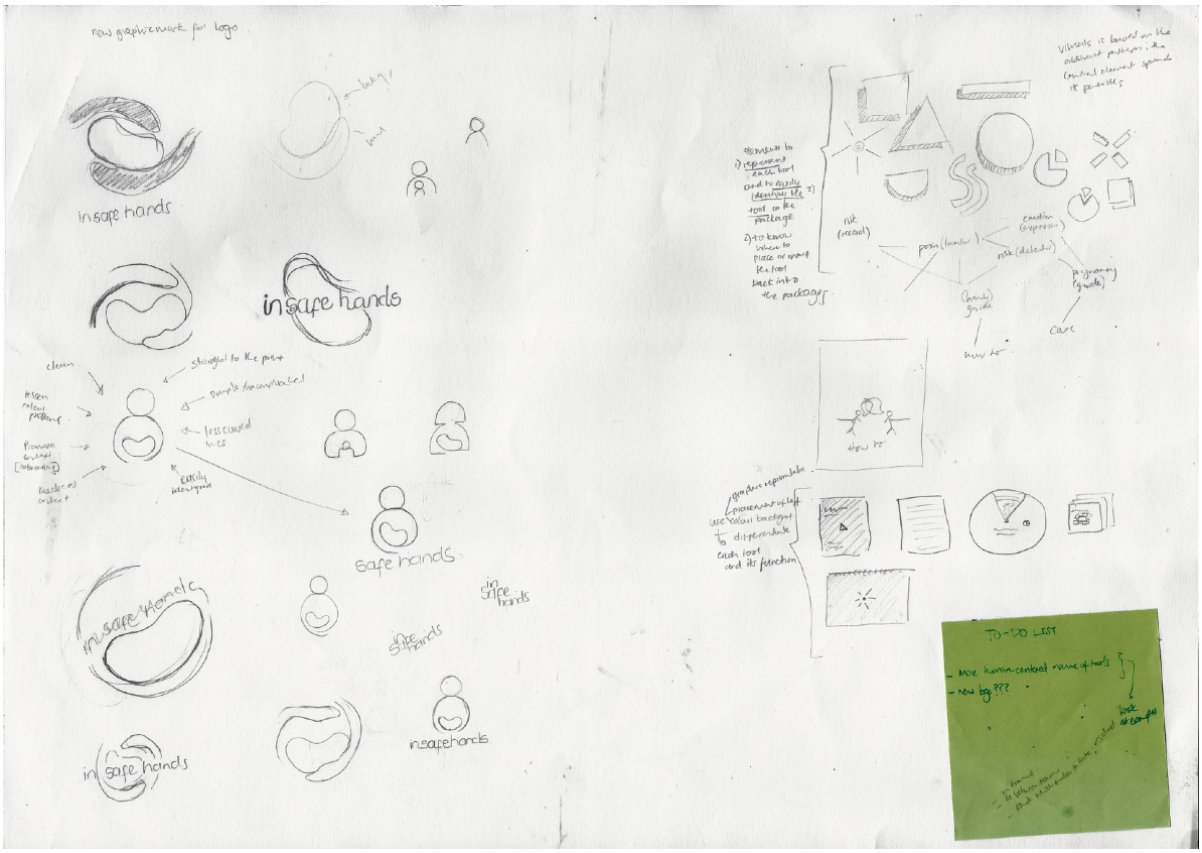

Image 55a: Exploring through a Mindmapping technique the communication kit's preliminary brand identity, names, slogans, and sketching and developing logo possibilities. Process work by researcher.

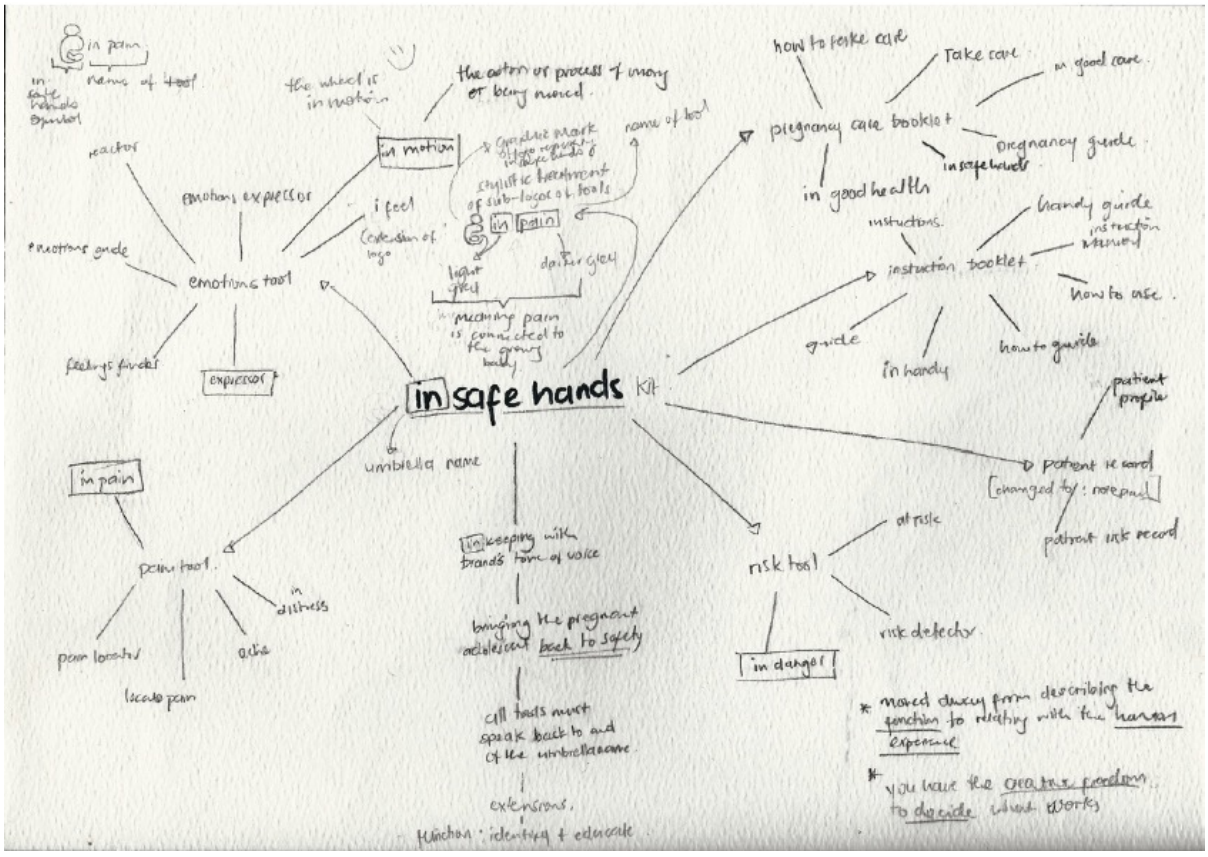

Image 56a: Exploring through a Mindmapping technique the communication kit's preliminary brand identity, names, slogans, and sketching and developing logo possibilities. Process work by researcher.

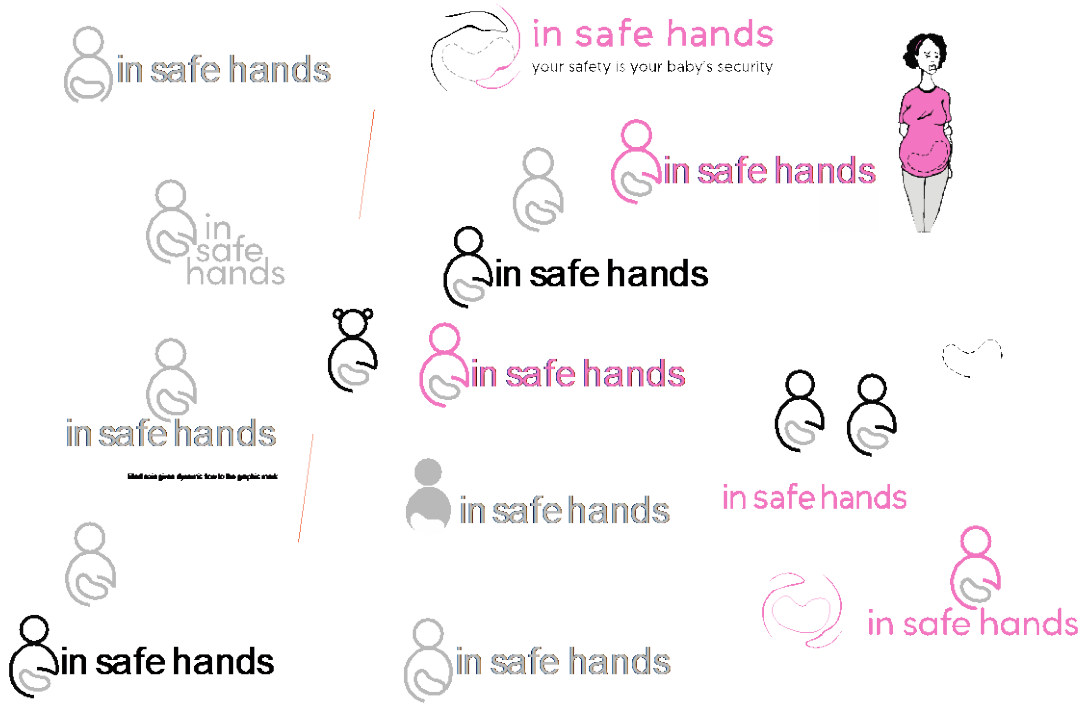

Image 57a: Digital refinement of logo design, selection of colours and illustration style exploration in Adobe illustrator towards a design language. Process work by researcher.

Image 58a: Digital refinement of logo design, selection of colours and illustration style exploration in Adobe illustrator towards a design language. Process work by researcher.

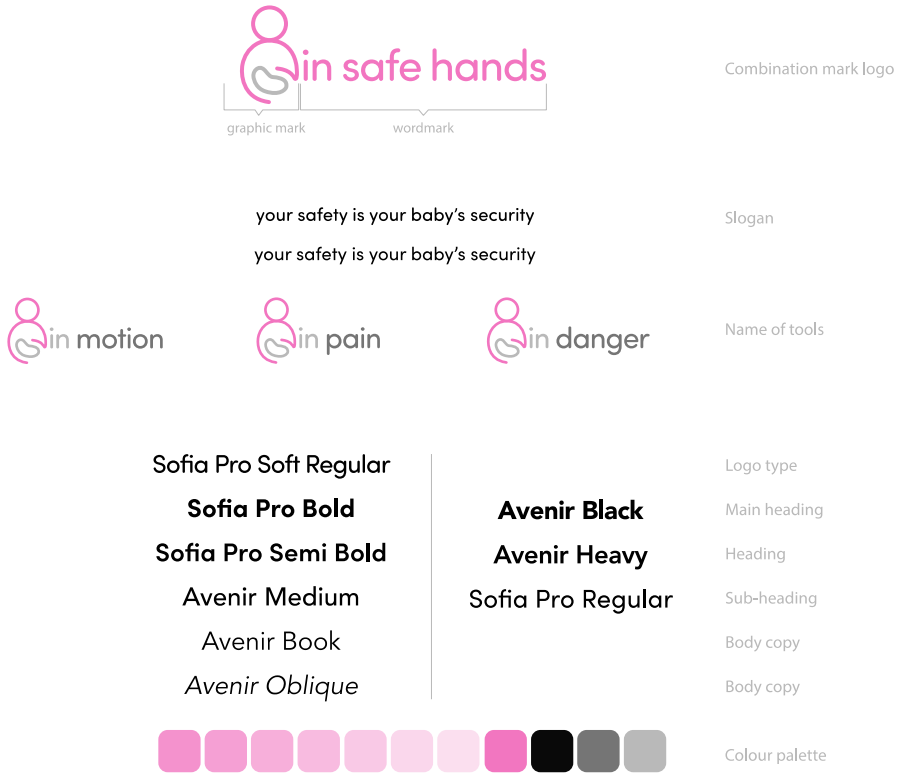

Image 59a: Digital refinement of logo design, selection of colours and illustration style exploration in Adobe illustrator towards a design language. Process work by researcher.

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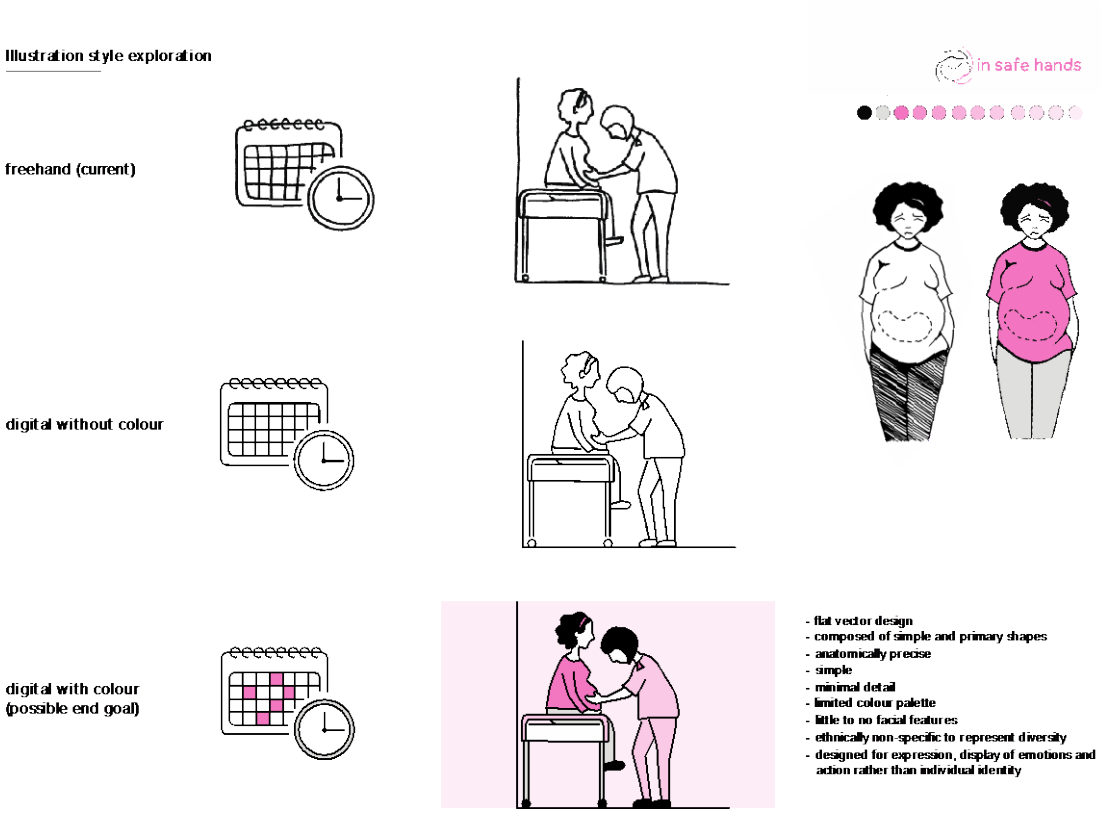

Image 61a: Digital refinement of logo design, selection of colours and illustration style exploration in Adobe illustrator towards a design language. Process work by researcher.

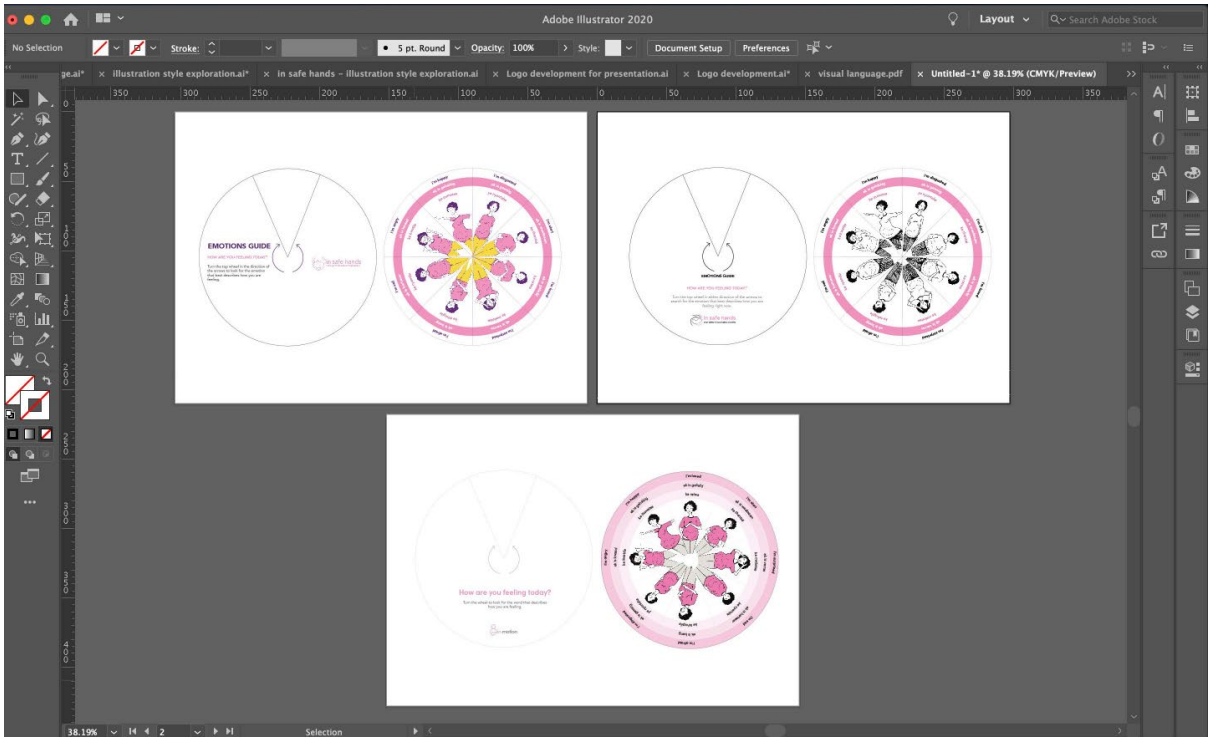

Image 62a: Digital refinement of logo design, selection of colours and illustration style exploration in Adobe illustrator towards a design language. Process work by researcher.

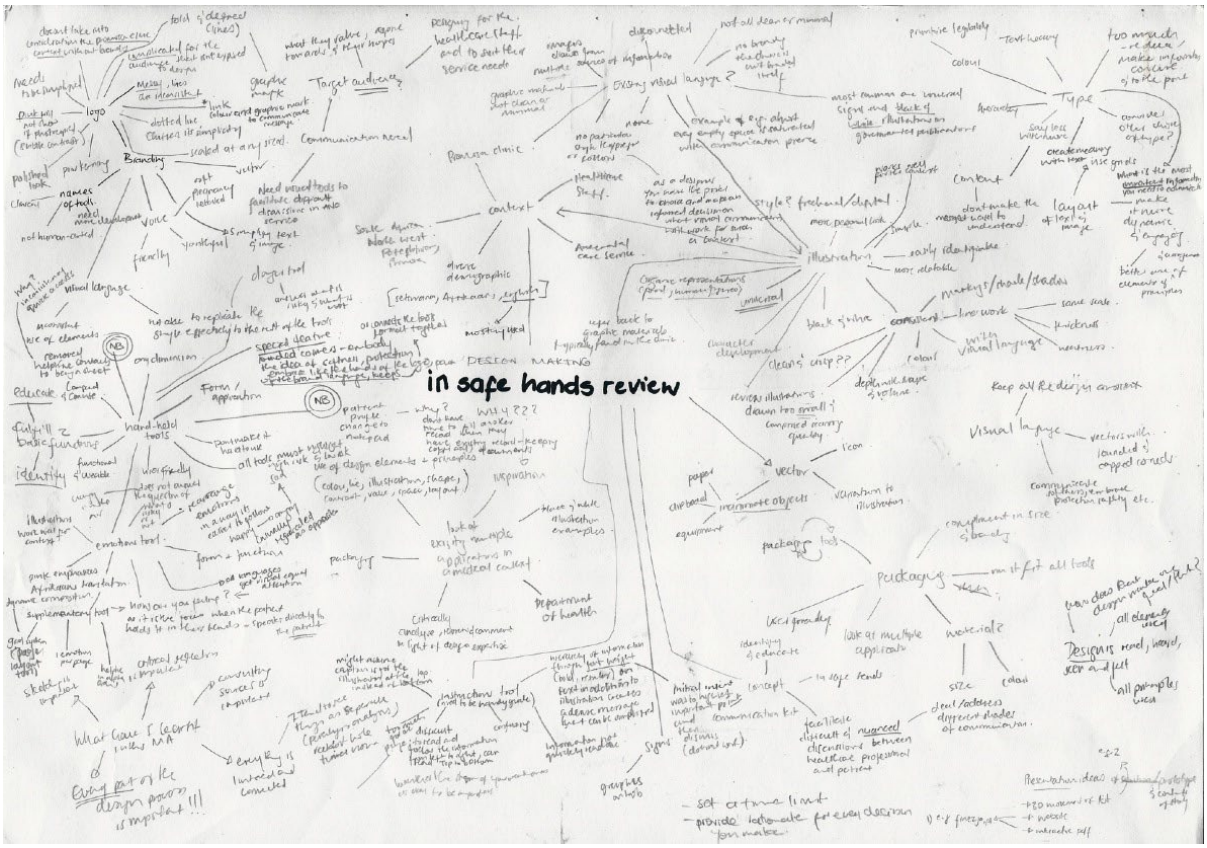

Image 63a: A visual audit and plan on how to refine the final prototype with additional elements and principles. Process work by researcher.

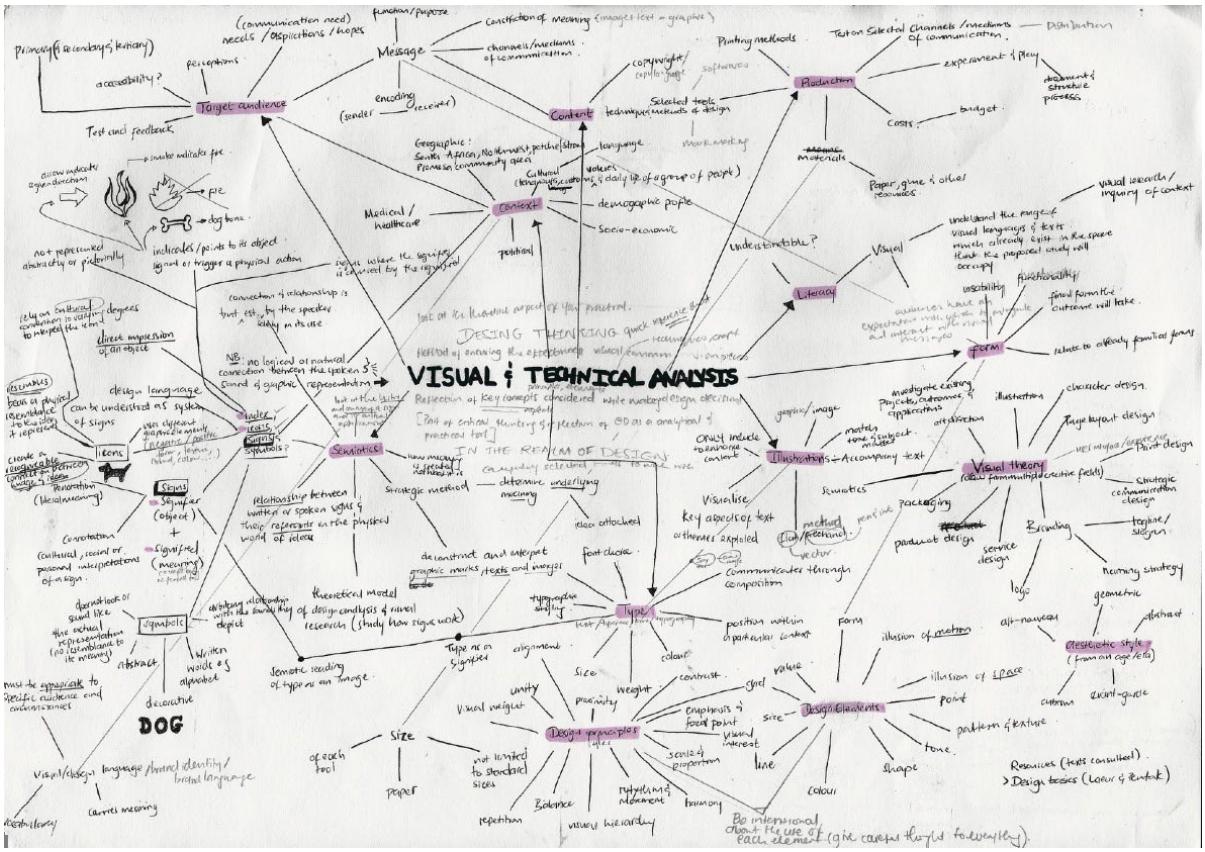

Image 64a: A visual audit and plan on how to refine the final prototype with additional elements and principles. Process work by researcher.

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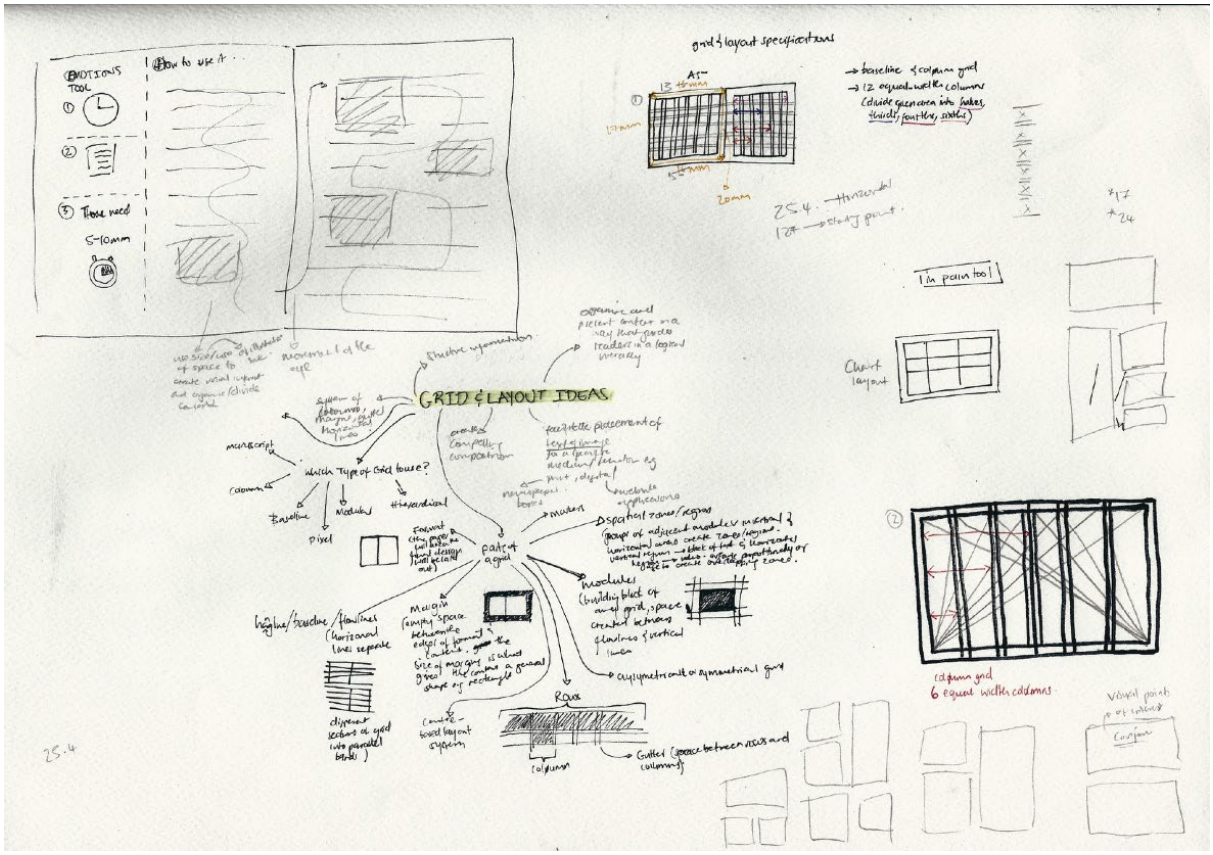

Image 66a: A visual audit and plan on how to refine the final prototype with additional elements and principles. Process work by researcher.

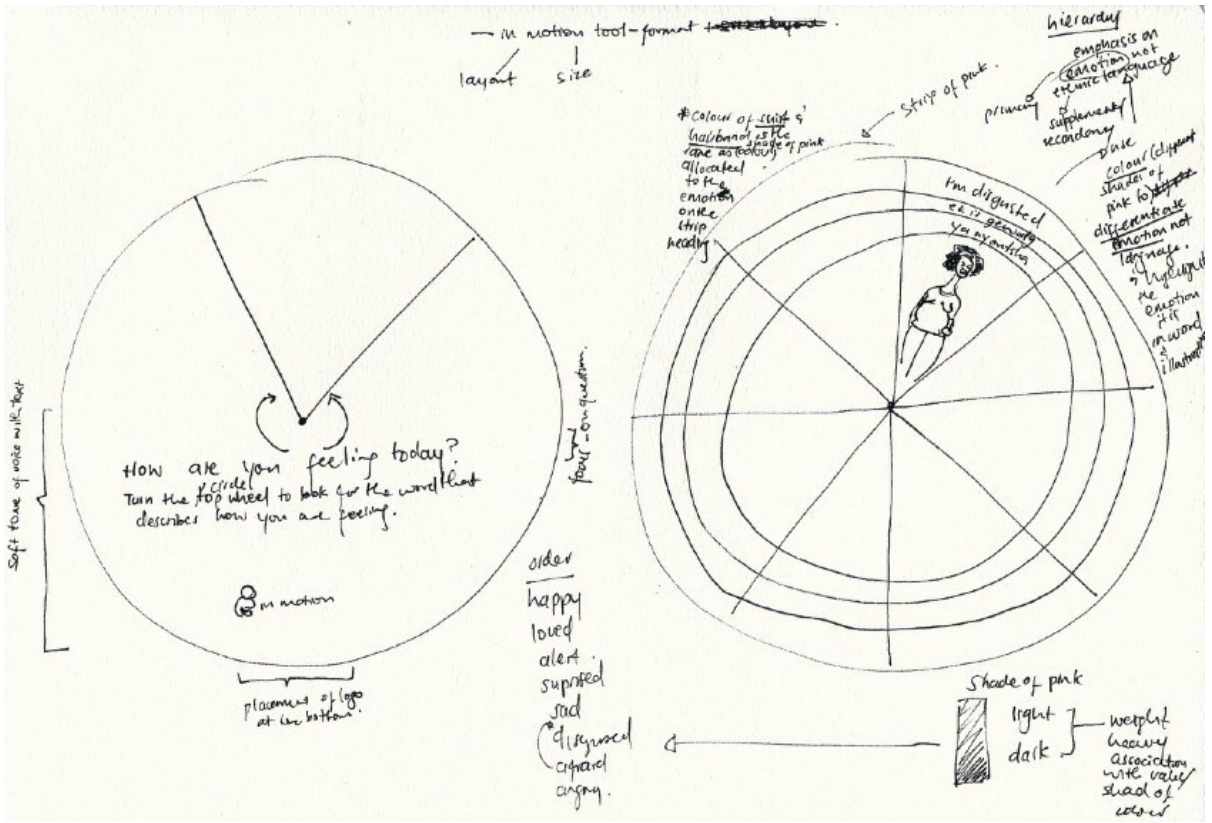

Image 67a: A visual audit and plan on how to refine the final prototype with additional elements and principles. Process work by researcher.

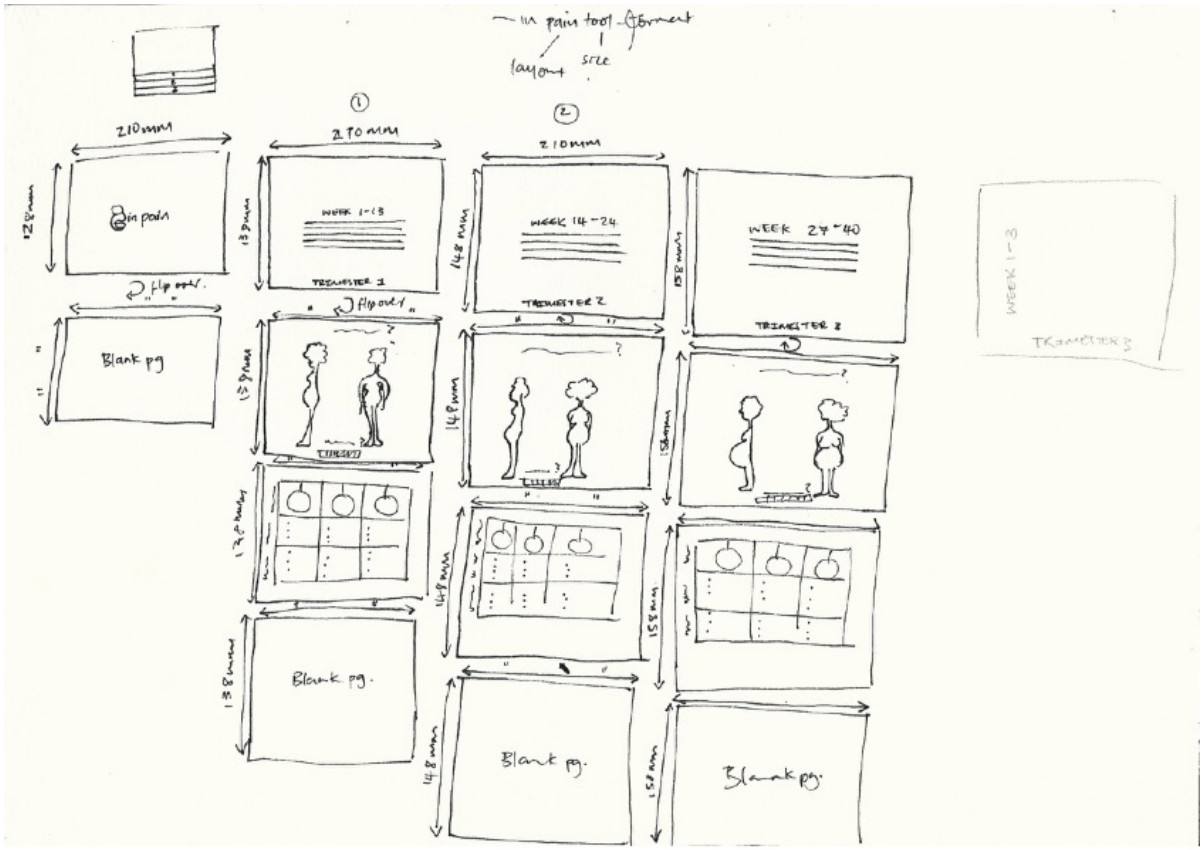

Image 68a: A visual audit and plan on how to refine the final prototype with additional elements and principles. Process work by researcher.

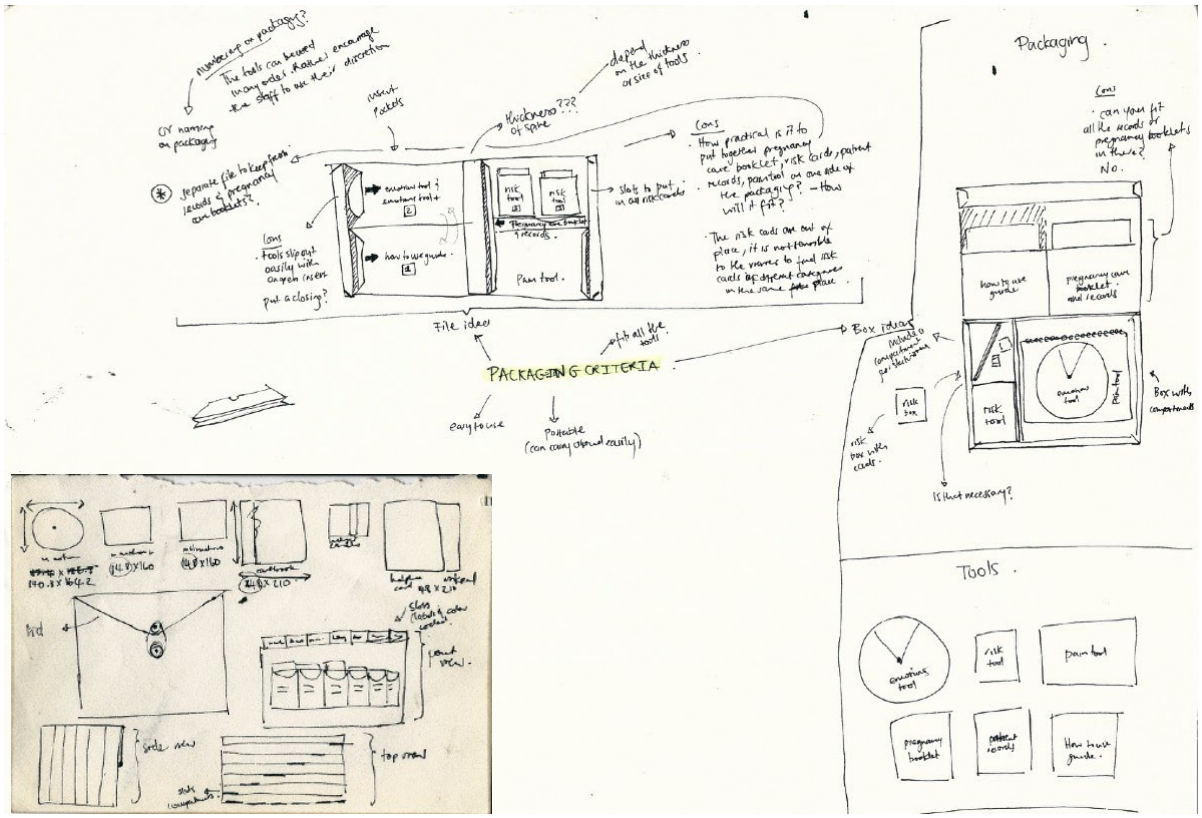

Image 69a: A visual audit and plan on how to refine the final prototype with additional elements and principles. Process work by researcher.

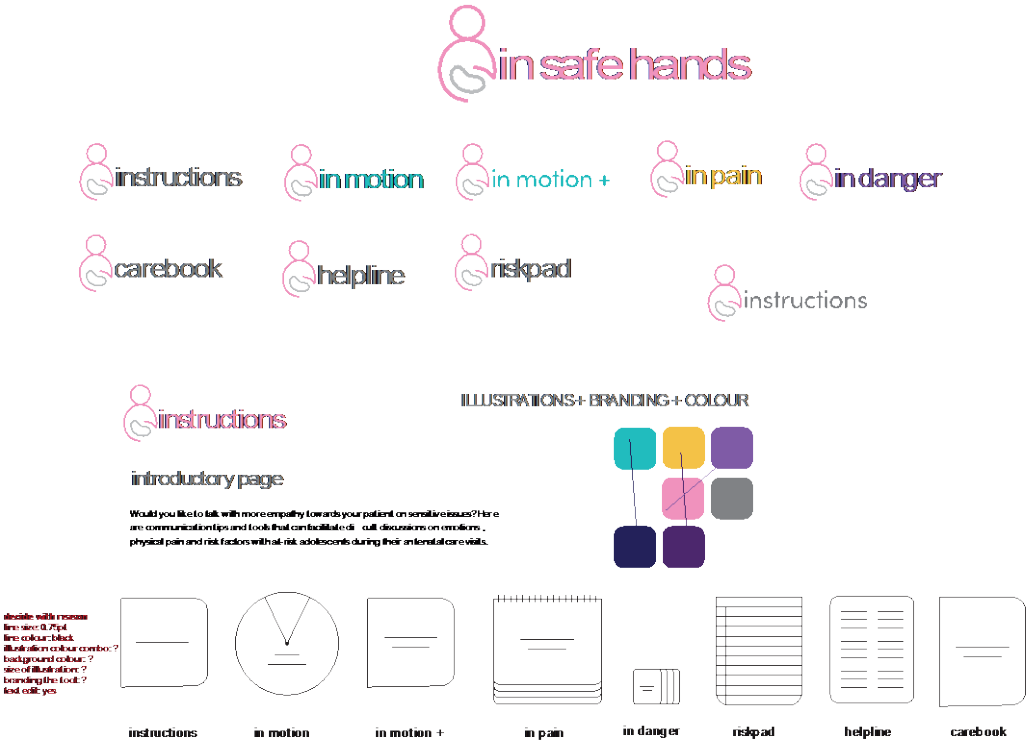

Image 70a: The refinement process of the *in safe hands* kit. Process work by researcher.

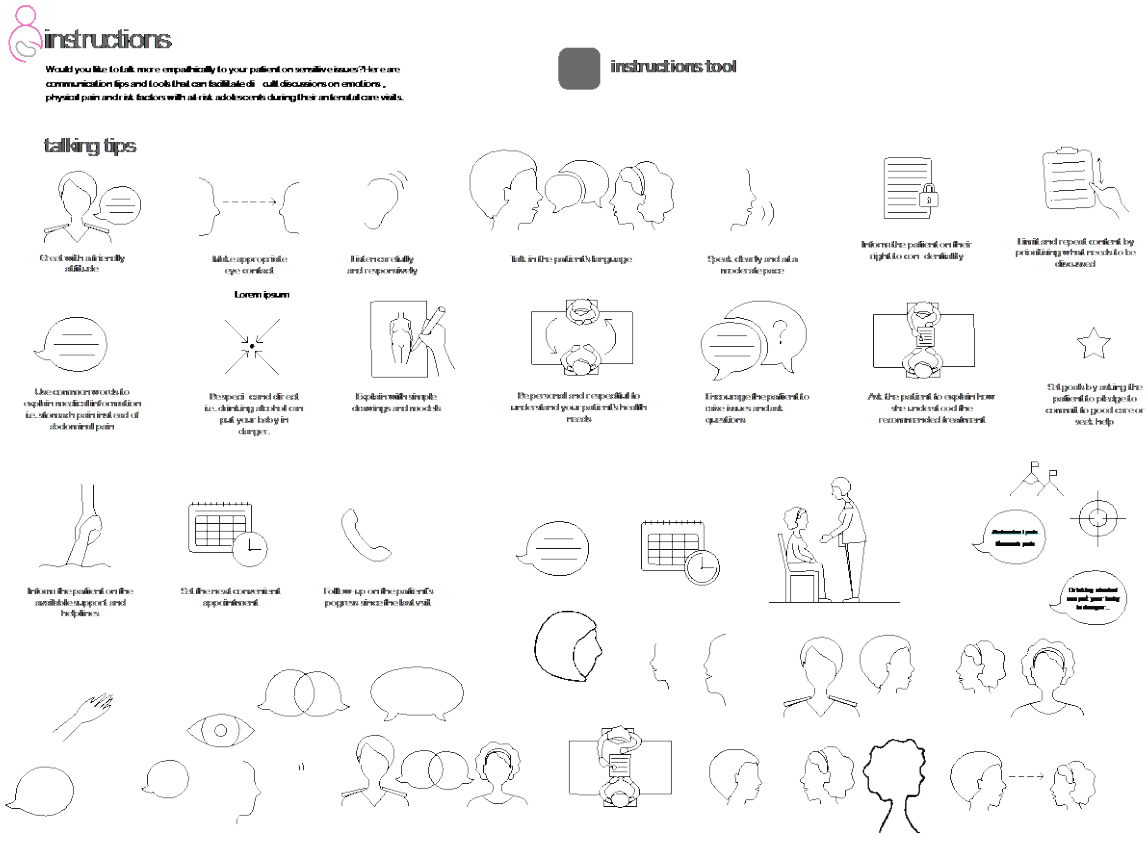

Image 71a: The refinement process of the *in safe hands* kit. Process work by researcher.

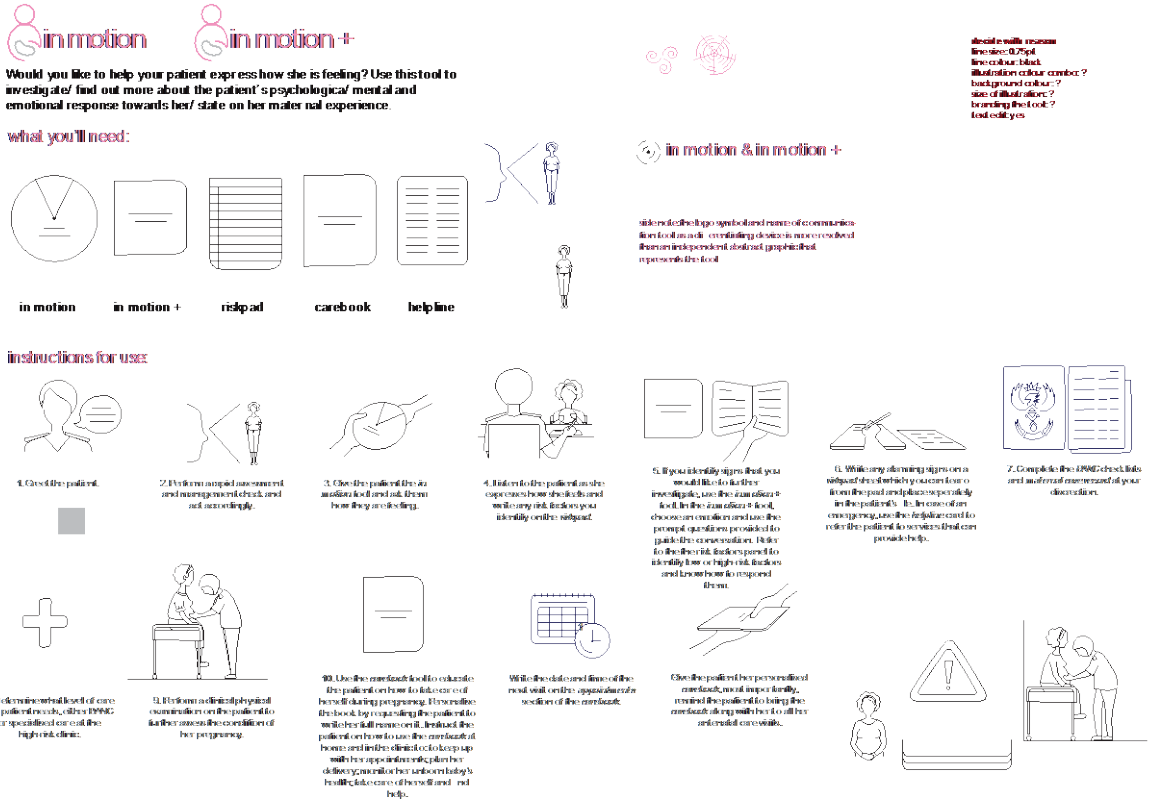

Image 72a: The refinement process of the *in safe hands* kit. Process work by researcher.

Image 73a: The refinement process of the *in safe hands* kit. Process work by researcher.

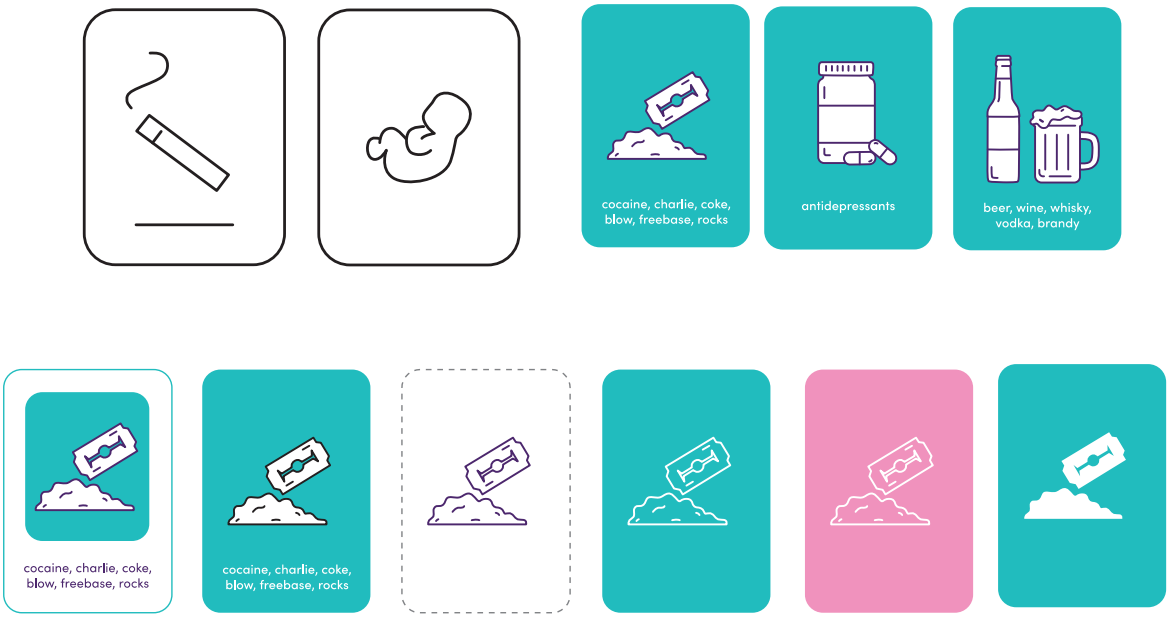

Image 74a: The refinement process of the *in safe hands* kit. Process work by researcher.

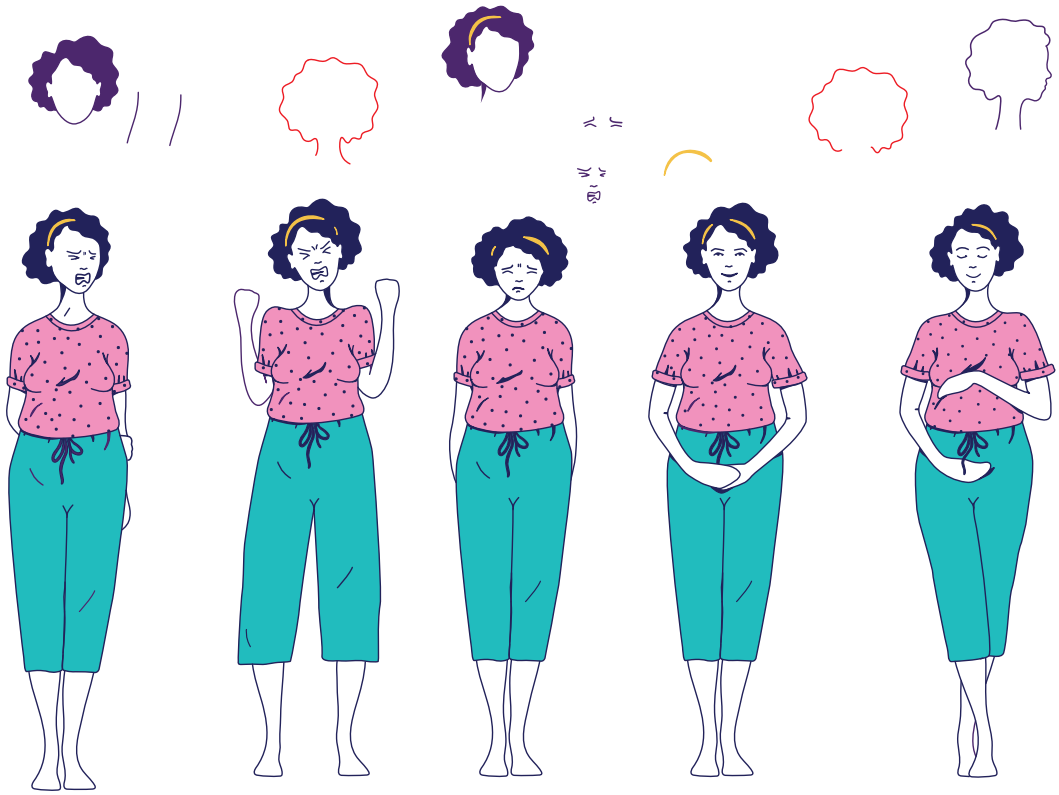

Image 75a: The refinement process of the *in safe hands* kit. Process work by researcher.

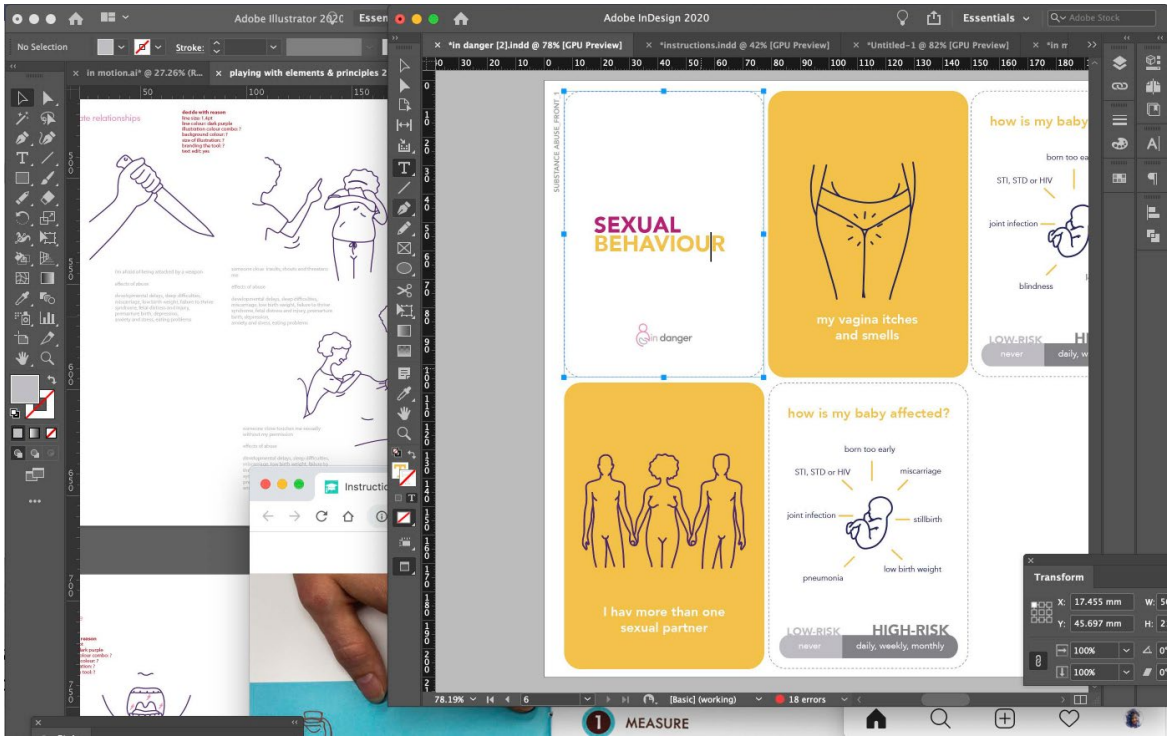

Image 76a: The refinement process of the *in safe hands* kit. Process work by researcher.

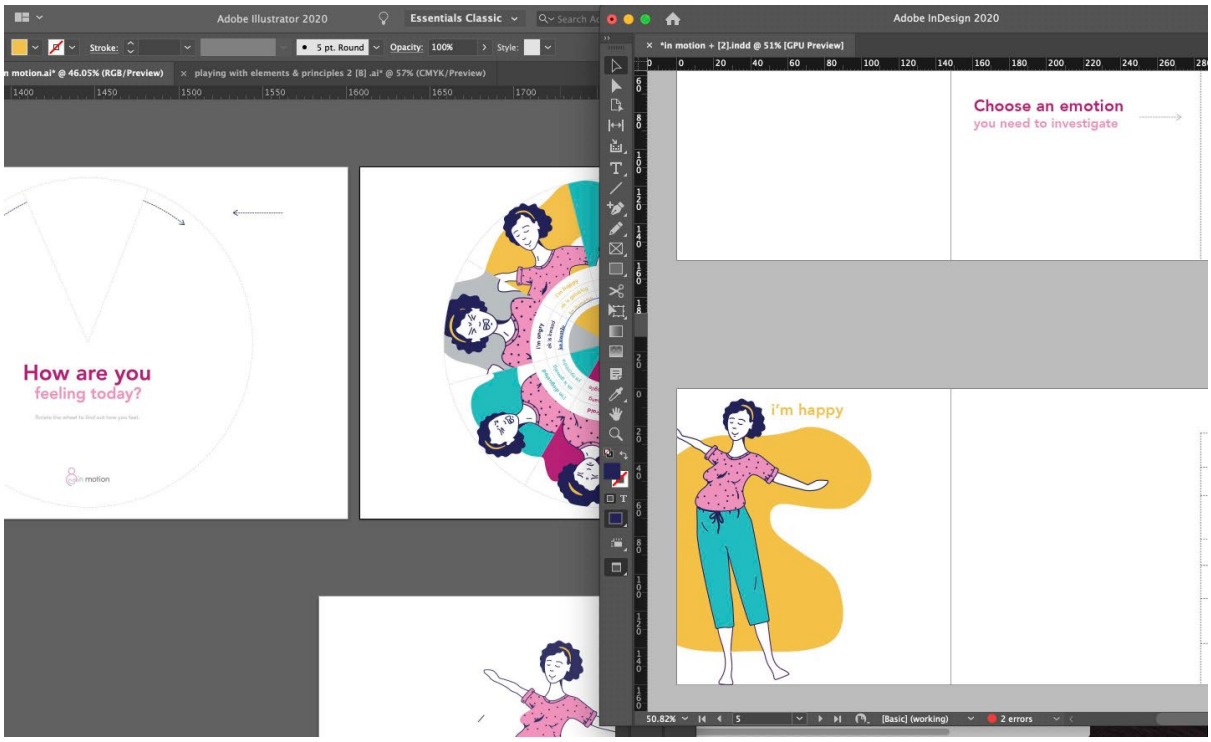

Image 77a: The refinement process of the *in safe hands* kit. Process work by researcher.

Image 78a: The refinement process of the *in safe hands* kit. Process work by researcher.

Image 79a: The refinement process of the *in safe hands* kit. Process work by researcher.

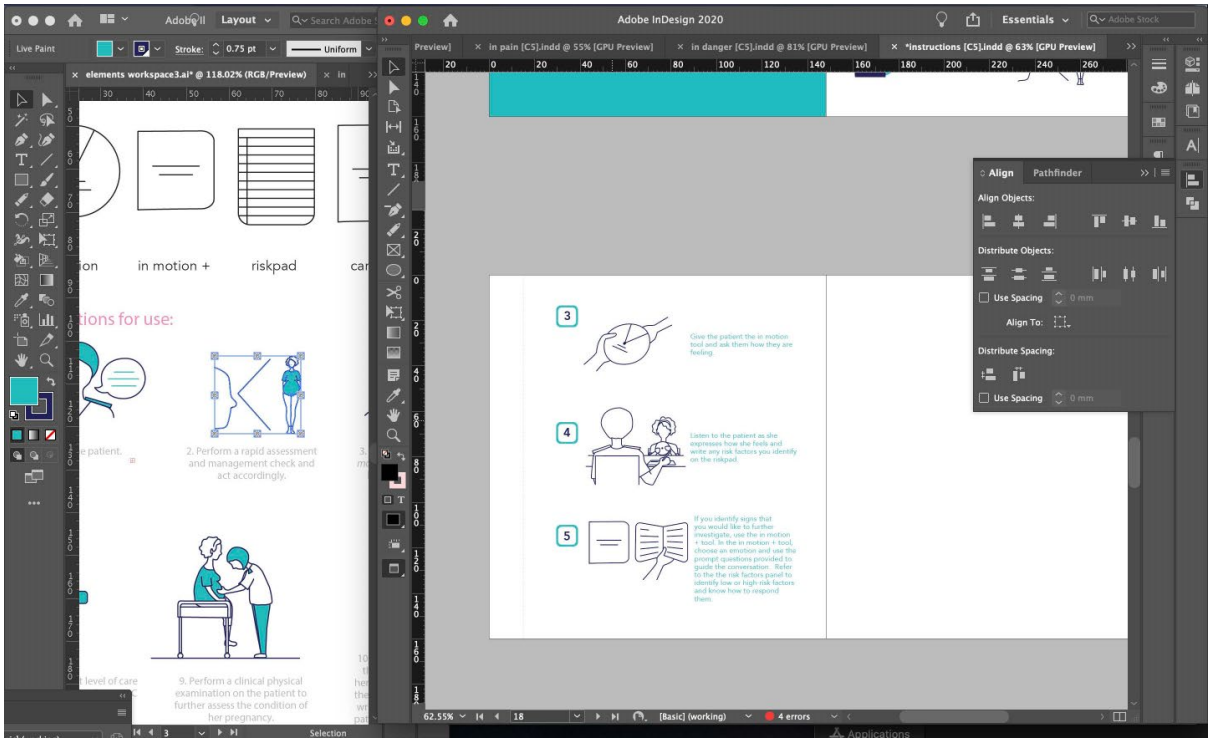

Image 80a: The refinement process of the *in safe hands* kit. Process work by researcher.

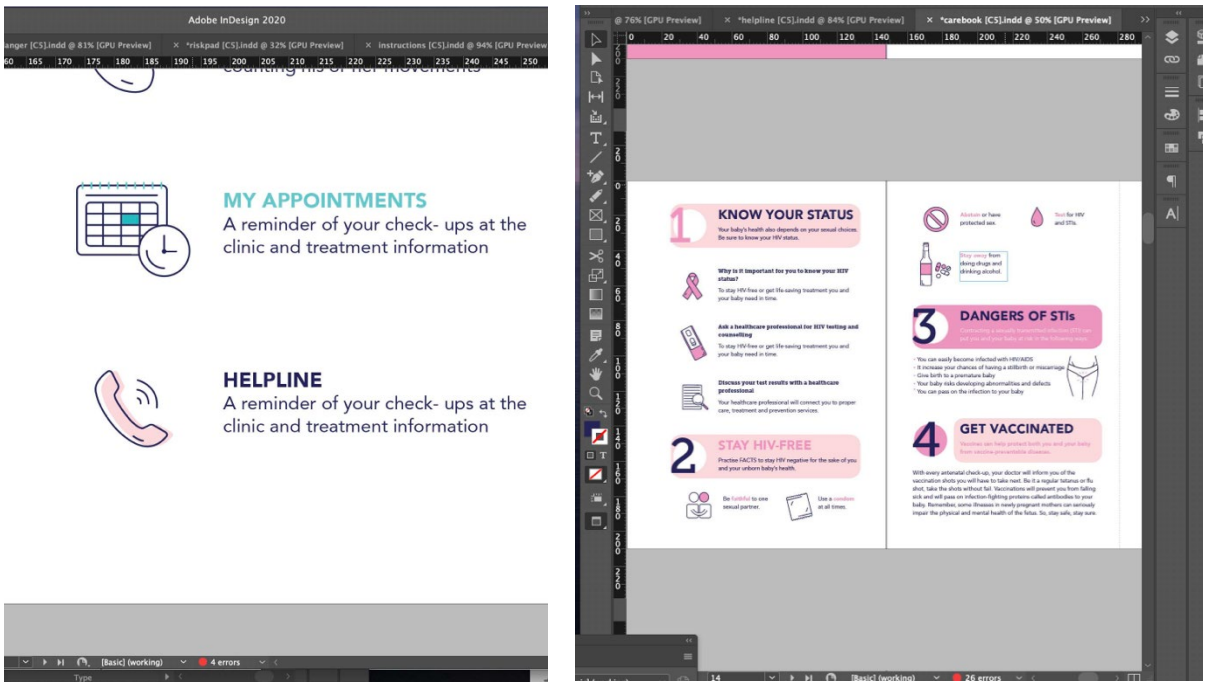

Image 81a: The refinement process of the *in safe hands* kit. Process work by researcher.

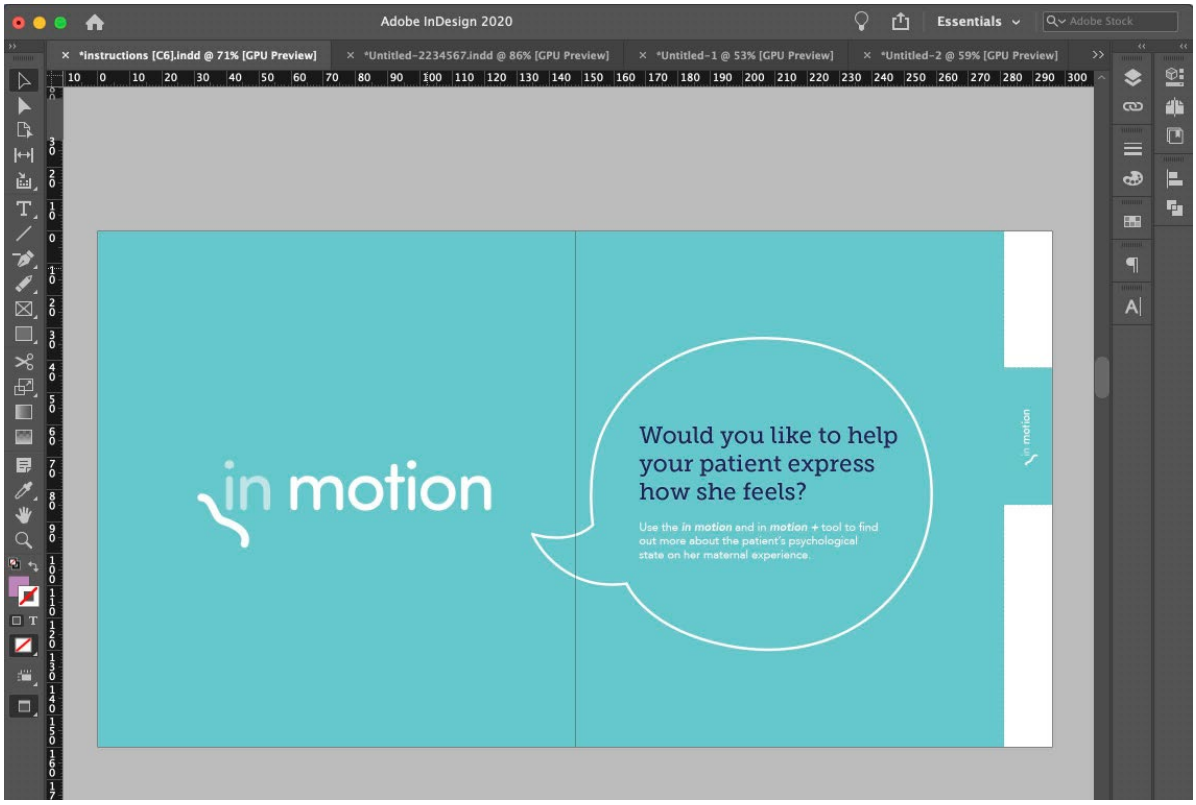

Image 82a: The refinement process of the *in safe hands* kit. Process work by researcher.

Image 83a: The refinement process of the *in safe hands* kit. Process work by researcher.

Image 84a: The refinement process of the *in safe hands* kit. Process work by researcher.