COMMUNITY HEALTH WORKER PERFORMANCE IN RURAL ZIMBABWE: PERSPECTIVES, DRIVERS AND OPPORTUNITIES FOR INTERVENTION

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

By Rukundo Kambarami Benedict

August 2016

COMMUNITY HEALTH WORKER PERFORMANCE IN RURAL ZIMBABWE: PERSPECTIVES, DRIVERS AND OPPORTUNITIES FOR INTERVENTION

Rukundo Kambarami Benedict Ph.D.

Cornell University 2016

In low-income countries, the shortage of skilled health workers remains a major barrier to the effective implementation of health interventions, including many related to nutrition. Despite a renewed focus on Community Health Workers (CHWs) and an increasing body of evidence on the determinants of CHW performance, there remains minimal focus on task specific CHW performance and clients' perceptions about health service delivery in sub Saharan Africa; especially in the context of expanding CHW workloads.

The three papers in this dissertation aimed to expand our understanding of CHW performance, with the goal to improve job performance. They explore task specific performance and client perspectives of CHW performance using quantitative and qualitative methods, and present findings from the evaluation of a financial performance based incentive (PBI) intervention designed to improve CHW performance, in the context of the Sanitation, Hygiene and Infant Nutrition Efficacy (SHINE) trial in rural Zimbabwe.

CHW individual and work context factors influenced job performance, but they differed by the two tasks, pregnancy surveillance and health education. Moreover, some determinants for increased pregnancy referrals were a deterrent for

lesson delivery. For example female CHWs made more pregnancy referrals, but had lower lesson delivery scores.

The second paper revealed the importance of aligning CHW skills with areas of competency valued by clients for well–functioning programs. Pregnant female clients valued respectful treatment, confidentially, teaching skills and availability and approachability of CHWs during health service delivery. Surprisingly, CHW gender was not an issue for our female clients, suggesting that male CHWs can adequately deliver maternal and child health services.

Finally, the implementation of a PBI significantly increased job performance on pregnancy surveillance. Additionally, we hypothesized the PBI would decrease CHWs' intrinsic motivation and increase extrinsic motivation. However, CHWs' intrinsic motivation remained unchanged and extrinsic motivation decreased.

Overall, this research provides information on demographic and work context drivers of performance and the task-dependence of these drivers in the context of expanding workloads. This work also provides insight on core quality health service delivery indicators that clients' value. These findings provide lessons on how to evaluate and improve CHW performance to create effective programs.

BIOGRAPHICAL SKETCH

Rukundo Kambarami Benedict's interest in public health began during her high school years in Zimbabwe. At that time Zimbabwe had one of the highest HIV infection rates in sub-Saharan Africa. As president of her high school 'AIDS Awareness Club' she was keenly interested to prevent the spread of HIV among the youth, but she also discovered many health system barriers as well as socio-cultural barriers that impeded care for so many.

Based on her desire to improve the health conditions in Zimbabwe, she attended Hood College in Maryland and graduated with a B.A. in Biochemistry in 2008. As part of her undergraduate she conducted lab research on zinc-finger proteins and field research in Dar es Salaam Tanzania on wastewater quality. The Tanzania internship was her confirmation that international public health was the area she wanted to pursue. After a brief stint working at Frito-Lay headquarters in Plano, Texas, she moved back to the Northeast.

In 2009 she began her MSPH in International Health at Johns Hopkins Bloomberg School of Public Health in Baltimore. She met Jean Humphrey in 2010 and was invited to do her internship in Zimbabwe at the Zvitambo Institute for Maternal and Child Health Research. During this time she stumbled into the world of nutrition, water sanitation hygiene, behavior change communications and community health workers.

She began her Ph.D. in International Nutrition at Cornell in 2011 and continued to work with Zvitambo. Her research has focused on community health workers and developing ways to measure and improve their performance and strengthen the primary healthcare system. Upon graduation, she will be a Postdoctoral associate at Cornell, where she will explore breastfeeding programs and policies in South Asia and continue to publish her dissertation publications.

For the women of my life, grandmothers, mothers, sisters and aunties, who set me along this path and uplifted me with love and prayers

ACKNOWLEDGMENTS

So many wonderful teachers and professors have shaped my academic development over the years and it would be remiss if I did not first acknowledge Dana Lawrence and Susan Ensel from Hood College for giving me the academic currency that helped me get to this stage.

My special committee members have all supported me and provided sage advice and guidance about which classes to take, to various pieces of writing.

Rebecca Stoltzfus, my major advisor, has been a mentor and guided me from my early research days to become a more confident, independent, multi-disciplinary researcher. On a personal level, we developed a friendship and she helped me through some difficult times and also celebrated many happy times with my family and I.

David Pelletier played many roles from my epidemiology chair to talking about anthropology, health systems and policy. He helped me think about my research in different ways and I am grateful for his advice and support.

I took a class with Jeff Sobal during my first semester at Cornell at Becky's suggestion. Theory was not something entirely new to me nor particularly interesting, but Jeff got me excited and opened up the world of social science theory. I am eternally grateful for this introduction, as I have continued to use theory in all my work.

Mark Constas was my "measurement expert". Throughout our interactions he also evolved into the educationist, evaluation specialist and qualitative guru. I am grateful to Mark for always challenging me to be clearer and more transparent with my qualitative methodologies.

I deeply appreciate Mduduzi Mbuya's guidance before and during my Ph.D. Over the years we worked closely together in Zimbabwe I learned about the rigors of field-based research and he taught me a great deal professionally and personally. We

have worked, laughed, debated and problem solved together and I am grateful for your patience, trust and confidence. It would be impossible for me to have achieved this level scholarship without your support, guidance and friendship.

There are several other faculty and staff in DNS and ILR that have contributed to my success through teaching and support. These include John Bunge, Kate Dickin, Jean-Pierre Habicht, Tove Hammer, Greto Pelto, Kathy Rasmussen, Sera Young, and Francoise Vermeylen. Thank you to Al Armstrong, Doralee Knuppenburg, Jean Miller and Donna Whiting for all your administrative support.

My graduate colleagues and friends, Tara Agrawal-Pedulla, Amy Desai, Sarah Dumas, Julia Felice, Elizabeth Fox, Dadirai Fundira, Thokozile Malaba, Stephanie Martin, Cynthia Matare, Netsai Nembarawe, Francis Ngure, Lanre Omotayo, Liz O'Sullivan, Roseanne Schuster, Laura Smith, Djeinam Toure, Lua Wilkinson, and Sarah Wilson, thank you for being a source of many laughs and great support through all the ups and downs.

I am grateful to Jean Humphrey for giving me chance to work with her and the amazing team at Zvitambo that included Bernard Chasekwa, Dzivaidzo Chidhanguro, William Heylar, Robert Ntozini, Florence Majo, Mandava Mandava, Simon Phiri, Andrew Prendergast, Virginia Sauramba, Naume Tavengwa, Alice Tengende and the rest of the SHINE team.

I also gratefully acknowledge the financial support of DNS, the Mario Einaudi Center, Provost Diversity Fellowship, SUNY Diversity Award Fellowship, UK-DFID and the Bill and Melinda Gates Foundation.

In Zimbabwe, the community plays a large role in the upbringing of a child and I am thankful to the many communities I call family. Thank you to the Ugandan community in Zimbabwe and a special thanks to Aunty Hope, Aunty Beata and Aunty Sarah. To my Benedict family, thank you for embracing me and loving and supporting

me through this journey. To the Kambarami family, thank you for always encouraging and supporting me in so many ways –thank you Mom, Dad, Annette, Farisai, Tatenda and Bongani. To my husband Alan, I thank you for your love, support, patience and your willingness to read draft after draft-I love you!

Lastly, "*to Him who is able to do exceedingly abundantly above all that we ask or think*" I give all glory, honor and thanks.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

CHW	Community Health Worker
VHW	Village Health Worker
MoHCC	Ministry of Health and Child Care (Zimbabwe)
SHINE	Sanitation Hygiene and Infant Nutrition Efficacy trial
WHO	World Health Organization
IYCF	Infant and Young Child Feeding
WASH	Water Sanitation/Hygiene
NGO	Non Governmental Organization
PBI	Performance Based Incentive
ePregI	Early Pregnancy Identification

CHAPTER 1

INTRODUCTION

I encountered community health workers by chance during my internship at Zvitambo Institute for Maternal and Child Health Research in 2010. Through my participation in the design of water/sanitation hygiene behavior change tools, I learned about the CHWs since they were the agents of delivery for the messages I was developing. I was also fortunate to meet and interact with several CHWs and CHW trainers and I witnessed some CHW training sessions.

As Zvitambo geared up to start the SHINE (Sanitation Hygiene Infant Nutrition Efficacy) trial, I was struck by how little we knew about the work life of the CHWs who were critical to delivery of the interventions. I wondered how SHINE was going to measure CHWs performance and what performance meant in this context. The more I thought about it, the more curious I became to understand CHWs work context. I wanted to find out from the CHWs and their clients what they thought about performance and what criteria they used to measure it so we could develop contextually relevant ways to measure CHW performance. I started the PhD in nutrition thinking about these questions and how ultimately we can strengthen the delivery of nutrition and other health intervention by CHWs.

The dissertation is my scholarly attempt to understand CHW performance in my home country of Zimbabwe in the context of the SHINE trial to which I contributed during its' formative stages and throughout my doctoral research by providing program feedback and technical guidance.

1.1 The problem: the reach of maternal and child nutrition interventions

Despite demonstrated interventions to reduce maternal and child undernutrition in low income countries, undernutrition is an underlying cause for up to 3.1 million deaths among children under the age of five.[1] Health worker shortages, which are acute in Sub-Saharan Africa and South Asia, impede the implementation and scale up of effective maternal and child nutrition interventions.[1–4] Realizing the potential impact of these interventions will require addressing bottlenecks to implementation: who delivers the interventions, how are they delivered, are they acceptable and are they reaching the intended beneficiaries.[3,5,6]

1.2 Community-based health service delivery: the Community Health Worker

There is increasing recognition that Community Health Workers (CHWs) are an effective heath delivery platform for maternal child heath and nutrition programs.[2,7] CHWs are the frontline of primary healthcare systems in many low-income countries. CHWs are lay workers that receive basic training from governments or non-governmental organizations (NGOs) on a variety of preventative and curative health services. They are members of the communities they serve and are often selected by other community members. In many countries additional selection criteria for CHWs may be used, e.g. literacy, age, or gender. Their training duration can range from a few days to several months and compensation varies from a small salary to volunteers receiving a small honorarium.[8] Other financial and non-financial incentives are also

commonly provided to motivate CHW performance, but more research about how to best remunerate CHWs to achieve high levels of job performance is still needed.[9,10]

In some settings CHWs focus on one specific health issue, e.g. HIV/AIDS, but usually CHWs deliver a range of maternal and child health and nutrition and reproductive health services.[8] Increasingly, CHWs are being assigned more specialized health tasks such as the screening and referral of serious childhood illnesses, and micronutrient supplementation in order to increase access to health services.[11] As more CHWs are recruited in the bid to provide universal health care access and CHW services continue to expand, understanding CHW performance in multi-task environments and how services are delivered is a priority for strengthening health systems.

1.3 Objectives

The overarching objective of this dissertation was to understand the dynamics of CHW job performance in rural Zimbabwe in order to improve performance. The aims of this dissertation were 1) to understand CHW performance from an organizational perspective and identify organizational and individual level determinants of CHW performance in a multitask setting, 2) to explore community perspectives about CHW health service delivery to further our understanding of the characteristics communities' value during interactions with their CHW, and 3) to evaluate the impact of a financial performance based incentive on CHW performance and motivation.

1.4 Structure of this dissertation

Chapter 2 provides a review of CHW job performance literature with a focus on the use of theoretical frameworks. We include theories of motivation in our discussion and propose a conceptual framework for understanding individual level CHW job performance and outline specific research questions for the subsequent chapters. In Chapter 3, we briefly describe the Zimbabwean context and the program in which this work was embedded. Chapter 4 empirically identifies task-specific influences on CHW job performance, and we follow this with a qualitative study focusing on client perceptions of the delivery of health services by CHWs (Chapter 5). Chapter 6 presents an empirical study evaluating the impact of a financial performance based incentive on CHW performance and motivation. In Chapter 7 we synthesize conclusions of the body of work and discuss implications for programs and future research.

REFERENCES

1. Bhutta ZA, Das JK, Rizvi A, et al. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *Lancet*. 2013;382(9890):452–477.

2. Haines A, Sanders D, Lehmann U, et al. Achieving child survival goals: potential contribution of community health workers. *Lancet*. 2007;369(9579):2121–2131.

3. Jones G, Steketee R, Black R, Bhutta Z, Morris S. How many child deaths can we prevent this year ? *Lancet*. 2003;362:65–71.

4. Global Health Workforce Alliance, World Health Organization (WHO). A universal truth: no health without a workforce. Geneva: WHO; 2014. Available from: http://www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal_truth_report.pdf?ua=1

5. Chopra M, Sharkey A, Dalmiya N, Anthony D, Binkin N. Strategies to improve health coverage and narrow the equity gap in child survival, health, and nutrition. *Lancet*. 2012;6736(12):1–10.

6. Bryce J, Arifeen S el, Pariyo G, Lanata C. Reducing child mortality: can public health deliver? *Lancet*. 2003;362:159–164.

7. Singh P, Sachs JD. 1 million community health workers in sub-Saharan Africa by 2015. *Lancet*. 2013;382(9889):363–365.

8. Perry H, Zulliger R. How effective are community health workers? Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2012.

9. Singh D, Negin J, Otim M, Orach CG, Cumming R. The effect of payment and incentives on motivation and focus of community health workers: five case studies from low- and middle-income countries. *Hum Resour Health*. 2015;13(1):58.

10. Bhattacharyya, K., Winch, P., LeBan, K., Tien M. Community health worker incentives and disincentives: how they affect motivation, retention, and sustainability. Arlington, Virginia: The Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development; 2001. Available from: http://pdf.usaid.gov/pdf_docs/PNACQ722.pdf

11. World Health Organization. Task Shifting: rational distribution of tasks among health workforce teams: global recommendations and guidelines. Geneva: World Health Organization; 2008.

CHAPTER 2

LITERATURE REVIEW, CONCEPTUAL FRAMEWORK, SPECIFIC RESEARCH QUESTIONS

2.1 The Concept of Performance

Performance is a multi-faceted construct that can be differentiated into behavioral and outcome aspects.[1] The behavioral aspects refer to actions taken by an individual e.g. teaching math to high school students while the outcome aspects are the results of the behavior e.g. students passing regional math tests.[1] The behavioral and outcome aspects of performance are often related as is evident in some definitions of performance e.g. "Performance is what the organization hires one to do and do well".[2]

However, not all behaviors are necessarily captured in such definitions such as those behaviors that cannot be easily measured. This dissertation aims to understand CHW performance from the behavioral perspective which characterizes performance in relation to tasks and the overall work context. Task performance describes " an individual's proficiency…[to] perform activities which contribute to the organization's 'technical core' "[1] and contextual performance describes "activities which do not contribute to the technical core but which support the organizational, social, and psychological environment in which organizational goals are pursued".[1]

In studying task and contextual performance three main perspectives have been used by researchers (Table 2.1). First, the "individual differences perspective"[1] focuses on the factors driving individual differences in performance to identify the individuals that work best. Second, the "situational perspective"[1] focuses on the work

environment to understand the conditions that allow workers to perform at high levels. Lastly, the "performance regulation perspective"[1] focuses on the process of performance and aims to describe this process. As indicated in Table 2.1, there are some assumptions and implications for each perspective, including theories of motivation and goal setting that we discuss later in the chapter.

Table 2.1 Research perspectives on performance

Perspectives	**Individual differences**	**Situational**	**Performance regulation**
Core question	Which individuals perform best?	In which situations do individuals perform best?	How does the performance process look like? What is happening when someone is 'performing'
Theoretical and other assumptions	Motivation, self-efficacy, Cognitive ability, professional experience	Motivation, job characteristics, situational constraints, role stressors	Action process factors, Adequate hierarchical level
Implications for performance improvement	Training, personnel selections	Job design	Goal setting, feedback, training, job design

Adapted from Table 1.1[1]

The following sections discuss the CHW performance explicitly. They highlight what we know about CHW performance in low-income countries, describe frameworks that have been used to study CHW performance and expand this discussion to focus on theory. The chapter concludes with a theoretical framework informed by our review and the specific research questions for each chapter.

2.2 The use of theory in community health worker performance literature

CHW performance is a complex construct and has been defined by some as the combination of the availability, competency, productivity and responsiveness of CHWs embedded within a community context and the healthcare system.[3,4] There is little explicit use of theoretical frameworks to describe CHW performance.[5–10] Most of these studies apply a social ecological perspective describing the influence of intrapersonal, family, community, and organizational level characteristics on CHW performance. Characteristics that have been associated with CHW performance from these studies include

(i) Individual level: age, gender, marital status, education level, income level, motivation

(ii) Community level characteristics: community size, support, selection, and expectations; social and cultural norms, religious and linguistic factors; geography

(iii) Organizational level characteristics: training methods and duration, material resources, supervision, financial and non-financial incentives, health policies

More recently, a few reviews have provided generalized mechanisms or models for how these different characteristics may interact. Kane et al.[7] in his review of CHW performance efficacy studies identified four generalized mechanisms that can influence CHW performance, self-efficacy (individual level); credibility of CHW activities due to health systems support (community and organizational level); perceptions of providing important services to communities (individual level); and perceptions of improved social status (individual level). The other reviews of CHWs

use logic models to organize relevant factors. Logic models map the process from what programs intend to achieve and impact.[11] They implicitly assume a program theory, but do not identify underlying assumptions or even causal linkages therefore they provide guidelines that can be used to monitor and evaluate CHW programs.[9]

Kok et al.[8,10] described program and contextual factors from low and middle-income countries and linked them in a logic model to CHW performance, which they defined to include individual level inputs (e.g. motivation), process level mediators (e.g. CHWs providing improved access to health services) and program outputs (e.g. increased use of services due to productivity of the CHW). Naimoli et al.[9] also used a multi-level logic model to describe CHW performance and influencing factors. Their logic model described the broader political and economic context that surrounds the health system and the community system, which influences the program level. CHW performance occurs at the program level and Naimoli et al.[9] defined CHW performance as a combination of changes at the CHW level (outputs), community level changes (outcomes) and population level change (impact).

These mechanisms and logic models all illustrate the intersection of community, organizational and individual psychosocial context as important contributors to CHW performance. However at the individual level the social ecological perspective does not provide an in-depth understanding of individual cognitions i.e. how factors interact at the different levels or how factors such as individual perceptions of different tasks operate to influence performance.[12] Therefore,

a shift in theoretical perspective is necessary to understand and explain how these broader multi-level factors are linked to the individual cognitions and resulting behaviors.

2.3 Individual level characteristics of CHW performance: Motivation

Motivation is a central theme in CHW literature, largely focusing on retaining CHWs and maintaining high performance standards.[5,13–15] Gaps exist in our understanding of how to improve CHW performance, especially at scale.[4,8,9,16] A broader conceptual framework is needed to understand the roles of motivation and other determinants before devising strategies to improve performance and increase retention of CHWs.

As a key construct to the optimal functioning of organizations, work motivation research has garnered much attention.[17] Locke and Latham[18] define motivation as the "*internal factors that impel action and to external factors that can act as inducements to action".* Others have proposed similar definitions,[19–21] but all share overlapping themes: the drive, direction and maintenance of the behavior.

Motivation research seeks to explain "the *why* of behavior".[21] In the field of pubic health, the *why* of health worker behaviors is linked to the *performance* of the health workers i.e. the quality and quantity of care provided.[22,23]

Goal setting and self-determination theories provide frameworks for linking motivation, self-efficacy, knowledge and goal setting capacity to performance.[19,21,24–29]

The discourse on work performance and motivation in organizational behavior theory highlights the roles of (i) goals (ii) personal competence and (iii) beliefs about the pathways to various outcomes.

Goal setting theory proposes that employees identify goals, are committed to them and strive towards achievement of their goals.[30] Clear, challenging goals where employees receive appropriate feedback motivates workers to perform.[30] Goal setting theory implicitly assumes the goals are of value to the employee and that the employee has self-efficacy: the personal perception of competence for the task.[19,29] Therefore, an employee will work towards the goal that will yield the expected outcome.

Social cognitive theory addresses the inter-relationships among environmental factors (e.g. organizational and self-identified goals), personal factors and behaviors (e.g. performance). It identifies self-efficacy as a key personal factor predicting behavior modification; in goal setting, it operates by enabling goal striving.[30,31] If the task requires skills above the level of employee, this may lower their self-efficacy and performance. Thus, employees require sufficient skills/knowledge for the tasks.

Self-determination theory (SDT) elucidates the origin of the drive of behavior. It assumes that the employees extrinsic environment and intrinsic needs[32] interact to shape the motivation to act, i.e. select goals and perform tasks. The influence of the interaction of environment and 'self' preset an employee's perception of the level of control he/she feels he/she has over whether to perform the task; his/her self-efficacy

for the task; and his/her affinity with supervisors or community. The greater his/her autonomy, competence and relatedness, the greater his/her motivation will be to perform the task.[33]

Ryan[34] categorizes motivation as intrinsic and extrinsic. Intrinsic motivation is the 'self' originated drive, characterized by people performing tasks because it satisfies internal needs and they find it interesting and enjoyable.[34] Extrinsic motivation is the integration of the external social environment e.g. organization values with 'self' and thus this external force is the origin of drive.[34] The combination of goal setting theory and SDT provides a broader picture of the role of motivation in performance by describing the locus of drive and direction of behaviors. Furthermore, these theories also explain the maintenance of behaviors through feedback attained internally or through supervisors on the route to meeting the tasks and assume this feedback further motivates the employee to pursue goals.

Goal setting theory and SDT provide the basis for the development of a conceptual framework describing the work performance of CHWs. However, it is important to note some limitations in generalizing these theories to non-western contexts where their insight may be limited. First, CHWs are mostly volunteers and many do not receive a salary, but do receive a small financial support stipend which is often infrequently delivered and in some cases independent of their work performance.[35–37] Secondly, as community representatives they have dual accountability to the community they serve in addition to the formal healthcare

system.[22] The dual accountability makes goal-setting theory challenging to apply because the health system and community goals may sometimes conflict. Nevertheless, by incorporating constructs from SDT, which include the "environment-self" interaction and allows for the identification of the locus of the drive, SDT strengthens understandings of performance.

2.4 CHW performance conceptual framework

Figure 2.1 provides a framework for studying this complex performance relationship. Our conceptual framework proposes how CHW job performance is a function of individual level factors: job self-efficacy to perform activities, technical skill which is work specific knowledge as a result of training, intrinsic and extrinsic motivation to perform the activities and CHW's capacity to set goals. Community and organizational support systems exert influence on performance through influencing motivation, technical skill, goal setting capacity and job-self-efficacy to perform tasks. The conceptual framework adopts a social ecological approach and is hierarchical representing distal and proximal factors that may influence CHW performance.

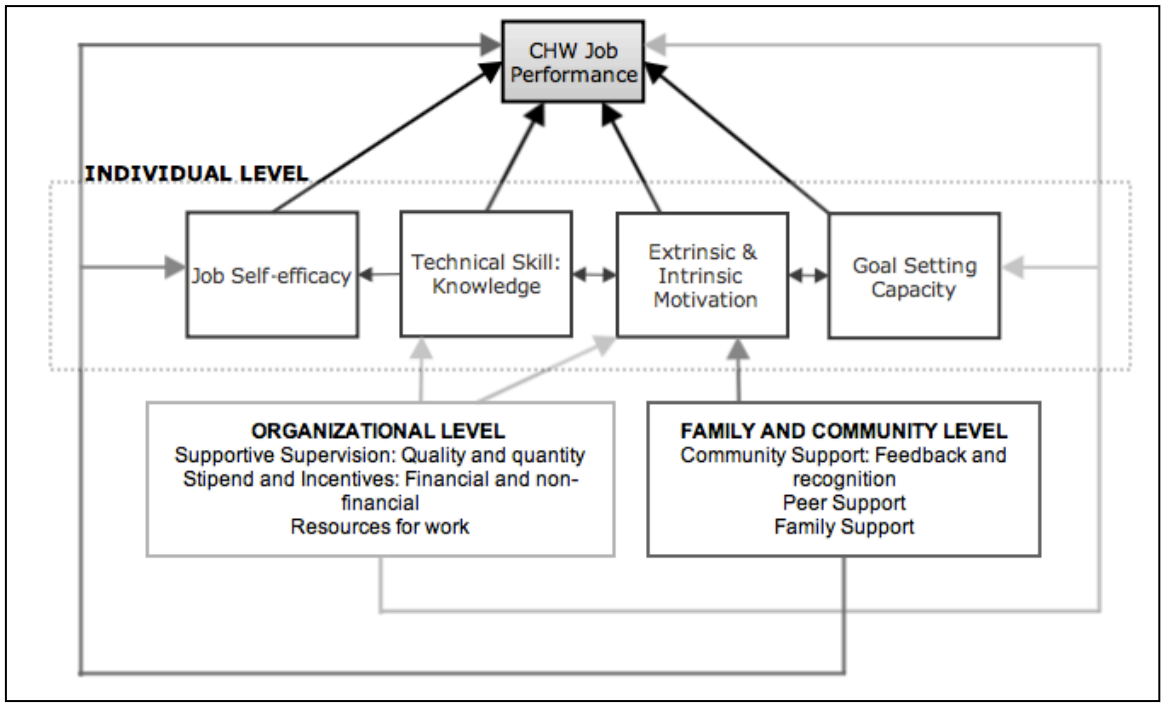

Figure 2.1. Conceptual framework showing determinants of CHW job performance at the individual, community and organizational levels

2.5 Specific research questions

This dissertation seeks to provide insight on how to improve CHW performance in low-income countries by exploring the individual, situational and performance regulation perspectives. Each chapter specifically focuses on one aspect of our overarching objective to understand the dynamics of CHW job performance in rural Zimbabwe.

2.5.1 Specific Research questions Chapter 4

1. What individual and organizational factors are associated with CHW performance of different tasks in rural Zimbabwe?
2. Do the influences on performance differ by specific task?

2.5.2 Specific Research questions Chapter 5

1. What are client perspectives of CHW health service delivery in rural Zimbabwe?
2. Are there any qualities that are seen by clients as facilitators or barriers to CHW health delivery?
3. How can programs use client perspectives about CHW health service delivery to increase program impact?

2.5.3 Specific Research questions Chapter 6

1. Does CHW work performance increase after the introduction of the performance-based incentive (PBI)?
2. Does intrinsic motivation decrease after the introduction of the PBI?
3. Does extrinsic motivation increase after the PBI?
4. What are CHWs perceptions about the PBI?

REFERENCES

1. Sonnentag S, Frese M. Performance concepts and performance theory. In: Sonnentag S, ed. *Psychological management of individual performance*. Chichester, UK: John Wiley & Sons; 2002.

2. Campbell J, McCloy R, Oppler S, Sager C. A theory of performance. In: Schmitt E, Borman WC & Associates, eds. *Personnel selection in organizations*. San Francisco: Jossey-Bass; 1993. p. 35–70.

3. World Health Organization. The world health report 2006: working together for health. Geneva; 2006.

4. Perry H, Zulliger R. How effective are community health workers? Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2012.

5. Dieleman M, Cuong P, Anh L, Martineau T. Identifying factors for job motivation of rural health workers in North Viet Nam. *Hum Resour Health*. 2003;1(1):10.

6. Franco LM, Bennett S, Kanfer R, Stubblebine P. Determinants and consequences of health worker motivation in hospitals in Jordan and Georgia. *Soc Sci Med*. 2004;58(2):343–355.

7. Kane SS, Gerretsen B, Scherpbier R, Dal Poz M, Dieleman M. A realist synthesis of randomised control trials involving use of community health workers for delivering child health interventions in low and middle income countries. *BMC Health Serv Res*. 2010;10(1):286.

8. Kok MC, Dieleman M, Taegtmeyer M, et al. Which intervention design factors influence performance of community health workers in low- and middle-income countries? A systematic review. *Health Policy Plan*. 2015;30(9):1207–1227.

9. Naimoli JF, Frymus DE, Wuliji T, Franco LM, Newsome MH. A community health worker "logic model": towards a theory of enhanced performance in low- and middle-income countries. *Hum Resour Heal*. 2014;12(1):56.

10. Kok MC, Kane SS, Tulloch O, et al. How does context influence performance of community health workers in low- and middle-income countries? Evidence from the literature. *Heal Res Policy Syst*. 2015;13(1):13.

11. Funnel SC, Rogers PJ. *Purposeful program theory: effective use of theories of change and logic models.* San Francisco: Jossey-Bass/Wiley; 2011.

12. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education: theory, research, and practice*. 4th ed. John Wiley & Sons; 2008.

13. Bhattacharyya, K., Winch, P., LeBan, K., Tien M. Community health worker incentives and disincentives: how they affect motivation, retention, and sustainability. Arlington, Virginia: The Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development; 2001. Available from: http://pdf.usaid.gov/pdf_docs/PNACQ722.pdf

14. Glenton C, Scheel IB, Pradhan S, Lewin S, Hodgins S, Shrestha V. The female community health volunteer programme in Nepal: decision makers' perceptions of volunteerism, payment and other incentives. *Soc Sci Med*. 2010;70(12):1920–1927.

15. Rahman SM, Ali NA, Jennings L, et al. Factors affecting recruitment and retention of community health workers in a newborn care intervention in Bangladesh. *Hum Resour Heal*. 2010;8(1):12.

16. Lewin S, Munabi-Babigumira S, Glenton C, et al. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. *Cochrane Database of Syst Rev*. 2010;28(3): CD004015.

17. Steers RM, Porter LW. *Motivation and work behavior*. New York: McGraw-Hill; 1991.

18. Locke EA, Latham GP. What should we do about motivation theory? Six recommendations for the tewnty-first century. *Acad Manag Rev*. 2004;29(3):388–403.

19. Vroom VH. *Work and motivation*. New York: Wiley; 1964.

20. Campbell JP, Pritchard RD. Motivation theory in industrial and organizational psychology. In: Dunnette MD, editor. *Handbook of industrial and organizational psychology*. Skokie, IL: Rand McNally; 1976. p. 63–130.

21. Deci EL, Ryan RM. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press; 1985.

22. Robinson SA, Larsen DE. The relative influence of the community and the health system on work performance: a case study of community health workers in Colombia. *Soc Sci Med*. 1990;30(10):1041–8.

23. Alam K, Tasneem S, Oliveras E. Performance of female volunteer community health workers in Dhaka urban slums. *Soc Sci Med*. 2012;75(3):511–515.

24. Dachler HP, Mobley WH. Construct validation of an instrumentality-expectancy-task-goal model of work motivation: some theoretical boundary conditions. *J Appl Psychol*. 1973;58(3):397–418.

25. Latham GP, Pinder CC. Work motivation theory and research at the dawn of the twenty-first century. *Annu Rev Psychol*. 2005;56:485–516.

26. Locke EA. The motivation sequence, the motivation hub, and the motivation core. *Organ Behav Hum Decis Process*. 1991;50(2):288–299.

27. Deci EL, Vroom VH. *Management and motivation: selected readings*. Harmondsworth: Penguin;1970.

28. Rowe AK, de Savigny D, Lanata CF, Victora CG. How can we achieve and maintain high-quality performance of health workers in low-resource settings? *Lancet*. 2005;366(9490):1026–35.

29. Bandura A. Social Cognitive Theory: An agentic perspective. *Annu Rev Psychol*. 2001;52:1–26.

30. Locke EA, Latham GP. Goal setting theory: an introduction. In: *A theory of Goal setting & test performance*. Upper Saddle River, NJ: Prentice Hall; 1990:1–26.

31. Cullen K, Baranowski T, Smith S. Using goal setting as a strategy for dietary behavior change. *J Am Diet Assoc.*2001; 101(5):562-6.

32. Maslow AH, Frager R. *Motivation and personality*. New York: Harper and Row; 1987.

33. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol*. 2000;55(1):68–78.

34. Ryan RM. *The Oxford handbook of human motivation*. Ryan RM, ed. New York: Oxford University Press; 2012.

35. Wang H, Juyal RK, Miner SA, Fischer E. Performance-based payment system for ASHAs in India: what does international experience tell us ? Bethesda, MD: The Vistaar Project, IntraHealth International Inc., Abt Associates Inc.; 2012.

36. Gopalan SS, Mohanty S, Das A. Assessing community health workers' performance motivation: a mixed-methods approach on India's Accredited Social Health Activists (ASHA) programme. BMJ Open. 2012;2(5):1–12.

37. Zimbabwe Ministry of Health and Child Care. The village health worker strategic direction. Harare: Ministry of Health and Child Care, Government of Zimbabwe; 2010. Avaiable from: https://www.humanitarianresponse.info/system/files/documents/files/Village%20Health%20Worker%20Strartegic%20Direction.pdf

CHAPTER 3

STUDY CONTEXT

3.1 Profile of Zimbabwe and the nutrition context

Zimbabwe is a landlocked country of 13 million located in Southern Africa along the great plateau between the Limpopo river in the south and the Zambezi river in the north.[1,2] The capital city of Zimbabwe is Harare and the country is divided into ten administration provinces, which are further subdivided into districts and wards (Figure 3.1). The two major language and cultural groups in Zimbabwe are the Shona and Ndebele and over 60% of the population lives in rural areas. Christianity is the predominant religion for the country and literacy rates among men and women very high at 94%.[2]

Figure 3.1. Map of Zimbabwe showing the ten provinces[2]

Mining and agriculture are the main economic drivers of the Zimbabwe.[2] A land redistribution program in the early 2000's, followed by the severe economic crisis in 2008 resulted in a constrained mining and agriculture sector and near collapse of social services.[2,3] Although there have been some signs of a modest economic recovery, social and healthcare services remain weak and unemployment levels are estimated to be as high as 89%.[3]

Among children under five years malnutrition is a major concern.[3] Nationally one third of children are stunted and the prevalence of underweight and wasting are 11% and 3% respectively.[3] In terms of infant feeding, breastfeeding is highly prevalent in Zimbabwe with over 98% reporting ever breastfeeding their infant.[3] However, exclusive breastfeeding rates among children under 6 months are 41% and the median duration of breastfeeding is 17 months.[3] Among complementary feeding practices in breastfed children 6-23 months, the proportion of children meeting the minimum meal frequency, diet diversity and minimum acceptable diet is 59%, 28% and 17% respectively.[3] Food insecurity, drought, traditional beliefs and other socio-cultural factors have been reported as barriers to complementary feeding practices in Zimbabwe.[4]

Zimbabwe is one of the early members of the Scaling up Nutrition (SUN) movement.[5] SUN aims to improve nutrition through using a multi-sector approach that brings together actors from different sectors to create an enabling political, legal and financial environment that can facilitate the adoption of best practices and alignment of implementation with a multi-sectorial results framework.[5] The Food and Nutrition Council (FNC) of Zimbabwe coordinates the SUN activities and has a presence within the central government as well as in all provinces.[6] Through the efforts of the FNC, nutrition is now recognized as part of the new (2013) constitution and has been included explicitly in the infant and young child feeding policy and as part of policies on national development and agriculture and social protection.[6]

3.2 Organization of the Zimbabwean health system

The Zimbabwean health care system is split into the primary (community), secondary (district), tertiary (provincial) and quaternary (central) levels.[7] The Ministry of Health and Child Care (MoHCC) oversees the health system that includes a mix of private and public health facilities. Village Health Workers (VHWs)[*] work at the primary level and represent the frontline of healthcare system in Zimbabwe. VHWs are supervised and supported by the nurse in charge at their rural health clinic.[8] At the district level and provincial levels, the district nursing officer and the provincial nursing officer supervise VHW activities.[7,8] The nutrition unit has an equivalent complement of staff at the district and provincial levels that frequently works with the nursing directorate on VHW projects and programs.

VHWs are selected by community members according to criteria set by MOHCC e.g. literate, mature, willing to work on a voluntary basis, well regarded by the community and can maintain confidentially. VHWs receive an 8-week training from trained MOHCC nurses, followed by an 8-week internship in the field and a 4-week post-internship training. Refresher courses (3-4days) are held twice a year. Their primary role is the delivery of simple health treatments (first-aid), and health prevention and promotion education on a range of topics including maternal and neonatal care, HIV/AIDS, TB, child health and nutrition, non-communicable diseases, water and sanitation.[8] The majority of VHW activities are delivered at the household

[*] Nomenclature for Community Health Workers (CHWs) varies by context. In Zimbabwe, CHWs are known as Village Health Workers (VHWs).

level, but VHWs do also deliver some group sessions. VHWs increase the health access of communities and also play a role in improving the quality of life of communities through increasing community agency to respond to health issues.

3.3 The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) trial

This dissertation contributes to the process evaluation of the SHINE (Sanitation Hygiene Infant Nutrition Efficacy) trial as part of the intervention impact pathway.[9] SHINE is a community-based, 2x2 factorial cluster-randomized trial, which aims to determine the independent and combined effects of a water sanitation/hygiene (WASH intervention) and improved infant and young child feeding (IYCF intervention) on linear growth and anemia in 5200 children living in rural Zimbabwe.[10] SHINE is a behavioral intervention utilizing 360 government supported VHWs to deliver the interventions. Each VHW has approximately 100 households in their geographical catchment area.

3.4 Role of Village Health Workers in SHINE

As part of SHINE, VHWs conduct early pregnancy surveillance. They visit all reproductive-aged women in their catchment area every five weeks and record last menstrual period data and offer urine pregnancy tests to those who have missed a menstrual period. VHWs refer all women with a positive pregnancy test to the nearest health center for antenatal care and notify SHINE staff. In addition, VHWs deliver all intervention messages (15 messages) to women from early gestation up to when the index child is 18 months of age.[10]

3.5 Village Health Worker Training and Supervisory Structure in SHINE

SHINE staff trained Ministry of Health and Child Care (MoHCC) VHW-trainers on intervention message content. Subsequently the trainers trained the 360 VHWs on the intervention lessons. Trainings were intervention arm specific. VHW trainings lasted from three days to two weeks. In addition to the primary trainings, cluster meetings were held regularly with VHW supervisors to provide support to VHWs and follow up with any training issues.

SHINE provided additional supervision to VHWs as a supplement to the MoHCC nurse at the local health center. The MoHCC nurses receive monthly surveillance report forms from VHWs detailing health statistics in their catchment area e.g. number of births, immunization records etc. SHINE supervisors provide supplemental field-based supervision and support for the VHWs. Thirty-two SHINE supervisors reside in district hubs (small towns) and travel via motorcycle to meet regularly with individual VHWs (ratio 1:13) and provide support e.g. field observations and praise for correct activities, troubleshooting and constructive feedback and delivery and resupply of kits/tools. Intervention nurses also review and extract information from VHW logbooks, planners, appointment calendars, and health registers.

3.4 Village Health Worker Compensation

VHWs receive a monthly stipend of $14 USD from the MoHCC. SHINE facilitates the on time delivery of the stipend every quarter. SHINE also provides non-financial incentives such as stationary, ledgers, uniforms, shoes, and bicycles. SHINE provides a grocery basket (worth $42) every quarter for every VHW and a small financial based performance incentive ($1-2) for intervention message delivery and early pregnancy identification.

REFERENCES

1. Zimbabwe Ministry of Health and Child Care. The National Health 2011 Profile Report. Harare: Ministry of Health and Child Care, Government of Zimbabwe; 2011.

2. Zimbabwe National Statistics Agency (ZIMSTAT), ICF International. Zimbabwe Demographic and Health Survey 2010-11. Calverton, MD: ZIMSTAT and ICF International Inc.; 2012.

3. Zimbabwe National Statistics Agency (ZIMSTAT). Zimbabwe Multiple Indicator Cluster Survey 2014, Final Report. Harare, Zimbabwe; 2015.

4. Paul K. *Using formative research to design infant and young child feeding interventions*. [dissertation]. Ithaca: Cornell University; 2010.

5. Scaling Up Nutrition Movement. Scaling Up Nutrition. Available at: http://scalingupnutrition.org/about/sun-country-approach. Accessed June 21, 2016

6. Scaling Up Nutrition Movement, SUN Movement Annual Progress Report. 2015; Available from: http://scalingupnutrition.org/wp-content/uploads/2015/10/SUN_Report2015_EN_Zimbabwe1.pdf

7. Zimbabwe Health Workforce Observatory. Human resources for health country profile Zimbabwe. Geneva: WHO; 2009. Available from: http://s3.amazonaws.com/zanran_storage/www.hrh-observatory.afro.who.int/ContentPages/2453220542.pdf.

8. Zimbabwe Ministry of Health and Child Care. The village health worker strategic direction. Harare : Ministry of Health and Child Care, Government of Zimbabwe; 2010. Available from: https://www.humanitarianresponse.info/system/files/documents/files/Village%20Health%20Worker%20Strartegic%20Direction.pdf.

9. Mbuya MNN, Jones AD, Ntozini R, et al. Theory-driven process evaluation of the SHINE trial using a program impact pathway approach. *Clin Infect Dis*. 2015;61(suppl 7):S752–S758..

10. The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial Team. The sanitation hygiene infant nutrition efficacy (SHINE) trial: rationale, design, and methods. *Clin Infect Dis*. 2015;61(suppl 7):S685–S702

CHAPTER 4

HOW DO FACTORS ASSOCIATED WITH VILLAGE HEALTH WORKER PERFORMANCE DIFFER BY TASK IN A MULTI-TASKED SETTING IN RURAL ZIMBABWE?

4.0 Abstract

Background: Zimbabwe, like most low-income countries, faces health worker shortages. Village Health Workers (VHWs) bridge this gap and help deliver essential health services and nutrition interventions. However, as VHW workloads increase, their ability to provide quality services may be compromised. We studied influences upon VHWs' 1) pregnancy surveillance and 2) nutrition and hygiene education performance in rural Zimbabwe. **Methods:** In the context of a health systems strengthening effort in two rural districts participating in the SHINE Trial, 322 government-employed VHWs identify and refer pregnant women for early antenatal care and deliver household-level lessons about infant feeding and hygiene to approximately 5,200 women. We assessed VHW demographic and work characteristics by questionnaire interview. Exploratory factor analyses of the Likert-type questions produced eight distinct and reliable (Cronbach α range: 0.68-0.92) constructs of job satisfaction and motivation, supervision, peer support and feedback. Pregnancy surveillance performance was assessed from pregnancy referrals and nutrition and hygiene education performance was assessed through direct observation by a nurse supervisor using a six-item Likert-type checklist (score range 5-30). Poisson and multiple linear regressions were used to test associations between VHW

demographic and work characteristics and performance. **Results:** VHWs who referred more pregnant women were female, unmarried, < 40 y old, from larger households, of longer tenure, perceived work resources to be adequate, received positive feedback from supervisors and the community, but were less satisfied with remuneration. VHWs with high scores on education lesson delivery had smaller households, received more supportive supervision but less operational supervision. Measures of job satisfaction and motivation were not associated with either task. **Conclusion:** Amongst VHWs responsible for multiple tasks in rural Zimbabwe, different factors were associated with performance of different tasks. Our methods and findings illustrate ways to examine heterogeneity in VHW performance and identify organizational factors associated with quality of program delivery.

4.1 Introduction

Village health workers (VHWs) are an effective part of the workforce for delivering essential maternal and child health and nutrition services.[1,2] In many sub-Saharan Africa countries like Zimbabwe, health worker shortages are critical and the role of VHWs in health systems continues to expand.[3,4] VHWs' scope of practice varies substantially among and within countries and as VHW workload and task complexity increases, concern exists about the quality of services provided.[5,6]

In Zimbabwe, VHWs have been the front line of the national health system since the 1980s.[7] They provide basic health treatment and health promotion education on a broad range of topics and report monthly to the head nurse at their nearest primary health care facility. VHWs are selected by their community and are expected to cover about 100 households in their geographical catchment area. The functionality of this system has declined in recent years due to severe economic shocks experienced in the early 2000's. A 2009 report estimated that approximately half of all rural households in Zimbabwe did not have contact with or knowledge of a VHW in their area; furthermore the VHWs lacked basic medicines.[8] As part of a strategy to strengthen the national health system, the government has been revitalizing the VHW program by increasing recruitment and training of VHWs.[7,9]

For this health system to work, VHW's not only need to be in place, but also to perform at high quality. VHW performance is a complex construct.[10] In environments

where VHWs perform a variety of tasks, describing pathways to performance is helpful in understanding the causes of variation in VHW performance across different tasks. Some frameworks describing VHW performance[11–13] apply a general social ecological perspective describing the influence of intrapersonal, family, community, and organizational level characteristics on VHW performance. This perspective provides a broad context for situating the individual, but previous work has examined a limited range of influences and the field could be strengthened through the use of explicit theoretical frameworks.

From the field of organizational behavior, goal setting theory and self-determination theory provide frameworks for understanding the role of VHWs extrinsic environments and their intrinsic needs and expectancies at an individual and organizational level.[14–16] Goal setting theory posits that workers identify, commit, and strive to achieve goals and are motivated by clear, challenging goals and appropriate feedback on those goals.[14] Self determination theory posits that intrinsic motivation to perform is increased in environments that foster workers intrinsic needs (autonomy, competence, and relatedness).[16]

Together these theories link motivation, self-efficacy, knowledge, skill, and goal setting capacity with performance; and explain the maintenance of behaviors through a positive feedback, motivation, and effort loop.[14,16] However, others also describe the moderating relationship of the nature of the task, especially task

complexity, on goal setting and performance.[17] Thus, different levels of effort are required to perform for different tasks. The exertion of these efforts requires the mobilization of different internal (e.g. intrinsic motivation) and external (e.g. work tools) resources. In an enabling context these efforts are translated to performance. Therefore we explore the internal and external resources mobilized by VHWs performing different tasks.

The present study investigates VHW demographic and work characteristic influences upon two different tasks performed by VHWs in the Sanitation Hygiene and Infant Nutrition Efficacy (SHINE) study, a randomized evaluation of several intervention packages delivered by VHWs in rural Zimbabwe. In addition, we were also interested to learn whether these influential factors varied by task.

4.2 Study Context

SHINE is a community-based 2x2 factorial cluster-randomized trial in rural Zimbabwe that aims to determine the independent and combined effects of a water sanitation/hygiene (WASH intervention) and improved infant and young child feeding (IYCF intervention) on linear growth and anemia in all rural children born in two districts from January 2013 to January 2015. Government-recruited VHWs are the backbone of SHINE's intervention delivery.

As part of SHINE, VHWs conduct early pregnancy identification surveillance every five weeks in their catchment areas. For every woman of childbearing age in a

VHWs' catchment area, the VHW records last menstrual period on a 5-weekly basis, and offers pregnancy tests to women who have missed a menstrual period and who assent to the test. VHWs are also responsible for delivering all behavior change lessons and material inputs as needed (e.g. soap) from the time women are enrolled into SHINE (early pregnancy) until the new child is 18 months of age. Monthly lesson delivery is aligned with specific gestational age or infant age, to increase relevance for the women and facilitate uptake and modification of key maternal behaviors.

All SHINE VHWs receive a standard five-month Ministry of Health and Child Care (MoHCC) training program. The program consists of 8 weeks each of in-classroom and field-based training, concluded with a 4-week classroom session following the field internship.[7] Training covers topics in maternal and neonatal care, HIV/AIDS, TB, child health and nutrition, non-communicable diseases, water and sanitation, communication and adult education methods.[7] Short refresher trainings are conducted annually. SHINE VHWs were trained for an additional 20-35 days on content specific to the SHINE trial. Experienced MoHCC trainers conduct all trainings and SHINE staff provide support for the additional SHINE-specific training. All VHWs receive a standard monthly MoHCC allowance of $14USD and this is distributed every quarter along with a SHINE food basket valued at $42USD.

Thirty-two SHINE nurse supervisors provide constructive feedback and supervision support for the 342 VHWs. Half of the supervisors are male, half are married, and they range in age from 23-48 years. Supervisors meet once a month with

VHWs for group meetings (approximately 11 VHWs per supervisor) to discuss concerns, troubleshoot, and review expectations. Individual review meetings with VHWs are held in the field approximately once a month and supervisors evaluate performance of specific tasks and provide additional support.

4.3 Methods

4.3.1 Participants:

A survey was conducted among all 342 VHWs living in Shurugwi and Chirumanzu districts and participating in the SHINE trial in 2013. Two VHWs declined and 18 did not attend the meetings where the survey was administered.

4.3.2 Measures:

The questionnaire was adapted from a survey used in a previous study[18] and was modified, translated and pre-tested by the study team to fit the Zimbabwean context. The questionnaire included questions about socio-demographic characteristics, motivation, supervisory support, peer support, community and organizational feedback mechanisms, and standard health curriculum knowledge covered in MoHCC training. Questions varied in format, but most used a 5-point Likert response scale ranging from strongly agree to strongly disagree.[19] The survey was administered using netbook computers, in English and the local language (Shona).

The cross-sectional survey was administered in April 2013 by five Zimbabwean enumerators, fluent in Shona. Written informed consent was obtained from VHWs before administering the survey to VHWs in the their preferred language.

Ethical approval for the study was provided by the Medical Research Council of Zimbabwe and the Johns Hopkins Bloomberg School of Public Health IRB.

4.3.3 Performance Assessment:

Pregnancy referral rate and behavior change lesson delivery were selected as important and contrasting performance outcomes and because of their relevance to other maternal and child health interventions. The major differences between the two outcomes were the novelty and prestige of the task (higher for pregnancy referrals), VHW and community cultural acceptability for the task, and time burden for the task (both higher for lesson delivery) (Table 4.1).

Table 4.1. Comparison of VHW tasks: Pregnancy referrals and Lesson delivery

Pregnancy Referrals	**Lesson Delivery**
• New activity in community	• Common activity in community
• Cultural sensitivity for activity	• Culturally acceptable
• Visit all homesteads in VHW catchment area every 5 weeks covering seasonally difficult terrain	• Visit all SHINE homesteads at least once a month (scheduled visits) covering seasonally difficult terrain
• Instruct women how to use and interpret pregnancy tests	• Provide demonstrations and use lesson books for visits
• Social prestige is likely due to pregnancy test kits and visibility	• Fatigue is likely because it is a common activity
• Similar procedure for all visits	• Different lessons at every visit
• Relatively quick visit (~10mins)	• Longer visits (~60mins)
• Delivered to women of childbearing age in the household	• Delivered to SHINE women and occasionally other household members

Pregnancy referral data were obtained from the SHINE database. VHWs regularly visit all women of reproductive age in their area, and identify new pregnancies through a two-stage process of asking about the last menstrual period and confirming

pregnancies by a dipstick urinary hCG test (Pregnancy Midstream Tests, Kurkel Enterprises, LLC). Pregnant women are referred to clinics for antenatal care, including HIV testing and care. Pregnancy referral information is also sent to a SHINE supervisor who arranges for a second, confirmatory, urine test administered by a research nurse. Confirmed pregnancy referrals are entered daily into the SHINE database. Total referrals in 2013 were summed for each VHW and data about the median number of women 15-49 years per VHW catchment area was extracted from VHW registers. Referrals per women of reproductive age were calculated as an annual rate. Pregnancy referral data were available for 319 VHWs.

Nurse supervisors assessed the quality of behavior change lesson delivery during a supervisory visit planned to occur during one of the first times that a specific lesson was being delivered. The supervisor observed the VHW delivering a lesson and completed a checklist of six statements about adherence to quality lesson delivery: reviewed last session with mother; asked mother questions about her recall, knowledge and current practices; delivered lesson in a relaxed manner; allowed mother to ask questions; responded to mother's questions correctly and appropriately; and reviewed current lesson information at the end of the session. Questions were on a 5-point Likert scale[19] and a summative score (range 5-30 points) was calculated (Cronbach α=0.83). In the SHINE Trial, which aims to evaluate the effects of two different VHW content packages in a 2x2 factorial design (4 intervention arms), the VHWs deliver up to 15 different behavior change lessons. However, the instrument assessed issues of quality that were relevant to every lesson, regardless of content. For

each VHW, their average lesson score was calculated from all lessons observed between January 2013 and August 2014. Lesson delivery score data were available for 289 VHWs and all were included in this analysis.

4.3.4 Statistical Analyses:

Descriptive statistics were performed on VHW demographic data. Exploratory factor analysis was used to reduce data from the questionnaire. From each section, factors were retained after principal axis factor extraction, scree tests and promax rotation.[20] Items with factor-loadings above 0.30 were included in factors and any items that cross-loaded were included in the factor where they had the higher factor-loading and conceptual relevance (Appendix A1). Reliability analyses were performed on factors, and items that decreased reliability were omitted from the final factors. For each factor, the total score was calculated as the sum of scores for the items in the factor. Factors were standardized as z-scores to account for the different number of items in each factor. Across factor variables the proportion of VHWs missing data was 15% (n=49). Missing data from factors was imputed using multiple imputation by chained equations with ten iterations and all model covariates with non-missing data specified.[21]

Multiple linear regression was used to investigate associations between VHW lesson delivery score and demographic and factor variables. Poisson regression was used to assess associations with the number (count) of pregnant woman referred over the one-year period. To account for the different number of women of childbearing

age in each VHW's catchment area, a natural log of median number of women of childbearing age was included in the model as an offset. Linearity of continuous independent variables was examined for each outcome by scatter plot smoothing.[22] For pregnancy referral rate, the job satisfaction and motivation factor was modeled and as a categorical variable. All other variables were modeled as linear variables for both regression models.

All demographic variables and standardized factors were entered into a backwards-stepwise regression analysis. Level of significance was at the p=0.05 level. Models were adjusted for SHINE trial randomization variables and demographic variables of interest from VHW performance literature.[12] To assess differences among the variables associated with performance between the two tasks, we fit a multilevel linear model.

Multilevel modeling was used to account for the non-independence of performance scores for the same VHWs nested within nurse-supervisors. VHW and nurse supervisor were identified as random effects and VHW demographic and work characteristics were modeled as fixed effects. To compare predictors between the different tasks, first we transformed the pregnancy referrals data using a square root transformation because it followed a Poisson distribution. Then we standardized as z-scores the lesson delivery score and the transformed pregnancy referrals data. We created a dummy variable for the task and tested the interaction term between the dummy variable and each demographic and work characteristic variable. This

interaction model was adjusted for SHINE trial randomization variables and the median number of women of childbearing age in a VHW's catchment area. All data were analyzed using STATA 12.0 (Stata statistical software, release 12; Stata Corporation).

4.4 Results

Three quarters of the 322 VHWs were female, most were married (74%), of middle age (45.0 years ± 8.8) and 82% had some secondary school experience or higher (Table 4.2). The median duration of job tenure was 3 years and for 75% of VHWs, this was their first experience with a health education job.

Table 4.2. Characteristics of village health workers (VHWs) (n=322). Values are numbers (percentages) unless stated otherwise

VHW Characteristics	**Total N (%)**
Age (years) (mean SD)	45.0 ± 8.8
<40	87 (27.0)
40-50	153 (47.5)
>50	82 (25.5)
Gender	
Female	237 (73.6)
Marital Status	
Currently married	247 (76.7)
Other	75 (23.3)
Household size (mean SD)	4.82 ± 2.50
Educational Level	
Primary completed	54 (16.8)
Some secondary	101 (31.4)
Completed O'Level or higher	167 (51.9)
Tenure as VHW (years) (median IQR)	3.2 (2.2-11.1)
First experience with health education job	243 (75.5)

VHWs knowledge scores were moderate (mean of 17 out of 24 questions) and less than 1% of VHWs scored below 12 out of 24 questions (Table 4.3). Eight factors emerged from factor analyses of work characteristic questions: job satisfaction and motivation, satisfaction with remuneration, perceived peer support, perceived supportive supervision, perceived operational supervision, perceived adequacy of resources for work, perceived negative feedback (from supervisors, community and peers), and perceived positive feedback (from supervisors, community and peers) (Appendix A2). Reliability analyses showed adequate internal consistency for all scales (Cronbach $\alpha > 0.70$) except for perceived positive performance feedback ($\alpha = 0.68$) (Table 4.3). Mean scores on 5 out of the 8 factors were high, at or above 75%. Negative feedback and satisfaction with remuneration mean factor scores were moderate, at 70% and 66%. The adequacy of resources for work factor had the lowest mean score at 63%.

Table 4.3. Mean scores on scales assessing knowledge, satisfaction, motivation and peer support, supervision, feedback and work resource factors

Scale	Cronbach alpha	Range in data	Mean ±SD
Health curriculum knowledge (range 1-24) (n=322)	--[a]	11-22	17.6 ± 2.0
Job satisfaction and motivation (range 12-60) (n=311)	0.85	39-60	53.0 ± 4.7
Satisfaction with remuneration (range 3-15) (n=318)	0.92	3-15	9.9 ± 3.4
Perceived peer support (range 5-25) (n=316)	0.75	5-25	18.7 ± 4.4
Perceived supportive supervision (range 12-60) (n=314)	0.90	31-60	51.7 ± 5.7
Perceived operational supervision (range 10-50) (n=310)	0.77	22-50	42.6 ± 5.7
Perceived negative feedback (range 5-25) (n=307)	0.72	7-25	17.6 ± 3.6
Perceived positive feedback (range 6-30) (n=315)	0.68	16-30	25.3 ± 2.5
Perceived adequacy of resources for work (range 5-25) (n=312)	0.70	5-25	15.7 ± 4.3

[a] knowledge items were based on training materials and do not reflect a singular "knowledge" construct therefore we do not report a cronbach alpha

4.4.1Pregnancy referral rate

Several VHW characteristics were significantly associated with more referrals (Table 4.4): female gender (incidence rate ratio for referring an additional woman (IRR)=1.13; P<0.05), larger household size (IRR=1.01; P<0.05; range 0-16 people) and longer job tenure (IRR=1.01; P<0.05; range 1-30 years). Middle aged and older VHWs [(IRR=0.89; P<0.05) (IRR=0.82; P<0.05)] and those married made fewer referrals (IRR=0.88; P<0.05). From VHW perceptions of their work characteristics, positive feedback (IRR=1.06; P<0.05) and adequacy of work resources (IRR=1.06; P<0.05) were the only factors significantly associated with more referrals.

Interestingly, VHW's who were more satisfied with remuneration made fewer referrals (IRR=0.92; P<0.05).

Table 4.4. Poisson regression models to predict associations with the pregnancy referral rate[a] of Village Health Workers

VHW Variables	Pregnancy referral rate (n=299) [b]		Pregnancy referral rate (n=319) [c]	
	IRR (95%CI)	p-value	IRR (95%CI)	p-value
Age (Ref <40yrs)				
40-49years	0.89 (0.80, 0.99)	0.035*	0.89 (0.80, 0.98)	0.022*
50+ years	0.81 (0.70, 0.93)	0.002**	0.81 (0.71, 0.93)	0.002**
Gender (Ref male)	1.14 (1.02, 1.26)	0.018*	1.13 (1.02, 1.25)	0.019*
Marital Status (Ref not married)	0.89 (0.80, 0.98)	0.021*	0.88 (0.80, 0.97)	0.010*
Household size	1.02 (1.00, 1.03)	0.070	1.01 (1.00, 1.03)	0.047*
Tenure (years)	1.01 (1.00, 1.02)	0.003**	1.01 (1.00, 1.02)	0.003**
Satisfaction with remuneration	0.92 (0.87, 0.96)	0.000***	0.92 (0.88, 0.96)	0.000***
Perceived adequacy of resources for work	1.06 (1.02, 1.11)	0.008**	1.06 (1.02, 1.11)	0.006**
Perceived positive feedback	1.06 (1.01, 1.11)	0.013*	1.06 (1.01, 1.10)	0.014*

[a] Number of pregnancy referrals in one year
[b] Complete-case model
[c] Imputed model
Models adjusted for VHW's education, knowledge, study arm, cluster ID, ward number, median number of women of child bearing age per VHW catchment area
CI= confidence interval; Ref= reference category
Significant at *p<0.05; **p<0.01; ***p<0.001

4.4.2 Lesson delivery score

Multiple regression analysis showed two variables were significantly associated with lesson delivery score (Table 4.5): supportive supervision was associated with higher scores (B= 0.41; P<0.05) but operational supervision was

associated with lower scores (B= -0.43; P<0.05).

Table 4.5. Estimates of standardized regression coefficients (and standard errors) of multiple linear regression models to predict factors associated with behavior change lesson delivery scores[a] of Village Health Workers from the supervisor administered checklist

VHW Variables	Lesson Delivery Score (n=274)[b]		Lesson Delivery Score (n=289)[c]	
	Beta (SE)	p-value	Beta (SE)	p-value
Household size	-0.14 (0.08)	0.053	-0.12 (0.07)	0.075
Tenure (years)	-0.05 (0.03)	0.133	-0.05 (0.04)	0.108
Perceived supportive supervision	0.43 (0.21)	0.039*	0.41 (0.20)	0.040*
Perceived operational supervision	-0.45 (0.21)	0.032*	-0.43 (0.20)	0.035*

[a] Summative score of six 5-point Likert response statements: reviewed last session with mother; asked mother questions about her recall, knowledge and current practices; delivered lesson in a relaxed manner; allowed mother to ask questions; responded to mother's questions correctly and appropriately; and reviewed current lesson information at the end of the session
[b] Complete-case model
[c] Imputed model
Models adjusted for age, gender, marital status, education, knowledge, study arm, cluster ID, ward number, number of observations/VHW
Significant at *p<0.05; **p<0.01; ***p<0.001

4.4.3 Interaction model

The type of task significantly modified the relationship between work performance and some VHW demographic and work characteristic variables (Appendix A3). Significant interactions were observed for VHW gender, household size, job tenure, work resources and operational supervision (Figure 4.1). Higher task performance on pregnancy referrals (more referrals) was associated with female gender (P<0.05), larger household size (P<0.05), more job tenure (P<0.05), more operational supervision (P<0.05) and the availability of resources for work (P<0.1) (Figure 4.1). However, the same variables were associated with *lower* task performance on lesson scores (lower scores). The magnitudes of effect were weak for

household size and tenure and moderate for adequate work resources, perceived operational supervision and gender.

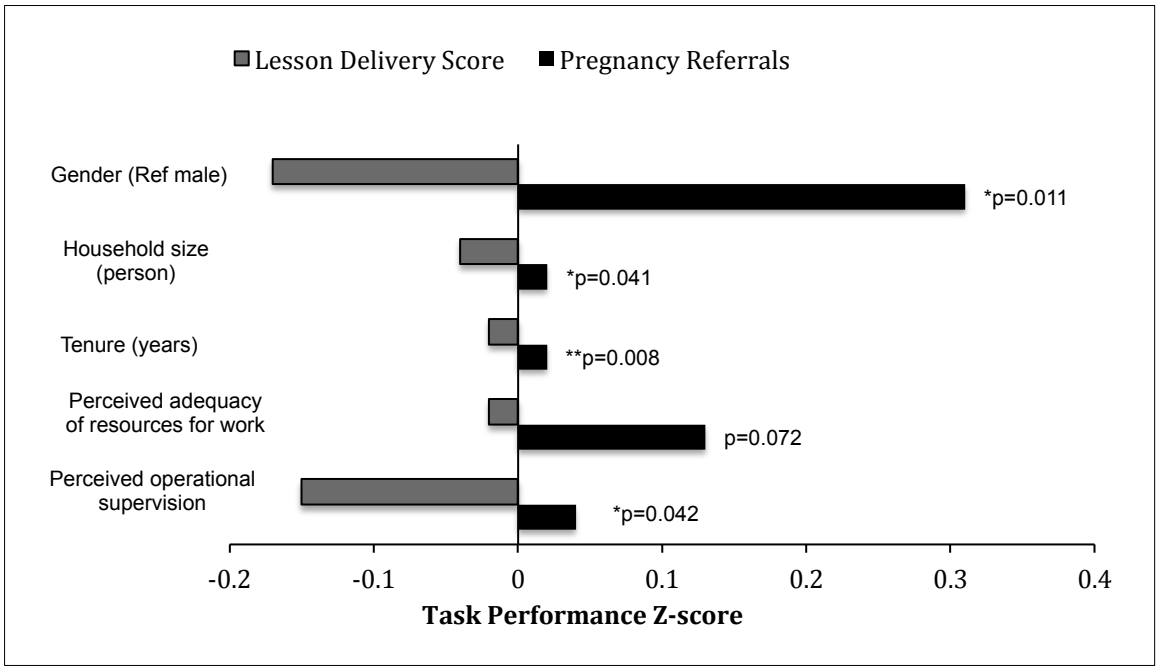

Figure 4.1. Significant interaction terms of task and demographic and work characteristics from the interaction model
Significant at *p<0.05; **p<0.01; ***p<0.001

4.5 Discussion

In this context of well-trained and supported VHWs in rural Zimbabwe, different individual and organizational factors were associated with the performance of different tasks. Performance on pregnancy referrals was influenced by several VHW demographic characteristics (age, gender, marital status and household size) and several work characteristics (financial incentives, feedback, resources and job tenure) while performance on lesson delivery was influenced by only one demographic characteristic (household size) along with supervision factors. The factors that proved

significant for these Zimbabwean VHWs have also been highlighted by other authors,[5,12] but there have been no studies considering how factors differ by the type of task. Our findings indicate the need for programs to tailor approaches to improve VHW performance by carefully considering the different factors associated with various tasks VHWs perform. Moreover, for researchers it reinforces the need to explore how various factors lead to improved performance for different tasks.

4.5.1 Pregnancy Referrals

Female VHWs made more pregnancy referrals than male VHWs. In many cultures, early pregnancy detection is a culturally sensitive topic[23] and it may be easier for women to disclose their pregnancy to female VHWs. Other studies have shown gender to positively influence performance on maternal and child health activities[24–26] corroborating our result. The fact that the gender and task interaction was significant, further illustrates that for different types of tasks, females perform the task differently.

For age and marital status, there is no consensus in the literature regarding associations with performance and it seems plausible that the influence of these factors varies by task and social context.[12] Younger (<40yrs) and unmarried VHWs performed more pregnancy referrals. VHW's younger age may increase their accessibility to women of childbearing age and their physical capacity to canvass villages. Unmarried VHWs may have less time demands and be able to conduct more pregnancy referrals. Variability in task time burden and task complexity can influence which characteristics are associated with better performance.

VHWs with larger households and more job tenure (adjusted for age) made more pregnancy referrals. Larger households could be a proxy for family support[27,28] and a few studies suggest VHWs with fewer household duties and family support may be more productive.[27,28] The significant interaction between task and job tenure shows that the type of task influences the relationship between job tenure and performance. Limited and mixed evidence suggests more job experience may improve client satisfaction and VHW use of tools.[29,30] The novelty and social prestige associated with the pregnancy identification task may increase community and family support and the sharing of household duties,[27,28,31] giving VHWs time to work and motivating VHWs to perform.

Despite numerous studies reporting that financial incentives are associated with motivation and improved performance,[12,32–34] VHWs that were more satisfied with their remuneration made fewer pregnancy referrals. SHINE VHW allowances were higher than ordinary government allowance and were also independent of the workload and performance. Thus low performers, satisfied with their allowances, may have found no added incentive to performing the new task. A similar finding among VHWs delivering behavior change education in rural Haiti[35] led those authors to posit that their VHWs perceived little benefit to increasing performance in the face of the difficult terrain, an observation they termed "disgruntled stars and happy slackers".[35] Similarly rugged working conditions exist in rural Zimbabwe that could explain our results. However, it is important to note that this observation applied to the new task and it could also be a function of workload. This has implications for increasing VHW

workload particularly in difficult to reach, resource limited settings. VHWs work under challenging conditions and livelihood constraints in many parts of the world. In fact, SHINE and the MoHCC initiated a performance-based incentives scheme after this study was completed, and these are currently being evaluated.

Adequate work resources were associated with more pregnancy referrals, and this is consistent with several studies.[12] Pregnancy identification required VHWs to have pregnancy test kits to make referrals. The nature of the task influenced how VHWs perform on tasks as the significant interaction of work resources and task type confirmed. When tools are essential to the performance of a task, the lack of those tools certainly constrains performance.

Positive feedback from supervisors and the community was associated with improved performance for pregnancy referrals. Our finding is consistent with prior studies linking supervision and recognition with improved motivation and performance.[28,36–38] The pregnancy identification task allowed VHWs and women to find out women's pregnancy status immediately and VHWs likely received immediate feedback from the women. Additionally, supervisor's skill providing constructive positive feedback may have motivated VHWs to perform this new activity. Supervision is important for all tasks; but for different tasks, specific aspects of supervision are vital to improved performance reinforcing the importance of different supervision approaches.

4.5.2 Lesson Delivery

Fewer demographic and work characteristic items predicted lesson delivery scores. VHW's from larger households (adjusted for age) had lower scores—a finding exactly opposite from those for pregnancies referrals. The significant interaction between household size and the type of task showed that task performance differed for different tasks. Lesson delivery is a routine activity, takes approximately an hour to complete and lacks the social prestige factor of newer faster to complete tasks, which may reduce family support and household duty redistribution resulting in lower lesson scores for VHW's with large families. In addition, VHW fatigue is also likely to decrease motivation to perform, particularly in the absence of family and community support.[31]

We assessed perceptions of two types of supervision, supportive and operational supervision, and they were oppositely associated with lesson delivery. Supportive supervision, characterized by treating the VHW as a peer and supporting their work needs, was positively associated with lesson delivery. Operational supervision, characterized by frequent interactions and consultations for work, was inversely associated with lesson delivery. Because of the routine nature of lesson delivery VHWs may have perceived operational support as disruptive and a hindrance to performance, as indicated by the interaction of operational supervision and task type. It is also possible that supervisors intervened with weaker VHW's by providing more operational support than supportive supervision (reverse causality in our analysis). How VHWs perceive different supervision approaches is just as important as the

supervision package itself. Further research is required to unpack supervision and understand what types of supervision approaches are appropriate for different tasks to promote improved VHW performance.[12,39]

Interestingly, the item we termed "job satisfaction and motivation" was not associated with either pregnancy referrals or lesson delivery. This factor contained items representing recognition, satisfaction and intrinsic motivation. Although these items loaded as one factor and had an adequate Cronbach's alpha, it may have been too broad. A better scale separating out these constructs might provide more clarity for the relationships between the tasks and constructs.

4.5.3 Theoretical and Practical Implications

Our work suggests that pathways to health worker performance for different tasks may vary, which has implications for contexts where VHW responsibilities are expanding. Importantly it shows that there is no single strategy that can be used to improve performance. There is need for broader conceptual thinking about VHW performance, the specific tasks they perform, and the environments in which they perform these tasks. Theories of motivation and performance are drawn from settings where there are clear roles and organizational structures and where workers are paid for their services. However, in low-income settings where VHWs are often unpaid, have less clearly defined roles, and have dual responsibility to their community and the health system, these theories may require adaption to fit the context. Further research examining VHW motivation and performance that acknowledge specific

activities or groups of activities can begin to take cognizance of the complexity of VHW performance and help to develop relevant theoretical frameworks that can guide the design and strengthening of programs.

Where VHWs have multiple concurrent responsibilities, selecting or recruiting VHWs based on the type and number of tasks within their purview is a substantial challenge. For practical, logistical, and political reasons, it might be more feasible to use such information for targeting supportive supervision and mentoring for performance improvement.

From a VHW training perspective, practices that include targeting VHWs based on gender or tenure and offering additional or special trainings for some groups of VHWs based on specific tasks may facilitate improved task performance. For VHW supervision, training VHW supervisors on supervision approaches that are less didactic and more interactive—where VHWs feel they are heard and guided—can foster improved performance. In addition, monitoring supervisor feedback and interactions with VHWs may also help ensure supervision is constructive. For those VHWs that require extra supervision, it is even more important to tailor the supervision approach to meet supervisory goals without negatively affecting VHW performance.

VHW programs in Zimbabwe and elsewhere can consider supporting VHWs based on meta-characteristics that include the structural and social aspects of the work

environment. A meta-characteristic profiling/targeting of VHWs would be one that considers the requirements for the job tasks, for example, time to conduct the activities, community value for the health activities, cultural norms about the health activities, the size of population to be covered, and family support for the VHW's work. Using this information, the program can navigate appropriate VHW strengthening to promote improved task performance. National VHW surveys can help programs answer the question of what services VHWs actually provide. With this knowledge, programs can then examine various influences on task-specific performance.

Overall, improving VHW performance in multi-task environments requires building a facilitative environment. This means using community-wide interventions that integrate VHW demographic factors, the community, and the work context. This package of interventions can address VHW training, supervision, remuneration, household-level dynamics, and community sensitivities for different tasks to create a conducive environment for VHWs to perform tasks.

4.5.4 Limitations of the study

Our findings should be interpreted cautiously based on limitations of the study. First, the cross-sectional design does not allow for causal inference nor permit inference about the direction of associations and how different factors change over time. A longitudinal cohort study would be the ideal design to examine directionality and how the relationships change over time.

Second, the lesson delivery checklist was a subjective measure of performance and more vulnerable to random error and rater-bias than pregnancy referrals our objective measure.[40,41] We attempted to minimize any rater bias that could either inflate or deflate estimates by training the nurse supervisors on a standardized procedure to complete the lesson delivery checklist. However, while objective measures are often more reliable, they reflect the results of behaviors where as subjective measures reflect the actual behaviors,[42] which was key for assessing the *quality* of lesson delivery. In future, using lesson scores from multiple observers unfamiliar with the VHW could help increase precision and reduce potential bias.

Third, to minimize potential social desirability bias from the VHW survey, the data collectors were trained in interviewer neutrality and followed a standard operating procedure for administering the interview. Finally, these results take place within an efficacy study with adequate resources and supported by national and local government entities in the two districts. The VHWs received an extensive amount of support, with an emphasis on a relatively small number of tasks, which limits the external validity of our results in other contexts such as government or NGO programs. Nevertheless, our results highlight that the factors shaping performance vary for different types of task.

4.5.5 Conclusion

We studied factors associated with VHW performance on contrasting jobs tasks and found that the factors associated with performance differed by task. This suggests

that in multi-task environments, what works to improve performance for some tasks may not work for other tasks. VHW-based programs should consider creating facilitative work environments that include developing familial and community support for VHW tasks and addressing VHW needs, including appropriate remuneration.

Further, programs can use this method to identify factors associated with different tasks to improve task performance. It may also be possible to use different performance evaluation measures to examine factors associated with quantity and quality performance outcomes. Additional research is needed to validate and explore these relationships in different contexts, over time, and to examine pathways to performance.

VHW services are important in primary health care systems in many low income settings. Focusing on understanding VHW performance in multi-task settings can help to prevent over-burdening VHW workloads and to maintain quality VHW performance as countries seek a transition towards universal health coverage.[43]

REFERENCES

1. Lewin S, Munabi-Babigumira S, Glenton C, et al. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases: a review synopsis. *Cochrane Database Syst Rev*. 2010;28(3):CD004015.

2. Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, et al. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *Lancet.* 2013;382(9890):452–77.

3. Global Health Workforce Alliance, World Health Organization (WHO). Global experience of community health workers for delivery of health related Millennium Development Goals: a systematic review, country case studies, and recommendation for integration into national health systems. Geneva: WHO; 2010. Available from: http://www.who.int/workforcealliance/knowledge/publications/CHW_FullReport_2010.pdf?ua=1

4. Global Health Workforce Alliance, World Health Organization (WHO). A universal truth: no health without a workforce. Geneva: WHO; 2014. Available from: http://www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal_truth_report.pdf?ua=1

5. Jaskiewicz W, Tulenko K. Increasing community health worker productivity and effectiveness: a review of the influence of the work environment. *Hum Resour Health*. 2012;10(1):38.

6. Frymus D, Kok M, Koning K De, Quain E. Knowledge gaps and a need based global research agenda by 2015. Geneva: WHO; 2013. Available from: http://www.who.int/workforcealliance/knowledge/resources/CHWsResearch_Agenda_by2015.pdf

7. Zimbabwe Ministry of Health and Child Care. The village health worker strategic direction. Harare : Ministry of Health and Child Care, Government of Zimbabwe; 2010. Available from: https://www.humanitarianresponse.info/system/files/documents/files/Village%20Health%20Worker%20Strartegic%20Direction.pdf

8. Zimbabwe Health Workforce Observatory. Human resources for health country profile Zimbabwe. Geneva: WHO; 2009. Available from: http://s3.amazonaws.com/zanran_storage/www.hrh-observatory.afro.who.int/ContentPages/2453220542.pdf

9. Zimbabwe Ministry of Health and Child Care. The national health strategy for Zimbabwe 2009-2013. Harare: Ministry of Health and Child Care, Government of Zimbabwe; 2013. Available from: http://www.who.int/workforcealliance/countries/zwe_healthStrategy.pdf?ua=1

10. Dieleman M, Harnmeijer J. Improving health worker performance: in search of promising practices. Geneva: WHO; 2006. Available from: http://cdrwww.who.int/entity/hrh/resources/improving_hw_performance.pdf

11. Naimoli JF, Frymus DE, Wuliji T, Franco LM, Newsome MH. A community health worker "logic model": towards a theory of enhanced performance in low- and middle-income countries. *Hum Resour Health*. 2014;12(1):56.

12. Kok MC, Dieleman M, Taegtmeyer M, Broerse JE, Kane SS, Ormel H, et al. Which intervention design factors influence performance of community health workers in low- and middle-income countries? A systematic review. *Health Policy Plan.* 2015;30(9):1207–1227.

13. Bronfenbrenner U. *The ecology of human development: experiments by nature and design*. Cambridge (MA): Harvard University Press; 1979.

14. Locke EA, Latham GP. Goal setting theory: an introduction. In: *A theory of Goal setting & test performance*. Upper Saddle River (NJ): Prentice Hall; 1990: 1–26.

15. Maslow AH, Frager R. *Motivation and personality*. New York: Harper and Row; 1987.

16. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol*. 2000;55(1):68–78.

17. Maynard D, Hakel M. Effects of objective and subjective task complexity on performance. *Hum Perform*. 1997;10(4):303–330.

18. Menon P, Mbuya M, Habicht J-P, Pelto G, Loechl CU, Ruel MT. Assessing supervisory and motivational factors in the context of a program evaluation in rural Haiti. *J Nutr*. 2008;138(3):634–7.

19. Likert R. *A technique for the measurement of attitudes. Archives of Psychology*. New York: Columbia University Press; 1932.

20. Costello AB, Osborne JW. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Pract Assessment Res & Eval*. 2005;10(7):1–9.

21. Allison PD. *Missing Data*. Thousand Oaks (CA): Sage; 2002.

22. Cleveland WS, Devlin SJ, Cleveland S. Locally weighted regression: an approach to regression analysis by local fitting. *J Am Stat Assoc*. 2013;83(403):596–610.

23. Finlayson K, Downe S. Why do women not use antenatal services in low- and middle-income countries? A meta-synthesis of qualitative studies. *PLoS Med*. 2013;10(1).

24. Bagonza J, Kibira SP, Rutebemberwa E. Performance of community health workers managing malaria, pneumonia and diarrhoea under the community case management programme in central Uganda: a cross sectional study. *Malar J*. 2014;13(1):367.

25. Jenson A, Gracewello C, Mkocha H, Roter D, Munoz B, West S. Gender and performance of community treatment assistants in Tanzania. *Int J Qual Heal Care*. 2014;26(5):524–9.

26. Kok MC, Kane SS, Tulloch O, Ormel H, Theobald S, Dieleman M, et al. How does context influence performance of community health workers in low- and middle-income countries? Evidence from the literature. *Heal Res Policy Syst*. 2015;13(1):13.

27. Alam K, Tasneem S, Oliveras E. Performance of female volunteer community health workers in Dhaka urban slums. *Soc Sci Med*. 2012;75(3):511–5.

28. Alam K, Tasneem S, Oliveras E. Retention of female volunteer community health workers in Dhaka urban slums: a case-control study. *Health Policy Plan*. 2012;27(6):477–86.

29. Crispin N, Wamae A, Ndirangu M, Wamalwa D, Wangalwa G, Watako P, et al. Effects of selected socio-demographic characteristics of community health workers on performance of home visits during pregnancy: a cross-sectional study in Busia District, Kenya. *Glob J Health Sci*. 2012; 4(5):78–90.

30. Alamo S, Wabwire-Mangen F, Kenneth E, Sunday P, Laga M, Colebunders RL. Task-Shifting to community health workers: evaluation of the performance of a peer-led model in an antiretroviral program in Uganda. *AIDS Patient Care STDS*. 2012; 26(2):101–7.

31. Rahman SM, Ali NA, Jennings L, Seraji MHR, Mannan I, Shah R, et al. Factors affecting recruitment and retention of community health workers in a newborn care intervention in Bangladesh. *Hum Resour Health*. 2010; 8:12.

32. Puett C, Coates J, Alderman H, Sadruddin S, Sadler K. Does greater workload lead to reduced quality of preventive and curative care among community health workers in Bangladesh? *Food Nutr Bull*. 2012;33(4):273–87.

33. Willis-Shattuck M, Bidwell P, Thomas S, Wyness L, Blaauw D, Ditlopo P. Motivation and retention of health workers in developing countries: a systematic review. *BMC Health Serv Res*. 2008;8:247.

34. Glenton C, Colvin CJ, Carlsen B, Swartz A, Lewin S, Noyes J, et al. Barriers and facilitators to the implementation of lay health worker programmes to improve access to maternal and child health: qualitative evidence synthesis. *Cochrane Database Syst Rev*. 2013;10(1):CD010414.

35. Mbuya MN. *Exploring the role of community health workers and their perceived work context on the delivery of behavior change communication in rural Haiti* [dissertation]. Ithaca, NY: Cornell University; 2008.

36. Bhattacharyya, K., Winch, P., LeBan, K., Tien M. Community health worker incentives and disincentives: how they affect motivation, retention, and sustainability. Arlington (VA): BASICS II; 2001. Available from: http://pdf.usaid.gov/pdf_docs/PNACQ722.pdf

37. Dieleman M, Cuong PV, Anh LV, Martineau T. Identifying factors for job motivation of rural health workers in North Viet Nam. *Hum Resour Health*. 2003;1(1):10.

38. Yeboah-Antwi K, Snetro-Plewman G, Waltensperger KZ, Hamer DH, Kambikambi C, MacLeod W, et al. Measuring teamwork and taskwork of community-based "teams" delivering life-saving health interventions in rural Zambia: a qualitative study. *BMC Med Res Methodol*. 2013;13(1):84.

39. Hill Z, Dumbaugh M, Benton L, Källander K, Strachan D, Asbroek A, et al. Supervising community health workers in low-income countries--a review of impact and implementation issues. *Glob Health Action*. 2014;7:24085.

40. Feldman JM. Beyond attribution theory: cognitive processes in performance appraisal. *J Appl Psychol*. 1981;66(2):127–48.

41. Bommer WH, Johnson JL, Rich GA, Podsakoff PM, Mackenzie SB. On the interchangeability of objective and subjective measures of employee performance: a meta-analysis. *Pers Psychol*. 1995;48(3):587–605.

42. Sturman M. Searching for the Inverted U-Shaped relationship between time and performance: meta-analyses of the experience/performance, tenure/performance, and age/performance relationships. *J Manage*. 2003;29(5):609–40.

43. Dye C, Boerma T, Evans D, Harries A, Lienhardt C, McManus J, et al. The world health report 2013: research for universal health coverage. Geneva: WHO: 2013. Available from: http://apps.who.int/iris/bitstream/10665/85761/2/9789240690837_eng.pdf?ua=1

CHAPTER 5

VILLAGE HEALTH WORKER HEALTH SERVICE DELIVERY IN RURAL ZIMBABWE: CLIENT PERSPECTIVES ABOUT VILLAGE HEALTH WORKERS AND IMPLICATIONS FOR PROGRAMS AND POLICY

5.0 Abstract

Background: The global shortage of skilled health workers has catalyzed interest in Village Health Workers (VHWs) as a mechanism to improve access to healthcare services in many low-income countries. Improving VHW healthcare service delivery access, equity and effectiveness of health systems requires understanding client experiences. Currently, little is known about client experiences with VHW healthcare delivery in rural Zimbabwe. This study describes client experiences with VHW work performance, identifies factors important to clients and discusses implications for programs and policies **Methods:** A sample of 20 pregnant women was purposively selected from a larger sample of women participating in the Sanitation Hygiene and Infant Nutrition Efficacy (SHINE) trial, a large-scale study of sanitation/hygiene and infant feeding interventions being delivered through the government's VHW system. In-depth interviews were conducted with VHW clients to explore their experiences with their VHW in June 2014. Interviews were audio recorded and transcribed and translated into English. Qualitative data were analyzed using an inductive and deductive approach. **Results:** Teaching skills, VHW availability and approachability, respectful treatment, maintaining client confidentiality and VHW gender were themes identified that described clients' perspectives about the quality of VHW service delivery. In addition, clients perceived their VHW as a mediator between the health clinic and the community and they also described their process of knowledge

acquisition from VHWs and how this learning aided behavior change. **Conclusions:** This study highlights client preferences for specific VHW attitudes, skills, characteristics, and behavior during health service delivery. Policy and program planning may be improved by aligning VHW selection and training with areas of competency valued by community members and strengthening community support for VHWs.

5.1 Introduction

The global shortage of skilled doctors, nurses and midwives is projected to increase from 7.2 million to 12.9 million by 2035.[1] To achieve Sustainable Development Goal 3, achieving universal health coverage, efforts are needed to mobilize other members of the healthcare workforce.[2] Increasing the Village Health Worker (VHW) workforce has become a prominent strategy in Sub-Saharan Africa (SSA) where skilled health worker shortages are most acute.[1]

VHWs are "lay" community-based health workers, who are traditionally selected by their communities and deliver a range of curative and preventative health services.[3] They are accountable to both the communities they serve and to the formal healthcare system. VHWs may be voluntary, receiving a small financial honorarium, or be paid a salary.[4] VHW scope of practice varies from delivering single interventions to providing a combination of services that may include promoting family planning and breastfeeding, newborn care, immunizations, reproductive health services, distributing micronutrient supplements or conducting surveillance and treatment for childhood illnesses.[3,4] In addition to these activities, VHWs are also often seen as representing community health interests to the formal health care sector.[5] How VHWs interact with their clients in the delivery of these health services influences client outcomes and potentially affects overall program impact.[5] Therefore the communities that VHWs serve, and more specifically the recipients of care, are important stakeholders.

To improve the quality of care it is crucial to explore client perspectives concerning their interactions with VHWs; only a few reports in the literature from sub-Saharan Africa explicitly explored VHW-client perspectives of service delivery. In Zimbabwe, clients identified trust as a characteristic they valued in their traditional birth attendants (TBA).[6] In Uganda, clients of community based peer counselors providing breastfeeding support found the counselors' friendliness and patience helpful.[7] And in South Africa, clients receiving HIV/AIDS related information and education also appreciated their community health workers' friendliness and assistance accessing facility-based health services.[8] Given the importance of client perspectives concerning their VHWs, it is striking that there are only a few published empirical studies to date from sub-Saharan Africa. More studies about the qualities of VHWs (who deliver a wider range of health services than TBAs) are needed as the dearth of client perspectives on VHW delivery impedes health systems responsiveness to promote healthcare utilization. The most productive strategy to improving community-based healthcare will be one that is built on an understanding of the quality of interactions between VHWs and clients.

To guide our exploration of what client experiences of VHW health service delivery mattered, we developed a simplified conceptual framework. Clients' perspectives of VHW healthcare delivery are shaped by a complex mix of individual and community values and expectations as well as clients' and the communities direct experiences with VHWs as shown in Figure 5.1. Community values and expectations that include cultural norms can influence individual client values and expectations. In

addition, community experiences shape the community perspective of VHW service delivery, which can influence individual client perspectives. Extrinsic health sector factors such VHW training, supervision and other VHW work factors can affect VHW performance at the community and client level and contribute to community and client perspectives.[3,9] For VHW programs to be successful, VHW efforts must be seen as appropriate by clients.[5]

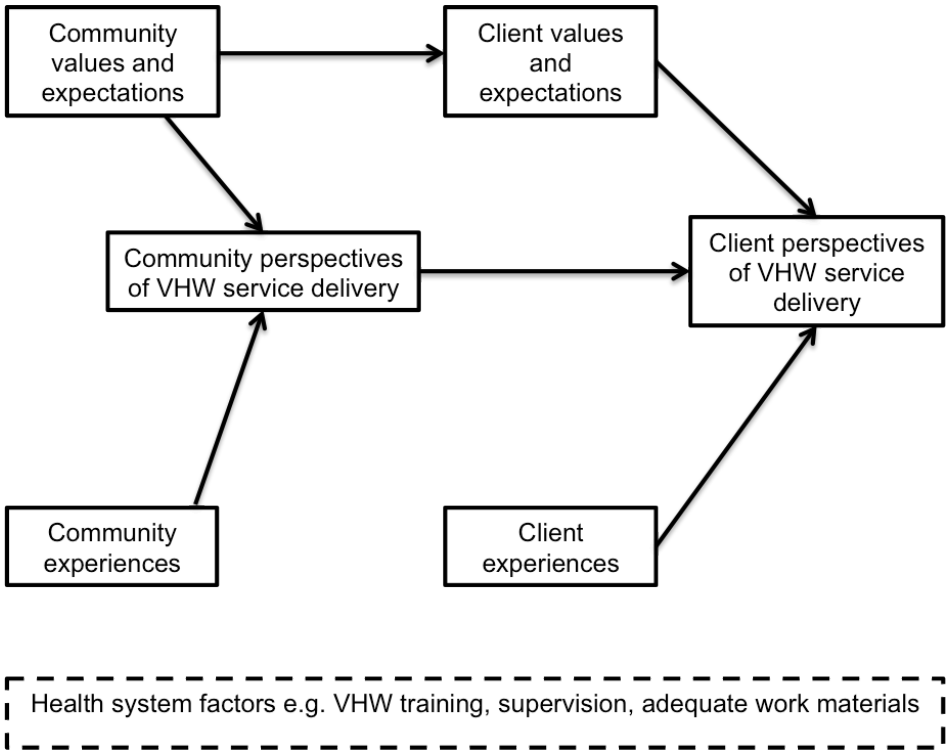

Figure 5.1. Conceptual framework of clients' perspectives of Village Health Worker service delivery

In this study we draw on findings from client interviews to: 1) describe client perspectives on VHW health service delivery in the context of a study in rural Zimbabwe, 2) identify facilitators and challenges to VHW health delivery that may

affect client experiences and perspectives, and 3) discuss how programs can use this knowledge to improve service delivery and increase program impact.

5.2 Programmatic Context

Zimbabwe, a nation of 13 million residents, faces a critical shortage of skilled health workers with only 8.8 health workers per 10,000 population available.[10,11] This is far below the international minimum threshold of 23 skilled health workers per 10,000 population deemed necessary for delivery of essential maternal and child heath services.[1,11] In rural areas, where over 70% of the population lives, this shortage of health workers is even more acute.[12] In 2009, the government of Zimbabwe launched a national health strategy to strengthen the primary health care by revitalizing the VHW program and increasing the recruitment and support for VHWs in rural areas.[13]

In Zimbabwe, approximately 4000 VHWs[12] provide health surveillance, health promotion education and support to clients, and treatment for minor health conditions. Community members in each village select VHWs according to guideline criteria from the Ministry of Health and Child Care (MoHCC). VHWs must reside in the community, be literate, over 25 years of age, well regarded by the community, able to maintain confidentiality, and willing to work on a voluntary basis.[14] In addition, VHWs can be any gender. The MoHCC trains VHWs over 5-months, including a 12-week in-classroom session and an 8-week field-based internship. VHWs are trained using principles of adult learning (e.g. role playing) and topics covered include interpersonal communication, sexual and reproductive health, and maternal, newborn

and child health and nutrition.[14] VHWs receive 3-4 day refresher trainings twice a year. The VHWs provide monthly reports to the nurse-in-charge at their nearest rural health clinic and receive a modest monthly stipend of $14USD. Zimbabwe's economic instability and funding constraints continue to limit the degree to which the planned VHW MoHCC activities take effect.[15]

The Sanitation Hygiene and Infant Feeding Efficacy (SHINE) trial, in partnership with the MoHCC VHW strengthening initiative, facilitated the recruitment and training of 342 VHWs in two rural districts of Zimbabwe, Shurugwi and Chirumanzu.[16] The population of these two districts is approximately 150, 000 residents and the predominant language groups are Shona and Ndebele.[17] Subsistence farming and mining are the predominant income generating activities for most residents with maize being the stable crop.[18] Among school-aged children, infection with schistosomiasis is prevalent and stunting rates are high among children at 24 months age.[16,19]

SHINE is a cluster-randomized trial investigating the independent and combined effects of a water/sanitation and infant and young child feeding intervention on child growth and anemia.[16] As part of SHINE, VHWs delivered behavior change intervention messages to pregnant women residing in the community. The VHWs conducted early pregnancy identification surveillance and delivered nutrition and hygiene health education lessons to pregnant women in their home. In addition to their MoHCC training, VHWs received a 1-month training on SHINE interventions, which

focus on sanitation, hygiene and infant feeding. The VHWs visited women of reproductive age and mothers of young children on a regular monthly schedule and were expected to spend a total of 60-75 minutes on the delivery of SHINE lessons plus MoHCC standard of care messages to clients. SHINE provided non-salary incentives (e.g. a food basket) and "tools of the trade" (e.g. uniforms, bicycles, first aid kits, and stationary) to VHWs and ensured the MoHCC financial stipend reached VHWs every quarter. SHINE also facilitated supportive supervision to VHW supervisors at the clinic (through training and mentoring) and to VHWs themselves through SHINE research staff.

5.3 Methods

5.3.1 Interview Guide Development

Free-list, open ended interviews were conducted with a convenience sample of SHINE female clients (n=6).[20,21] Free listing is a method that can be used to capture emic perceptions of a phenomenon.[20] The interviews can be performed quickly and yield a local vocabulary for understanding the phenomenon. The women were asked to list "*all things that come to mind when you think of VHW performance*" and probed for "*anything else*" until no further responses. Free-list interviews were conducted in Shona, the local language, audio recorded and translated and transcribed into English by a research assistant.

Salience analysis,[22] which accounts for the rank and frequency of items mentioned, was conducted on the free-lists from the transcripts. Briefly, for each

interview transcript all items mentioned were listed and then ranked inversely.[22] The individual interview salience was calculated by dividing the ranking number by the total number of items listed in that interview.[22] A composite salience value was calculated for each item listed in all free-lists by summing individual salience values and dividing by the total number of client interviews (Table 5.1).[22] The determination of salience was based on observing breaks in the composite ranks.[20] Using these break points the high, medium, and low salient items related to VHW performance were included in the interview guide where they were further explored (Appendix B1).

Table 5.1. Composite salience scores of items from the freelist

Free List Items	Individual salience scores for clients[a] (n=6) ID1	ID2	ID3	ID4	ID5	ID6	Sum of item salience	Composite Salience	Salience Category
Happy with work of VHW		1.00	1.00	0.80		1.00	3.80	0.63	High
SHINE messages and hardware	1.00	0.50		0.60	0.20		2.30	0.38	
Dedicated to work				0.40	0.80		1.20	0.20	Medium
Ensures mom understands messages					0.60	0.60	1.20	0.20	
Works well				1.00			1.00	0.17	
Free to interact with VHW					1.00		1.00	0.17	
VHW conducts herself well						0.75	0.75	0.13	Low
Good messages and true			0.67				0.67	0.11	
VHW happy and never frowns						0.50	0.50	0.08	
Moms see benefit of messages					0.40		0.40	0.07	
New knowledge			0.33				0.33	0.06	
VHW makes and keeps appointments				0.20			0.20	0.03	

5.3.2 Main Study Participants

Multi-stage purposive sampling was used to identify VHW clients for the main interviewing study.[21,23] First, eleven VHWs participating in SHINE were purposively selected from one study district to include diversity with regard to gender, age and tenure (Appendix B2). Second, between one to four clients per VHW were purposively selected (for a total of 20) to include diverse ages. The multi-stage sampling allowed us to explore client perceptions across the characteristics of different VHWs and client age was used a proxy for clients experience with a VHW. All clients were pregnant women participating in SHINE.

5.3.3 Interview Procedures

Interviews were conducted with VHW-clients in June 2014. Three trained female interviewers with no relationship to the clients or their VHWs conducted the interviews in Shona and took field notes during interviews. All interviews were conducted at the client's home without other household members present. Interviews lasted 27 minutes on average and ranged between 15-52 minutes. A research supervisor collected field notes and debriefed daily with the interviewers to discuss each interview and refine interview procedures and probes.

All interviews were audio recorded and then translated and transcribed into English. Randomly selected extracts from each interview transcript were verified for translational accuracy by an independent research assistant fluent in both Shona and English to examine the credibility of the transcripts.

5.3.4 Qualitative Data Analysis

After all data collection and transcripts were complete, one author (RK) reviewed all interview transcripts. In the first stage of analysis, RK and a research assistant (JS) used an inductive grounded theory approach[24] and deductive approach based on the interview guide and SHINE program knowledge to create a preliminary codebook. RK and JS used open-coding to independently code the same three interviews and identified initial codes for the codebook. Codes were created based on illustrative content related to the research questions. Then both coders repeated another coding iteration of three interviews. The codebook was updated with new codes and cross-checked for dependability by discussing consistencies and inconsistencies in respective coding until consensus was achieved (Appendix B3).

In the second stage, RK applied the updated codebook to all 20 transcripts and then looked for similarities and differences in the codes before grouping codes into themes that described discrete phenomena.[24] Subsequently, co-authors (RJS and MM) discussed the codes and themes, codes were refined and transcripts re-coded accordingly and final themes were identified. The analysis of transcripts was conducted using ATLAS.ti version 7.5 (Scientific Software Development GmbH, Berlin, Germany). The overall aim of the analysis was to identify themes that captured core responses from across the study sample, where a core class of responses was one that was generative and provided insight into client perspectives of health worker delivery and performance. Quotations that illustrate the themes are presented in the results.

Written informed consent was obtained from all participants and the study protocol was approved by the Medical Research Council of Zimbabwe and the Johns Hopkins Bloomberg School of Public Health IRB.

5.4 Results

5.4.1 Participant characteristics

The average age of clients in our sample was 26.8 years (range 15-43 years) (Table 5.2). Most women were married, one was widowed and one was unmarried. Almost all women had some secondary school education and had an average household size of 4.9 people (range 3-9 people). A total of six women reported that their VHW was a family relation (for 3 women a close relative and for 3 women a distant relative).

Table 5.2. Characteristics of female respondents. Values are numbers (percentages) unless stated otherwise

Client Characteristics	**Total (n=16)[a,b]**
Age (years) (mean, range)	26.8. (15-43)
Marital Status	
Currently married	14(87.5)
Other	2(12.5)
Educational Level	
Primary completed	3(18.8)
Some secondary	7(43.7)
Completed O'Level or higher	6(37.5)
Household size (mean, range)	4.9 (3-9)
Family relation to VHW	6(37.5)

[a] Missing demographic data for four clients
[b] All clients were female

5.4.2 Emergent themes

Seven major themes were identified from the analysis. The themes describe VHW skills and characteristics that clients valued and clients processing of the health messages. The themes were 1) teaching styles, 2) attention and availability of VHWs, 3) respectful interactions, 4) gender and work performance perceptions, 5) client knowledge acquisition and behavior change, 6) the VHW as a health representative, and 7) client confidentiality.

5.4.2.1 Teaching strategies and styles

All clients (20/20) discussed how the VHWs explained the lessons in great detail, repeating information and using demonstrations to better help clients understand.

"…He first delivers the message to me and [then] asks what I have understood…if I have not understood anything…he repeats the…message to me… then he asks me once again…."
(21-year-old client, with male VHW of 12 years tenure)

For a few clients (3/20), the individualized attention they received from their VHWs was important and they perceived their VHWs to *"work with [them] with love"*. All clients appreciated feeling free to ask VHWs questions and noted that VHWs were careful to ensure the client's understanding of lessons. Over half of the clients (13/20) specifically reported that VHWs did not rush through the lesson:

"…She does everything thoroughly without saying that she is in a rush or behind time; that helps me too to sit down and feel free and also not be in a hurry so that she can discuss with me properly…"
(21-year-old client, with female VHW of 13 years tenure)

A couple of clients specified that the VHWs explained information better than clinic nurses who were *"harsh and impatient"*

"...We would go frequently to hospitals and clinics but…things are [not] really explained to you there…my VHW tells me and explains in great detail how we should go about things…"
(Client with female VHW of 5 years tenure)

However, a few clients (4/20) reported feeling overloaded with information or the VHW not taking sufficient time to explain the messages

" …The…one [VHW] will be saying as long as I have done my job. They will not even ask if we have understood what they are saying…"
(18 year-old client, with female VHW of 11 years tenure)

"…Delivering several messages to us all at once. This causes us to fail to understand the messages…because it will now have become overwhelming…"
(17-year-old client, with female VHW of 18 years tenure)

5.4.2.2 Prompt attention, availability and approachability of VHWs

A few VHWs (3/20) were late for appointments or missed appointments altogether. Their clients were disappointed with this behavior and felt that it affected the VHWs teaching.

"...I do not like…the times she does not come…I get offended at such times. I will be saying to myself so she is no longer going to teach us like she did before..."
(Client B with related female VHW of 13 years)

For one client living with her in-laws, the late VHW visits interrupted her household chores. She expressed that she did not have enough time to talk with the VHW and felt limited in her openness with the VHW because her mother-in-law would be around the homestead.

"…They visit us when it is almost sunset such that you will not be able to say all things that are bothering you… I am a daughter-in-law and it will not be right for me to cook when the mother-in-law is in the house…so I end up rushing…and just talking about a few things…"
(19 year-old client, with related female VHW of 18 years)

However, the majority of clients told stories of VHWs reliable and punctual visits and over half the clients (11/20) discussed how their VHWs prioritized their work, even sacrificing their other household chores.

"…Whenever she says she is coming she comes on that time and never disappoints…they will not be lying... What I like is that they always come on time…"
(Client A with related female VHW of 13 years)

Most clients also felt they could approach VHWs at all times not just during scheduled visits and that their VHWs were available to them anytime.

"…I can approach her at her house when she is busy attending to household chores…and she will leave whatever she is doing and…help without showing annoyance…"
(43-year-old client, with female VHW of 10 years tenure)

When clients had urgent needs, a few (3/20) had the expectation of a quick response. These clients described mixed responsiveness from VHWs and one client expressed discontent when the VHW did not respond promptly, considering it an indicator of poor VHW performance.

"…What shows that a VHW does not work well …they do not come when you send a child over to them when you need help or are in a dilemma; they do not come quickly…"
(24-year-old, client with related female VHW of 4 years tenure)

5.4.2.3 Respectful and good-natured interactions

Several clients (16/20) reported their VHW treated them respectfully which helped the clients feel comfortable during lesson delivery.

"… They do not insult you, but talk to you in an evidently free manner that enables you to work harmoniously…she [VHW] never shifts from her good disposition…"
(21-year-old client, with female VHW of 13 years tenure)

"…When they work with us, delivering lessons happily without showing animosity towards us, that helps us enjoy…"
(40-year-old client, with female VHW of 18 years tenure)

However, after a probe asking women about they type behaviors from a VHW would make them unhappy, a few clients (3/20) gave examples of poor disrespectful treatment and how this could influence their interaction with the VHW

"…if they are harsh in responding to us, that is what determines whether we will cease to be open with them..."
(28-year-old client, with female VHW of 2 years tenure)

5.4.2.4 VHW gender and work performance perceptions

A few clients (3/20) indicated that female (but not male) VHWs must complete household duties and look after their family before going out into the community. Women accepted male VHWs well. Three clients reported their male VHWs were "*easy to interact with"* and all three noted feeling free to discuss sensitive topics like family planning. Indeed the women reported that seeing their male VHWs demonstrate how to prepare thick porridge for a baby was an indicator of the VHW's dedication since cooking is usually a female task. Moreover, the male VHWs behaved professionally as one client, a widow, said:

"…If the [male] VHW was to come and try to propose to me or say let us have an affair, I was going to be very disappointed. But he does not do that, he just comes and does his work only…"
(40-year-old client, with male VHW of 6 years tenure)

5.4.2.5 Client knowledge acquisition and behavior change

All clients (20/20) expressed gaining new knowledge from the VHWs. From their new knowledge, several clients reported the reasoning behind the recommended behaviors and reflected on how this helped them to change and maintain the new behaviors.

"…We are told to start feeding the baby solid foods at six months…I have realized that the chances of the baby contracting a disease are drastically reduced if the baby does not have solid foods introduced too early in his/her diet..."
(40-year-old client, with female VHW of 18 years tenure)

Other clients also found that the information that VHWs shared helped them to clarify some client myths and misconceptions about health issues. For example:

"…We are disregarding the myths that a baby should be given cooking oil. With our previous babies we would give them cooking oil because we were afraid for their health but with these babies we are not, and yet we are realizing that our babies are growing healthily…"
(27-year-old client, with female VHW of 2 years tenure)

5.4.2.6 The VHW as a health representative

All clients (20/20) expected VHWs to perform tasks associated with the healthcare system, like teaching and encouraging healthful behaviors, visiting the sick, dispensing first aid and referring community members to health clinics. Some clients (6/20) considered VHWs to be their health representative, a mediator between the health system and the community.

"…We cannot come directly to you [Ministry of Health] to ask about what projects are in the pipeline; they [VHWs] are the ones who introduce them to us, since we selected them to represent us when it comes to health related issues. So every single thing that comes from the health sector or from hospital staff they should tell us…" (22-year-old client, with related female VHW of 10 years tenure)

As a representative of the health care system, clients trusted VHW health advice and viewed the VHW as a health authority. A few clients (2/20) used the community trust of the VHW's expertise as validation when talking about lessons with other family members.

"…Their work pleases me because among the things my VHW tells me, even if I am to tell my husband, there is nothing he disputes, he sees no wrong in it…" (23-year-old client, with related female VHW of 4 years tenure)

5.4.2.7 Maintaining client confidentiality

Almost half of the clients (8/20) expressed the importance of confidentiality. The clients, most of them young and married, valued being able to "*confide*" in their VHW and feeling free to so because their VHW *"maintains confidentiality*".

" …Say you have told her [VHW] about the way things are at your home, she [VHW] is not a type of person who gossips [to the community] …" (19-year-old client, with related female VHW of 18 years tenure)

For one client, this ability was considered an indicator of her VHW's good performance and dedication**.**

5.5 Discussion

The purpose of this study was to describe client perspectives of VHW health delivery and identify characteristics of the health service delivery that facilitated or

hindered clients' uptake of health messages in rural Zimbabwe. The interviews revealed a range of VHW interpersonal qualities and skills clients considered important aspects of VHW performance, namely teaching manner, availability and approachability, respectful treatment and confidentiality. Gender of the VHW was surprisingly of little concern to our pregnant female clients and they described how their knowledge acquisition promoted behavior change. With only a few of studies explicitly exploring client perspectives of VHW health service delivery in Sub-Saharan Africa, a region where use of VHWs is rapidly expanding, [25] this study provides several programmatic implications for strengthening community based health worker systems.

First, to promote the uptake of health interventions by clients, it is important to identify VHW skills and behaviors that the clients value in their interaction with VHWs. In our study all clients acknowledged VHWs teaching techniques and patience during lesson delivery and most clients considered VHWs' appointment keeping, availability in the community and promptness during emergency to be important aspects of health service delivery. Many welcomed their VHWs polite, kind and considerate demeanor with a few describing harsh treatment as being disrespectful. Several studies of lay health-workers in other contexts have reported that respectful interactions, training in communication skills and scheduling and keeping appointments can influence client perceptions of the health service delivery and the effectiveness of programs.[5,26–29] However, while training curricula for VHWs vary in scope and focus there is little published evaluation of VHW training programs and

their influence on the health behaviors of clients. [27,30,31]

Understanding what aspects of health service delivery matter to clients and incorporating these into training content is likely to facilitate clients' uptake of messages. In this study VHWs had received extensive training, but the interviews suggest that there may be more room to contextualize trainings; for example train VHWs on the local meanings of 'respect' e.g. being polite and considerate. In addition to training, community participation is critical to the success of programs[32] and gathering regular client feedback about VHW health service delivery can help programs strengthen VHW trainings and likely improve program success. Future programs could benefit from studies documenting the process of incorporating client and community perspectives into VHW trainings and their evaluation at the client level.

Although most VHWs were female there were subtle variations in a few clients' expectations for how male and female VHWs prepare before going to work in the community and how their performance was construed. However, some gendered expectations of social conduct that might have influenced male VHW interactions with clients were not realized in practice. In Zimbabwe gender is not part of the VHW selection criteria set by the MoHCC and each community selects a candidate regardless of gender. Communities select VHWs based on the competencies and personal characteristics that reflect local preferences and gender norms.[33] This may partly explain the mixed evidence linking VHW gender with VHW performance.[34]

Suitability of VHW characteristics to the local context is thus important and failure to adequately select VHWs (by governments or other organizations) could possibly result in poor health service delivery and uptake of messages.

Second, understand community experiences and expectations of VHW health service delivery. It is important to recognize that in addition to individual client perspectives, VHWs serve a community and thus community perspectives about VHWs should also be considered. Throughout all interviews VHWs health promotion activities were noted and some clients even considered their VHWs to be their healthcare representatives. In addition several clients expressed maintaining confidentiality was important to them. Because of the longstanding community-based selection for VHWs in Zimbabwe, it is reasonable that there are community expectations for VHWs to connect the community with the health center and to deliver health services. Furthermore, VHWs provide services on sensitive topics such as family planning, and maintaining client confidentiality and privacy likely enhances community trust of the VHW and client uptake of interventions. Identifying community perspectives can assist programs to develop strategies to support VHWs work role in the community.

Health workers' responsiveness to clients needs have been explored using different frameworks in mostly middle and high-income contexts.[35–37] The World Health Organization's (WHO) Health Systems Responsiveness survey[35] (HSRS) has eight domains that focus on the non-clinical interpersonal interactions that clients

experience during health care provision. The domains are thought to be universal and have wide applicability.[35,36] Our results support some of these domains, such as clarity of communication, confidentiality, dignity, and prompt attention. However, the WHO framework fails to explicitly link the health system domains to why they matter for clients.

Another framework by Entwistle et al.[37] explains why the health worker characteristics and their behavior during interactions with clients are important for enabling clients to engage with health workers to make healthcare decisions. The framework focuses on the client experiences in high-income settings and is broad to reflect the context dependent nature of client perspectives and the complexity of heath service delivery.[37,38] Similar to our results this framework identifies health workers characteristics such as "available, approachable and accessible"[37]; actions such as "invite, welcome and answer questions"[37] and client feelings such as "feel valued, accepted and respected as a person".[37] While both the HSRS and Entwistle's frameworks underscore the importance of the client perspective, Entwistle et al. explicitly explore the health worker characteristics with actions that result in specific client feelings and behavior change.

These frameworks provide a useful starting place for researchers and programs to consider why the client experience matters, what characteristics and behaviors of health workers are modifiable and what are the strategies we can use to change them. To expand this discussion, it is necessary for future studies about VHW health service

delivery and performance to conduct careful analysis of the context and develop frameworks that include the role of the community. Key lessons for programs and policy makers from this work are:

- It is important for health systems strengthening to consider both the client and community views of VHW health service delivery and performance.
- Client-identified skills and competencies should be aligned with VHW trainings, supervision and support.
- Evaluation of VHW trainings should incorporate client perspectives to ensure health interventions are delivered in the best way and at high quality.
- While this study highlighted characteristics of VHW service delivery that were relevant in rural Zimbabwe, more research is required to learn about VHW service delivery from clients in different contexts.

5.5.1 Strengths and Limitations

A strength of this study was the use of qualitative methods to provide in-depth client insights into VHW health service delivery and performance. By using interview guides derived from the free list interviews we strengthened our grounded theory approach to enhance the client voice. In addition, our results offered insights into how specific actions of the program were linked to client perceptions about quality VHW performance.

The findings from this study may have limited generalizability because of the small sample size and non-substantive purposive sampling in the interview guide

development and in the in-depth interviews. Additionally, the clients received an unusually high level of care and attention from VHWs and other research staff as part of the SHINE trial. Zimbabwean VHWs also have a long duration of VHW training and they primarily provide health education. Although our sample sizes were small and non-random, the aim of this study was to provide insight and understanding about VHW performance from clients and the free-list sample provided emic insight into this construct, which we further explored during the in-depth interviews with the twenty clients.

Another limitation is the possibility of social desirability bias. Clients may have associated interviewers with SHINE or ministry of health workers and been reluctant to criticize their VHW. Furthermore, six participants also indicated having some familial relation to their VHW. However, this prevalence of kinship is not unusual in rural Africa and all participants were assured of confidentiality of the interviews and the interviewers were not part of the SHINE supervisory teams. Interviewers were also trained to use probes and generate open discussions with participants to minimize the potential for social desirability bias. Lastly, our work only focused on client perspectives and we recognize that there are unique elements from other stakeholders that we did not consider, such as health system staff and VHWs themselves.

5.5.2 Conclusion

Creating stronger health systems requires attention to the viewpoints of various

stakeholders. As the recipients of care, clients (and their communities) are one major stakeholder. The VHW-client relationship is important and by supporting and strengthening this relationship, health systems can facilitate improved client and community health, reinforce community heath-center linkages and improve programs. The work also provides a substantive foundation for constructing quantitative assessment tools to better understand VHW performance. Future research should compare and contrast perspectives from all stakeholders involved in VHW health service delivery and focus on how programs can be adapted to maximize VHW health service delivery as part of health systems strengthening efforts.

REFERENCES

1. Global Health Workforce Alliance, World Health Organization (WHO). A universal truth: no health without a workforce. Geneva: WHO; 2014. Available from: http://www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal_truth_report.pdf?ua=1

2. United Nations. Sustainable Development Knowledge Platform. Available at: https://sustainabledevelopment.un.org/?menu=1300. Accessed February 1, 2016.

3. Lehmann U, Sanders D. Community health workers: what do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers. Geneva: World Health Organization: Evidence and Information for Policy; 2007.

4. Perry H, Zulliger R. How effective are community health workers? Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2012.

5. Glenton C, Colvin CJ, Carlsen B, Swartz A, Lewin S, Noyes J, et al. Barriers and facilitators to the implementation of lay health worker programmes to improve access to maternal and child health: qualitative evidence synthesis. *Cochrane Database Syst Rev*. 2013;10(1):CD010414.

6. Mathole T, Lindmark G, Ahlberg BM. Competing knowledge claims in the provision of antenatal care: a qualitative study of traditional birth attendants in rural Zimbabwe. *Health Care Women Int*. 2005;26(10):937–56.

7. Nankunda J, Tumwine JK, Soltvedt Å, Semiyaga N, Ndeezi G, Tylleskär T. Community based peer counsellors for support of exclusice breastfeeding: expereinces from rural Uganda. *Int Breastfeed J*. 2006;1(1):19.

8. Zulliger R, Moshabela M, Schneider H. "She is my teacher and if it was not for her I would be dead": exploration of rural South African community health workers' information, education and communication activities. *AIDS Care*. 2014;26(5):626–632.

9. Puett C, Coates J, Alderman H, Sadler K. Quality of care for severe acute malnutrition delivered by community health workers in southern Bangladesh. *Matern Child Nutr*. 2013;9(1):130–142.

10. Zimbabwe Ministry of Health and Child Care. The National Health 2011 Profile Report. Harare; Ministry of Health and Child Care, Government of Zimbabwe 2011.

11. Global Health Workforce Alliance, World Health Organization (WHO). Zimbabwe : participatory process for the development and implementation of the HRH plan: lessons learned. Geneva: World Health Organization; 2010.

12. Zimbabwe Health Workforce Observatory. Human resources for health country profile Zimbabwe. Geneva: WHO; 2009. Available from: http://s3.amazonaws.com/zanran_storage/www.hrh-observatory.afro.who.int/ContentPages/2453220542.pdf

13. Zimbabwe Ministry of Health and Child Care. The national health strategy for Zimbabwe 2009-2013. Harare: Ministry of Health and Child Care, Government of Zimbabwe; 2013. Available from: http://www.who.int/workforcealliance/countries/zwe_healthStrategy.pdf?ua=1

14. Zimbabwe Ministry of Health and Child Care. The village health worker strategic direction. Harare : Ministry of Health and Child Care, Government of Zimbabwe; 2010. Available from: https://www.humanitarianresponse.info/system/files/documents/files/Village%20Health%20Worker%20Strartegic%20Direction.pdf.

15. Mlambo A, Raftopoulos B. The regional dimensions of Zimbabwe's multi-layered crisis: an analysis. In: Election processes, Liberation movements and Democratic change in Africa. Maputo; 2010

16. The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial Team. The sanitation hygiene infant nutrition efficacy (SHINE) rital: rationale, design, and methods. *Clin Infect Dis*. 2015;61(suppl 7):S685–S702.

17. Zimbabwe Ministry of Health and Child Care. The National Health Profile 2013 Report. Harare: Ministry of Health and Child Care, Government of Zimbabwe; 2013.

18. Zimbabwe National Statistics Agency (ZIMSTAT). Zimbabwe Population Census 2012: Midlands provincial report. Harare, Zimbabwe: ZIMSTAT; 2012.

19. Zimbabwe National Statistics Agency (ZIMSTAT). Zimbabwe Multiple Indicator Cluster Survey 2014, Final Report. Harare, Zimbabwe; 2015.

20. Quinlan M. Considerations for collecting freelists in the field: examples from ethobotany. *Field methods*. 2005;17(3):219–234.

21. Patton MQ. *Qualitative evaluation and research methods*. 2nd ed. Thousand Oaks, CA: Sage Publications; 1990.

22. Smith J. Using ANTHOPAC 3.5 and a spreadsheet to compute a free-list salience index. *Cult Anthropol Methods*. 1993;5(3):1–3.

23. Onwuegbuzie AJ, Leech NL. A call for qualitative power analyses. *Qual Quant*. 2007;41(1):105–121.

24. Corbin JM, Strauss AL. *Basics of qualitative research : techniques and procedures for developing grounded theory*. Los Angeles, CA: Sage Publications; 2008.

25. Singh P, Sachs JD. 1 million community health workers in sub-Saharan Africa by 2015. *Lancet*. 2013;382(9889):363–365.

26. Mbuya MNN, Menon P, Habicht J, Pelto GH, Ruel MT. Maternal knowledge after nutrition behavior change communication is conditional on both health workers' knowledge and knowledge-sharing efficacy in rural Haiti. *J Nutr*. 2013;143(12):2022–8.

27. Vélez LF, Sanitato M, Barry D, et al. The role of health systems and policy in producing behavior and social change to enhance child survival and development in low- and middle-income countries: an examination of the evidence. *J Health Commun*. 2014;19 Suppl 1(October):89–121.

28. Okuga M, Kemigisa M, Namutamba S, Namazzi G, Waiswa P. Engaging community health workers in maternal and newborn care in eastern Uganda. *Glob Health Action*. 2015;8

29. World Health Organization. The world health report 2006: working together for health. Geneva; 2006.

30. Tran NT, Portela A, de Bernis L, Beek K. Developing capacities of community health workers in sexual and reproductive, maternal, newborn, child, and adolescent health: a mapping and review of training resources. *PLoS One*. 2014;9(4):e94948.

31. Viswanathan M, Kraschnewski J, Nishikawa B, et al. Outcomes of community health worker interventions. *Evid Rep Technol Assess (Full Rep)*. 2009;(181):1–144, A1–2, B1–14, passim.

32. Global Health Workforce Alliance, World Health Organization (WHO). Global experience of community health workers for delivery of health related Millennium Development Goals: a systematic review, country case studies, and recommendation for integration into national health systems. Geneva: WHO; 2010. Available from: http://www.who.int/workforcealliance/knowledge/publications/CHW_FullReport_2010.pdf?ua=1

33. Kok MC, Kane SS, Tulloch O, et al. How does context influence performance of community health workers in low- and middle-income countries? Evidence from the literature. *Heal Res Policy Syst*. 2015;13(1):13.

34. Kok MC, Dieleman M, Taegtmeyer M, et al. Which intervention design factors influence performance of community health workers in low- and middle-income countries? A systematic review. *Health Policy Plan*. 2015;30(9):1207–1227.

35. Valentine NB, De Silva A, Kawabata K, Darby C, Murray CJL, Evans DB. Health system responsiveness: concepts, domains and operationalization. *Heal Syst Perform Assess debates, methods empiricism*. 2003;(July 2015):573–595.

36. Üstün B, Chatterji S, Villanueva M, Benib L. WHO multicountry household survey study on health and responsiveness 2000-2001. Global Programme on Evidence for Health Policy Discussion Papers, No.37. Geneva; 2001

37. Entwistle V, Firnigl D, Ryan M, Francis J, Kinghorn P. Which experiences of health care delivery matter to service users and why? A critical interpretive synthesis and conceptual map. *J Health Serv Res Policy*. 2012;17(2):70–8.

38. Ryan M, Kinghorn P, Entwistle VA, Francis JJ. Valuing patients' experiences of healthcare processes: Towards broader applications of existing methods. *Soc Sci Med*. 2014;106:194–203.

CHAPTER 6

PERFORMANCE-BASED INCENTIVES FOR VILLAGE HEALTH WORKERS IN ZIMBABWE: A PRE-POST EVALUATION OF MOTIVATION AND PERFORMANCE

6.0 Abstract

Background: The Sustainable Development Goals call attention to the critical health worker shortages in several low-income countries and the need for universal health coverage to deliver essential health services. In many parts of sub Saharan Africa village health workers (VHWs) are insufficiently compensated but their workloads continue to expand, therefore maintaining quality job performance is a challenge. A performance-based incentive (PBI) is one strategy proposed to promote VHW performance and improve health outcomes. There is concern however that PBIs will displace pre-existing intrinsic motivation. **Objective:** To evaluate the impact of a PBI on VHWs motivation and performance on early pregnancy identification (ePregI) referrals and to understand VHW attitudes towards a PBI. **Methods:** In the context of the Sanitation Hygiene Infant Nutrition Efficacy (SHINE) trial, 322 VHWs conducted ePregI and pregnancy referrals were counted for each VHW. PBIs were introduced in December 2013 and VHWs were surveyed about work context characteristics pre (April 2013) and post (April 2014) PBI implementation. We used exploratory factor analysis to identify factors representing intrinsic motivation and extrinsic motivation (satisfaction with extrinsic rewards) (Cronbach α 0.85 and 0.92). Pregnancy referrals and motivation summative factor scores were compared before and after the incentives. Six focus group discussions with 9-12

participants were held with VHWs after the post-PBI survey, and audio recordings were transcribed directly into English. An inductive and deductive analysis approach was used to identify themes. **Results:** Average pregnancy referrals increased 37% ($p<0.001$) pre to post-PBI. Extrinsic motivation scores decreased 8% ($p<0.001$) after the PBIs and there was no change in the intrinsic motivation scores. VHWs generally appreciated the incentive, but wanted an increase in the amount of the incentive. VHWs described how technology and supervisory systems prevented cheating and most VHWs described prioritizing their activities by SHINE program function, although a few admitted to prioritizing their work activities based on the incentive. **Conclusion:** In the short term, the PBI was associated with improved early pregnancy identification and did not alter VHW intrinsic motivation but was associated with decreased external motivation. Dissatisfaction with overall remuneration was not displaced by incentives. There are still potential drawbacks with PBIs and careful consideration and balance of its benefits and risks are cautioned.

6.1 Introduction

Increasing the health workforce in low and middle income countries and achieving universal health coverage is a target of the Sustainable Development Goals for health.[1] In sub-Saharan Africa, countries face acute shortages of skilled health workers.[2,3] Strategies being used to address the health worker shortage include the recruitment of village health workers (VHWs), a non professional community based health worker, alongside the promotion of task–shifting, the redistribution of health services among health workers.[4–6] It is important to know whether these strategies are working, and if so, how.

VHWs perform a range of curative, preventive and supportive health services and range from volunteers to salaried employees in different contexts.[7,8] Several reviews have shown that VHWs can effectively deliver many efficacious maternal and child health interventions and reduce maternal, perinatal and child deaths.[8,9] In many low-income settings, this is done with little or inadequate financial remuneration. However, VHW work responsibilities continue to expand in response to global health targets and initiatives. This has brought motivation, quality and retention into the foreground as major issues affecting the performance and sustainability of VHW programs.[10,11]

Theories about work motivation are numerous[12] and link motivation to worker behaviors (performance). Locke and Latham[12] define motivation as the internal and external factors that drive action. Intrinsic motivation refers to the internal drivers for

action i.e. 'self' originated interests and values and extrinsic motivation refers to external rewards or inducements that promote action.[13] Studies involving motivation have largely focused on retaining VHWs and maintaining high performance standards by promoting the use of both intrinsic and extrinsic motivators.[11,14]

Financial incentives are an important factor in performance and VHW retention in programs.[11,15] VHW contexts differ substantially in the nature and number of tasks VHWs perform, the communities where VHWs work, the cost of living, the organizational environment, and VHWs satisfaction with existing sources of financial and non-financial incentives.[15–17] Therefore implementing relevant financial incentives requires tailoring incentive packages to all of these contextual factors.

Since 2008, the World Health Organization (WHO) has recommended "financial and non-financial incentives and performance based incentives (PBIs)"[4] to improve VHW health service delivery. Despite this, there is debate about the risks of extrinsic financial rewards displacing VHWs intrinsic motivation for their work.[13,18–20] In addition, there is concern that performance based incentives, financial incentives conditioned on adequate performance of a specific task,[21] can alter VHWs work priorities toward activities being incentivized.[22] Despite these potential risks, financial performance based incentives may be a useful tool for improving VHW performance outcomes under certain conditions.[14] Therefore understanding the relationship between PBIs and VHW motivation can assist programs in selecting appropriate financial and non-financial incentives schemes to promote health program outcomes.

The overall aim of this mixed-methods study was to evaluate the introduction of a financial PBI on measures of VHW motivation and work performance. We hypothesized that 1) work performance would increase after the introduction of the PBI; 2) intrinsic motivation would be lower after the introduction of the PBI; and 3) extrinsic motivation would increase after the PBI. To provide additional context for our results, we conducted focus group discussions with VHWs to understand their attitudes about the PBI.

6.2 Study Context

This study was conducted to support the implementation of the Sanitation Hygiene Infant Nutrition Efficacy (SHINE) trial, a cluster randomized trial evaluating a package of nutrition and water, hygiene and sanitation interventions on over 5000 children born in two districts in rural Zimbabwe.[23,24] VHWs in Zimbabwe are voluntary workers selected by their community according to Ministry of Health and Child Care (MoHCC) criteria that includes being literate, mature in age and willingness to work as a volunteer.[25] As part of SHINE the government-supported VHWs are provided with material incentives that include a uniform and shoes, a raincoat, a VHW bag, stationary and a bicycle. They also receive their $14USD monthly stipend from the MoHCC and a quarterly SHINE grocery basket valued at $42USD, both delivered every quarter.

A total of 342 VHWs delivered all SHINE intervention lessons to women enrolled in the study (15 one hour interactive lessons over 18 months).[23] VHWs also

conducted early pregnancy identification surveillance in all households with women of reproductive age (15-49 years old) in their geographic catchment area (approximately 100 households).[23] Every 5 weeks VHWs recorded last menstrual period data from every woman of child-bearing age and offered pregnancy tests to women who had missed a menstrual period. Thirty-two SHINE nurse supervisors (approximately one per 11 VHWs) met with VHWs twice a month for one group and one individual review meeting and discussed concerns, evaluated performance and provided any additional support. VHWs referred pregnant women to their local clinic for antenatal care and also notified SHINE staff who arranged for a second confirmatory pregnancy test that was administered by a research nurse.[23] Using this system, approximately 5200 pregnant women were identified and enrolled into the trial between November 2012 and March 2015.[23]

Performance-based incentive for early pregnancy identification

A PBI was introduced 12 months after introducing this method of pregnancy identification into the scope of work of VHWs. The incentive was designed to increase the number of pregnant women identified during early gestation (increasing enrollment into the SHINE trial) and to facilitate early antenatal care attendance and subsequently increase antenatal care visits in line with the WHO recommended minimum of four or more antenatal visits. [26]

Between December 2013 and October 2015 VHWs received a PBI payment of $2USD for every SHINE pregnancy referral. The incentive amount was based on a

review of incentive programs regionally,[27] VHW input, the novelty of the task, trial duration and cost considerations. All incentive payments were disbursed every quarter to coincide with the VHWs' receipt of their MoHCC stipend and SHINE grocery basket. VHWs were retroactively compensated for all pregnancy referrals they had made before December 2013. Several group meetings were held with VHWs to explain and clarify the PBI package during the first three months of the incentive scheme.

6.3 Methods

6.3.1 Participants

In April 2013, prior to introduction of the PBI, 322 out of 342 VHWs completed a baseline survey (2 VHWs declined the interview and 18 were not present at training). The PBI started on January 1, 2014 and four months later in April 2014, 303 VHWs completed the follow-up survey (19 VHWs were not present at training event). Participants for the focus group discussions (FGDs, described below) were purposively sampled in May 2014 based on their SHINE study arm.

6.3.2 Survey Data collection

A survey, previously validated,[28] was administered in April 2013 and April 2014 by five Zimbabwean enumerators fluent in the local language, Shona. The baseline and post-PBI questionnaire included questions about socio-demographic characteristics, motivation, and other work context questions.[29] The post incentives questionnaire also included questions about the PBI. Most questions used a 5-point

Likert response scale ranging from strongly agree to strongly disagree. Each survey took about 60-90 minutes to administer.

6.3.2 Motivation Variables

Motivation factors (Appendix A1) were retained from exploratory factor analysis, these methods are described in detail elsewhere.[29] Briefly, a promax rotation was used and items with factor loadings above 0.3 were included in the factors. Reliability analyses were performed and items that decreased the reliability were omitted from the final factors.[29] A continuous summative factor score was calculated from the sum of scores for the items in each of the factors.

6.3.3 Performance Assessment

Total pregnancy referrals data and the median number of women of childbearing age for each VHW were collected from VHW registers and SHINE databases. Total pregnancy referrals were summed for each VHW between January-November 2013 (pre-incentive) and between January-November 2014 (post-incentive). The total number of pregnancy referrals was multiplied by two dollars to get VHWs earnings from the PBI in 2013 and 2014 respectively.

6.3.4 Quantitative Data Analysis

Descriptive statistics about VHW demographics, catchment area and work burden were calculated as absolute frequencies, means, standard deviations, medians and interquartile ranges. Summative factor score averages and proportions were

calculated, and paired t-tests on average motivational summative factor scores and pregnancy referrals before and after the incentives were conducted. All analysis was performed in STATA 12.0 (Stata statistical software, release 12; Stata Corporation).

6.3.5 Qualitative Data Collection and Analysis:

Six focus groups discussions (FGDs) with 61 VHWs were held 1-3 weeks after the April 2014 post-PBI survey questionnaire. Each FGD had between 9-12 participants and lasted 90-120 minutes. Trained facilitators used a FGD guide and talked with VHWs about their perceptions and experiences with the incentive and challenges in the PBI-system (gaming) (Appendix C1). FGDs were conducted in the Shona language at VHW district training centers. With VHWs permission, all discussions were audio-recorded and transcribed into English.

An inductive and deductive approach was used to analyze the FGD data with a multi-pass approach. Open coding, a grounded theory technique[30] was used to code transcripts, some codes were derived from the focus group discussion interview guides. Codes were grouped together according to their similarities into sub-themes and then overarching themes. Themes were organized according to the interview guide and the qualitative results were triangulated with the survey data and supervisors reports.

The Medical Research Council of Zimbabwe and the Johns Hopkins Bloomberg School of Public Health IRB provided ethical approval for this study.

6.4 Results

A total of 322 out of 342 VHWs completed the baseline survey and 303 VHWs completed the follow up survey. There were no significant differences in the main characteristics of VHWs before and after the incentives except for VHW workload and income from the PBI (Table 6.1). Of the 303 VHWs, 46 years ± 8.9 (mean ± standard deviation) was the average age, 74% of the VHWs were female, 75% were married and 84% had some high school education or more. VHWs had a median of 76 women (IQR 54-96 women) of childbearing age in their catchment area. The median number of lessons VHWs were expected to deliver in 2014 (129 lessons IQR 81-192 lessons) was significantly higher ($P<0.001$) than the median number of lessons expected before the incentives (26 lessons IQR 13-42 lessons). The total median PBI income from January to November 2014 and 2013 was significantly higher ($P<0.001$) post PBI (USD$16 IQR $10-$24) than pre PBI (USD$12 IQR $2-$48) (calculated retrospectively). VHWs earned a fixed annual stipend of USD$168 and the distribution of their additional income from the PBI pre and post PBI was positively skewed while the gain (post-pre) was normally distributed (Figure 6.1).

Table 6.1. Characteristics of village health workers (VHWs) Pre-PBI (n=322) and Post PBI (n=303). Values are numbers (percentages) unless stated otherwise

VHW Characteristics	Pre-PBI N (%)	Post-PBI N (%)
Age, yrs (mean ± SD)	45.0 ± 8.8	46.2 ± 8.9[a]
<40	87 (27.0)	65 (21.5)
40-50	153 (47.5)	149 (49.3)
>50	82 (25.5)	88 (29.2)
Gender		
Female	237 (73.6)	224(73.9)
Marital Status		
Currently married	247 (76.7)	228 (75.2)
Other	75 (23.3)	75 (24.8)
Education Level		
Primary completed	54 (16.8)	46 (15.2)
Some high school	101 (31.4)	99 (32.7)
Completed high school or higher	167 (51.9)	158 (52.1)
Women of childbearing age in VHW catchment area (median IQR)	75 (52-94)	76 (54-96)[b]
Expected module deliveries (median IQR)	26(13-42)	129 (81-192)***
Income from PBI January-November, dollars (median IQR)	12 (2-48)[c]	16 (10-24)[d]***

[a]n=302,[b]n=297,[c]n=315,[d]n=299
Significant at *p<0.05; **p<0.01;***p<0.001

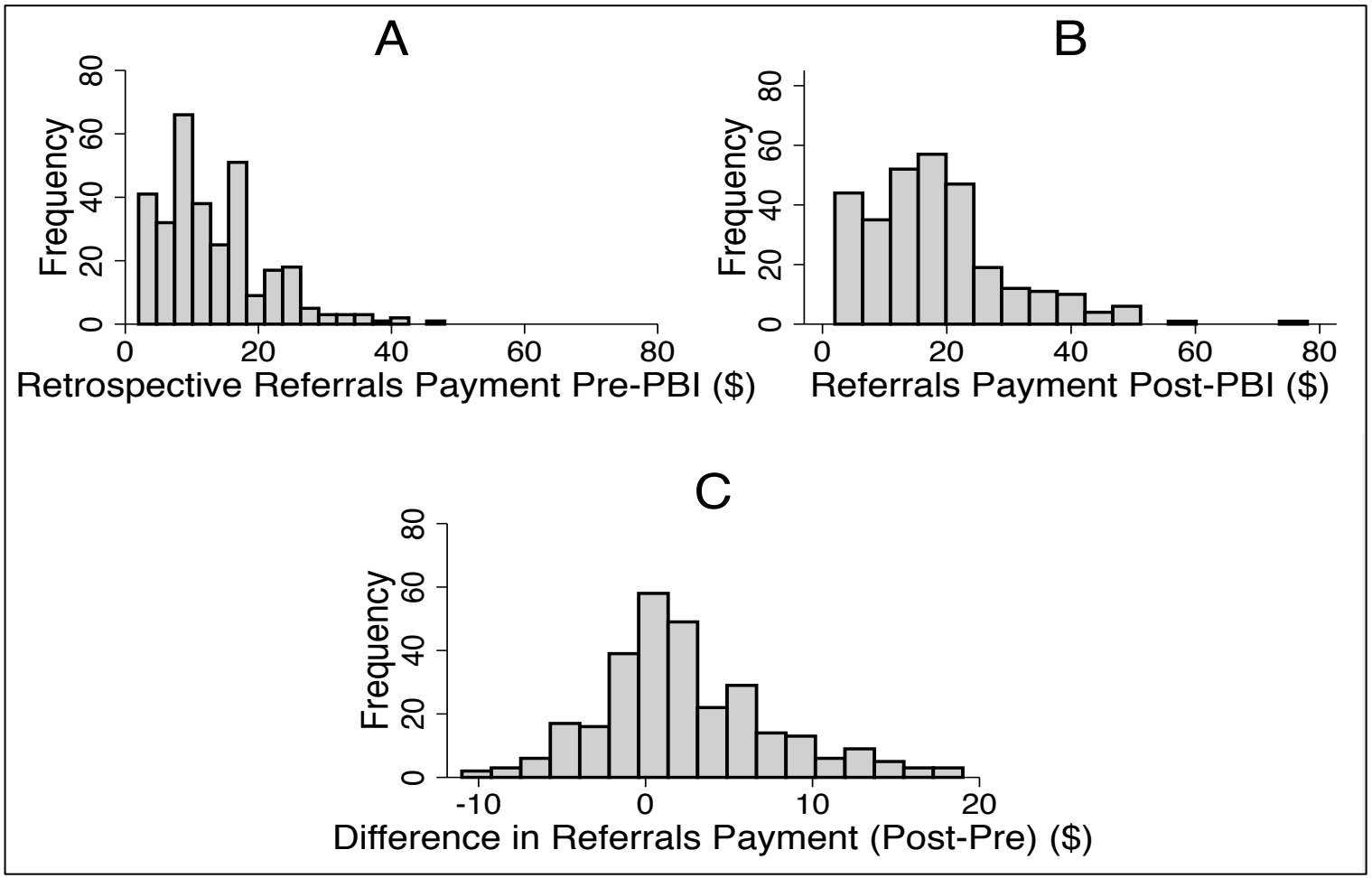

Figure 6.1. Histograms showing the distribution of VHWs income from the performance based incentive, pre (A), post (B) and the gain (post-pre: C)

6.4.1 Emerging factors from exploratory factor analysis

From each survey, the same twelve items loaded onto the intrinsic motivation factor and the same three items loaded on to the extrinsic motivation factor (satisfaction with extrinsic rewards) (Table 6.2). Items loading on the intrinsic motivation factor in general described VHWs love and personal motivation for their work, while items loading on the extrinsic factor described VHWs satisfaction with their stipend.[29]

Table 6.2. Description of motivation factors from factor analysis

Factor	Number of items	Cronbach's alpha	Description of factor
Intrinsic motivation	12	0.85	VHW feels personally motivated and happy with work, making a positive impact, appreciated by community, health workers and organizations for work
Extrinsic motivation (Satisfaction with extrinsic rewards)	3	0.92	Satisfied with remuneration for the work

6.4.2 Pregnancy referrals before and after incentives

Before the incentives, VHWs referred an average of 6.8 pregnant women/VHW ± 4.0 (mean ±SD). After the incentives, the average number of referrals made by VHWs was significantly higher based on a paired T-test ($P<0.001$) (9.2 pregnant women/VHW ± 5.7). The gain in referrals among VHWs was 2.4 pregnant women/VHW ± 5.2 and an IQR of -1-5 pregnant women (Table 6.3).

Table 6.3. Average pregnancy referrals, intrinsic and extrinsic motivation scores and gain scores pre/post incentive

Variable	Pre-PBI Mean ±SD (% of total score)	Post-PBI Mean ±SD (% of total score)	Gain Pre/Post Mean ±SD (IQR)	p-value
Pregnancy Referrals/VHW/yr (n=294)	6.8 ± 4.0	9.2 ± 5.7	2.4 ± 5.2 (-1-5)	0.000***
Intrinsic motivation (score range 12-60) (n=289)	53.0 ± 4.6 (88%)	53.3 ± 4.2 (89%)	0.27± 4.9 (-3-3)	0.345
Extrinsic motivation (score range 3-15) (n=298)	9.8 ± 3.4 (65%)	9.0 ± 3.4 (60%)	-0.80± 3.7 (-3-2)	0.000***

Significant at *p<0.05; **p<0.01; ***p<0.001

6.4.3 Motivation factors before and after incentives

The average score on the intrinsic motivation factor before the incentive was relatively high at 88% of the total factor score (53 points ± 4.6 (mean ± SD) out of 60 points) and the average score for extrinsic motivation moderate at 65% (9.8 points ± 3.5 out of 15 points). After the incentives, the average score on the intrinsic motivation was the same as before at 88% (53.5 points ± 4.6 out of 60 points), but the average score on extrinsic motivation was significantly lower (P<0.001) at 60% (9.0 ± 3.4 out of 15 points). The gain in intrinsic motivation among VHWs was 0.27 ± 4.9 points (mean ± SD) and an IQR of -3-3 points. The gain in extrinsic motivation among VHWs was -0.80 ± 3.6 points (mean ± SD) and an IQR of -3-2 points (Table 6.3).

6.4.4 Perceptions about the PBI from the post-incentive survey

Over 65% of VHWs felt proud to receive an incentive and felt that the incentive helped them visit more pregnant women. A total of 60% of VHWs felt that the incentive was not enough and half of the VHWs indicated feeling discouraged if they did not receive an incentive. Most VHWs (80%) indicated that they felt recognized when they received an incentive (Figure 6.2).

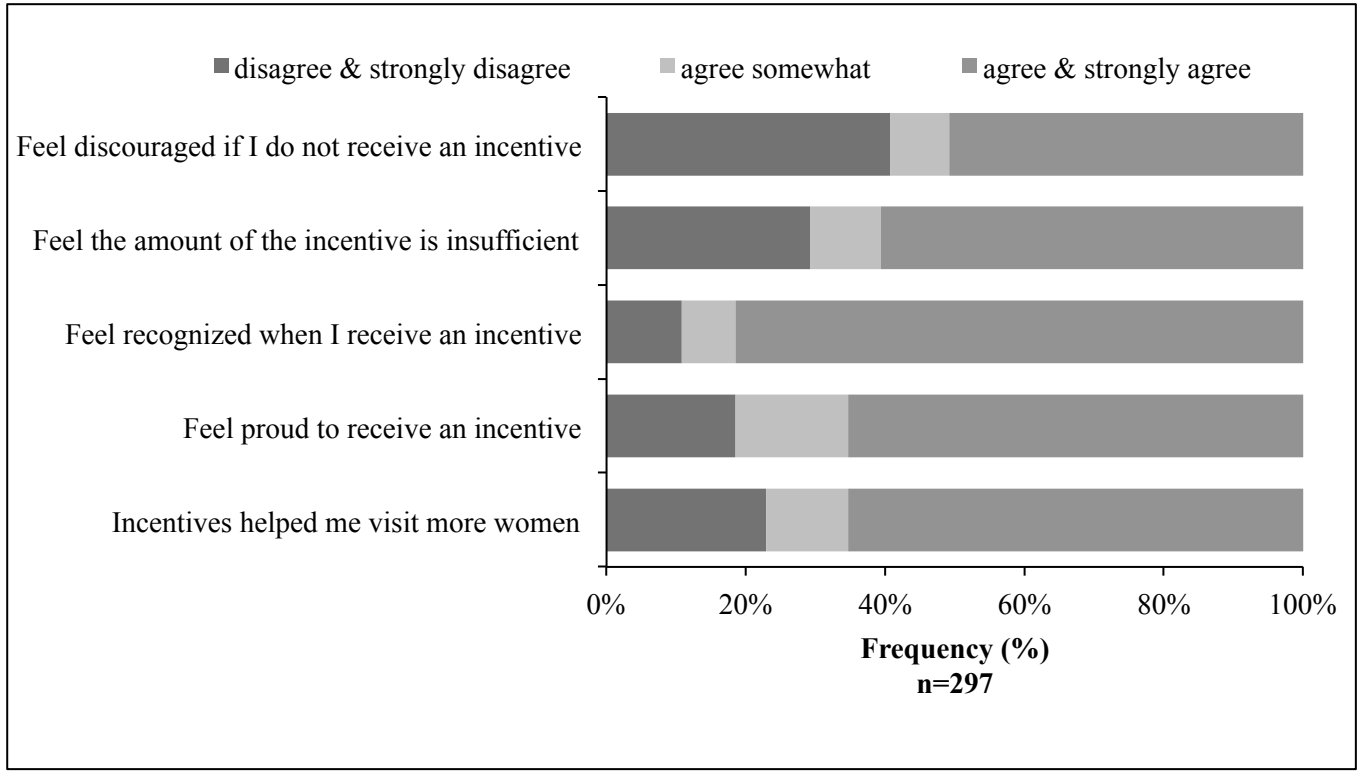

Figure 6.2. VHW perceptions about the performance based incentive four months after it was introduced

6.4.5 Perceptions about the pregnancy referrals incentive from qualitative data

All VHWs reported they were initially happy to receive the pregnancy referrals incentives, with the added income being appreciated by all VHWs. They explained how the incentives motivated them to identify and refer pregnant women. Some VHWs saw the incentive as recognition for the difficulty of their work; one VHW explained how the incentive had not changed her level of dedication for the work,

"…I saw it as an acknowledgement of how difficult it is to get a pregnant woman to consent to being tested [for pregnancy] and how difficult it is to actually find a pregnant woman…" FGD6

A few others mentioned how the incentives led to more family support for the VHWs work.

"… My children and husband encourage me to go and do my work telling me that they will do all the work that needs to be done at home..." FGD5

For one male VHW, the incentives were useful in helping him overcome difficulties in discussing the delicate issues around menstruation and pregnancy with women. Another VHW considered the incentives a form of performance assessment.

"…I was really happy because for us men it was really hard to approach a mother and start talking about pregnancy issues…the $2[incentive] encouraged me to look for pregnant mothers..." FGD2

When probed about their feelings after 4.5 months with the incentive, all VHWs were still happy with the incentive, but all felt the amount of incentive should increase. One VHW suggested receiving a fixed salary instead of the incentive for their work since other SHINE staff received salaries.

"…They get monthly salaries but we will be getting the government quarterly salaries that we are always getting. For us it means that they do not value us in this work that we are doing…"FGD 2

6.4.6 Perspectives about unintended consequences of the incentives

Although a sensitive topic, VHWs were probed to examine their thoughts about unintended consequences of the PBIs, particularly gaming: VHWs who receive incentives when they have not referred pregnant women. VHWs were generally unaware of any potential gaming of the incentives system and strongly indicated that any sort of gaming would be cheating. They suggested that computer and supervisor errors could be the source of these issues if they existed. When probed how gaming could be prevented, they suggested peer monitoring in addition to supervision from their nurse supervisors. Several VHWs also voiced how it is important that they are trustworthy in their work, as explained by one:

"…We as VHWs should just be honest and trustworthy in our work and not write down work that we have not done..." FGD3

Because VHWs also performed other activities e.g. delivering lessons and hosting community health drives, we asked VHWs about the work activities they prioritize and they gave mixed responses. Several VHWs discussed their priorities in the context of SHINE intervention delivery. A few VHWs saw delivering SHINE messages as more pressing than pregnancy referrals and some thought the referrals were the entry point for women into SHINE. A handful of VHWs discussed prioritizing their activities based on community health issues and a few others

prioritized the pregnancy referrals because of its benefits to maternal and child health as pointed out by one VHW:

" ...I prioritize pregnancy referrals because it is helping our rural community in that there is now early booking of the pregnancies. If it is someone with a status that is not right, maybe she will be HIV positive, she can get help and deliver a healthy baby. It is really helping in the rural community, people now book their pregnancies early, get tested and give birth to a healthy baby…" FGD5

However, it is noteworthy that only a few VHWs said they prioritized the pregnancy referrals over other activities because of the monetary incentive.

6.5 Discussion

This study evaluated a novel performance-based incentive for VHWs in rural Zimbabwe. It explores the relationship between a PBI and VHW motivation and performance providing insight into how the incentive addresses VHW work context and livelihood issues. Our results show that (1) performance increased significantly after the incentives, (2) intrinsic motivation was generally high before and after the incentives, and (3) extrinsic motivation was initially lower and decreased further after the incentives. The FGDs further revealed that in general while VHWs appreciated the incentive, they were dissatisfied with the dollar amount of the incentive.

6.5.1 PBI and Work performance

There was a significant increase in the number of pregnancy referrals VHWs made after the PBI with an average gain of 2 women/VHW (Table 6.3). In Zimbabwe, pregnancy related deaths are high at 578 deaths per 100,000 live births.[31]

The majority of women (over 60%) live in rural areas where delays in women's knowledge about danger signs and long distances to health centers prevent women from accessing maternal care services.[32] Early pregnancy identification and promoting early antenatal attendance are feasible interventions that can increase health access and prevent maternal deaths in this population.[32] VHWs identified over 5200 pregnancies in the community between November 2012 and March 2015 and 90% of SHINE participants reported booking early for antenatal care services [internal communication]. Our study focused on an important maternal health issue, but the VHWs also delivered family planning, child immunization, infant nutrition and WASH information and it is plausible that the incentive could also have improved VHW's performance of other health related tasks.[33]

Evidence for the effectiveness of PBIs on improving healthcare delivery and health outcomes in low and middle-income countries is still mixed, in part due to a shortage of rigorous studies and varying target populations (i.e. the facility, facility-based health worker, community-based health worker, or patient).[17,34,35] Similar increases in work performance after a PBI have been reported among VHWs in Zambia providing HIV/AIDS services and among Angawadi workers and Accredited Social Health Activists (ASHAs) in India promoting child immunizations and facility births.[22,33] A study in the Philippines providing PBIs to VHWs and women for institutional deliveries saw an increase in facility births, but it was not possible to disentangle the impact of the VHW PBIs.[35] An evaluation of a program providing several PBIs to VHWs delivering promotional, curative and preventative health

services in Uganda reported VHWs general satisfaction with the PBIs but did not evaluate the impact of the PBI on VHW performance.[16] More documentation from programs using PBIs with VHWs is needed and empirical studies looking at the relationship between VHW performance and PBIs.

It is important to note that our performance indicator captured a service delivery outcome. For VHWs to have more pregnancy referrals, they had to visit more women of reproductive age and conduct pregnancy tests. Therefore the nature of the extra work (increased performance) was about reaching more women of reproductive age. However, our performance indicator did not include a quality indicator and we were unable to draw inference about any correlation between the PBI and the quality of VHW service delivery. Nevertheless, in areas where there is low coverage of maternal and child healthcare services, our study supports evidence that PBIs for VHWs may improve VHW performance, expand access and promote utilization of health services.[6,11] Further research among VHWs is needed to understand if this also extends to the quality of service provision.[29]

6.5.2 Intrinsic and Extrinsic Motivation

Our findings did not support our hypotheses about the association between PBIs and work motivation. We hypothesized that intrinsic motivation would decrease, but the average levels of intrinsic motivation did not decrease after the PBI and the average gain was close to zero (Table 6.3). We also hypothesized that extrinsic motivation would increase, but the average levels of extrinsic motivation significantly

decreased after the PBI with an average loss of -0.80 points (Table 6.3). There are several plausible explanations for our results. Our intrinsic motivation factor included items describing internal motivations for work and recognition from the community and other health workers that may not have changed after the PBI. The extrinsic motivation factor described VHWs' satisfaction with their work stipend, thus the PBI may not have had an impact on their perceptions of their stipend. Alternatively, our motivation factors may not have been good indicators of the motivation constructs. However, our factor analysis results show similar factor structure and internal consistency with two other studies from different countries.[28,36]

The high levels of intrinsic motivation and relatively short follow up period during which performance was assessed could explain the lack of change in correlations between intrinsic motivation and the PBI. It is also plausible that because the PBI was embedded in a system that aimed to maximize VHW performance by providing training, supervision, non-financial incentives and adequate work tools to VHWs, other factors could have contributed to the consistently high levels of intrinsic motivation. Some critics of monetary incentives for VHWs describe how financial incentives can erode VHWs altruism for their work by decreasing their intrinsic motivation,[19] while others have found that sufficient financial incentives can motivate VHWs delivering maternal and child health services in the short term.[15,37] Our findings show that the relationship between incentives and motivation is complex and may be shaped by context.

It is important to note that in this context at the time of the study, VHWs workloads were increasing as the SHINE trial experienced the recruitment and early follow up stages, and our results (particularly as they pertain to extrinsic motivation) could reflect this. From the FGDs, the modest levels of extrinsic motivation before the PBI may be due to VHWs dissatisfaction with their $14/month stipend. After the PBI, VHWs average levels of extrinsic motivation were significantly lower at 60% of the total score and this could partly be due to the VHWs four-fold increase in workload delivering lessons—which not the focus of the PBI that we studied, but an important part of their scope of work. The PBIs may have prevented VHWs extrinsic motivation from decreasing further given this context of increasing workload and time burden. However, the PBIs may not have been able to offset VHWs perceptions that their stipend was insufficient to meet family and livelihood demands. Previous research has shown that insufficient and irregular stipends can be demotivating[6,11,15] and our results may point to this and add to existing recommendations for adequate remuneration that considers VHW workload and livelihood demands.[4,15,38] In addition, we found that while PBIs can be used to address some workload pressure, PBIs are not substitutes for adequate compensation.

There is no consensus about how PBI amounts should be derived for different tasks in different contexts.[14] Demographic factors, poor support for VHW programs, a lack of efficient payment systems and health system and program funding constraints can limit the amount of incentives in different countries and even within countries. In Uganda, VHWs received PBIs ranging from US$0.15 to US$1.50 based on the public

health relevance of the problem in Uganda and the task complexity for the VHW.[16] In contrast, ASHAs in rural areas of India can receive between USD$1.50 hosting health promotion days to USD$9 for escorting pregnant women for hospital delivery.[39] A framework that considers VHW estimations of time spent on different work activities, income generating projects, and comparisons to lower level health facility based staff can be used to estimate meaningful incentive amounts.[40] Further research should explore the valuation of different work activities for PBIs.

6.5.3 Gaming the system and other unintended consequences

A potential consequence of PBIs is gaming of the system to receive more money and increased recognition from work.[41] Most VHWs reported feeling that receiving the incentive was a form of recognition and half of the VHWs reported feeling discouraged if they did not receive an incentive. They expressed that gaming of the system was wrong and would violate their role as trustworthy members of the community. However, although VHWs felt that the PBI system was tamper proof because of the supervision, SHINE supervisory reports [internal memo] found that because of the size of the reward a few VHWs did concoct schemes to increase the number of pregnant women they identified.

Evidence from the FGDs about the distortion of VHW work activities after the PBI was mixed. VHWs were heavily supported for the delivery of SHINE health information messages and it is plausible this could also have influenced VHWs responses in relation to work priorities. Although we did not fully examine the

potential work distortion on VHW performance from the PBI, the SHINE communications provide evidence that it was occurring and offers some limited support for findings of other studies from India and Rwanda showing health workers favoring remunerated activities.[37,41] PBIs are not risk-proof and understanding the nuance of gaming and more harmful versus less harmful gaming will help programs select what types of activities are incentivized and monitor PBI systems. More research is needed to examine the extent of gaming among VHWs in pay systems with and without a PBI[42] and to explore the cost implications versus gains in VHW performance with gaming.

6.5.4 Strengths and Limitations

Our mixed methods approach allowed us to evaluate VHW performance and motivation before and after a PBI and provided context for our findings. Further, our study was conducted within an ongoing randomized control trial that worked within the government health system and used the existing VHW system in the two districts. We followed the same VHWs pre and post incentive, had an objective measure of pregnancy referrals that was collected independently from VHWs and used a motivation survey that has shown consistent results in other settings. In addition at the pre-PBI survey VHWs were not aware that a PBI was going to be introduced. We also triangulated VHWs responses from the FGDs with survey data to lessen any potential social desirability bias. Although the study context may also limit our generalizability, the broad conclusions from our study highlights important contextual factors for future programs to consider when contemplating or designing PBIs for village health

workers.

There are limitations with this study. Our study design did not include a comparison group, which limits the internal validity of our study. Pregnancy identification was a new activity performed only by VHWs within the SHINE study context and it was not possible to have a comparison group. The changes we observed in work performance in the post-PBI period could be due to the VHW survey and FGDs since they were held midway through the year and may have stimulated reflection and group norm shaping to increase work performance. In addition, a process evaluation was evolving during the study period and included monitoring systems for VHW performance[24] and this structural shift could have influenced the work performance results post-PBI. There is also the possibility that response bias to the survey could explain the high levels of intrinsic motivation we observed in our results pre and post PBI. The potential for regression to mean is also a possibility in our study. However, we used trained enumerators[29] for the survey data collection to minimize response bias. We also examined the potential role of VHWs workload in sub-analyses, since it increased substantially after the PBI and could have attenuated our performance and motivation results. We found no correlations, suggesting workload may have had a minimal influence on our results (Appendix C2). Finally, only pregnancy referrals for women who entered SHINE were included. Therefore we could be underestimating the correlation between the PBI and pregnancy referrals if more women declined to enter the SHINE but were actually referred to health centers for antenatal care. Alternatively, we could also be overestimating these associations if

after the PBI VHWs over-sold the benefits of SHINE participation. Collecting surveillance data about antenatal care utilization before and after the incentive could have permitted alternate statistical tests like anova regressions.

6.5.5 Conclusion

Our results reveal that PBIs improved performance and did not decrease VHWs levels of intrinsic motivation. Levels of extrinsic motivation declined slightly after the PBI. Despite the gains in performance from PBIs, there are still normative arguments in favor of appropriate financial remuneration sufficient to meet VHWs livelihood demands. Implementing PBIs in environments where VHW dissatisfaction with poor or no remuneration could lead to unintended consequences such as the distortion of work activities. In addition to providing adequate remuneration, health system characteristics such as government support specifically at the primary health care level, supervision and monitoring support and transparent systems for the delivery of payments to VHWs are fundamental for implementation of PBIs.[21]

REFERENCES

1. United Nations. Sustainable Development Goals: 17 Goals to Transform our World. *Sustain Dev Knowl Platf*. 2016. Available at: http://www.un.org/sustainabledevelopment/health/. Accessed February 25, 2016.

2. Wolrd Health Organization. The world health report 2006: working together for health. Geneva; 2006.

3. Global Health Workforce Alliance, World Health Organization (WHO). A universal truth: no health without a workforce. Geneva: WHO; 2014. Available from: http://www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal_truth_report.pdf?ua=1

4. World Health Organization. Task Shifting: rational distribution of tasks among health workforce teams: global recommendations and guidelines. Geneva: World Health Organization; 2008.

5. Singh P, Sachs JD. 1 million community health workers in sub-Saharan Africa by 2015. *Lancet*. 2013;382(9889):363–365.

6. Haines A, Sanders D, Lehmann U, et al. Achieving child survival goals: potential contribution of community health workers. *Lancet*. 2007;369(9579):2121–2131.

7. Lehmann U, Sanders D. Community health workers: what do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers. Geneva: World Health Organization: Evidence and Information for Policy; 2007.

8. Perry H, Zulliger R. How effective are community health workers? Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2012.

9. Lewin S, Munabi-Babigumira S, Glenton C, et al. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. *Cochrane Database Syst Rev*. 2010;28(3):CD004015.

10. Global Health Workforce Alliance, World Health Organization. Scaling Up , Saving Lives. Geneva; 2008.

11. Bhattacharyya, K., Winch, P., LeBan, K., Tien M. Community health worker incentives and disincentives: how they affect motivation, retention, and sustainability. Arlington, Virginia: The Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development; 2001.

12. Locke EA, Latham GP. What should we do about motivation theory? Six recommendations for the tewnty-first century. *Acad Manag Rev*. 2004;29(3):388–403.

13. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol*. 2000;55(1):68–78.

14. B-Lajoie M-R, Hulme J, Johnson K. Payday, ponchos, and promotions: a qualitative analysis of perspectives from non-governmental organization programme managers on community health worker motivation and incentives. *Hum Resour Health*. 2014;12(1):66.

15. Kok MC, Dieleman M, Taegtmeyer M, et al. Which intervention design factors influence performance of community health workers in low- and middle-income countries? A systematic review. *Health Policy Plan*. 2015;30(9):1207–1227.

16. Miller JS, Musominali S, Baganizi M, Paccione GA. A process evaluation of performance-based incentives for village health workers in Kisoro district, Uganda. *Hum Resour Health*. 2014;12(1):19.

17. Bellows NM, Askew I, Bellows B. Review of performance-based incentives in community-based family planning programmes. *J Fam Plan Reprod Heal Care*. 2015;41(2):146–151.

18. Gneezy U, Meier S, Rey-Biel P. When and why incentives (don't) work to modify behavior. *J Econ Perspect*. 2011;25(4):191–210.

19. Glenton C, Scheel IB, Pradhan S, Lewin S, Hodgins S, Shrestha V. The female community health volunteer programme in Nepal: decision makers' perceptions of volunteerism, payment and other incentives. *Soc Sci Med*. 2010;70(12):1920–1927.

20. Maes KC, Kohrt BA, Closser S. Culture, status and context in community health worker pay: pitfalls and opportunities for policy research. A commentary on Glenton et al. (2010). *Soc Sci Med*. 2010;71(8):1375–8; discussion 1379–80.

21. Eichler R, Levine R, and the Performance-Based Incentives Working Group. *Performance incentves for global health: potential and pitfalls*. Baltimore, MD: Brookings Insitition Press; 2009.

22. Wang H, Juyal RK, Miner SA, Fischer E. Performance-based payment system for ASHAs in India: what does international experience tell us ? Bethesda, MD: The Vistaar Project, IntraHealth International Inc., Abt Associates Inc.; 2012.

23. The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial Team. The sanitation hygiene infant nutrition efficacy (SHINE) trial: rationale, design, and methods. *Clin Infect Dis*. 2015;61(suppl 7):S685–S702.

24. Mbuya MNN, Jones AD, Ntozini R, et al. Theory-driven process evaluation of the SHINE trial using a program impact pathway approach. *Clin Infect Dis*. 2015;61(Suppl 7):S752–S758.

25. Zimbabwe Ministry of Health and Child Care. The village health worker strategic direction. Harare : Ministry of Health and Child Care, Government of Zimbabwe; 2010. Available from: https://www.humanitarianresponse.info/system/files/documents/files/Village%20Health%20Worker%20Strartegic%20Direction.pdf.

26. Lawn J, Kerber K, eds. Opportunities for Africa's newborns: practical data, policy and programmatic support for newborn care in Africa. Cape Town; 2006.

27. Morgan L, Eichler R. Performance-based Incentives in Sub-Saharan Africa: Experiences, Challenges, Lessons. Bethesda, MD; 2011.

28. Menon P, Mbuya M, Habicht J-P, Pelto G, Loechl CU, Ruel MT. Assessing supervisory and motivational factors in the context of a program evaluation in rural Haiti. *J Nutr*. 2008;138(3):634–637.

29. Kambarami RA, Mbuya MNN, Pelletier D, Fundira D, Tavengwa N V., Stoltzfus RJ. How do factors associated with village health worker performance differ by task in a multi-tasked setting in rural Zimbabwe? 2016. Under review.

30. Glaser BG, Strauss AL. *The Discovery of Grounded Theory*. Chicago,IL: Aldine; 1967.

31. Zimbabwe Ministry of Health and Child Care. The national health strategy for Zimbabwe 2009-2013. Harare: Ministry of Health and Child Care, Government of Zimbabwe; 2013. Available from: http://www.who.int/workforcealliance/countries/zwe_healthStrategy.pdf?ua=1

32. Munjanja SP. Maternal and perinatal mortality study. Harare: Government of Zimbabwe Ministry of Health and Child Care; 2007.

33. Kosec K, Avula R, Holtemeyer B, Tyagi P, Hausladen S, Menon P. Predictors of Essential Health and Nutrition Service Delivery in Bihar, India: Results From Household and Frontline Worker Surveys. *Glob Heal Sci Pract*. 2015;3(2):255–73.

34. Witter S, Fretheim A, Kessy FL, Lindahl AK. Paying for performance to improve the delivery of health interventions in low- and middle-income countries . *Cochrane database Syst Rev*. 2012;2(2):CD007899.

35. Eichler R, Agarwal K, Askew I. Performance-based incentives to improve health status of mothers and newborns: what does the evidence show? *J Heal Nutr*. 2013;31(4).

36. Schuster R, de Sousa O, Vopelak C, McMahon D, Pinault D, Young S. Motivation and workplace characteristics among facility- and community-based health workers in rural Mozambique to inform a performance-based incentive intervention. In: Third Global Symposium on Health Systems Research. Cape Town, South Africa; 2014.

37. Srivastava DK, Prakash S, Adhish V, Nair KS, Gupta S, Nandan D. A study of interface of ASHA with the community and the service providers in Eastern Uttar Pradesh. *Indian J Public Health*. 2009;53(3):133–136.

38. Maes K, Kalofonos I. Becoming and remaining community health workers: Perspectives from Ethiopia and Mozambique. *Soc Sci Med*. 2013;87:52–59.

39. Roy S, Sahu B. Can ASHA be the ray of hope for providing MCH services in Odisha , India ? Exploring through a qualitative study. *J Glob Heal Care Syst*. 2013;3(2):1–14.

40. Kasteng F, Settumba S, Källander K, Vassall A. Valuing the work of unpaid community health workers and exploring the incentives to volunteering in rural Africa. *Health Policy Plan*. 2015:1–11.

41. Kalk A, Paul FA, Grabosch E. “Paying for performance” in Rwanda: does it pay off? *Trop Med Int Heal*. 2010;15(2):182–190.

42. Hasnain Z, Manning N, Pierskalla JH. The promise of performance pay? Reasons for caution in policy prescriptions in the core civil service. *World Bank Res Obs*. 2014;29(2):235–264.

CHAPTER 7

CONCLUSION

7.1 Overview

To achieve the goal of "ensuring healthy lives and promoting the well-being for all at all ages",[1] strong health systems with an appropriately skilled health workforce are required. The resurgence of Community Health Workers as part of the health workforce is one response to the acute shortages of skilled health workers in sub-Saharan Africa. Although CHWs could be effective in increasing the reach and effectiveness of health delivery systems, their workloads are expanding, adequate remuneration is a problem for constrained health systems, and maintaining CHW motivation and high performance under these conditions remains a challenge. This dissertation addresses some pivotal issues in CHW implementation research today.

7.2 Synthesis of findings

In Chapter 2, we presented a conceptual framework for CHW performance (Figure 2.1). As shown, CHWs performance is embedded in individual level demographic and psycho-social factors that interact with one another and with other organizational and community level factors. We present a synthesis of our findings using our conceptual framework to discuss our findings at these different socio-ecological levels.

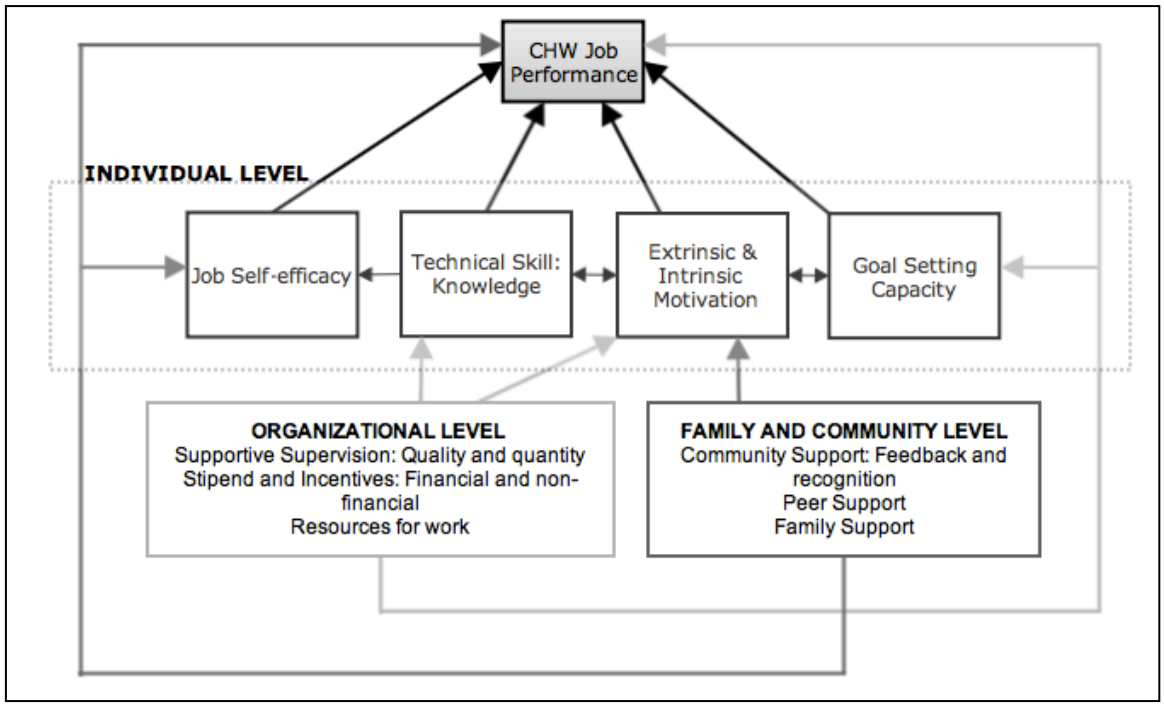

Figure 2.1 Conceptual framework showing influences on CHW job performance at the individual, community and organizational levels

7.2.1 At the individual level:

- Variability in CHW performance can be partially explained by socio-demographic differences such as age and gender, which may be important for strengthening CHW programs—it is not one size fits all. For example, more pregnancy referrals were associated with younger age and female gender CHWs. CHWs are delivering multiple health services in many countries and the level of performance on each activity may vary due to CHW's abilities and perceptions of the task.
- The provision of a small financial performance based incentive (PBI) for pregnancy referrals was associated with increases in the number of pregnancy referrals. Contrary to our hypothesis that we would observe higher extrinsic

motivation after introduction of the PBIs, we actually observed a decrease in CHWs extrinsic motivation (satisfaction with external rewards) and no change in CHWs intrinsic motivation.

- We illustrate the importance of remuneration at the individual level. CHWs that were satisfied with their remuneration made fewer pregnancy referrals, but the PBI actually increased the number pregnancy referrals. Despite this increase, CHWs satisfaction with their remuneration remained low and even decreased with the addition of the PBI.

7.2.2 At the community level:

- The determinants of higher performance in one task may be associated with lower performance on different task. For example, more pregnancy referrals were associated with CHWs unmarried status and larger household size. However, a larger household size was associated with lower lesson delivery scores.
- Community perspectives about the *quality* of CHW performance can inform us about locally appreciated CHW skills and behaviors. Clients considered their CHW to be their health representative, and identified respectful treatment, confidentiality, teaching manner, availability and approachability as important qualities for CHW health service delivery. Furthermore, CHW gender did not appear to affect community perceptions about message delivery quality. Our results are significant because they suggest a core set of competencies, including communication, confidentiality, respect, and prompt attention, that

all CHWs should be trained on to positively influence the utilization of CHW services.

7.2.3 At the organizational level:

- The *adequate provision* of skills training and tools can promote CHWs self–efficacy, technical capacity and motivation to perform different tasks. For example more pregnancy referrals were associated with CHWs having adequate work resources.
- Different supervision approaches can either encourage or discourage CHW performance of different tasks; particularly in contexts where CHWs have monthly group meetings and field-based individual review meetings with a supervisor. For example positive feedback encouraged CHWs to make more pregnancy referrals, while higher lesson delivery scores were associated with supportive supervision but not operational supervision.
- PBIs *can improve* task specific job performance directly, but there may be potential work distortion of those activities that are incentivized.

7.3 Contributions to the literature

Overall our work begins to explore some of the implementation challenges to health service delivery and clarifies some of the complexity of CHW job performance by recognizing that client expectations and perceptions of the CHW, and CHW-client and CHW-MoHCC relationships are critical for effective delivery of health messages. Understanding what helps CHWs deliver different services well (e.g. family support

and supportive work supervision, respectful interactions and other behaviors that make community members more receptive to health services and in turn renders CHWs more effective) is important. Similarly, understanding the kinds of behaviors that weaken the relationship between CHWs and community members e.g. missing appointments is important to avoid community members losing faith in their CHW.

In the context of increasing CHW workloads, current CHW performance research has not explicitly focused on individual task performance. Chapter 4 explored the research question "*What individual and organizational factors are associated with CHW performance of different tasks in rural Zimbabwe?"*. Examining the factors associated with performance by specific task was a novel approach. In addition, we incorporated factor analysis and multilevel modeling techniques to explore our research question.

Supervision strategies that lead to improved performance are not well understood.[2] Our work confirmed the complexity of supervision and highlighted that task specific supervision packages may be required to motivate CHWs (Chapter 4). This research is crucial to health systems because they need to provide appropriate supervision strategies for an array of tasks for an increasing CHW workforce. Training CHW supervisors about different approaches and moving away from didactic interactions where information is provided to or extracted from the CHW and towards more interactive meetings where CHWs are heard and guided can foster improved performance.

There is little published research describing CHW performance from the perspective of the clients in sub-Saharan Africa. Chapter 5 used in-depth interviews with Zimbabwean clients to understand their perspectives of the characteristics, competencies, and attitudes they valued from their CHWs, elucidating some universal core competencies for health service delivery. This work is essential for health system strengthening efforts and future programs should acknowledge community expectancies and ensure CHWs are trained on the core domains of interpersonal interactions to effectively deliver maternal and child health and nutrition community-based interventions.

Evidence supporting the effectiveness of performance-based incentives is mixed and there is still controversy about PBIs affecting CHWs intrinsic motivation. Chapter 6 evaluated the impact of a PBI on motivation and performance. Our research illustrated that in the short term a PBI may be used to improve performance with no disruption of CHWs internal motivations for work, which is a novel finding and a substantial contribution to the literature. This research is also particularly relevant at this time, as more studies are needed to evaluate the use of PBIs among CHWs in sub-Saharan Africa.

7.4 Implications of the work for global programs and policies:

Our findings suggest that program*s* need to integrate financial incentives with

other organizational and community level factors that shape CHWs work context. Interventions to improve CHW performance may need to be multi-faceted and focused on creating a facilitative work environment. A facilitative work environment will be one that *integrates* interventions at the individual level (e.g. gender specific trainings, using pairs of CHWs with different ages or tenure to work in the same community), at the community level (e.g. sensitizing the community to CHWs healthcare services, human resource or financial subsidies for CHWs livelihood demands), and at the organizational level (e.g. ensuring tools of the trade, improved remuneration, and task specific financial and non-financial incentives). Target areas for action include but are not limited to:

- Developing CHW recruitment criteria based on the tasks CHWs are expected to perform and considering the time burden and complexity for the tasks in relation to gender norms and expectations
- Ensuring adequate remuneration by considering CHWs workload
- Developing training programs for CHWs that incorporate the interpersonal skills that communities value
- Tailoring supervision activities to different tasks and utilizing communities to provide community-based supervision

The political work context of CHWs involves many actors representing different health issues. Ensuring that nutrition and other actors do not get left behind during health strengthening efforts is important for building sustainable health systems. Support for the target areas for action outlined above must also be led from the top

through policy and leadership from all actors and sectors involved. Drawing inspiration from the Scaling Up Nutrition Movement, a *CHW health systems movement* that can integrate several sectors and build the necessary legal and financial frameworks to improve the performance of CHWs could also be successful. Some steps towards this goal include having representation for CHWs at all levels of government, and thinking about the multiple roles of the CHW and bringing together key stakeholders from public health, social services, agriculture, nutrition and community organizations etc. to discuss ways to improve CHW health service delivery from a common framework.

7.5 Implications for the Ministry of Health and Child Care of Zimbabwe (MoHCC):

This dissertation work was conducted in two rural districts of Zimbabwe, and within the context of a longstanding governmental primary health care system. From our experiences we learned several lessons and we make the following recommendations to strengthen the CHW network in Zimbabwe:

1. Conduct a national survey of CHWs job-tasks

   CHWs are trained on a wide range of activities, but there is little information on what health services CHWs actually provide throughout the districts of Zimbabwe. To identify the strengths and gaps in health programming the MoHCC can consider conduct nationwide surveys with CHWs. Additional benefits of such surveys would be to identify geographical areas where more CHWs are required and to help targeting of health system strengthening resources for CHWs to deliver essential health services.

2. Develop mechanisms to support CHWs and promote community trust

   Quarterly field supervision for all CHWs: at the rural health center level, the nurse in charge is the main form of supervision. However, the MoHCC can expand this to include other nurses at the rural health center or district level to conduct field visits and familiarize other facility level staff with the CHWs. Our findings suggest that the extra supervision that was provided to CHWs in the context of this study may have facilitated their high levels of intrinsic motivation. Additional supervision for CHWs may further establish community trust in CHWs and help CHWs to feel recognized by the MoHCC. In addition, these visits provide a time for one-on-one trouble shooting as well as an opportunity for clinic supervisors to engage with local communities to develop local community-based systems for supportive supervision of CHWs.

   CHW recognition days: the MoHCC can also motivate CHWs and promote performance through encouraging communities, districts or rural health centers to organize and host annual events recognizing the CHWs for their work.

3. Explore strategies to provide material rewards and remuneration

   Timely receipt of CHW stipends: the MoHCC can leverage mobile cash technologies to ensure CHWs receive their remuneration on time.

   Expand partnerships with national and international non-governmental organizations (NGOs) and the private sector: the MoHCC can use these relationships to address challenges with the provision of financial and non-financial incentives (e.g. uniforms, badges, bags, bicycles, stationary and first aid kits) for CHWs. Partnership agreements can take various forms and could

include short term PBIs for any NGO-specific programming above regular CHW activities. However, the MoHCC and partners would have to provide careful monitoring of the PBIs to avoid any distortion of CHWs regular activities.

7.6 Future research priorities

Our findings suggest there are different predictors for higher performance depending on the task. As CHW workloads expand, our work can be leveraged to identify key areas for intervention for different types of tasks. CHW performance is also dynamic and evaluating the relationships between task performance and the individual, community and organizational level factors over time (in job) will help to understand how they change. For example for newer tasks certain factors may be important, but they can change once the task is routinized. Similarly, we can also investigate these relationships as new interventions are added onto existing workloads.

This dissertation focused on CHW performance as defined by SHINE/MoHCC and CHW-clients. Collecting perspectives of CHW performance from additional stakeholders, such as the CHWs and rural MoHCC staff is warranted to further understand facilitators and barriers to CHW health service delivery. Ultimately, these findings from the qualitative inquiries can be used to develop quantitative assessment tools for CHW-client interactions.

The PBIs were developed for a finite period of approximately 3 years to

coincide with the SHINE trial and we evaluated them four months after they were implemented. Furthermore, the PBIs were provided for CHW services largely independent of the local health facility. Ideally, to strengthen health systems PBIs should be provided along the continuum of care (defined by the place of care). Thus CHW PBIs should be linked to relevant services at health facilities e.g. promotion of ANC and facility births, promotion of child immunizations and vaccinations. Future research to explore how to extend facility based results based-financing, a form of PBIs, to include CHWs is therefore warranted as well as the long-term impacts of PBIs for CHWs.

7.7. Limitations: Internal and External Validity

Although this work contributes to the literature on CHW performance, there are some limitations. In terms of the internal validity, we administered cross-sectional surveys to assess CHWs work context perceptions and therefore we can only assess associations at one time point. Furthermore, for our pre-post analysis of the PBIs using the surveys, we lacked a comparison group and could not a make any causal inferences concerning the PBIs. But we conducted sub-analysis to assess correlations between the PBI and CHW workload and found weak correlations. In addition, the measures of work context factors we used in the survey were validated[3] to fit the local Zimbabwean context and are consistent with findings in other contexts.[4,5] Finally, the data collectors for the survey and interviewers for the in-depth interviews were well trained to avoid social desirability bias and followed standard operating guidelines.

The generalizability of our findings to other contexts may be limited because this study contributed to the process evaluation of the SHINE trial where CHWs were heavily supported and SHINE participants experienced a higher level of care than usual. However, the conceptual findings and methodology from this work may be generalizable to other contexts because our CHWs performed a range of activities, their workload expanded and their remuneration was modest and independent of their work performance which is similar to CHWs in several other rural low-income contexts. Therefore this dissertation still makes substantive contributions to our understanding of CHW job performance in low-income settings and provides considerations for how to develop strategies to improve CHW job performance and increase the effectiveness of maternal and child health and nutrition interventions.

REFERENCES

1. United Nations. Sustainable Development Knowledge Platform. Available at: https://sustainabledevelopment.un.org/?menu=1300. Accessed February 1, 2016.

2. Jaskiewicz W, Tulenko K. Increasing community health worker productivity and effectiveness: a review of the influence of the work environment. *Hum Resour Heal*. 2012;10(1):38.

3. Kambarami RA, Mbuya MNN, Pelletier D, Fundira D, Tavengwa N V., Stoltzfus RJ. How do factors associated with village health worker performance differ by task in a multi-tasked setting in rural Zimbabwe? *Glob Heal Sci Pract*. 2016. Under review.

4. Menon P, Mbuya M, Habicht J-P, Pelto G, Loechl CU, Ruel MT. Assessing supervisory and motivational factors in the context of a program evaluation in rural Haiti. *J Nutr*. 2008;138(3):634–637.

5. Schuster R, de Sousa O, Vopelak C, McMahon D, Pinault D, Young S. Motivation and workplace characteristics among facility- and community-based health workers in rural Mozambique to inform a performance-based incentive intervention. In: Third Global Symposium on Health Systems Researc*h*. Cape Town, South Africa; 2014.

APPENDIX-A

Table A1. Factor analysis solution showing factor loadings for the motivation and support constructs. The highlighted boxes indicate items that were retained for each factor

Items entered into analysis		Factor 1 Intrinsic Motivation	Factor 2 Satisfaction with Remuneration (Extrinsic Motivation)	Factor 3 Peer Support
B1	I feel like I enjoy my work as a village health worker.			
B2	I feel that my work will improve people's lives.			
B3	I feel like I am adequately prepared for my responsibilities.			
B4	I feel like I am responsible for so many activities that it's not possible to do them all well in the time I have.			
B5	I feel very connected with other village health workers.			0.3645
B6	I feel well supported by the other VHWs I work with.			0.3297
B7	If I were sick, I can easily find someone to help with my VHW duties.			0.5025
B8	I can find at least one VHW whose advice I really trust.			0.6446
B9	There is someone who gives me information to help me understand a VHW work's situation.			0.5527
B10	There is someone I work with who I can turn to for advice about handling problems with my family?			0.6195
B11	If I need help visiting mothers I know that I can always get help from the other village health workers.			0.6373
B12	I have had thoughts of leaving this job.		-0.4845	
B13	I feel that I am responsible for more work than other colleagues.		-0.3048	
B14	I am proud to tell others that I am a village health worker.			

Table A1. (Continued)

Items entered into analysis		Factor 1 Intrinsic Motivation	Factor 2 Satisfaction with Remuneration (Extrinsic Motivation)	Factor 3 Peer Support
B15	Unless I am rewarded for it in some way, I see no reason to spend extra effort promoting community health.		0.3564	
B16	How hard I work is directly linked to how much I am paid.		0.3564	
C1	I am contributing to improving the conditions of the communities I am working in..	0.5792		
C2	I help to change behaviors in a positive direction.	0.5993		
C3	I receive adequate training to meet my current responsibilities.	0.5473		
C4	I feel like I receive refresher training as often as I need it.	0.4559		
C5	I am very much involved personally in my job.	0.5896		
C6	I have a lot of pressure in this job. It really seems like the workload keeps increasing.		-0.6696	
C7	I find my job to be motivating and I like to do it.	0.6541		
C8	I feel that the clinics/health workers value the work that we do in the communities.	0.3942		
C9	I am satisfied with my allowance when I compare this job to other similar jobs.		0.8187	
C10	I am satisfied with the allowance I receive for the work I do.		0.8609	
C11	I am satisfied with my allowance when I compare it to that of others who have backgrounds and experience comparable to mine.		0.8039	
C12	I am satisfied with my job when I consider the expectations I had when I became a village health worker.	0.4145	0.4026	
C13	I feel secure that I will not lose my job in the near future.			
C14	The community values our efforts to improve their lives.	0.5924		

Items entered into analysis		Factor 1 Intrinsic Motivation	Factor 2 Satisfaction with Remuneration (Extrinsic Motivation)	Factor 3 Peer Support
C14	The community values our efforts to improve their lives.	0.5924		
C15	Other organizations, such as NGOs, respect the work that I do.	0.3296		
C16	The other health professionals respect the work that I do.	0.6250		
C17	I am happy with the amount of time I dedicate to my Village Health Worker duties.	0.6382		
C18	My work as a Village Health Worker gets in the way of my work at home		-0.5482	
Approximate Variance explained by each factor		**38%**	**38%**	**24%**
Reliability (Cronbach's alpha)		**0.85**	**0.92**	**0.75**

Table A2. Factor analysis solution showing factor loadings for the supervision constructs. The highlighted boxes indicate items that were retained for each factor

Items entered into analysis		Factor 4 Supportive Supervision	Factor 5 Operational Supervision
D1	My supervisor keeps me informed about the follow-up of my concerns/worries.		0.3626
D2	My supervisor informs me about upcoming trainings/meetings, etc., in a timely fashion.		0.3138
D3	My supervisor respects my fixed monthly activities when planning other meetings.		0.6329
D4	My supervisor consults with me before making changes to the activities that I am involved in.		0.6297
D5	My supervisor takes my concerns into account when planning activities that involve me.		0.5576
D6	When I make a mistake on the job, my supervisor scolds me.	-0.3215	
D7	My supervisor praises me when I do something really well.		0.4486
D8	I feel that my supervisor takes my concerns up to the higher level.		0.5011
D9	My supervisor helps me to organize my time and activities in an efficient manner.		0.5776
D10	My supervisor uses times when I make mistakes or don't perform well as opportunities to help me improve my skills.		0.4268
D11	I know who to approach when I encounter challenges in my work.		0.4067
D12	My supervisor inspects the registers that I use.		
D13	My supervisor gives me feedback on the registers that I use.		
D14	I feel well informed by my supervisor about changes/modifications to the activities that I am involved in.	0.5052	
D15	I see my supervisor as often as I need to.	0.4452	
D16	My supervisor is easy to talk with	0.7088	
D17	My supervisor ensures that I have enough of the supplies that I need to do my work.	0.4441	
D18	When I disagree with my supervisor I feel safe to express my opinion.		

Table A2. (Continued)

Items entered into analysis		Factor 4 Supportive Supervision	Factor 5 Operational Supervision
D19	Having a supervisor visit me motivates me to do a better job.	0.6551	
D20	The way the supervisor provides feedback on my performance at work inspires me to do my best	0.7329	
D21	My supervisor's commitment to her job encourages me to do my best.	0.6681	
D22	My supervisor takes into account/considers my suggestions to improve things	0.6224	
D23	I feel that my supervisor is sympathetic to my problems/cares about my problems	0.5074	
D24	I constantly learn new things about maternal and child health from my supervisor (technical information)	0.6834	
D25	My supervisor gives me enough guidance and structure to help me do my job.	0.7468	
D26	I feel that my supervisor helps me plan not just my job but also my future.	0.6315	
Approximate Variance explained by each factor		**51.0%**	**24.3%**
Reliability (Cronbach's alpha)		**0.90**	**0.77**

Table A3. Factor analysis solution showing factor loadings for the work resources construct. The highlighted boxes indicate items that were retained for each factor

Items entered into analysis		Factor 6 Adequacy of resources for work
How often does the following affect your job performance in your community		
E1	Shortage of medicines, bandages.	0.4951
E2	Shortage of stationery – pen, books, forms.	0.4064
E3	Shortage of bicycle repair implements.	0.7448
E4	Shortage of other related tools- IEC material	0.4899
E5	Lack of availability of transport	0.6970
Approximate Variance explained by each factor		**100%**
Reliability (Cronbach's alpha)		**0.70**

Table A4. Factor analysis solution showing factor loadings for the performance feedback constructs. The highlighted boxes indicate items that were retained for each factor

Items entered into analysis		Factor 7 Negative Performance Feedback	Factor 8 Positive Performance Feedback
F1	I feel confident that I am performing very well in my job.		0.4692
F2	I find it difficult to cope with the demands of the job.		
F3	How do you know when you are performing your job well?		
F4	My supervisor informs me.		0.5489
F5	Change in supervisor's attitude/behavior.	0.4307	
F6	Other VHWs tell me	0.6102	
F7	The community members tell me.	0.3429	0.4360
F8	Change in the community beneficiaries knowledge, attitudes and behavior		0.4047
F9	The job becomes easier.		0.5793
F10	I just know it		0.4070
F11	How do you know when you are not performing your job well?		
F12	My supervisor informs me.	0.3204	0.3693
F13	Change in supervisor's attitude/behavior	0.6553	
F14	Other VHWs tell me.	0.6852	
F15	The community members tell me	0.5910	
F16	Change in the community beneficiaries knowledge, attitudes and behavior	0.3931	
F17	The job becomes harder.		
F18	I just know it.		
Approximate Variance explained by each factor		**47.5%**	**35.3%**
Reliability (Cronbach's alpha)		**0.72**	**0.68**

Table A5. Description of eight factors from the exploratory factor analysis of the SHINE VHW survey questionnaire

Factor	Number of items	Description of factor
Perceived job satisfaction and intrinsic motivation	12	VHW feels personally motivated and happy with work, making a positive impact, appreciated by community, health workers and organizations for work
Satisfaction with remuneration	3	Satisfied with remuneration for the work
Perceived peer support	5	Receives advice and support from other VHWs
Perceived supportive supervision	12	VHW feels valued, motivated, guided, heard, supervisor is accessible
Perceived operational supervision	10	VHW feels informed and consulted about work activities, provided communications to improve work; feels needs are represented
Perceived adequacy of resources for work	5	Frequency of shortage of transportation and work tools
Perceived negative performance Feedback	5	Community, other VHWs and supervisor attitude indicates poor performance
Perceived positive performance Feedback	6	Supervisor and community inform VHW of good performance, positive changes in community; increased job confidence

Table A6. Multilevel Interaction Model showing VHW demographic and work characteristic factors associated with VHW performance on pregnancy referrals and behavior change lesson delivery tasks

VHW Variables	Pregnancy Referrals (n=246)		Lesson Delivery Score (n=246)		Interaction Term
	Beta (SE)	p-value	Beta (SE)	p-value	p-value
Age (Ref<40yrs)					
40-49 years	-0.24 (0.14)	0.081	0.07 (0.14)	0.630	0.602
50+ years	-0.27 (0.19)	0.140	-0.14 (0.19)	0.448	0.416
Gender (Ref male)	0.31 (0.14)	0.022	-0.17 (0.14)	0.226	0.011*
Marital Status (Ref not married)	-0.14 (0.14)	0.296	0.01 (0.14)	0.967	0.423
Educational Level (Ref Primary)					
Some secondary	0.11 (0.11)	0.532	0.06 (0.17)	0.725	0.359
Completed O'Level or higher	0.01 (0.19)	0.978	0.24 (0.19)	0.198	0.117
Household size	0.02 (0.02)	0.300	-0.04 (0.02)	0.085	0.041*
Tenure (years)	0.02 (0.01)	0.091	-0.02 (0.01)	0.050	0.008**
Job satisfaction & motivation	-0.12 (0.08)	0.122	-0.07 (0.08)	0.342	0.656
Satisfaction with remuneration	-0.12 (0.07)	0.067	0.02 (0.07)	0.738	0.110
Perceived peer support	-0.05 (0.06)	0.463	-0.04 (0.06)	0.574	0.898
Perceived supportive supervision	0.02 (0.09)	0.821	0.17 (0.09)	0.046	0.189
Perceived operational supervision	0.04 (0.07)	0.533	-0.15 (0.07)	0.029	0.042*
Perceived adequacy of resources for work	0.13 (0.06)	0.033	-0.02 (0.06)	0.729	0.072§
Perceived negative feedback	0.00 (0.06)	0.993	-0.09 (0.06)	0.143	0.284
Perceived positive feedback	0.15 (0.08)	0.057	0.03 (0.08)	0.708	0.258

Models adjusted for study arm, cluster ID, ward number, number of observations/VHW
Ref= reference category
Significant at §p<0.1; *p<0.05; **p<0.01; ***p<0.001

APPENDIX-B

Table B1. In depth interview guide: Client's perception of VHW health service delivery

Question/Statement	Probes
1. How would you describe VHWs work in the community?	*General work of a VHW and this can include SHINE work*
2. From what you have just shared, what do you consider to be good VHW performance?	*In your opinion, why do these things mean that a VHW has worked well?* • *What Good things can a VHW do when performing a delivery a lesson* • *What Good things can a VHW do when working in the community*
3. Not all VHWs work well as expected. In your opinion, what sorts of things show you that a VHW has not worked well?	*Why do these things mean to you that a VHW has NOT worked well?* • What sorts of things would a VHW do that are not helpful in delivering lesson messages • What things would a VHW do that are not helpful when working in the community
4. When a VHW is talking to you about health information for the first time, what sorts of things can he/she do to help you understand the messages?[a]	
5. In your opinion, what things show that a VHW is dedicated to their work?[a]	*In what ways do you think their dedication influences how they are able to work with you?*

From some interviews with other women who also get visits and similar messages from VHWs, they told us about some of the things that they think about when they think of VHW performance. The **following statements**[a] are examples of the things that they told us in describing VHW performance. For each of these statements, could you please indicate HOW OFTEN you, personally, have felt this way **– ALWAYS, OFTEN, SOMETIMES, RARELY or NEVER.** If you feel that a statement here does not apply to you, please tell us so.

[a]Interview items included the guide from the salience analysis

Table B1. (Continued)

Question/Statement	Probes
6. I am free to interact with my VHW	*What things came into your mind to make you say you are free/not free with your VHW?* • *Which interactions with your VHW were you thinking about in responding to the question?*
7. I am happy with the work of my VHW	*What were you thinking as you were coming up with the response for this statement?* • *Why has the VHW work made you happy/unhappy?* • *What kinds of things would make you unhappy with the work of your VHW? Why?*
8. I like that my VHW makes and keeps appointments	*What were you thinking as you were coming up with the response for this statement?* • *How do you think this reflects a VHWs work performance?*
9. I like that my VHW shares new knowledge	*What were you thinking as you were coming up with the response for this statement?* • *How do you think this reflects a VHWs work performance?*
10. I like that I can see the benefit of the messages that I get from the VHW.	*What were you thinking as you were coming up with the response for this statement?* • *How do you think this reflects a VHWs work performance?*
11. VHWs are happy and never frown	*What were you thinking as you were coming up with the response for this statement?* • *How do you think this reflects a VHWs work performance?*

[a]Interview items included the guide from the salience analysis

Table B2. Multistage sampling selection matrix showing VHW and client characteristics

					(Client characteristics n=20)[a]					
VHWID	**SHINE Arm[b]**	**Gender**	**Age, years**	**Tenure, years**	**Client ID[c]**	**Age, years**	**Marital status**	**Education years**	**Household size, persons**	**Relation to VHW**
VHW154	WASH +	M	46.4	6	R03	39.8	widowed	≤7 (primary school)	8	N
					R05	41.5	married	≥ 8 (some high school or more)	5	N
VHW162	WASH +	F	41.1	18	R16	17.0	married	≥ 8 (some high school or more)	6	N
					R13	39.9	married	≥ 8 (some high school or more)	4	N
					R19	-	-	-	-	Y-close relative
					R12	18.8	married	≥ 8 (some high school or more)	7	Y-close relative
VHW166	WASH +	F	44.1	2	R11	27.7	married	≥ 8 (some high school or more)	3	N
VHW170	WASH +	F	47.8	5	R06	21.4	married	≤7 (primary school)	3	N
					R01	-	-	-	-	N
VHW182	WASH +	M	48.9	12	R10	21.1	married	≥ 8 (some high school or more)	9	N
VHW225	SOC	F	40.4	4	R04	23.3	married	≥ 8 (some high school or more)	3	Y-close relative
VHW234	SOC	F	40.2	11	R09	17.6	married	≥ 8 (some high school or more)	6	N
VHW 237	SOC	F	48.2	13	R18	27.9	married	≥ 8 (some high school or more)	5	N

[a] missing demographic data for four clients
[b] VHWs selected from 2 of the 4 SHINE study arms. WASH+ (Water sanitation hygiene + Infant young child and feeding) and SOC (standard of care)
[c] All clients were female
M/F=male/female; Y/N=yes/no

Table B2. (Continued)

VHWID	SHINE Arm[b]	Gender	Age, years	Tenure, years	(Client characteristics n=20)[a] Client ID[c]	Age, years	Marital status	Education years	Household size, persons	Relation to VHW
VHW241	SOC	F	46.0	10	R02	32.6	married	≥ 8 (some high school or more)	5	N
					R14	21.3	married	≥ 8 (some high school or more)	3	Y-distant relative
					R17	42.6	married	≤7 (primary school)	5	N
VHW284	SOC	F	57.5	3	R20	15.4	not married	≥ 8 (some high school or more)	4	N
VHW294	SOC	F	44.4	13	R08	21.2	married	≥ 8 (some high school or more)	3	N
					R07	-	-	-	-	Y-distant relative
					R15	-	-	-	-	Y-distant relative

[a] missing demographic data for four clients
[b] VHWs selected from 2 of the 4 SHINE study arms. WASH+ (Water sanitation hygiene + Infant young child and feeding) and SOC (standard of care)
[c] All clients were female
M/F=male/female; Y/N=yes/no

Table B3. Data analysis codebook showing primary and secondary code, definition of the secondary codes, and the inductive or deductive locus of the codes

Primary Code	Secondary Code	Definition	Inductive/ Deductive Origin
VHW Community Responsibility (Community)	*Family Definition: A discussion of the perceived job role of the VHW in the community*		Inductive
	Representative	VHW selected by community; VHW represents the community; working for the community	
	Presence	Visibility in the community with no reference to a particular role	
	Surveillance	Role in community as a health sentinel and makes referrals to clinics	
	Informant	Sharing of clinic/program information	
	Advocate	Promotes a healthy lifestyle/clean compound	
	First Aid	Dispense painkillers, other first aid treatments to community members	
	Health Improvement	Overall, fewer illnesses among the babies/children in the community	
	Role model	Practicing the healthy lifestyle that the VHW teaches	
VHW Job Responsibility (Job)	*Family Definition: A discussion of the job role of a VHW e.g. relating to module messages (content) i.e. promoting healthy babies etc.*		
	Home visits	Making home visits; including the frequency of visits	Deductive
	Pregnancy Surveillance	Providing calendars for women to track periods, providing pregnancy test kits	
	Encouraging healthy behaviors	Encouraging healthy growth and feeding babies, sanitation & hygiene, care of baby, ANC	
	Equipment	Having/carrying necessary tools e.g. bag	
	Deliver module content	Breastfeeding, IYCF, Hygiene, sanitation, family planning, child growth/health/care messaging, immunizations	
	Adhere to module guidelines	Follow module guidelines e.g. with regards to timing of module, length of time of module, use of tools (pictures, pamphlets, stickers, boards)	
	Planning	Plan work schedules	
Program Function (Program)	*Family Definition: Issues raised that relate to program operations and not within the control of the VHW e.g. latrine construction delays*		*Deductive*
Client Behavior (C-Behavior)	*Family Definition: Discussion of implementation (or non-implementation) of behavior or adherence to any behavioral changes*		*Inductive*

Table B3. (Continued)

Primary Code	Secondary Code	Definition	Inductive/ Deductive Origin
Client Knowledge Acquisition & Sharing (C-Knowledge)	*Family Definition: Discussion of VHW information dissemination*		
	New Knowledge	Client states novel things learned *(client must state/imply this clearly, otherwise it is increasing knowledge)*	Deductive
	Increasing knowledge	Knowledge acquisition adds to existing knowledge	Deductive
	Empowering knowledge	New knowledge that facilitates change in a behavior	Deductive
	Differentiation	Notices the difference in knowledge post lesson/compared to non-SHINE women/compared to previous child rearing behaviors	Deductive
	Corrective knowledge	Correcting misconceptions	Deductive
	Doubtful	Child encounters other health issues and mothers express hesitation/doubt about the VHW's messages/knowledge sharing	Inductive
	Share knowledge	Express a desire or the ability to share new information	Inductive
Client Trust in VHW (C-Trust)	*Family Definition: Discussions of confidence in VHW ability*		
	Confidentiality	Express some aspect of confidentiality (positive/negative); can confide in VHW	Deductive
	Problem solver	Express VHWs ability to assist client solving problems	Inductive
	Honesty	Express belief that VHW provides accurate/truthful information (i.e. they will not say something just to please us).	Inductive
	Responsive/not responsive	Express that VHW will come/ not when called	Inductive

Table B3. (Continued)

Primary Code	Secondary Code	Definition	Inductive/ Deductive Origin
VHW Teaching Skills (Teaching)	*Family Definition: Discussions related to teaching aspects of VHW teaching style*		
	Repetition	To aid in client understanding & comprehension	Deductive
	Patience	With explanations/understanding i.e. allowing mother time to grasp materials	Deductive
	Love	Clients mention love/care/passion with regards to teaching	Inductive
	Probes	Probes/questions mother to assess comprehension	Deductive
	Appropriate Language	Uses different language for the client; use SHONA but temper down language or provide more time to assist mother with understanding	Deductive
	Interactive	Allows mother to ask questions; demonstrations (VHW/Client)	Deductive
	Insufficient teaching	With regards to quantity/quality to change behaviors; confusion on what is right/wrong	Inductive
	Skilled/competent	Expresses the VHW's ability to answer all questions even those not related to modules	Deductive
VHW Relationship with clients (Relationship)	*Family Definition: Discussion related how mother perceives the VHWs' interactions*		
	Accessibility/Communication	Availability of VHW; ease of communication access (i.e. mobile phone)	Inductive
	Comfort	No issues with lesson delivery; lesson in-home; gender; discussing any issues, concerns, module content with VHW	Inductive
	Respect	Respect client's time; client; client's home, client's family	Deductive
	Disrespect	Scold clients/ harsh with clients	Inductive
	Gender	Male VHWs do not make advances towards single women; do not scold clients; are not harsh with clients	Inductive
	Humility	VHW is not pretentious in interactions; VHW is understanding/able to relate to client	Deductive
	Relative	VHW is related to client e.g. in-law etc.	Inductive
	Friendly	VHW is friendly, personable (i.e. can't pass without saying something)	Inductive

Table B3. (Continued)

Primary Code	Secondary Code	Definition	Inductive/ Deductive Origin
VHW Relationship with clients (Relationship)	Open	Can talk with VHW about things not related to modules i.e. other personal/family issues	Inductive
	Valued	Clients express feeling valued "set aside time for us"	Inductive
	Professional	Doesn't let his family/personal problems affect his work/interactions with clients	Inductive
VHW Dedication to work (Dedication)	*Family Definition: Discussions about VHWs time commitment, prioritization and sacrifice for their work*		
	Appointments	Schedule appointments; Keeping appointments; Late for appointments; Waiting for mother	Deductive
	Prioritize work /Passion (also do not prioritize work)	Sacrifice family time/ Sacrifice household duties (do not make visits because they busy)	Inductive
	Hard working	Follows up with clients from clinic/module visits and pursues women to make visits	Deductive

APPENDIX C

Table C1. Focus group discussion guide: village health workers perception of the performance based incentives

Question/*Probe*
1. Which VHW activities do you enjoy the most? (*Why? On average how much time do these activities take?)*
2. What are your thoughts about the quarterly VHW hamper?
3. When you first learned about receiving the Referrals $2 appreciation in December 2013, what were your first thoughts?
4. Since then, you have had some time thinking and reflecting about these tokens of appreciation. What do you think **NOW** about the **referral token of appreciation**? (*Why do you think this?)*
5. After the introduction of tokens of appreciation for **referrals** In what ways have your SHINE VHW activities remained the same? In what ways have your SHINE VHW activities differed from before? (*How is it the same/different)*
6. What sorts of things/activities are different since receiving the **Referral token of appreciation**? **Hamper**? (*How are they different?)*
7. Sometimes you have to give priority to one work activity over another e.g. ePregI vs. lesson delivery, which types of activities do you prioritize first? (*Why?)*
8. What do you think about some VHWs being given tokens of appreciation when they have not performed ePregI? *(What are some of the reasons you think this may happen?)* *(What sorts of things do you think can be done to make sure VHWs get the correct tokens of appreciation for the ePregI work they do?)*

Table C2. Correlations between the change (gain) in performance and motivation and pre and post PBI workload

		Change
Pregnancy Referrals (n=294)	**Change**	1
	Pre-PBI workload	-0.0059
	Post-PBI workload	0.0935
Intrinsic motivation (n=289)	**Change**	1
	Pre-PBI workload	0.0608
	Post-PBI workload	0.0345
Extrinsic motivation (n=298)	**Change**	1
	Pre-PBI workload	0.0938
	Post-PBI workload	0.0705