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Women and Infant Nutrition Field Support Project (WINS)

Participation of the WINS Project Deputy Director in the XV International Congress of Nutrition

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SUBMITTED BY:

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I. PURPOSE AND OBJECTIVES OF THE TRIP

The Deputy Director of the WINS Project, Dr. Judith Ricci, travelled to Adelaide, South Australia to participate in the 15th Congress of the International Union of Nutritional Sciences (IUNS). This year's Congress, which convenes every four years, focused on sustainability, or more specifically, the need to integrate nutritional policies and development into an ecologically sustainable strategy.

The specific objectives of Dr. Ricci's trip were to:

- present a paper on "Maternal Time Allocation and Children's Food Consumption in a Peri-Urban Egyptian Village" in the IUNS Congress workshop on Diet Quality and Micronutrient Deficiencies;

- participate in the scientific program featuring state-of-the-art plenary lectures on current major issues in human nutrition, new concepts, and future directions for international nutrition and development; and

- meet with colleagues from the United States and abroad to discuss the WINS Project and to identify potential needs for technical assistance which can be met by the WINS Project's particular expertise in women's and infant's nutrition.

II. ACTIVITIES AND ACCOMPLISHMENTS

- Dr. Ricci presented the research she conducted on linkages between mothers' patterns of daily time allocation and the dietary adequacy of children 18 to 30 months of age residing in a peri-urban Egyptian village. She received positive and encouraging feedback on both the quality of her research and presentation. Workshop participants commented on the relevance and timeliness of the topic given recent trends in nutrition policy and programming to focus both on mothers'/women's health and on methods to improve the sustainability of community health interventions. An understanding of how mothers organize and allocate their time was viewed as imperative for designing community health programs that affect long-term improvements in the well-being of both children and their mothers. Refer to Appendix A for a summary of her presentation.

- Dr. Ricci met with Dr. Dhiren D. Makdani (Professor of Nutrition, Lincoln University) and Dr. Chet Raj Pant (Director, Nepal National Vitamin A Programme) to follow-up on discussions intitiated by Dr. Makdani. The purpose of the meeting was to: i) learn more about on-going nutrition activities in Nepal; ii) determine Nepal's needs for technical support in the area of nutrition; and iii) discuss how the WINS Project could best serve these needs. Dr. Pant commented that in-country technical expertise in Nepal was very strong in the area of vitamin A research and health service delivery, but weak in addressing other micronutrient deficiencies,

i.e. iron and iodine.[1] He indicated a strong desire to round out his country's national primary health care strategy by expanding the micronutrient program to address both iron-deficiency anemia and iodine deficiency disorders (IDD). In particular, he was interested in conducting operations research to develop a strategy for addressing IDD. Additionally, Dr. Pant was interested in improving the nutrition of weaning age infants and in women's income-generating activities. He believed that an intersectoral solution to nutrition problems was feasible given the strong on-going collaboration in Nepal's primary health care strategy among the Ministries of Agriculture, Health, and Education. Dr. Pant has worked closely with the U.S.A.I.D. mission to Nepal in the past and thus, felt confident of their support for this work.

- Dr. Ricci met with Dr. Mohammad Amr Hussein (Director, Egypt Nutrition Institute and Head, WHO Collaborating Center for Research and Training in Nutrition in Cairo, Egypt) to discuss a six-month Regional Training Course in Nutrition offered at the Nutrition Institute from July 1 to December 31, 1994. The course is conducted in English and covers a variety of topics including nutrition policy formulation, etiology of community nutrition problems and intervention strategies, effective communication, management and administration of nutrition projects/programs, quantitative methods (epidemiology, biostatistics, and computing), and several electives. Tuition is US$4000.00 and does not include room and board. Dr. Ricci obtained a pamphlet on the training course which provides more information.

- Dr. Ricci met at length with both Dr. Suzanne Murphy (Associate Research Nutritionist, University of California at Berkeley) and Dr. Benjamin Torun (Head, Program of Metabolism and Clinical Nutrition Institute of Nutrition of Central America and Panama). She and Dr. Murphy reviewed the potential for using UC Berkeley's International Minilist Food Composition Data Base in the WINS Project's provision of technical assistance to REDSO/WCA because of its flexibility and adaptability to a wide variety of dietary patterns. She and Dr. Torun discussed his interest in collaborating with the WINS Project in Latin America, once a Latin American country is identified.

- Dr. Ricci described the WINS Project's program to address iodine deficiency disorders (IDD) in Togo with Dr. Rainer Gutekunst (UNICEF/New York). Dr. Gutekunst is an international iodine expert who co-authored the 1993 WHO/UNICEF/ICCIDD publication entitled "Indicators for Assessing IDD and Their Control Programs." Dr. Gutekunst was interested in the WINS Project's program in Togo and expressed a willingness to provide technical oversight to the components of the WINS Project's programs that address IDD.

- Dr. Ricci also met more briefly with many other nutrition professionals about the WINS Project and WINS Project activities. Individuals represented a number of developing countries including Tanzania, Egypt, Guatemala, Thailand, Nepal, Indonesia, India, and Pakistan.

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[1]Dr. Pant commented that 25 percent of children younger that five years of age were iron deficient.

III. NEXT STEPS

In follow-up to the meeting among Drs. Pant, Makdani, and Ricci, Dr. Makdani plans to draft a letter to the WINS Project describing Nepal's interest in WINS Project technical assistance. Dr. Pant looks forward to a visit by Dr. Makdani to Nepal to further discuss the details of collaboration and to work with him in drafting a proposal for the WINS Project's provision of technical assistance to support nutrition activities in Nepal.

APPENDIX A

INTRODUCTION

This research examines the linkages between mothers' patterns of time use and the dietary adequacy of children 18 to 30 months of age in peri-urban Egypt. In particular, the research focuses on whether maternal economic responsibilities influence the amount of time mothers allocate to child caregiving and whether there are associated effects on the adequacy of children's diets, in this case, as defined by daily dietary energy intakes.

These questions are critical because poor women in many developing countries face stringent time constraints. They continually must choose how to allocate their time among many competing tasks for which they bear full responsibility. Decisions on time allocation are particularly critical for mothers who increasingly must try to balance economically productive roles with maternal responsibilities. In addition, mothers are also expected to play a key role in the child survival revolution which relies heavily on mothers' participation and thus, time commitment. Consequently, it is important that we understand how mothers organize and allocate their time if we hope to effectively intervene to enhance the well-being of both children and their mothers.

CONCEPTUAL FRAMEWORK

Conceptually, a mother's time use pattern results from a basic economic decision-making process whereby mothers marginally adjust amounts of time allocated to competing responsibilities in an effort to maximize utility given a unique set of resource constraints. Two of these constraints, time and goods, are key components of welfare. If children's welfare or well-being is the desired outcome, then we can assume that it can also be influenced by the allocation of time and goods.

Maternal time use patterns potentially affect children's well-being through three major productive pathways - economic production, household production, and self production. All mothers participate in all three types of activities to varying extents each day such that each mother's unique distribution of activities characterizes her own daily time allocation pattern. We assume that different patterns of maternal time use will have different effects on children's well-being.

Economic production refers to work that contributes directly or indirectly to household economic security through the generation of income or the provision of other economic resources through labor exchange, "in-kind" payments for services, or uncompensated labor.

Household production refers to all work performed to maintain the home environment and nurture family members. Child caregiving, especially breastfeeding, feeding, and properly caring for children during illness and convalescence are particularly important.

Self production refers to activities performed by mothers on their own behalf to promote, maintain, or restore their own physical, mental, and social health. A mother's own health and

nutritional status in addition to her ability and effectiveness in managing the household are key determinants of children's well-being.

Finally, it is important to state that the relationships being investigated are not simple. Many demographic, social, cultural, economic, and biological factors intervene to affect both mothers' pattern of daily time allocation and children's dietary adequacy.

METHODS

The data were collected as part of the Nutrition Collaborative Research Support Program in Egypt.[2] Quantitative data were collected on 161 mother-toddler pairs and included information on mothers' time allocation and hemoglobin levels, sociodemographic information, and food intake and morbidity data on children 18 to 30 months of age.

In collecting time allocation data, fieldworkers observed and systematically recorded a mother's ongoing activities during a continuous two-hour time period, at five different times every three-months during their 12 months of study participation. Mothers were observed both at home and away from home between either 8:00 a.m. and 6:00 p.m. or 9:00 a.m. and 7:00 p.m.

During an observation period, fieldworkers recorded all observed activities in coded format every minute of the two-hour period. There were 26 possible general activity codes which were supplemented with object codes to provide more specific information on the activity.

Blood was drawn by a finger prick into a capillary pipette and hemoglobin was measured by a cyanmethemoglobin method. Sociodemographic data were collected using a combination of interviewing and direct observation. Food intake methods combined probed 24-hour recall and sample weighing of dietary items. Toddlers' morbidity data were collected by mothers' weekly recall.

Data analysis was conducted cross-sectionally by children's age. Four three-month age intervals were created beginning at age 18 months. Given the longitudinal data collection schedule, we averaged repeated measures of variables so that each child was represented as a single observational unit within each 3-month age interval.

Multiple linear regression models were built within each age interval. The conceptual framework provided direction for testing variables. Those that were statistically significant in at least one of the four age intervals were retained for testing in the final models.

In the last step, we collapsed the four three-month age intervals into two six-month age intervals

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[2]The research was made possible in part by a grant from the United States Agency for International Development, Office of Nutrition (USAID Grant No. DAN-1309-G-SS-1070-00).

stratified at 24 months of age. The models were then refined and robust variances were estimated to account for the dependence between observations created within six-month age intervals.

RESULTS

Demographic Characteristics

Table 1 summarizes the main demographic and socioeconomic characteristics of sample households. A typical household consisted of eight individuals with three female residents six years of age or older and three children five years of age or younger. The majority of households were nuclear families, completely non-agricultural in subsistence and of lower intermediate socioeconomic status. On average, mothers were 30 years of age with normal hemoglobin levels. Most had no formal education, and virtually all worked for their families without remuneration.

Time Allocation

Table 2 describes mothers' daily time allocation patterns according to toddler's age. Mothers spent 8 hours and the majority of the day in household production, followed by three hours in self production, and one hour in economic production. The large coefficients of variation associated with these figures indicate that mothers' time is not ascribed, but flexible and therefore influenced by a number of factors.

This table also shows that mothers coping with time constraints often performed activities simultaneously. Mothers performed, on average, more that 10 hours of activity within the 10 hours that they were observed.

The table also suggests that mothers prioritized activities and made trade-offs in choosing activities to perform each day. For example, when toddlers were under 2 years of age, mothers spent more time in household production and less time in other types of production. However, after 2 years of age as mothers expected toddlers to become increasingly more autonomous, they spent less time in child caregiving which allowed mothers more time for themselves and for economically productive activities.

Table 3 presents the results of a regression analysis to identify factors associated with maternal time per day spent in child caregiving. Analyses were stratified by children's age and different determinants emerged in each stratum indicating that children's age may be the most significant predictor of maternal time use patterns. Again, with age-dependent effects, other factors such as the amount of time allocated to economic production, the household's mode of economic subsistence, and level of paternal education were negatively associated with the amount of time mothers spent in child caregiving.

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The toddlers' breastfeeding status along with household composition variables including the number of females six years of age and older and the number of infants in the household were positively associated with maternal time in child caregiving.

Toddler Energy Intake

Children's dietary energy intakes reflect only non-breastmilk sources of nourishment. Two-thirds of the boys and half of the girls were still breastfed at their time of study entry. However, relatively few mothers continued to breastfeed children after 24 months of age.

Table 4 presents data on toddlers' daily dietary energy intakes stratified by breastfeeding status. It shows that partially breastfed toddlers age 18 to 20 months consumed significantly less energy from non-breastmilk sources than weaned toddlers the same age suggesting that breastmilk may provide a significant source of dietary energy for children beyond 18 months of age in this village. When comparing the intakes of completely weaned toddlers to the FAO daily energy requirements, we found that toddlers were adequately nourished, on average, with respect to energy.

To identify factors that most strongly predicted children's daily energy intakes, we ran a series of stepwise multiple regression models in which we examined several conceptually distinct categories of variables including i) mothers' time allocated to activities expected to promote children's food consumption, ii) household-level socioeconomic factors, iii) social determinants, and iv) biological determinants.

Table 5 presents the results of this analysis, which again shows that the types of factors associated with children's daily energy intakes were dependent on their age. In the younger 18 to 23 months of age group, maternal child caregiving behavior was critical. Children's breastfeeding status at the time of dietary intake data collection and mothers' frequency of feeding children were the most significant predictors of their daily energy consumption.

After two years of age, as children were expected to become more self-reliant, their breastfeeding status and their mothers' frequency of feeding them no longer predicted their daily energy consumption. However, maternal factors continued to influence children's daily energy intake now operating indirectly through mothers' education.

None of the social determinants that were examined were associated with children's energy intakes and with the exception of children's breastfeeding status and age, none of the biological determinants affected children's energy intake. These included the proportion of days with diarrhea, the child's gender, the number of infants in the household, and maternal age and hemoglobin level.

DISCUSSION

The results of this analysis indicate that mothers of young children clearly experienced time constraints in this village. Household production dominated mothers' time. In particular, child caregiving consumed more maternal time per day than any other type of activity suggesting that when children are young, their mothers' principal responsibilities are to raise them, nurture the family, and maintain the home environment.

In general, given young children's need for time-intensive types of child-care, mothers did not make trade-offs between time allocated to child-care and economic production when their children were younger than two years of age. Instead, mothers most likely performed economically productive activities in conjunction with child caregiving. Because most economic production performed by mothers in Kalama was based at home or near home, these activities were compatible with child caregiving. On the other hand, after two years of age, when children received less time-intensive care, the amount of time mothers spent in economic production was negatively associated with their time in child caregiving.

Another important finding documents the significant contribution of maternal child caregiving behavior to promoting the daily dietary energy intake of toddlers under two years of age. The positive association between children's energy intake and the frequency with which their mothers fed them supports current international recommendation to feed young children more frequently to improve their energy and nutrient intakes. In addition, this finding also provides some evidence to support recent claims that the degree and type of maternal control over children's food consumption may be as important as food availability or household socioeconomic status in determining the dietary intakes of young children.

CONCLUSION

In conclusion, we established that the factors determining maternal patterns of time allocation are highly context-specific and that the associations between maternal activity patterns and children's well-being depend largely on children's age. Our results also begin to clarify how differentials in maternal time investments in a specific environment can impact on maternal child caregiving behavior, an important intervening variable in the relationship between maternal participation in economic production and children's well-being.

Finally, the contribution of the self production pathway as a predictor of children's health and nutritional status remains an important avenue for future research. Maternal personal resources, including her own health and nutritional status and her skills, efficiency, and effectiveness as a time manager and child caregiver may provide additional insight to clarifying and understanding the relationships between maternal patterns of time allocation and children's well-being.

Table 1 Demographic and socioeconomic characteristics of study households

Variable	Category	Number	Percent	Number of households
Household subsistence type	Agricultural only	37	23.0	160
	Agricultural and non-agricultural	40	25.4	
	Non-agricultural only	83	51.6	
Household structure	Nuclear family	104	64.6	161
	Extended family, Type 1	47	29.2	
	Extended family, Type 2	10	6.2	
Household socioeconomic status	Low	41	25.5	161
	Lower intermediate	67	41.6	
	Upper intermediate	33	20.5	
	High	20	12.4	
Maternal employment status	Self-employed	1	0.6	161
	Working without pay for the family	160	99.4	

	Mean ± standard deviation	
Household size	7.5 ± 2.7	161
Number of females ≥ 6 years	2.7 ± 1.4	161
Number of children ≤ 5 years	2.5 ± 1.0	161
Maternal education (years)	1.3 ± 2.8	161
Maternal age (years)	29.6 ± 5.8	161
Maternal hemoglobin (g/dL)	12.7 ± 1.6	126

Table 2 Average number of hours per day mothers spend in various types of production by age of child: Mean and coefficient of variation (CV)

Type of production	Age of child			
	18 to 23 months		24 to 29 months	
	Mean	CV	Mean	CV
Economic production				
Income-generating	0.2	3.0	0.1	4.0
Non-remunerative	0.5	2.0	0.7	1.4
Total	0.7	1.6	0.8	1.4
Household production				
Child-focused	3.8	0.4	3.6	0.5
Other than child-focused	4.2	0.5	4.1	0.4
Total	8.0	0.3	7.7	0.3
Self production				
Bioculturally mandated	0.6	1.3	0.5	0.8
Personally elected	2.2	0.6	2.7	0.6
Total	2.7	0.5	3.1	0.5
Number of mothers[a]	83		111	

[a]Excludes mothers with infants - 18 to 23 months (n=11), 24 to 29 months (n=38).

Table 3 Determinants of maternal time in child-focused household production by age of child (minutes per 10-hour day)

Explanatory Variable	18 to 23 months		24 to 29 months	
	β	s.e.	β	s.e.
Economic production	0.08	0.24	-0.35****	0.07
Father's education	-7.86****	1.94	-1.55	1.97
Household subsistence (1=agricultural)	-68.54***	20.31	-48.64*	19.11
Household structure (1=extended)	14.81	29.12	-21.62	21.47
Number of females 6 yrs. or older	1.91	9.76	14.30*	7.20
Number of children under 5 yrs. of age	3.65	14.72	-1.87	10.46
Number of infants	-57.36	33.90	106.09****	24.13
Toddler still breastfed (1=yes)	52.49*	25.03	98.55	61.51
Age group (1=older 3 months)	-37.93	21.99	20.15	17.50
Interaction: Economic production* breastfeeding status	-0.44	0.28	0.04	0.38
Intercept	299.57****		225.98****	
F	3.14		6.13	
Adjusted R^2	0.15		0.19	
n	122		218	

*p<0.05; **p<0.01; ***p<0.001; ****p<0.0001

Table 4 Mean energy intake (kilocalories/day) and mean amount of maternal time (minutes/day) feeding children by age of child and child's breastfeeding status

Age of Child and Breastfeeding Status	Daily Energy Intake		FAO/WHO/UNU Energy Requirement (1985) (kilocalories/day)
	Mean ± s.d.	N	
18 to 20 months			1150
Breastfeeding	865.5 ± 367.1	83	
Not breastfeeding	1068.3 ± 390.4	59	
T statistic	3.16**		
21 to 23 months			1150
Breastfeeding	1011.1 ± 457.7	29	
Not breastfeeding	1170.9 ± 440.1	110	
T statistic	1.72		
24 to 26 months			1350
Breastfeeding	1326.2 ± 445.0	8	
Not breastfeeding	1252.3 ± 443.8	124	
T statistic	-0.46		
27 to 29 months			1350
Breastfeeding	1165.0 ± 239.0	2	
Not breastfeeding	1173.6 ± 359.8	121	
T statistic	0.03		

**$p<0.01$

Table 5 Determinants of children's daily dietary energy intake (kilocalories/day) by age

Explanatory Variable	18 to 23 months		24 to 29 months	
	β	s.e.	β	s.e.
Frequency of feeding	27.54*	13.46	1.41	7.84
Material assets (1=low to 3=high)	106.28	60.50	-78.26	46.23
Father's education	8.68	12.20	5.11	7.71
Mother's education	-12.49	17.62	38.41*	15.56
Breastfeeding flag (0=none to 1=all)	-363.91***	101.32	-117.07	229.03
Age group (1=older 3 months)	3.50	60.67	-88.64*	42.69
Intercept	900.41****		1315.07****	
F	4.01		3.23	
Adjusted R^2	0.13		0.06	
n	122		212	

*p<0.05; **p<0.01; ***p<0.001; ****p<0.0001