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**ECONOMIC CONSIDERATIONS IN THE HSPF/P:
DRUG COSTS AND EXPENDITURES**

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LIST OF FOREIGN WORDS

puskesmas	Pusat Kesehatan Masyarakat (community health center)
posyandu	Pos Pelayanan Terpadu (community center for integrated health services)
kabupaten	Rural Regency

LIST OF ACRONYMS

ARI	Acute Respiratory Infections
ASKES	Asuransi Kesehatan -- National Health Scheme for Civil Servants
CCS	Center for Child Survival
CDC	Centers for Disease Control
CDD	Control of Diarrheal Disease
CHIPPS	Comprehensive Health Improvement Project -- Province Specific (AID-funded health project.)
CMR	Child Mortality Rate
CSP-1.CSP-2	Child Survival Pharmaceutical Studies 1 and 2
DMS	Drug Management Study
DOH	Department of Health
DUS	Drug Use Study
FA	Focussed Assessment
GOI	Government of Indonesia
HSFP-PC	Health Sector Financing Project Pharmaceutical Component
IDEM	Drug Estimation Model
IMR	Infant Mortality Rate
INPRES	Special Presidential Program
ISTI	International Science and Technology Institute, Inc.
KAP	Knowledge, Attitudes and Practices Study
MCH	Mother Child Health
MPS	Manpower Study
MSH	Management Sciences for Health

ORS	Oral Rehydration Salts
POM	Directorate of Food and Drugs
SMS	Social Marketing Study
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

The consultant examined cost and expenditure issues related to the Health Sector Financing Project Pharmaceutical Component (HSFP-PC), and met with the Department of Health (DOH), project staff and consultants, the United States Agency for International Development (USAID) personnel and other project consultants. The visit served to provoke several useful discussions which helped clarify some difficult issues.

This report presents the consultant's findings on some of the more concrete economic issues, as well as recommendations about the direction in which the project should proceed.

The HSFP-PC has evolved into a component with extremely difficult and complex objectives. The Focused Assessment (FA) confirmed previous information regarding inefficiencies in the public pharmaceutical sector, but fell short of providing all the information needed to design interventions. In order to achieve the project goals by 1992, the remaining the Knowledge, Attitudes and Practices (KAP) study should be regarded as an operational research tool, designed to help these interventions, rather than a rigorous scientific inquiry.

The Drug Use Survey (DUS) confirms the validity of the proposals for cost-savings and reallocations put forward in Child Survival Pharmaceutical studies 1 and 2 (CSP-1 and CSP-2). National estimates for savings on key intervention diseases suggest that significant cost savings will be possible if standard treatments are adopted.

An approach to monitoring changes in expenditure for key indicator drugs during the intervention phase is described. This will require that HSFP-PC staff are trained in the use of the RX system and that software and data are procured. The same also applies to the DEM computer package, and to Logistic for supply management.

It is essential that representatives from the DOH diarrheal disease and respiratory disease programs be brought back into consultative roles, and involved directly in planning the KAP study.

I. INTRODUCTION

The consultant was given two assignments to carry out during the short time spent with the USAID/Government of Indonesia (GOI), Health Sector Financing Project's Pharmaceutical Component. The first involved carrying out the tasks described in the Scope of Work which included:

- Reviewing existing data from the Drug Management Study (DMS), Manpower Study (MPS), and Drug Use Study (DUS), and identifying data on expenditures related to drug planning, selection, procurement, distribution and use;
- Analyzing DMS, MPS, and DUS findings on drug cost and requirements by comparing current patterns of use with estimated need (based on standards of treatment); and
- Assisting in the development of evaluation criteria and an evaluation plan for measurement of expenditures for the different therapeutic categories of drugs; internal reallocative shifts within the budget; and changes in expenditures for child survival related pharmaceuticals.

The second was to assist in the integrated analysis of the above Focussed Assessment (FA), and help plan the forthcoming KAP study for assessing needed behavioral changes.

The International Science and Technology Institute's (ISTI's) local project managers suggested that the consultant look at the project with no pre-conceived ideas and opinions and propose ways in which the project could be monitored and ways in which its goals could be accomplished within the remaining time period.

The consultant has taken advantage of this mandate to include some frank observations in this report, in the hope that they are not offensive to anyone, now or previously involved in the project, and with the sole intent of providing guidance for the project.

II. AN OVERVIEW OF THE HSFP-PC

Originally conceived on rather simple lines and with clear-cut objectives, the HSFP Pharmaceutical component has evolved into one of a highly complex nature. Documents available in English, which trace the origins and evolution of this project are very informative.

The problems related to inefficient management and use of drugs in the public sector in Indonesia was recognized during the Comprehensive Health Improvement Project -- Province Specific (CHIPPS). The economic dimensions were clarified to a large degree in the work by Management Sciences for Health (MSH), and summarized in the first report on Child Survival Pharmaceutical (CSP-1) of 1987, which compared government drug expenditures, in seven provinces, to the needs based on known morbidity patterns for under-five's and standard drug treatments. MSH concluded that the actual drug budget of 27.9 billion Rupiah in 1984 - 1985 was only about 1 billion more than what was needed if standard therapies were used, but expenditure for certain other categories such as antibiotics, analgesics/antipyretics, antitussive and injectables, was very high, and the pattern of drug procurement indicated *inter alia* that too little money was being spent on essential "child survival" drugs. Because of the mismatch between the rates and causes of child mortality, and the percent of money spent on essential child survival drugs, it was claimed that up to two-thirds of infant and child deaths could be averted with effectively delivered pharmaceutical therapies, with the implication that improved economic efficiency in the pharmaceutical sector could help make the needed treatment available.

MSH then analyzed prescription of drugs for children and adults at primary health centers in two provinces and described in the 1988 CSP-2 report that the procurement patterns found in CSP-1 were a reflection of the prescribing patterns, with doctors, nurses, and paramedics all prescribing many more antibiotics, antitussive, analgesics, and injections than required by standard treatments. It is likely that preliminary results of CSP-2 were known when the HSFP Project was being designed. It is worthwhile quoting the 1988 USAID Project Paper:

"The third output [of HSFP] will be improved efficiency in the procurement, distribution, and use of pharmaceuticals, making more resources available for essential drugs which affect child survival.

"A focused assessment of the pharmaceutical sector will be conducted to identify problems impeding the efficient use of the present pharmaceutical budget. Data from the assessment will be used to formulate and test management, training, and communications interventions for more rational drug use. A comprehensive group of interventions will be demonstrated in a representative sample of districts, and evaluated for their impact upon prescribing patterns, internal allocative shifts within the pharmaceutical budget, and magnitude of expenditures on pharmaceutical which directly support child survival programs." ¹

¹ Executive Summary p.2

These two brief paragraphs gave the HSFP-PC the primary task of increasing the proportion of public sector funds available for child survival drugs, and was instructed to accomplish this task by performing operational research and interventions in areas which included drug supply management, rational prescribing and use of drugs, use of the media to communicate messages about rational drug use and other child survival-related concerns, and on technical aspects of drug therapy for priority child survival problems.

Conceivably this wide range of activities was not the intent of the project planners. Indeed, the financial savings foreseen in the Project Paper, for successful implementation of the pharmaceutical component are modest, in the order of Rps. 2-4 billion per year, or less than US\$ 0.01 per capita. This amount was evidently an extrapolation from total public sector drug expenditure of Rps. 109 billion from the CSP-1 estimate of savings of Rps. 1.7 billion per year on the seven-province expenditure of Rps. 29.0 billion. Nor do the project objectives specify any child survival objectives such as reductions in Infant Mortality Rate (IMR) and Child Mortality Rate (CMR), other than an increase of 10 percent per year in spending on child survival, but only state that the project is in support of the health and population goals of the current five-year plan.

There are good reasons for including a technically complex component with such low returns alongside other project components having far higher rates of return. One reason may be the intense levels of research into rational drug use in Indonesia by earlier USAID projects. Another may be the promulgation of the policy (formulated in 1988 by World Health Organization's (WHO) Drug Action Programme), of making all possible efforts to improve the cost-efficiency of the public sector before considering any type of cost-recovery system for health care. Since drugs and medical supplies are usually the largest health budget component after salaries, (these comprise 32 percent of the hospitals' budget in Indonesia), it is logical to concentrate on improving efficiency through more rational selection of drugs and better quantification of needs, procurement, prescribing, and compliance.

Whatever the reasons, the HSFP-PC has been given several immense tasks, any one of which would severely tax the abilities of any project blessed with the most generous resources and the best available technical assistance. This project has largely had technical guidance since it was originally designed by a series of consultants, some who have recognized the opportunities of learning more about fundamental issues in rational drug use and suggested rigorous research agendas for the assessment and intervention phases of the HSFP-PC. It would indeed be a great benefit and not just for Indonesia, if all the questions raised about changing prescribing patterns, the relationship between prescribing, drug cost and drug supply, patients' demands and cultural preferences, etc., could be answered through this project. However, it does not appear that this can be done with the time, money and research expertise available in order for any action-oriented interventions to be piloted and evaluated by 1992.

This has been recognized and the focus of the research has already been narrowed, making the tasks more reasonable: the scope of the interventions will be limited to *puskesmas* and Class C and D hospital outpatients. Further, the supply and use of certain important child

survival pharmaceuticals such as iron folate and vitamins fall outside the direct scope of the project, and the ability of the HSFP-PC to affect expenditures on vaccines may be limited to those supplied through the Special Presidential Program (INPRES) budget. Well-child (Mother Child Health (MCH) visits, and *posyandu* visits will not be affected. It has been decided to concentrate on effecting reallocations only within the INPRES and Asuransi Kesehatan (ASKES) budgets which comprise about 70 percent of the total drug budget. Finally, the emphasis of the project interventions is to be on priority interventions of Acute Respiratory Infections (ARI), diarrhea, and skin diseases (possibly parasitic diseases).

III. THE FOCUSED ASSESSMENT AND INTEGRATED ANALYSIS

No fewer than four reports (Quick, Gipson, Bates et al, and Ross-Degnan), on the Focused Assessment (FA) were given to the project between the commencement of the project component and the present time. Some of these have emphasized the importance of not rushing into the formulation and testing of interventions until the FA has been thoroughly analyzed and the results absorbed and discussed by the HSFP-PC Consensus Group. An idealized intervention process has been suggested by Ross-Degnan, in which several possible interventions for a given type of problem are pilot tested on a small scale, and the ones found to have the greatest impact incorporated into the long-term intervention trial package. The impact of this set of intervention packages would be compared to control areas, the ultimate goal being to recommend cost-effective intervention packages for national implementation.

This approach, while probably not feasible given the constraints on the HSFP-PC, should be kept in mind as an ideal because of its scientific rigor. But it is unlikely that there will be opportunities to pre-test interventions, therefore, the pre-test phase will probably have to be replaced by information from the completed Integrated Analysis, combined with expert judgement and experience.

A. What the Focused Assessments Tell Us About Expenditures

1. Drug Planning

The Drug Management Study (DMS) has identified as a problem the time lag between calculating for procurement and actual delivery of the procured supplies. If requirements are growing at a rate of 10 percent each year for instance, and the year's supply of drugs are delivered eight months after the start of the fiscal year, the amounts delivered are in fact short of the current requirements by two-thirds of 10 percent. This means that if the lag cannot be reduced, the required increase should be anticipated in the budget of the prior fiscal year.

The INPRES and ASKES budgets are always constant amounts per capita, presently 478 and 700 Rps. respectively. Any variation between districts in the total per capita drug budget is a function of other, smaller, budget sources (ABPD, ABPN). The degree to which actual supply varies between districts in terms of adequacy of vital drugs was not determined. Focus group discussions in the DUS provide much anecdotal evidence that essential drugs are often out of stock at some *puskesmas*. This suggests a strong need to introduce a better system of estimating requirements, at least for the vital life-saving drugs, based on the morbidity patterns of the *kabupaten*.

2. Drug Selection

Although no actual studies covering this area have been carried out, it appears that a number of items on the INPRES Essential Drug List are never supplied to *puskesmas*, and some of the items supplied are considered obsolete. A WHO evaluation of the drug program carried out in 1989 recommended reduction of the number of *puskesmas* drugs to

between 60 and 80 (this does not seem to be based on a rigorous analysis). This would reduce administrative costs and reduce training needs. At a minimum, the list should be reviewed and any obsolete items eliminated.

3. Drug Procurement

An important issue was raised during discussions with the DMS consultant regarding the feasibility of shifting funds between the several budget sources. If savings in INPRES drugs are realized, could these savings be transferred to Control of Diarrheal Diseases (CDD), for example, to increase procurement of Oral Rehydration Salts (ORS)? A second point concerns costs of drug supplies which are not accounted for at all, and which should be affected by HSFP-PC interventions. Improved planning, procurement and distribution should result in decreased wastage of drugs, and lower inventory costs (although these are apparently not taken into consideration). Note that all public sector procurement is, whenever possible, by generic name.

4. Drug Distribution

Drug distribution to *puskesmas* is generally a problem only in provinces where transport is difficult or costly. In most of these provinces, drugs are distributed at the *kabupaten* level only once a year. Costs are high because of the distance from Jakarta, and when air transport is used within the province. It has been suggested that local drug producers should be given a chance to compete for supply of INPRES and ASKES drugs to these remote areas, since lower distribution costs might make the net price cheaper.

5. Drug Use

The DUS largely confirms the CSP-2 findings on prescribing methods in *puskesmas*, and adds new information about drug use in hospitals. Using actual prescription data from the DUS, it was possible to recalculate the cost comparisons between actual use and standard treatments for diarrhea and ARI. The actual observed costs per case of treating these two problems were (for cases where only a single diagnosis was made):

	Puskesmas	C Hospitals	D Hospitals
Diarrhea(all ages combined)	513 Rupiah	1999	1276
ARI (all ages and severity)	563 Rupiah	2174	1129

IV. COSTS OF ACTUAL AND STANDARD TREATMENT

The standard treatment costs were problematic to calculate because of different assumptions and uncertainty regarding drug cost data. Clearly these should be sorted out so that objective comparisons can be made, and it cannot be recommended strongly enough that representatives from the diarrheal and respiratory diseases divisions be brought into this discussion as promptly as possible.

Calculated standard treatment costs for diarrhea (average all ages) ranged widely. Using the standard treatment from CSP-1 and present drug cost yields an average cost per case of Rps. 972 was calculated. The standard treatment of Irian Jaya, where 20 or 30 ORS packets are given per child and adult respectively, because of the difficulty in accessing to the *puskesmas*, results in an average cost of Rps. 3,735 per case, while recalculating the CSP-1 standard treatment with the current unit cost for ORS of Rps. 61 instead of Rps. 130 used in CSP-1 and CSP-2, yields a treatment cost per case of Rps. 700 per case.

For ARI, standard treatment costs were calculated using different assumptions about the prevalence of mild, moderate, and severe cases of infection, using drug cost and treatment data from CSP-1. Using the distribution observed in the DUS results in an average cost per case of Rps. 228 but if the distribution expected by Centers for Disease Control (CDC) diagnostic standards is used, the average cost increases to Rps. 311. This is useful to know, since it foresees that costs will rise somewhat as diagnostic accuracy improves. The effect of using a different standard treatment for comparison was noted when the Irian Jaya protocol was costed, at only Rps. 181. Finally, the current database on standard treatments uses a higher cost and a higher dose of oral penicillin than CSP-1 for moderate ARI, resulting in average treatment costs of Rps. 332 (vs. Rps. 228 for the observed distribution) and Rps. 480 (vs. Rps. 311 for CDC distribution). Note also that current treatment costs for many diseases may be on the rise due to a trend to prescribe ampicillin in place of tetracycline.

The intention was to use this type of data to estimate cost savings which would result from various stages of implementation of standard treatment protocols for ARI and diarrhea, as was done in CSP-1 and CSP-2. Using existing data as conservatively as possible, and making allowances for presumptive treatments for parasites or anaemia which are taken into consideration in the DUS observations, it is estimated that standard treatments for diarrhea cost Rps. 450 per case more than present treatments at *puskesmas*, Rps. 250 less at Class D hospitals, and Rps. 1050 less at Class C hospitals. ARI standard treatments cost Rps. 200 less at *puskesmas*, Rps. 650 less at Class D hospitals, and Rps. 1,650 less at Class C hospitals. The results for *puskesmas* are comparable to those given in CSP-2.

Unfortunately, data on the relative number of cases seen at hospitals and *puskesmas* was not available during this consultancy, so it is not possible to calculate the expected total saving from instituting standard treatments for these two problems. CSP-1 cites the figure of 0.43 pharmaceutical-prescribing visits to health units per person, per year in the seven provinces studied. Since data in CSP-1 was based on regency aggregate drug orders, it is assumed that a health unit includes hospitals as well as *puskesmas*. This extrapolates to 75 million visits per year in Indonesia. From the DUS, ARI cases seen comprise 161.4, 321.8,

and 239.9 cases per thousand at Class C hospitals, Class D hospitals, and puskesmas, respectively. The corresponding rates for diarrhea are 53.3, 76.3, and 72.3. Somewhat arbitrarily assuming that these health units see 5 percent, 10 percent, and 75 percent respectively of all health unit visits, it allows calculation of cost savings if standard treatments were implemented at 100 percent nationally:

Class Facility	<u>Total Visits</u>	<u>ARI cases</u>	<u>Diarrhea cases</u>	'000's Rps change-ARI	'000's Rps change-Diar	'000 Rps Total Change
Class C	3,750,000	605,250	286,125	- 998,662	-281,531	-1,280,193
Class D	7,500,000	2,413,500	572,250	-1,568,775	-143,062	-1,711,837
Puskesmas	56,250,000	13,494,375	4,066,875	-2,698,875	+ 1,830,093	-868,782
Total	67,000,000	16,513,125	4,925,250	-5,266,312	+ 1,405,500	-3,860,812

The assumptions and approximations used here are numerous, but serve to indicate that it is possible to make calculations of this type. The possibility of large cost savings in Class C and D hospitals needs to be confirmed by a larger sample of prescriptions since the actual costs are based on a very small sample.

V. TARGET COST SAVINGS OR REALLOCATION?

At this point it should be clear that the Project Paper's target cost savings of Rps. 2-4 billion per year for the HSFP-PC was based on an extremely rough estimate. A careful reading of the approach used in CSP-1 to estimate the potential savings in the seven provinces, shows that the estimated cost of pharmaceuticals based on the morbidity figures depends largely on adjustments for multiple diagnoses and unmeasured stock losses. As demonstrated, both actual and projected treatment costs are also subject to the selection of diseases for which standard treatments are to be implemented, since some (e.g., diarrhea), result in increased expenditure over present costs, as well as errors in the unit costs and standard treatment protocols. The net savings is thus the difference between two figures, each of which contains a large error, and is highly sensitive to even small misestimates of unknowns. All this means is that the actual change in the drug budget resulting from successful interventions could be a much larger saving than Rps. 2 to 4 billion, or could just as easily be an increase by a similar amount. This issue is further confounded by the fact that one drug (kanamycin injection) which accounted for nearly one billion Rps., 3.1 percent of drug costs in CSP-1 and 2.3 percent of drug costs in CSP-2, has been totally eliminated and does not appear in the DUS (perhaps partially accounting for the drop in injections given to over-five's from 54 percent in CSP-2 to 45 percent in DUS). The interventions by the HSFP-PC will directly affect only Class D hospitals and *puskesmas*. The proportion of the Rps. 109 billion total public sector drug budget actually spent by these divisions however, could not be ascertained. The hospitals component of the HSFP will also be implementing pharmaceutical reforms using the same principles.

The consultant participated in a discussion about the distinction between real cost savings and shifting or reallocation of the drug budget to child survival pharmaceuticals. According to the proposed way of defining reallocations, any increase in spending on child survival drugs such as ORS or vaccines is to be considered a positive allocation. Thus, even if no real total savings resulted from the change to standard treatments, there would certainly be a sizable reallocation, but counting the reduction in "irrational" drug spending as a reallocation does not seem legitimate. This approach is illustrated by the example of diarrhea cases (the numbers used are rough approximations):

<u>Drug Prescribed</u>	<u>Per case Cost (present)</u>	<u>Per case Cost (standard)</u>	<u>Per case Real Saving</u>	<u>Per case Reallocation</u>
ORS	100 Rps.	600 Rps.	-500 Rps.	+500 Rps.
Ringer's lact.	25	100	- 75	+ 75
Antibiotics	300	0	+300	0
Antidiarrheals	75	0	+ 75	0
Total	<u>500 Rps.</u>	<u>700 Rps.</u>	<u>-200 Rps.</u>	<u>+575 Rps.</u>

VI. WHAT ASSESSMENT QUESTIONS REMAIN UNANSWERED?

The DUS has supplied new information on the localities in which the HSFP-PC interventions will be implemented, and also on hospital drug use, but some of the data are incomplete. Some of the questions now raised are:

- The average cost per case for prescribed drugs is much higher at both C and D hospitals than at *puskesmas*. This may be explained by the use of different and more expensive drugs at C hospitals, but D hospitals use nearly as high a percentage of INPRES drugs for their outpatients as do *puskesmas*. What morbidity and prescribing patterns are responsible for this? This is a question which could well be investigated by the HSFP Hospital component.
- The drug cost data used is based on the drugs that were prescribed, not those actually received by the patient. Given that some commonly prescribed drugs are out of stock some times, it is important to know what percent of drugs prescribed, are purchased elsewhere by the patient. This could be a topic of the KAP. It has been proposed in connection with a recent study on drug pricing for cost recovery in Indonesia (Litvack, Quick, and Shepard, 1988) that higher markups could be charged for non-essential treatments, including injections, which patients continue to demand. This may not be desirable from the viewpoint of promoting rational drug use, but it would be useful to know if willingness to pay is indicated by purchases from pharmacies of these drugs.

This information will be of use in making important corrections to the DUS cost data, and also in formulating policies about selection of drugs.

- The three-day rule for prescribing seems to be followed in most health facilities. This may have no adverse therapeutic effect if patients actually come back for further examination and more drugs, (it has been suggested that this is a way to increase the revenues earned and retained at the *puskesmas*, since patients pay a fee per visit, 25 percent of which is retained locally), but there is no conclusive information on the rate of return visits.
- CSP-2 recommended that an analysis be carried out on the relationship between prescribing practices and stock levels, since it is possible that improvements in supply with no change in prescribing could contribute to increased polypharmacy. The question of whether stock levels influence prescribing may also be important from the point of view of costs, but there is little information available. From a quick analysis of stock data from one *puskesmas*, there is a hint that as the stock of some vital drug runs low, less of the drug is consumed, as if to conserve some for serious cases. It would be useful to know if in this case the prescriber writes fewer prescriptions, or a decision is taken by the dispenser not to issue the drug, and also what other factors may be at play.

VII. THE KAP STUDY

While the absence of much desirable data from the FA studies would add weight to using a rigorous idealized two-stage intervention approach, it is difficult to see how this could be done in the time remaining in the project contract. The challenge now should be to move quickly into the intervention/evaluation phase of the project, but at the same time exercising care to select interventions using the criteria of probable cost-effectiveness, relevance to project goals, and feasibility in terms of resources needed to implement and evaluate the intervention.

All but one of the FA studies have now been carried out. While they have succeeded in identifying some important problems of drug management and use, they have also raised questions about structural and behavioral causes. The cancelled Social Marketing Study (SMS) might have answered some of these questions, as the focus groups incorporated in DUS do. However, it is fortunate that these studies were not done simultaneously, since the issues raised by the DUS and SMS might not otherwise have been investigated through the KAP studies.

Without further insight into the causes of the impediments to efficient drug use, there is little basis on how to decide which interventions (out of many possible ones, few of them are simple or cheap) should be tested. Only the KAP study remains to be done, so it is of vital importance to design this study in a way that will ask the right questions and get answers will guide the final choice. This is probably the last opportunity to compensate for a certain lack of conceptual clarity which has crept into the design and implementation of some of the other focussed assessments.

As stated clearly by Ross-Degnan in Consultant Report No. 27, the goal of the behavioral study will be to identify the relative importance of factors which contribute to a specific problem, and to suggest which factors are most likely to be changed by interventions of the type HSFP-PC can mount. This will best be done, however, if the KAP studies are oriented toward depth rather than breadth -- that is to partially replace the first stage of the idealized intervention process by asking specific questions designed to answer: "What type of intervention is likely to have the greatest impact on this specific problem?"

Apart from baseline data on the actual prescribing patterns in the intervention areas, the KAP study should not be expected to provide quantitative results. In principle, studies could be designed to provide data for example, to calculate the coefficients of a simple multivariate model of prescriber behavior. This approach would assure most critics that a sound basis had been used for prioritizing interventions affecting irrational prescribing. But even a study of this magnitude would be beyond the scope and capacity of the HSFP-PC. Quantitative answers may still be required for some questions asked in the KAP studies, but may be important mainly to lend weight to conclusions drawn from qualitative methods such as in-depth interviews with patients and providers.

Other consultants' warnings not to rush into the selection of interventions notwithstanding, the Integrated Analysis is unlikely to provide a complete picture of drug management, manpower needs, and drug use, so it does not seem too bold to suggest that the design of

the KAP study be guided by working backwards from a possible model of an intervention plan. The details of such a model should be discussed as soon as possible in order to provide guidance to the Center for Child Survival (CCS) group which will be implementing the KAP studies. In essence, three intervention packages, in the major areas of drug supply management, rational prescribing and use and communication of drug use and child survival messages to the public will be tested. Alternative components of the intervention packages could be evaluated in small-scale trials during the latter part of the KAP study period. Since it will be impossible to achieve the desired prescribing impact in the brief intervention period, another useful outcome of the KAP studies would be an approach to establishing targets for intervention impacts.

Once such a basic plan is adopted, a list of possible interventions can be made. Using the results of the DUS and the DMS, and a "longlist" such as the examples given in Report 27, Table 1, a "shortlist" of remaining problems can be drawn up by the Consensus Committee. For example, selecting only one under "Interventions to improve drug management", many questions will arise in connection with an intervention to train dispensers in stock management and quality control. First, did the DMS or MPS suggest that there were deficiencies? Could these be due to behavioral factors such as the dispensers being unaware of the need to dispense a full course of drugs? What if anything does the dispensers' job description say about these functions? Are dispensers aware of the dangers of sub-therapeutic courses of treatment?

VIII. TRACKING AND EVALUATING COSTS AND EXPENDITURES

The tracking and evaluation methodology to be employed should be kept as simple as possible, and should be directly related to the intervention being evaluated. The indicators to be used cannot be specified until the interventions are designed. For example, one set of interventions likely to be tried: training to improve diagnostic skills for ARI, training of prescribers in standard treatments for the different types or levels of severity of ARI, and training of dispensers to dispense and instruct the patient in the importance of taking the full course of treatment. This set of interventions will have intermediate process outputs, such as higher percent of correct diagnoses, higher proportion of prescriptions using standard treatments and higher proportion of patients instructed in correct drug use. The intervention will have an impact on the amounts of different drugs dispensed at *puskesmas*, and an ultimate impact on the cost of drugs used to treat ARI.

The final output of the HSFP-PC is a shift in expenditure away from certain therapeutic categories which are now procured in quantities significantly in excess of need, as calculated by the morbidity method (antibiotics, especially those with few indications, injectable, antitussive, antidiarrheals, analgesics and antipyretics), and towards categories considered more cost-effective (penicillin tablets) and comprising better treatment for the important MCH/child survival problems (ORS, Ringer's lactate, ARI antibiotics). It may not be practical to use as indicators the amounts of Vitamin A, iron supplement and vaccines procured, since these are generally supplied to *puskesmas* through budgetary sources, which may not be under the influence of the same planning/procurement system.

There are two possible approaches to monitoring the impact of the interventions: by measuring drug use, and by measuring expenditures. If it were necessary to choose only one, it would be better to monitor drug use routinely and then calculate the change in expenditures at wider intervals or just at the end of the intervention period. Fortunately this choice should not be necessary since RX provides cost data with little extra effort. The computer program RX would be very suitable as a tracking and evaluation tool. As used in the DUS, it would require paper input from the health units, prescriptions, patient and diagnosis data and procurement cost data from the central level, in return it would produce outputs by *puskesmas*, *kabupaten*, or other aggregated unit:

- Sample characteristics, prescription pattern and morbidity pattern;
- Cost and pattern of treatment;
- Prescribing for common problems;
- Prescribing for individual drugs; and
- Comparison between provider types.

What RX cannot easily do is quantify the number of prescriptions which use a defined standard treatment. A simple Dbase program could be written up to do this for the key diseases, or manual counts can be done from a printout.

A practical alternative is to use selected prescription items as a proxy for the standard treatment. For example, since it is known from the DUS and CSP-2 that about 80 percent of diarrhea and ARI cases receive one or more injections, which are not indicated in standard treatment for any (single-diagnosis) diarrhea cases and for at least 80 percent of ARI cases, and since these two problems comprise a majority of under-five and nearly half of over five presentations, the rate of injections for these two disease categories is a sensitive indicator.

Other proxies for adherence to standard treatment which reflect adverse findings in CSP-2 and the DUS, and would provide useful cost data are:

- Percent of <5, >5 diarrhea cases for which a given number of ORS packets is prescribed;
- Percent of <5, >5 diarrhea cases for which Ringer's lactate is prescribed;
- Percent of skin cases receiving any antibiotic;
- Percent of diarrhea/skin/eye cases for which more than one antibiotic is given;
- Percent of skin cases receiving an injection;
- Percent of any <5 case receiving tetracycline injection;
- Average number of days oral antibiotics prescribed; and
- Percent of prescriptions of oral penicillin versus tetracycline versus ampicillin.

Note that there is no correlation between the cost per case and the number of injections given. This should be confirmed with the DUS results.

In addition to this type of indicator, overall prescribing profiles can readily be compared by the use of graphs generated from RX data which show the percent of different therapeutic classes used in the treatment of the key diseases.

The computer-based Drug Estimation Model (IDEM) used for CSP-1 to track drug orders would be a useful companion to RX for evaluation and tracking. The IDEM provides a convenient way to keeping track of standard treatments, including their costs, and also provides data on actual drug orders from the intervention areas. In any case, IDEM is an important tool for the Directorate of Food and Drugs (POM) to possess. The use of the computer program Logistic has also been proposed as part of the drug supply management intervention and as a monitoring tool. A possible indicator for assessing management impact would be the frequency with which key child survival drugs and other important items are out of stock. HSFP-PC staff will need to be trained in all three programs by the time the pilot interventions are started.

Making use of RX, however, requires the rather time-consuming recording, entering, and checking of prescription data. The sample size required by the intervention design will determine whether it is reasonable to have RX audits at intermediate points in the intervention, or if manual audits of prescription records at *puskesmas* should be done.