DEPARTMENTAL AUDIT OF MALARIA CONTROL PROGRAMME 2001–2005 NORTH WEST FRONTIER PROVINCE (NWFP)

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Background: Pakistan adopted the malaria control strategy with provincial commitment in 1998. Pakistan joined the roll back malaria (RBM) initiative in 2001. This led to development of a 5 year roll back malaria strategy. the aim of the paper is to audit whether the malaria control programme in NWFP was able to implement strategies suggested by RBM initiative in the year 2002–2005, and its subsequent effect on the number of cases of malaria confirmed by peripheral blood smear/slide (confirmed cases), confirmed cases of plasmodium Falciparum (P. Falciparum) and annual parasite incidence (API). **Methods:** data was obtained from the malaria control programme (MCP), directorate general health services, Peshawar. We examined budget allocation and its breakdown for financial years 2002–2005 and standard surveillance proformae (data sheets) containing summated data. Data had been totalled from all first level care public health facilities (outpatient facilities) in 24 districts for 2001–2005. This was further totalled by the malaria control programme to give annual figures for the entire province. the data from the province contained information on, the total no of slides examined by active case detection, (ACD) passive case detection, (PCD) cases of malaria confirmed by peripheral blood slide examination, total number of cases of plasmodium Falciparum (API) confirmed by peripheral blood slide examination and annual parasite incidence (API) for 2001–2005. **Results:** budget allocation fell from rupees 5.043 million in 2002 to rupees 3.3 million in 2005. In 2002 malaria control programme purchased 400,000 blood lancets and 437 kg more insecticide than the consecutive years, but all other items purchased were the same. By the end of 2005, 925 medical officers and 67 microscopists had been trained in case management and diagnostic techniques (according to who guidelines) in 16 districts of NWFP in a phased manner. Budget for training was not allocated from the provincial malaria control programme. The total number of slides examined in 2005 was 62% more than 2001. the number of slides collected by active case detection increased by 68% and passive case detection increased by 55.7% from 2001 to 2005. Total number of malaria cases confirmed by peripheral blood smear peaked in 2002 and 2003 and then fell in 2004. In 2005, the number of malaria cases confirmed by peripheral blood smears were similar to those reported in 2001. Annual parasite incidence (API) peaked in 2002 and 2003 to 3.01 and 3.57 per 1000 respectively, it fell in 2004 and in 2005. API was reported to be 2.01 per 1000 in 2005, this was double the rate reported in 2001, i.e., 1.09 per 1000. The confirmed cases of plasmodium Faliciparum peaked in 2002 and 2003, the number of cases decreased in 2004, and by 2005, the number of cases reported were similar to 2001. **Conclusion:** NWFP was committed to roll back malaria initiative but it appears that it was unable to implement the strategy, because of the lack of a parallel commitment in resources. Although annual figures illustrate activity in the malaria control programme, inferences have not been drawn from the data. There is no evidence to suggest that information is disseminated or any feedback is given to the districts and the first level health care facilities. The malaria control programme does not appear to have capacity or resources to change policy or implement change based on evidence depicted by the data.

Keywords: Plasmodium Falciparum, Plasmodium vivax, Epidemiology, Prevalence, Pakistan, WHO guidelines.

INTRODUCTION

Malaria control was initiated in Pakistan in 1950[1]. this passed through several evolutionary stages. in 1960 it started as the malaria eradication programme, but due to the resurgence in the seventies the programme strategy turned from "eradication" to "control"[2]. in 1975 malaria control programme was decentralized and integrated with primary healthcare infrastructure[3]. the north west frontier province (NWFP) consists of 24 districts, the capital of which is Peshawar. the total population of all the districts is 17.744 million with annual growth rate of 2.82% (census of Pakistan 1998).

Malaria remains a public health problem in all district of NWFP; but 2 geographical clusters have been identified as high risk.[2] the parameters for high risk are based on number of slides confirmed by peripheral blood smear, annual parasite incidence (API) and number of cases of plasmodium Falciparum. these districts comprise of Kohat, Lakki Marwat, Bannu,

Tank, Dera Ismail Khan on the south west of NWFP, and on northeast of NWFP are Malakand, Buner, Shangla, and dir. since the merger of malaria control programme with department of health (provincial) the execution and implementation of the programme in the districts was delegated to the executive district health officers in the settled areas and agency surgeons in tribal areas. as a result of the merger, the provincial malaria control programme operates from a single room, shares staff and infrastructure with other public health programmes of the directorate general health services. in the process of downsizing and devolution to the districts, the provincial programme lost the entomologist, and the malaria supervisor was declared as a dying cadre. The loss of the entomologist threatened technical support for vector control and the absence of a malaria supervisor at district level threatened ownership of the programme in the district. the 5 years rbm strategy entailed the following components:

1. Strengthening existing surveillance system, early case detection correct treatment and timely treatment of all malaria cases.
2. Strengthening of provincial and peripheral laboratories and enhancing passive case detection at all rural health outlets.
3. Perform active case detection where appropriate.
4. Ensure availability of adequate and trained staff & sufficient drugs.
5. Effective monitoring, supervision and evaluation.
6. capacity building by strengthening research and training component WHO issued guidance for roll back malaria standared (table1)

MATERIAL AND METHODS

Parameters for Roll Back Malaria. Standards obtained from WHO were compared to data which was obtained from the malaria control programme, directorate general health services, Peshawar (Table 1). we examined budget allocation and its breakdown for financial year* 2002-2005 and standard surveillance proformae (data sheets) containing summated data. (Data had been totalled) from all first level care public health facilities (outpatient facilities) in 24 districts for 2001-2005. Data from the 24 district was further totalled by the malaria control programme to give annual figures for the entire province. the data from the province contained information on, the total number of slides examined by active case detection (blood specimen are collected in the community) passive case detection (slides are taken from patient at the first level care health facility), case of malaria confirmed by blood slide examination, total number of confirmed cases of plasmodium Falciparum and annual parasite incidence (API) for 2001-2005.

Table-1: Roll Back Malaria Standards

Therapy/treatment	Diagnosis	Active Surveillance	Purchase and distribution of impregnated bed nets (ITN)	integrated vector management (IVM)
Monotherapy should be replaced by antimalria combination therapy (ACT)	The diagnostic component of the programme in all the districts should be strengthened reference laboratories should be established in the district	• Peripheral blood slides of at least 10% of the population of the district should be examined. • Annual parasite incidence, • Slide positivity rate of vivax and falciparium, No. of Households with one bed nets (atleast) proportion of children under 5 sleeping under ITN. • Proportion of pregnant women sleeping under ITN. • Number of Primary health Care Facilities out of stock of drugs in the last three weeks. • Number of /outbreaks controlled within two weeks.	• There should be at least one ITN per household in “high risk districts”	• Impregnated bed nets + residual insecticide spray (RIS) + antilarvicidal measure. • (ITN+RIS+a antilarvicidal)

Source: provincial malaria control programme: world health organization (who) guidelines

RESULTS

In 2002, 400,000 blood lancets and 437 kg more insecticide were purchased than the consecutive years All other items purchased were identical from 2002–2005(Table-2) Budget allocation fell from initial Rs. 5.043 Million to Rs. 3.066 Million by 2005. (Table-2a). Training component of RBM began in 2002 and by 2005 training had been imparted in 16 districts (Table-3). The total number of slides examined per year increased from 474,081 in 2001 to 761,1130 in 2005. The total number of malaria cases confirmed by peripheral blood slides peaked to 11,821 and 10,274 in 2002 and 2003 respectively. The number of cases gradually decreased in 2005, total number of cases were slightly less than those reported in 2001, i.e., 7949 (2001) and 7864 (2005) (Table-4). In 2005 API was reported to be 2.18 per 1000 this still high compared to 2001, which was reported to be 1.09 per 1000 (Table-5). The total number of cases of plasmodium falciparum reported peaked in 2002–2003. It gradually fell in 2004, and in 2005 the number of cases reported was comparable to 2001. the total number of plasmodium falciparum accounted for 70% of total number of confirmed cases of malaria from 2002 to 2005 (Table-6). The malaria control programme purchased 350 impregnated bed nets in 2002 ,and antilarvicidal spray but data failed to show any integrated vector management in accordance with the who standards (Table-7).

Table-2: Quantity of items purchased for 2002–05

Quantity of item purchased	2002	2003	2004	2005	Comparison with RBM Standards
Anti-malarial drugs (Tablets) Chloroquin Fansidar	 100,000 75000	 100,000 75000	 100,000 75000	 100,000 75000	No evidence of monotherapy being replaced by antimalarial combination therapy (ACT)
Peskil/Temphos insecticides (L)	400	1100	1100	???	Antilarvicidal purchased in 2002, 2003 and 2004. no data available on distribution or utilization.
Glass Slides	225000	225000	225000	225000	
Spray Pumps (Spare parts)	500	500	500	500	
ULV Generators	5	6	-	-	-
Impregnated Bed Nets	350	-	-	-	350 ITN's were purchased in 2002. No data available on distribution according to RBM standard.
Blood Lancets	400000	-	-	-	
Deltamethrine insecticides (Kg)	1437	1000	1000	1000	

Source: provincial malaria control programme

Table-2a: Financial Allocation and expenditure 2002–05

Year (Financial year)	2002 (30-08-01– 1-6-02)	2003 (30-08-02–1-6-03)	2004 (30-08-03–1-6-04)	2005 (30-8-04–1-6-05)
Financial (Allocation)	Rs. 5.043 Million	Rs. 5.3 Million	Rs. 3.3 Million	Rs. 3.066 Million

Source: Provincial malaria control programme

Table-3: Trainings in districts of NWFP 2002-05

Years	Districts						Medical officer	Microscopists
2002	Malakand	Swabi	Lakki	D.I.Khan			250	16
2003	Bannu	Buner	Kohat	Karak			200	16
2004	Dir upper	Dir lower	Nowshra	Haripur	Abbottabad	Mansehra	300	25
2005	Peshawar	Mardan					175	10

Source: Provincial malaria control programme

Table-4: Total number of slides and slides confirmed by peripheral blood examination (slide positivity rate)

Year	Total of slides	No. of confirmed cases*	ACD slides**	Positive	PCD Slides***	Positive
2001	474081	7949	275502	5803	198579	2146
2002	619014	11821	359452	8543	259562	3278
2003	667522	10274	375250	7340	292272	2934
2004	699650	9204	386200	6703	313450	2501
2005	761130	7864	404520	5542	356610	2322

Source: provincial malaria control programme. *cases confirmed by microscopy, **active case detection, ***Passive case detection.

Table-5: Annual Parasite case detection.

Year	Annual Parasite Incidence (API) per 1000
2001	1.09
2002	3.01
2003	3.57
2004	2.96
2005	2.18

Source: provincial malaria control programme

Table No.6 Parasite examined by slide positivity rate and expressed as a proportion of slide positivity (Years)

Parasite	2001	2002	2003	2004	2005
P. Falciparum (Data totalled from all districts)	5075	7943	7587	6340	5654
P. Falciparum (% of total confirmed cases)	64%	67%	74%	69%	72%
P. Vivax	2874	3878	2687	2864	2210
P. Vivax (% of total confirmed cases)	86%	33%	26%	31%	28%

Source: provincial malaria control programme

Table-7: Integrated Vector Management

Malaria control programme	Comparison with RBM standards (IVM* = ITN** + RIS*** + antilarvicidal measure)
350 ITN were purchase in 2002. No data available on distribution according to RBM standards.	ITN
No information on RIS activity	RIS
Data provided only shows purchase of antilarvicidal	Antilarvicidal

*Source: Provincial malaria control programme, *Integrated vector management, **Impregnated bed nets, ***Residual insecticide spray*

DISCUSSION

The resource allocation of malaria control programme and items purchased did not reflect the components of the RBM strategy (Table-2 & 2a). Training component of RBM began in 2002 in accordance with the 'capacity building' component of the RBM strategy. Training initially began in 4 'high risk' districts (parameters were API, cases of malaria confirmed by blood slides and cases of Plasmodium Falciparum confirmed) and continued in a phased manner in other district of the province (Table-3). These trainings were not funded from the provincial malaria control programme.

The national malaria control programme reported sporadic outbreaks in certain districts in 2003.[2] This may explain the high rates of confirmed cases in 2002 and 2003 in NWFP. By 2005 training had been imparted in 16 districts of NWFP. Better diagnostic techniques could have reduced false reporting, and subsequently account for the decrease in number of confirmed cases after 2003, and the outbreaks could have been controlled. However no information from the budget suggests that any extra activities were undertaken during this period, unless resources were allocated from elsewhere, which were not accounted in the budget (Table-2, 2a, and,3).

Annual parasite incidence (API) depends on number of confirmed cases during 1 year expressed as a proportion of the total population under surveillance per 1000.[3] Malaria control programme reports high API in 2002, 2003 as would be expected because of the high number of confirmed cases(Table-4). If we examined the number of confirmed cases in 2001 and 2005, we observed that they were similar, so we would expect to have similar or a lower API in 2005. If the numerator remains the same or similar and the total population under surveillance (denominator) increases considering the annual growth rate of NWFP per year.[4] (census of Pakistan 1998). The API rates in NWFP for 2002–2005 are well above the rate reported by the national malaria control at 0.8 per 1000 (for 2003) with regional variation.[4] The actual prevalence is envisaged to be much higher considering more than 50% of out patients contact the private sector and are not recorded.

Data from the Malaria Control Programme showed that the incidence of Plasmodium Falciparum was greater then Plasmodium Vivax during this period (2001–2005). Bouma MJ *et al* (1996)[5] concluded that climatological changes in NWFP appear to have made conditions for transmission of Plasmodium falciparum more favourable and may account for the increase in NWFP.[6] In another study conducted in rural population of 5 districts in Punjab, Pakistan also reported the incidence of P. falciparum to be double that of Plasmodium vivax.[7] Rafi S, examined peripheral blood of febrile children who visited civil hospital Karachi, Pakistan over 12 year period, (1981–1992).[8] He concluded that Plasmodium falciparum was the predominant species after 1986. It could be argued that Plasmodium Falciparum may be easier to diagnosis on peripheral blood slide examination than Plasmodium vivax. 'Benneneson' however suggests that repeated microscopic examination of blood films in 12–24 hours may be necessary because density of Plasmodium Falciparum in peripheral blood varies.[4] Plasmodium vivax has less severe symptoms than Plasmodium falciparum, patients with Plasmodium vivax malaria may seek treatment elsewhere thus data regarding these cases may have been lost to the private sector or other health care providers.[2]

Although summated (totalled) data allows us to observe activity in the malaria control programme. It does not explain the rise in confirmed cases, API and plasmodium Falciparum in 2002 and 2003 and the decline in 2004 to 2005, the three key parameters that provide vital information on malaria transmission are slide positivity rate, plasmodium Falciparum rate and API. Summated data presented by the malaria control programme failed to be expressed as a rate. If we assume that the rise in cases was because of outbreak in the district, assuming that the total population at risk was known at the time of data collection, there does not

appear to be any activities in the budget to reflect this. If we assumed that the gradual increase in confirmed cases was due to better diagnostic techniques and better case management as a result of the training imparted in 2002–2005, there is no mechanism by which we can ensure that the medical officers and microscopists followed the WHO guidelines for case management, treatment and diagnostic techniques. The provincial malaria control programme did not draw any inferences or conclusion from summated data in the district or at provincial level. If any conclusions were drawn then it does not appear that the malaria control programme had the capacity or resources to act accordingly and rectify or address its weaknesses.

CONCLUSION

It may be concluded that although Pakistan and NWFP had committed to follow the Roll Back Malaria Standards, they were unable to implement these changes due to lack of parallel commitment or lack of investment in capacity development and infrastructure. The following suggestions could be made for improvement of the existing programme according to WHO standards:

- The budget should be allocated in accordance to the RBM strategy. The programme manager should be given technical assistance in preparing the budget.
- Clinical audit of medical officers and quality assurance of diagnostic techniques should be undertaken.
- All management personnel should be well versed in the three vital parameters of malaria transmission, i.e., API, confirmed cases of malaria, and confirmed cases of P. Falciparum. From this data slide positivity rate and Falciparium positivity should be calculated. Quality checks should be placed to ensure validity of data, minimize human error and the importance of numerator and denominator should be emphasized. Rates should be clearly expressed per 1000 or 100, etc.
- There should be regular feedback of collected data with inferences or conclusions from the provinces to the district and first level care facilities. A system of accreditation or rating could be started to encourage districts to improve their performance and enable other district to identify problems. Technical assistance should be provided by the provincial malaria control programme.
- Audit in the health department is usually carried out for budgets, inputs or processes. There is a fear that departmental audit which includes outcome would suggest failure of the programme manager. Support and technical assistance should be available to the programme manager so that they can identify and prioritize their shortcomings and can explore and implement different solutions followed by monitoring and evaluation. This should lead to continuous improvement in the programme.
- Methods should be explored by which it would be possible to capture data regarding malaria and its transmission in the private sector.

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